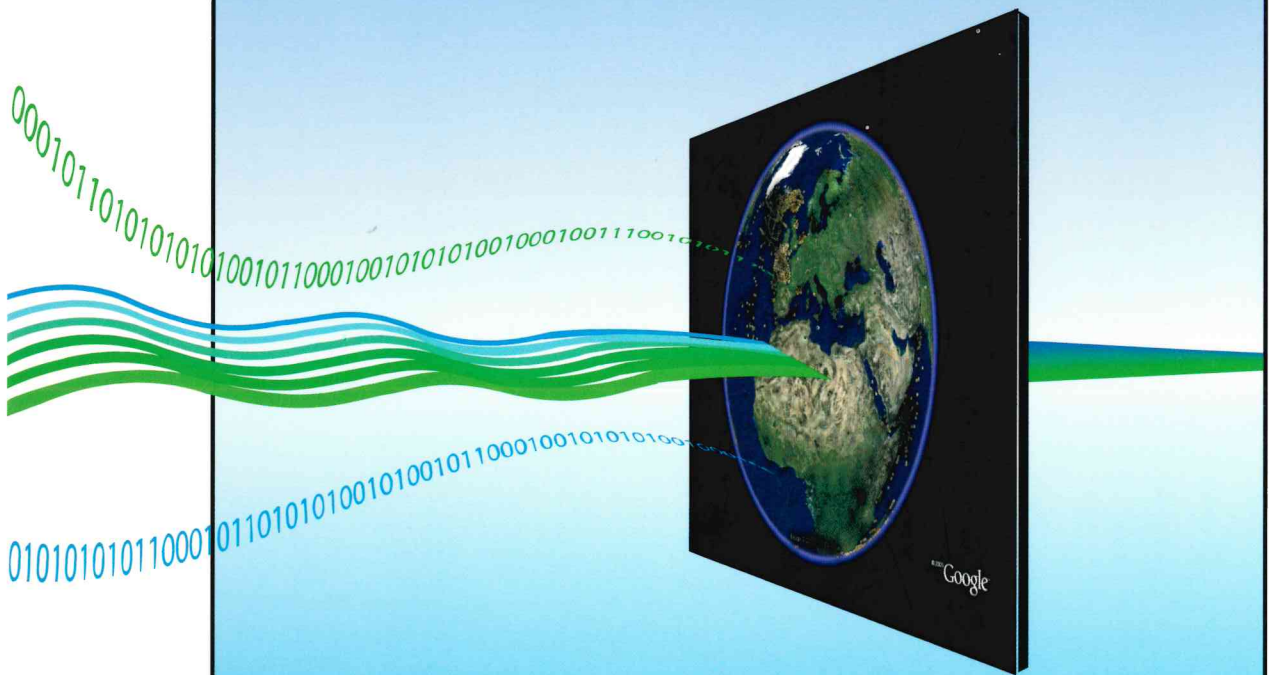


ANNUAL *Report* 2005



ROYAL NETHERLANDS INSTITUTE FOR SEA RESEARCH (NIOZ)

ROYAL NETHERLANDS INSTITUTE FOR SEA RESEARCH ANNUAL REPORT 2005

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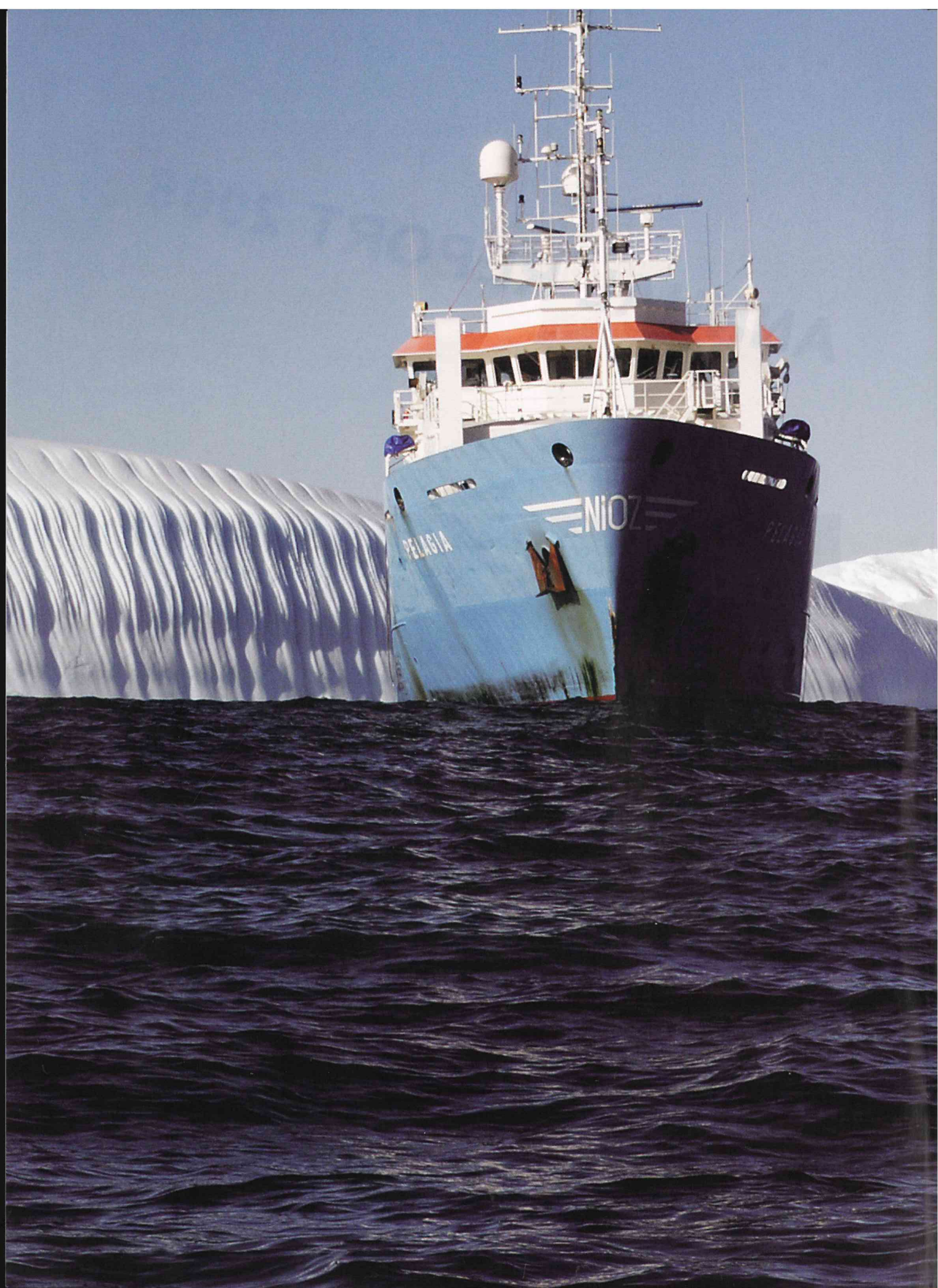
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ROYAL NETHERLANDS INSTITUTE FOR SEA RESEARCH



CONTENTS

INTRODUCTION	5
OBITUARY PROF. DR. HENK POSTMA	8
SCIENTIFIC DEPARTMENTS	11
DEPARTMENT OF PHYSICAL OCEANOGRAPHY	13
Limits to the predictability of the tide	15
Is deep-ocean mixing due to the decay of semidiurnal tides?	17
The Mixing of Agulhas Rings Experiment (MARE)	20
External Projects of the Department of Physical Oceanography.	23
DEPARTMENT OF MARINE CHEMISTRY AND GEOLOGY.	25
Production and sedimentation of planktic foraminifers and diatoms in the Southeast Atlantic Ocean.	27
Submarine canyons: pathways of particulate matter transport to the deep sea.	31
External Projects of the Department of Marine Chemistry and Geology.	34
DEPARTMENT OF MARINE BIOGEOCHEMISTRY AND TOXICOLOGY.	35
Biogeochemical processes occurring at fluid/methane venting sites at the seafloor.	37
Ecology of Archaea in the Southern North Sea	40
Reconstructing past CO ₂ concentrations using molecular fossils	43
External Projects of the Department of Marine Biogeochemistry and Toxicology.	45
DEPARTMENT OF BIOLOGICAL OCEANOGRAPHY.	47
Summertime overproduction of carbon in the North Sea	48
The natural laboratory of the Kerguelen Plateau	50
Bacterial growth in the open ocean	52
External Projects of the Department of Biological Oceanography.	54
DEPARTMENT OF MARINE ECOLOGY AND EVOLUTION	57
The benthic shift in the Frisian Front ecosystem – possible mechanisms	59
Seasonal changes in preen wax composition of marine birds	61
External Projects of the Department of Marine Ecology.	64
SCIENTIFIC SUPPORT SERVICES	65
THE NETHERLANDS MARINE RESEARCH FACILITIES (MRF)	66
DATAMANAGEMENTGROUP.	69
VESSELS AND LOGISTICS	72
MARINE TECHNOLOGY	74
JOURNAL OF SEA RESEARCH	78
NORTH SEA DAYS ON TEXEL	79
PUBLICATIONS AND PRESENTATIONS.	85
Dissertations	86
Refereed Papers and Books.	86
Refereed chapters in books	94
Monographs books	96
Non-refereed Papers.	96
Internal reports	97
Cruise reports.	98
Other reports (non-refereed)	98
Public outreach	99
Posters	100
Oral presentations.	104
External professional functions	117
Meetings	124
Courses	124
Colloquia	126
GUESTS	129
Guest scientists	130
Visitors.	131
Undergraduate University Students	132
Groups visiting	134
SOCIAAL JAARVERSLAG	135
Bestuur en wetenschapcommissie	136
Organogram	137
Personeelslijst.	138
Arbeidsvoorwaarden.	145
Verslag van de Ondernemings Raad	150
Verslag van de Personeels Vereniging	151



INTRODUCTION

In 2005, Royal NIOZ experienced quite a few memorable moments, including a sad event which shocked the NIOZ-population. This event concerns the death of Henk Postma, one of the founding founders of modern NIOZ. He died on July 19 at the age of almost 84. NIOZ acknowledged the request of Henk's family to say formally goodbye during a ceremony attended by a great number of friends in the great lecture hall of the institute. An obituary on the intensive involvement of Henk Postma with this institute between 1947 and 1986 has been written by Gerhard Cadee for this annual report.

A sequence of happy moments for young scientists, as well as for the institute, were the defences of altogether ten PhD theses at the universities of Groningen, Utrecht, Amsterdam, Wageningen and at the Vrije Universiteit Amsterdam.

Two NIOZ-scientists received prestigious awards: Jaap Sinninghe Damsté was granted the Treibs Medal from the geochemical Society of America. This is considered the highest international award in organic geochemistry. Jaap also became a member of the Royal Netherlands Academy of Arts and Sciences (KNAW). His close collaborator Stefan Schouten was awarded with the Vici grant of the Netherlands Organisation of Scientific Research (NWO). This is the most prestigious one in the Veni, Vidi, Vici series of NWO and is meant to facilitate very promising young scientists to develop their own field of expertise., Stefan will use the Vici-grant to develop new methods using chemical fossils (proxies) for the determination of sea surface and air temperatures for past periods in which the earth also had a climate as warm as we expect the planet to become in the future due to fossil fuel burning. Knowledge of the important regulatory processes in the past is a key-factor for the improvement of our current climate models.

Again, the crew of the Research Vessel Pelagia was to be congratulated with the prolongation of the award on weather observation programme VOSCLim (Voluntary Observing Ship Climate Project).

The year 2005 was also remarkable because NIOZ faced a formal evaluation by an international Peer Review panel. This panel visited the institute for two days by the end of May and subsequently submitted a written report to the General Board of the Netherlands Organisation of Scientific Research (NWO). The findings of the peers were very positive with respect to the scientific quality of the individual departments, ranging from very good to excellent. The institute as a whole was rated as "very good". It is needless to say that, prior to the visit of the peers, NIOZ went through a hectic time in order to prepare the self evaluation (documents) properly and in due time.

The report was accompanied by a set of recommendations concerning the anticipated progress of science at NIOZ, including also critical remarks with respect to certain aspects of the management and internal communication. These remarks contributed to an atmosphere which lead to the resignation of all but one members of the Board of Royal NIOZ. As from December 15, 2005, we have a new Board with prof. dr. ir. P. (Pier) Vellinga as chairman and prof. dr. E.A. (Eduard)



The new Board members.

Koster and prof. dr. J. (Jack) Middelburg as members. Prof. Middelburg was already a member of our previous board. In order to help NIOZ to solve its management problems, NWO decided to support the institute through the appointment of its director organization and planning dr. ir. B. (Bert) Geerken, as managing director of NIOZ on a part-time basis until the summer of 2006. Of major importance concerning the institute's financial affairs was the appointment of Tjerk Vos as controller in the spring.

The above developments had hardly any influence on the spirit of the NIOZ-employees, which allows concluding that business was almost as usual. Altogether, 162 papers were published in reviewed international scientific journals and chapters in books. Two papers with contributions from NIOZ scientists appeared in the highly prestigious Scientific Journal 'Nature'. One paper with Stefan Schouten as co-author describes the influence of the East Atlantic Ocean on the climate on part of the African continent; the other one with Jaap Sinninghe Damsté, Irene Rijpstra and again Stefan Schouten as co-authors describes the uptake of methane in cells of methanotrophic bacteria. In addition, six reports were issued in the NIOZ report series. One report concerned the development of the populations of different bird species on the Dutch Wadden Sea on request of the Dutch Society for the Protection of Birds. Other reports included various subjects of biotic and abiotic aspects of ecosystems of North and Wadden Sea, and the influence of human activities. These reports were commissioned by the Directorate Nature of the Ministry of LNV and the National Institute for Coastal and Marine Management (RIKZ) and the North Sea Directorate of the Ministry of V&W. The report of the effects of beam-trawl fishery on the benthic fauna of the North Sea was jointly issued with Alterra-Texel (WUR). The report on the benthos and shorebirds in Western Australia (WA) was written in cooperation with the WA Department of Conservation and Land Management, Environs Kimberley, Broome, and the Central Washington University, U.S.A. Most of the more recent NIOZ reports and our annual reports from 2002 onwards can now be downloaded from the library section on our web-site www.nioz.nl.

Our Marine Technology department made a great step forward in the development of the deep-sea sampler, where the microbial activity can be measured on board while maintaining the pressure of several hundreds bar and the low temperature occurring at the sea-floor. This piece of equipment was extensively tested during the ARCHIMEDES cruise in the subtropical North Atlantic Ocean in the autumn. NIOZ and Kongsberg Maritime AS signed a contract for delivery and installation of a Kongsberg multi-beam echo sounder for the RV Pelagia in 2006. New technology will make the new equipment capable of producing a swath of 4000m at 5 km water depth, increasing the possibilities of the Pelagia as a research vessel for both the research community and third industrial parties. The acquisition of the entire system was made possible through an investment subsidy from the NWO Large programme.

A start was made with the renovation of our former guest-house 'De Potvis' (the sperm whale). After having sold the buildings and premises to the 'Stichting Wonen Texel' (SWT) already earlier, the first part of the old buildings was torn down in 2005. The new facility will be ready in 2007. In the mean time, SWT will make housing capacity on the island available for our students, temporary personnel and guest-scientists. The workshop of the MT-electronics department was also completely renovated and newly furnished. In the NIOZ harbour, a new floating jetty was constructed to provide shelter for our smaller research ships against incoming high waves from strong south-easterly winds.

In 2005, NIOZ organised two symposia. 'Challenges in Marine Sciences' focused on the development of the more fundamentally oriented marine science field in the Netherlands. 140 participants took part in this symposium. In October, NIOZ and Alterra-Texel jointly organized the North Sea days. This two-day symposium is organized annually to promote the exchange of knowledge and opinions between 160

scientists, policy-makers and stake-holders using the North Sea for their own professional purposes. A summary of the highlights is given in the central part of this annual report. Both symposia were financially supported by NWO. The fourth International Algal Virus Workshop (AVW4) was organised by Corina Brussaard in collaboration with Dr. H. Gons of the Netherlands Institute for Ecological Research (NIOO-KNAW). The meeting was held from 17-21 April at the 'Trippenhuys' in Amsterdam, being the home of the KNAW. Forty participants took part in a successful workshop in this very dynamic research field which is highly relevant in aquatic ecology, since it is one of the key-factors in the regulation of algal blooms.

NIOZ-collaborators continued their activities in a number of international scientific organisations, including those pertaining to shipping. Jan W. de Leeuw, who still acts as a consultant of Royal NIOZ, initiated his term as chairman of POGO (Partnership for Observation of the Global Oceans), while Royal NIOZ' communications and PR-officer Jan Boon became chairman of the news and information group.

The Core Project Office of the IGBP project LOICZ (Land Ocean Interactions in the Coastal Zone) had to move from NIOZ to the GKSS institute in Geesthacht near Hamburg, Germany. LOICZ has been hosted by NIOZ since 1 November 1993 and has been very successful in assembling the knowledge of scientific and social processes of great relevance in models for coastal environments.

After all, 2005 was a good year for the institute and the same holds hopefully for 2006, when the anticipated nomination of a 'permanent' general director will initiate a new era in Royal NIOZ' history.

Johan E. Meulenkamp, scientific director
Bert Geerken, managing director

OBITUARY PROF. DR. HENK POSTMA 1921 –2005

G.C. Cadée

On the 19th of July 2005 our former director Henk Postma passed away. With him, we have not only have lost a well-known oceanographer, but also a wise, friendly and humoristic colleague. He has had a very long connection with NIOZ. Also after his retirement in 1986, he remained active in various national and international committees and a regular visitor to the Institute, interested in its progress, but also always full of anecdotes on life at the institute in the past.

Henk Postma was born in Zwolle in the province of Overijssel, where his father worked as a typesetter. Here he received his primary and secondary school education. In 1938 he started studying chemistry at Groningen University. Here he obtained his M.Sc degree in 1946, having lost some time during the war. Like many young field biologists, but unlike most chemistry students, Postma became a member of the Dutch Youth Society for Naturalists (NJN). Members had to leave this society at the age of 23, it was (and still is) completely organised by people under that age limit. For many of its members, the NJN proved to be an important meeting place where many life-time friendships were founded and a keen interest in general field biology was fostered. This has certainly helped Postma to understand the work of his biological colleagues at NIOZ at a later stage. It also helped him to fit his chemical and hydrographical studies in one of the goals of his predecessor as NIOZ director, dr. Jan Verwey: the understanding of the ecology of the Wadden Sea.

8

After a brief stay at the Philips laboratory in Eindhoven, Verwey selected Postma to work for a PhD study on the chemistry and hydrography of the Wadden Sea. Postma started work at the Zoological Station in Den Helder in 1947. The Zoological Station changed its name to 'Netherlands Institute for Sea Research' (NIOZ) in 1961. Postma's thesis *Hydrography of the Dutch Wadden Sea* (1954) is still a benchmark paper on the Wadden Sea. Published in the *Archives Néerlandaises de Zoologie* (10: 405-511), it first remained somewhat obscure. However, his Wadden Sea work became better known after he contributed a chapter to Lauff's well-known book *Estuaries* (1967), which was based on Postma's hydrographic studies in the Wadden Sea and in several other estuaries since. This 1967 paper became probably his most cited one (see NIOZ Annual Report 2001: 79-81). His thesis is still important, as it gives data for nutrients in the Wadden Sea before real eutrophication (*i.e.* the enrichment of nitrogen and phosphate by man's activities) started in the nineteen seventies. It also indicated why the Wadden Sea was already a rich area for bivalves (cockles, mussels), fish and birds before the years of heavy eutrophication. Postma's work showed that the Wadden Sea acts as a trap for suspended particles including phytoplankton and detritus, entering from the North Sea through the tidal inlets. He observed that, particularly during summer, much of this imported organic matter was mineralised in the Wadden Sea and that the liberated nutrients were either directly taken up by (micro)algae in the Wadden Sea or exported to the coastal North Sea. No wonder Postma and his long-time assistant Joop Rommets also carried out the first measurements on primary production activity in the Wadden Sea already in the early 1960s.



Postma continued studies in the Wadden Sea, e.g. on suspended matter, in which simple apparatus were his favourites, such as the Secchi-disc and his own water sampler. This Postma water sampler was much better adapted to collect suspended matter than those available before that time. He also went abroad studying sediments and sedimentary processes in the Gulf of Paria in front of the Orinoco river together with Tj. H. van Andel in 1952-'53. In 1954 he did research with K. Kalle in the Elbe estuary on the turbidity maximum also caused by the trapping mechanism for particles he had observed earlier in the Wadden Sea. With P. Korringa from the Netherlands Institute for Fisheries Research (RIVO) in IJmuiden, he studied the fertility of the water of the Gulf of Naples in 1954. With scientists from Delft Hydraulics Laboratory he investigated coastal erosion in British Guyana in 1960. In 1962 he spent a full year at Scripps Institution of Oceanography in La Jolla, California, an excellent place to enlarge his oceanographic knowledge and meet interesting colleagues. His studies on the uptake of CO₂ by the ocean were stimulated here by contacts with C.D. Keeling and resulted in a paper in 1964 in which the fundamentals for the exchange of oxygen and carbon dioxide between ocean and atmosphere were established (See NIOZ Annual Report 2004: 91-95). This was published in the Netherlands Journal of Sea Research (2: 258-283), of which Postma was one of the founders in 1961. He was its editor-in-chief from 1961-1969 and from 1970-1984 one of its editors. In this way he helped to develop the multidisciplinary character of marine sciences in The Netherlands. In 1986, this Journal dedicated a special volume to Postma with 22 invited papers on physical, chemical, geological and biological aspects of the marine environment; all fields in which Postma had shown his interest and published himself.

Postma became NIOZ director after the retirement of Jan Verwey in 1965. The rules of the the Dutch Zoological Society (NDV) as the founding organisation of our Institute required that he should share this position with a biologist,. From 1971, dr. Jenne Zijlstra became Postma's biological counterpart. Postma and Zijlstra proved to be an excellent team, where Zijlstra added his management capacities, which had not really Postma's interest.

Under their combined leadership of some 15 years, NIOZ flourished: its staff increased from 60 to 160 employees. Between 1969 and 1977, a new institute was built on Texel on the other side of the 'Marsdiep'. NIOZ expanded its scientific work from the coastal regions to all over the world's oceans, culminating in the Snellius-II expedition in Indonesian waters in 1984-'85, in which both directors were active as organisers as well as cruise-leaders. Under the directorship of Postma and Zijlstra, NIOZ became a true globally active oceanographic institution.

Postma was mainly interested in fundamental research, and he believed that the scientists themselves were the best to judge what was scientifically most important. This was reflected in the freedom NIOZ scientists had at that time to select their own research topics. This does not imply that NIOZ in general and Postma himself did not participate in applied research (e.g. on the already mentioned coastal erosion with Delft Hydraulics). Under Postma's directorship, the



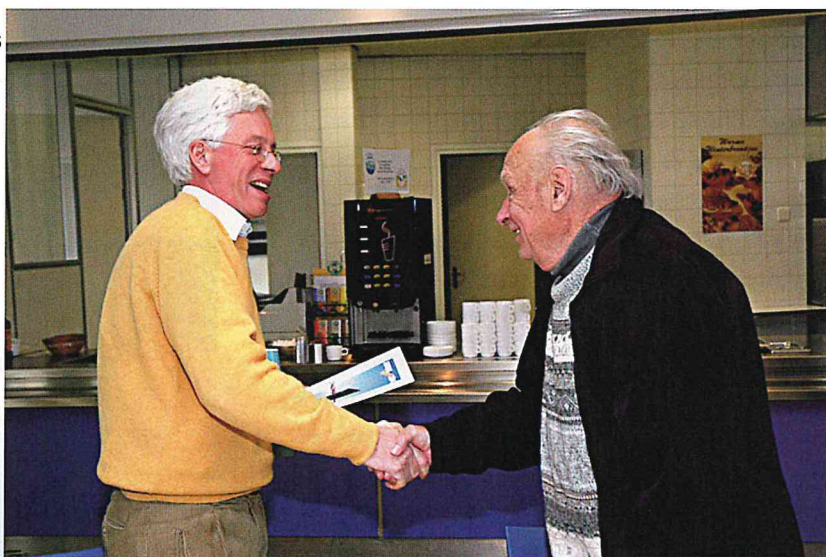
department 'Marine Pollution', with Jan C. Duinker as the head of department, started studying the fate and effects of the highly toxic PCB's and trace metals, dumping of radioactive waste in the deep sea (DORA-project) and the effects of the organic-rich potato-industry waste effluent on the ecosystem of Ems-Dollard estuary. For this project, the BOEDE group of scientists was appointed and their studies resulted in a mathematical ecosystem model that was also applied on the Western Wadden Sea and the North Sea. This group was lead by dr Piet de Wolf.

In 1963 Postma was appointed as professor in physical and chemical oceanology in the geology department of the University of Groningen. Between 1963 and 1991, 16 students wrote their PhD thesis under his guidance. In 1975 he became member of the Royal Netherlands Academy of Arts and Sciences (KNAW). Based on his wide expertise in many fields of oceanography, he has served in many National and International Councils. He was *i.a.* 10 year chairman of the Netherlands Committee for Sea Research and he advised the Dutch government on matters of marine pollution, Wadden Sea management and possible effects of increased CO₂ production and many other subjects.

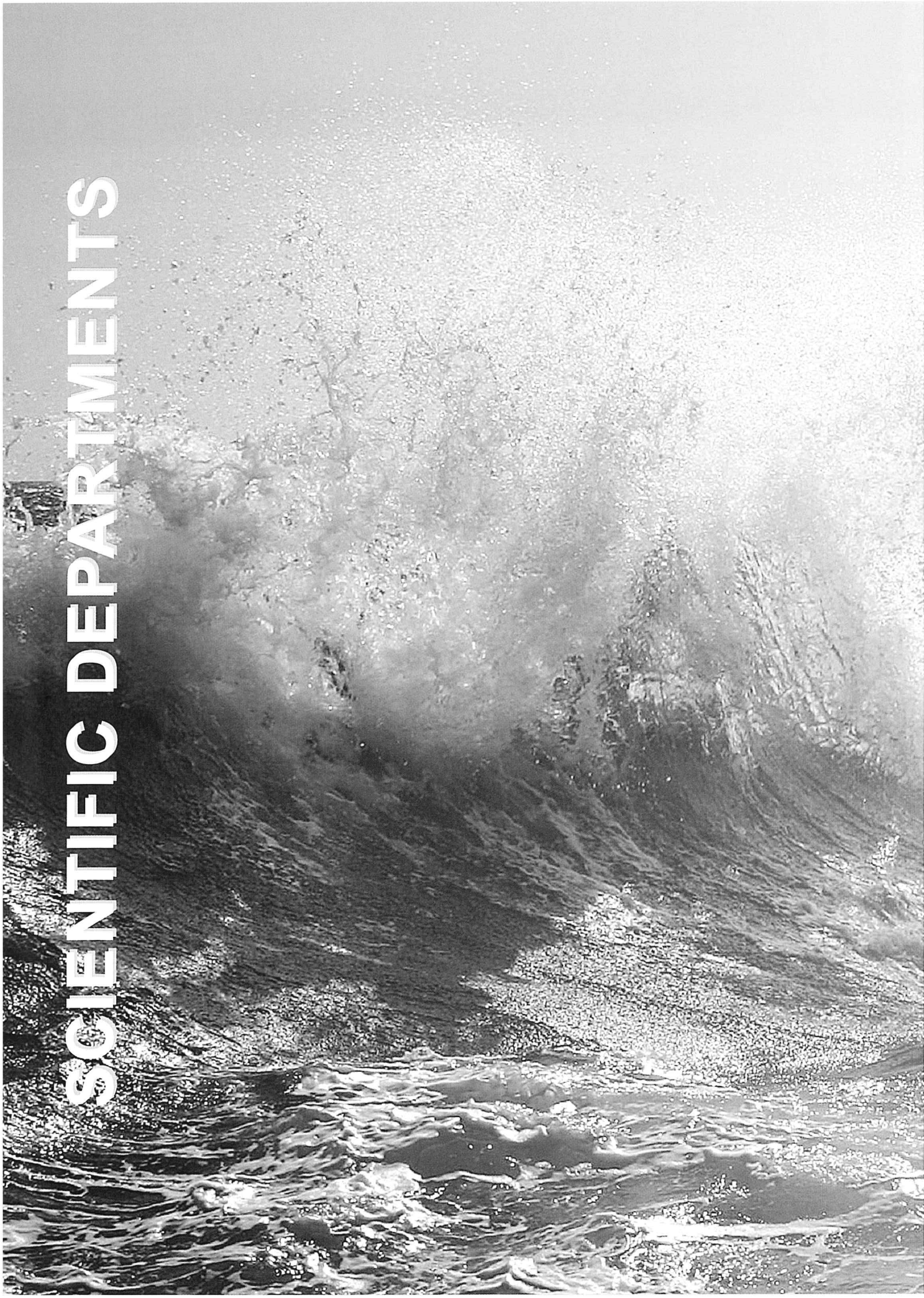
Internationally, Postma has been active in SCOR (Scientific Committee on Oceanographic Research), many years he served in its Executive Council and was SCOR's president from 1973-1975. He was member of the national UNESCO -committee for oceanographic affairs and had many contacts in UNESCO and the International Oceanographic Committee (IOC). After his retirement he played a leading role in designing the worldwide IGBP-LOICZ project (Land-Ocean Interaction in the Coastal Zone), in the planning committee (1991-'92) and as member of its scientific steering committee (1993-'95). Postma facilitated support of the Dutch Government and promoted establishment of the LOICZ headquarters at NIOZ on Texel. Sadly in the same year of Postma's death, LOICZ headquarters had to leave NIOZ after ten years and moved to the GKSS Research Centre in Geesthacht, Germany.

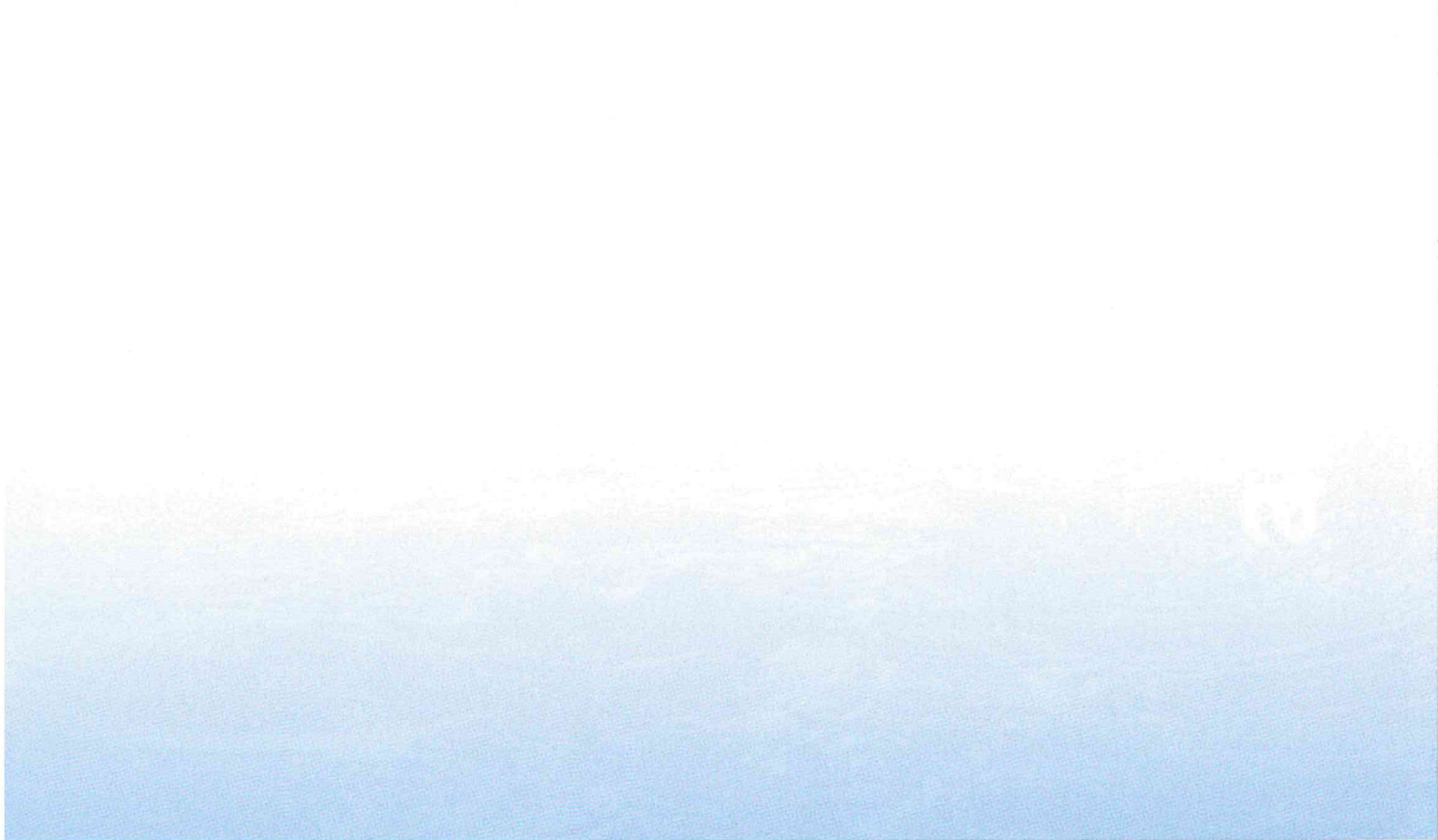
Till the end of his life Postma remained highly interested in oceanography in general and the role of his former institute in particular. He has been a very stimulating teacher for many of us, with a keen eye for the main lines in research, able to do the most interesting observations with simple apparatus and to base his conclusions on back-of-the-envelope calculations. On the other hand, he stimulated growth of research at NIOZ by offering possibilities to keep its facilities up-to-date. With Henk Postma, our country has lost one of its most important oceanographers.

On the central pages of our 2004 annual report, Prof. Hein de Baar summarized the valuable contributions of Henk Postma to the early scientific work in his 40 years old publication (1964) on the uptake by the sea of carbon dioxide from fossil fuel burning. For this reason, the first copy of last year's annual report was handed over to Henk Postma by Hein during a coffee celebration in the NIOZ canteen. Henk Postma used this opportunity to tell his successors some humorous anecdotes about his personal experiences in sea research, highlighting the contrasts with modern practise.



SCIENTIFIC DEPARTMENTS





PHYSICAL OCEANOGRAPHY

The scientific work of the department of Physical Oceanography (FYS) is organized under three main themes:

OCEAN CIRCULATION AND HYDROGRAPHY

This theme is occupied with open ocean research with a significant field component. It has a strong emphasis on climate related research and is mainly focused on large-scale ocean circulation and hydrography. Presently, research programmes are carried out in the framework of the international WCRP-programme CLIVAR.

In 2005 seagoing activities were mainly carried out as part of the NWO funded Long-term Ocean Climate Observations (LOCO) program. Sub-surface moorings were serviced and redeployed at a number of locations:

- in Lifamatola Strait (Indonesia) as part of the international INSTANT program that intends to measure the Indonesian Throughflow for a period of three years
- in the Irminger Sea (North Atlantic ocean) where two profiling moorings daily measure a temperature and salinity profile over the entire watercolumn
- in the Mozambique Channel (Indian Ocean) where seven current meter moorings measure the transport through this channel for a period of five years

A PhD study by Femke de Jong on the long term variability in ocean currents and properties in the North Atlantic Ocean using (new) profiling data and other historical data, was initiated.

As part of our collaboration with biological oceanographers, processes in the deep and dark waters of the North Atlantic ocean (TRANSAT) are studied. Our department participated to identify the different water masses present, because the biologist wanted to study whether ecosystems differ over the vertical water column between water masses of a different origin. This cruise was a logical follow-up of previous cruises where other branches of the North Atlantic Deep Water (NADW) were studied.

Astrid van Veldhoven completed her PhD thesis on the observations of Agulhas rings, large meso-scale eddies that transport Indian Ocean water into the South Atlantic at the southern tip of South Africa.

PROCESSES NEAR CONTINENTAL SLOPES, INTERNAL WAVES AND MIXING

In this theme, theoretical, numerical, laboratory and observational studies of the interaction between internal waves in a stratified ocean and topographic features are performed. The limitations of

the traditional approximation which neglects the horizontal component of the Earth rotation vector, were addressed in the Mediterranean Sea, where large internal waves were observed in completely mixed deep waters. This could only be explained with a new approach which includes this component. Other unusual properties of internal waves, culminating in the appearance of wave attractors, were reviewed.

As part of the LOCO program one array of moorings to observe the climatology of internal waves in the Canary basin was serviced and redeployed. Another internal wave mooring array that had been deployed in the Irminger Sea was successfully recovered.

Phil Hosegood completed a PhD study on nonlinear internal waves and mixing above the continental slope in the Faroe-Shetland Channel.

type of sensor, allowing us more flexibility.

In the mean-time, our studies on the spatial and temporal variability of the current field and on the transport of fine-grained sediments through the Marsdiep inlet were continued with measurements from the ferry 'Schulpengat'. It appeared that the classical model for the relation between acoustic backscatter and the concentration of suspended matter fails under strong tidal currents. We have been able to solve this inconsistency with the development of a novel model that takes into account the effect of turbulence on the backscatter of sound and improves the calibration drastically.

Guido Terra completed his PhD thesis on the likelihood of the appearance of multiple equilibria in the tidal response of coastal basins owing to several nonlinear mechanisms. The prediction was confirmed in the laboratory set-up of a tidal tank.

Most of our studies are part of these themes. Some other activities like the application of marine optics in oceanography, are mainly carried out in collaboration with other departments and/or institutes (and are often made possible by the availability of external funds).

Apart from these scientific activities the department supports national seagoing research programmes with hydrographic observations, satellite data and overall data-management. For these national tasks the Data Management Group acts as a separate group within our department.



LIMITS TO THE PREDICTABILITY OF THE TIDE

Guido M. Terra & Leo R.M. Maas*

Tidal elevation is often considered as one of the best predictable oceanographic quantities. It basically depends on the position of the sun and the moon, relative to the observer, and any variations are believed to be caused by the wind. However, owing to the particular shape of an inland sea, as for instance the North Sea basin, the tide can resonate and can be much stronger along our coast than in the Atlantic Ocean where it originates. Similar shape effects can again be found in the Wadden Sea. The areas behind the various tidal inlets can theoretically be considered as separate basins. We have discovered, that changes in the shape of such basins through, for instance, sea level rise or bottom decline, can unexpectedly and suddenly affect the tidal regime.

In many coastal areas, the tide plays an important role; the differences between high and low tide and ebb and flood currents evolve under the influence of the combined action of sun and moon. The word "tide" originates from its regular, predictable character: the dominating semi-diurnal lunar tide produces in general a high water every 12 hours and 25 minutes. At new and full moon, the sun and the moon will be on one line with respect to the earth and their gravitational pulls amplify each other (spring-tide). If they are in a perpendicular position, during the first and last quarter, they will weaken each other, which results in neap-tide. This is called the equilibrium tide.

However, there are two reasons for the tide on Earth to deviate from this equilibrium. Firstly, the oceans on the Earth are separated from each other by continents. Secondly, the sun and the moon are turning too fast with regard to a fixed point on the Earth, so that because of its slowness and

through friction, the water cannot keep up. Only in the Southern Ocean around Antarctica, are there no continents and is the ocean deep enough for the ocean tidal wave to keep up with the equilibrium tide. This motivates the usual picture of the tidal wave as one that originates from this area and then propagates into the other oceans and coastal seas, which as a result start to oscillate with it. An example of such a coupled system is the Atlantic Ocean-North Sea-Wadden Sea tidal system. During co-oscillation, the tide can be intensified, which actually is the case in the North Sea and the Wadden Sea. With a tidal difference of 54 cm for the moon and 27 cm for the sun, the equilibrium-tide on the ocean is relatively small. However, depending on local circumstances like the depth and the shape of the sea basin, certain vibrations within the equilibrium-tide can start to reverberate with the natural vibration of the sea basin. It is like pushing a child on a swing: pushing the swing regularly

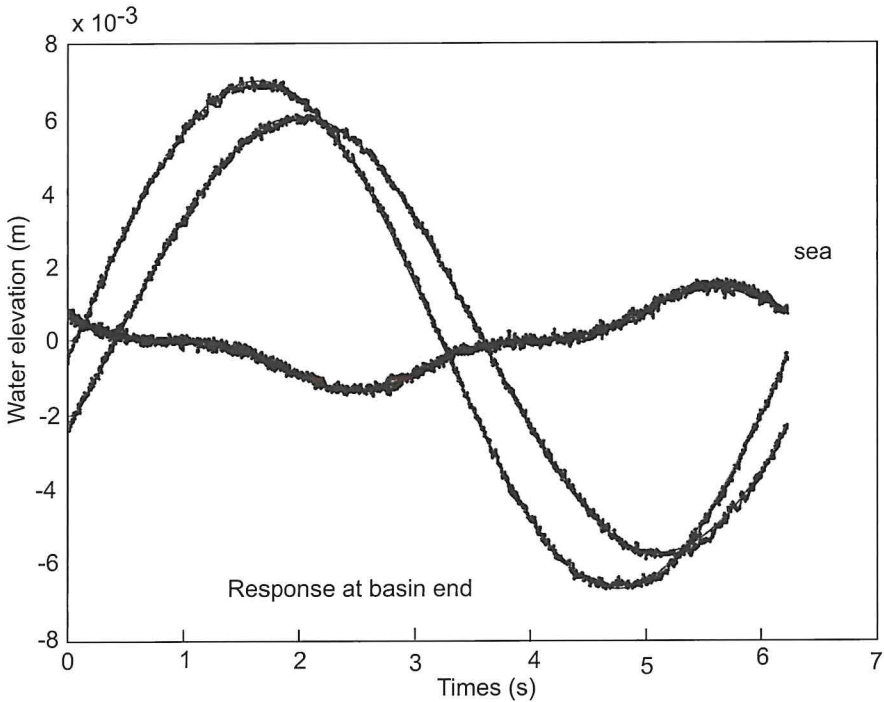
has much more effect than a push at the wrong moment. In a one-sided, open tidal basin resonance will occur if the length of the sea basin equals an odd multiple of quarter wave length of the tide, which is comparable to the way the air resonates in an organ pipe. As the width of the North Sea's southern entrance is relatively small compared to that on the north, it allows the North Sea to be described as such a half-open sea basin.

Another type of natural vibration can be found in small sea basins that are almost completely enclosed by land and which are connected to the "mother sea" through a narrow passage only. Examples are the various storage basins of the Wadden Sea, which are separated from each other by tidal flats, and which are connected to the North Sea through the various tidal inlets between the islands. These resonators are characterized by the following process: within a basin, the water rises and falls almost everywhere

at the same moment, as if the basin is breathing. The water will be squeezed through the narrow tidal inlets and back, as a result of the differences in water heights in the Wadden Sea basin and the neighbouring North Sea. However, this regular picture is disturbed because the rate at which the water level in a basin changes, becomes smaller when the water rises. This is caused by the rapid increase of the surface that is

available for the water at rising tide, due to the presence of extensive tidal flats. Because of this, several equilibria could in principle be possible; under the same circumstances, the basin could arrive into either a state with big tidal differences, or a state with much smaller differences. If the external circumstances are changing slowly, e.g. under the influence of a slow sea level rise or a possible bottom decline, such a system could adapt

itself very suddenly to the new situation, with a much higher or a much lower difference between high and low tide, including a change in the tidal streams through the tidal inlet. Even if the external circumstances will return to the old values, the system will stick to this new situation. Thus, theoretically there are limits to the predictability of the tide within a basin like the Wadden Sea, which were confirmed in laboratory experiments.



Experimental confirmation of existence of multiple equilibria in a tidal tank. The observed water elevation is given as a function of time over one single period of the forcing. The basic periodic component of the forcing at 'sea' is amplified in the basin. The two realizations shown here, obtained in experiments performed under identical conditions, demonstrate that the degree of amplification, and also its phase (timing of high water) can vary from one experiment to another.

IS DEEP-OCEAN MIXING DUE TO THE DECAY OF SEMIDIURNAL TIDES?

Theo Gerkema* & Hans van Haren.

Internal waves represent a ubiquitous and permanent “inner unrest” in the ocean; in particular, they play a pivotal role in deep-ocean mixing, a crucial chain in maintaining the large-scale meridian overturning circulation. The recent analytical and numerical modelling presented here has advanced the understanding of internal wave induced mixing, by studying the generation of internal waves at small scales of high shear. The model results are compared with observations from the Canary Basin, one of the LOCO-sites, both of which show a strong latitudinal variation in internal wave energy.

The internal-wave spectrum is usually dominated by two kinds of frequencies: the inertial frequency (i.e. at frequency f , the Coriolis parameter, which is proportional to the sine of latitude) and the tidal frequencies (semi-diurnal and, to a lesser extent, diurnal). Both are low frequencies, implying that Coriolis effects play a major role. In standard theory and models, the Coriolis force is taken into account in a simplified form, the so-called “traditional approximation”.

Theoretical work (in collaboration with V.I. Shrira of Keele University, U.K.) has now shown the importance of including the Coriolis force in its full form. When this is done, two new elements appear in the behaviour of near-inertial waves, both of which are of high relevance to vertical mixing processes in the ocean.

It appears that near-inertial waves ultimately become shorter as they propagate pole ward (in contrast to the traditional theory, where they become longer). The tendency to short scales makes them particularly susceptible to

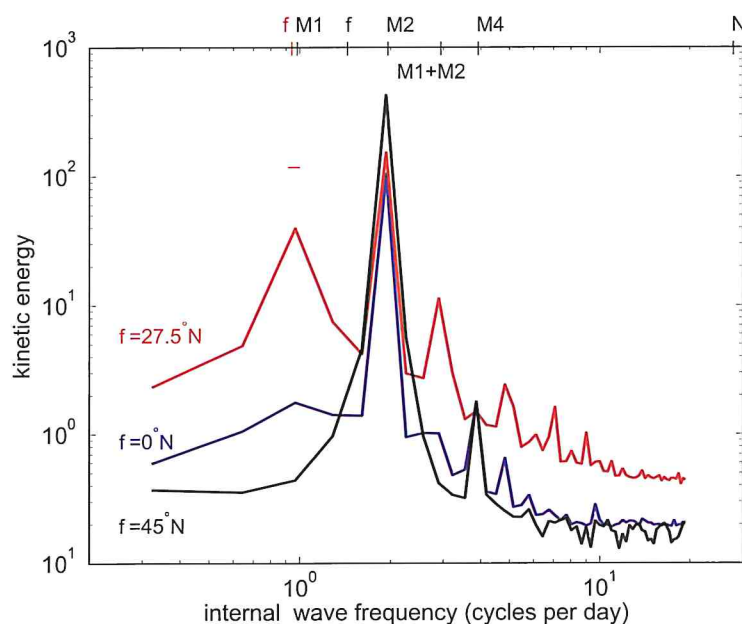


Fig. 1. Kinetic energy spectra from numerical internal wave model above a continental slope for different latitudes 0°N (blue; f is infinitely small and not shown), 27.5°N (red) and 45°N (black).

wave-breaking and hence increased mixing at high latitudes. It furthermore appears that they tend to be ‘locked up’ in regions of weak stratification, such as the abyssal ocean; in other words, their energy is pushed into the seabottom, precisely where enhanced mixing is needed in view of the large-scale ocean circulation!

The division made above between near-inertial and tidal fre-

quencies is not always appropriate. For example, diurnal internal tides are nearly inertial at the latitude of 30°North and South. Theoretically, one can expect to find enhanced inertial energy at this latitude. Our ongoing measurement programs carried out as part of the NWO-large investment project Long-term Ocean Current Observations (LOCO) near Great Meteor Seamount are intended to provide

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field evidence for this theoretical increase.

Diurnal internal tides can be created directly by diurnal barotropic tides, but also by instability of semi-diurnal tides (subharmonic resonance). Numerical model calculations (in collaboration with C. Staquet, LEGI, Grenoble, and P. Bouruet-Aubertot, LOCEAN, Paris) have now provided evidence of such a transfer in a reasonably realistic setting. Here internal tides are forced at the semi-diurnal lunar frequency (M2), but near 30°N one finds an additional spectral peak at the diurnal frequency M1 (Fig. 1) and motions at smaller vertical scales (Fig. 2), due to subharmonic resonance. This provides an extra source of near-inertial energy. However, the above model found such an extra source only very close to the continental slope, being the source of internal tides.

Further spectral analysis of historic and new long-term data sets over a period of more than 7

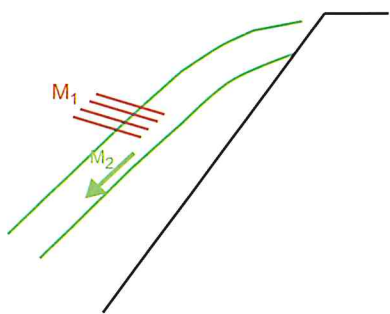


Fig. 2. Sketch of model results showing a change in slope and vertical scale from large-scale, steep sloping semi-diurnal tidal motions in a beam emanating from the continental shelf break, to small-scale diurnal tidal motions.

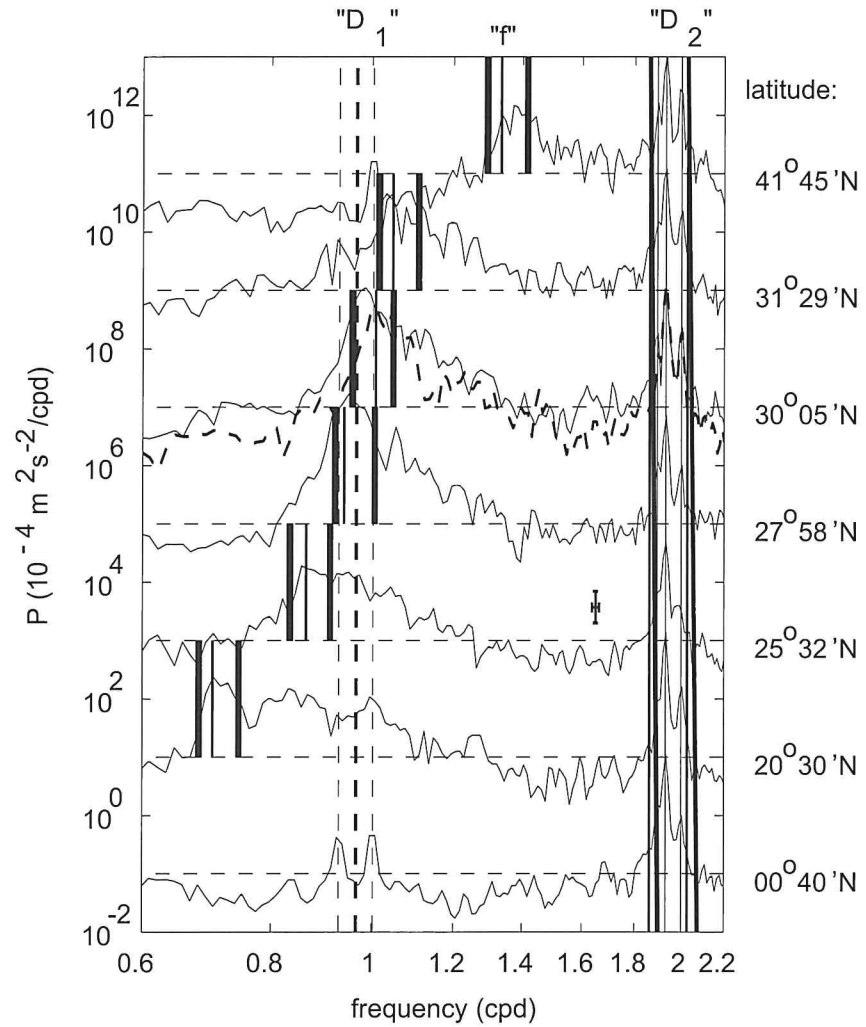


Fig. 3. Kinetic energy spectra from 8 current meter records between 1000-2000 m at different latitudes as a function of frequency (in cycles per day, cpd). Spectra are offset by two decades, except those from the two moorings near 30°N (30°11N is dashed). Vertical dashed lines indicate diurnal (D1) frequencies O1, M1 (heavy dashed) and K1 (l-r). Semi-diurnal frequencies (D2) include N2, M2, S2. Note that the f-band varies with latitude (equal to D1 at 28-30°).

months from the Canary Basin showed even stronger changes in diurnal/inertial and semidiurnal tidal energy (Figs. 3 and 4) than the model results predicted, and these observations were all from the open ocean, far away from topography such as the continental slope or seamounts. The spectra showed an energy loss by about 50% of M2 at 25- 28°N, but a nearly fivefold increase in inertial energy at 30°N. The enhancement

could be the result of subharmonic instability, although systematic enhancement of precise diurnal tidal frequencies, notably M1, was not observed, and the latitudes of low D2-energy and high f-energy did not coincide. This could be due to a mix of coupled and independent waves, whilst the pole-ward trapping of sub-f Coriolis energy suggested the occurrence of non-traditional effects.

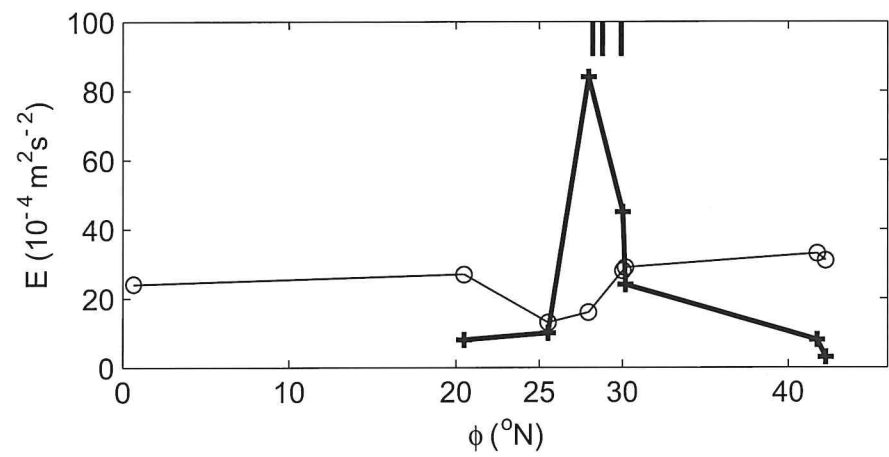


Fig. 4. Summed energies E observed between 1000-2000 m for the inertial (+) and semi-diurnal band (o) as a function of latitude ϕ . Short lines indicate critical diurnal latitudes N1, M1 and S1 (l-r).

THE MIXING OF AGULHAS RINGS EXPERIMENT (MARE)

Astrid van Veldhoven & Hendrik van Aken*

One of the major oceanic contributions to the global climate system is the oceanic thermohaline circulation (THC). In this global circulation system the inter-ocean exchange of mass, heat and fresh water plays an important role. Around South Africa the exchange of warm saline water between the Indian and Atlantic Ocean takes place as the so-called Agulhas leakage, whereby large oceanic rings (~300 km) shed from the retroflexion of the Agulhas Current near 38°S, 17°E (Figure 1). Computations with general circulation models have shown that the strength of the THC is very sensitive to the magnitude of the Agulhas leakage, determined by the annual number of Agulhas rings and the exchange of heat and salt between the rings and their surroundings. To study all aspects of the Agulhas leakage a national research programme was initiated by NIOZ in cooperation with Utrecht University (IMAU) and the Royal Netherlands Meteorological Institute (KNMI). The research programme was named Mixing of Agulhas Rings Experiment (MARE) in order to emphasize that the role of the Agulhas Rings in climate was the central issue.

The MARE programme consisted of 5 sub-projects: - observing the decay of a single Agulhas ring, - modelling of the evolution of these rings, - modelling the effects of the rings in the hydrography of the Atlantic Ocean, - studying the effects of variations of the Agulhas Leakage on the North Atlantic and - European Climate, and performing a paleoceanographic study of the Agulhas leakage and the occurrence of Agulhas rings in past climatic periods. The observational field programme of MARE took place in 2000 and 2001.

NIOZ was the lead institution for the observational and paleoceanographic sub-projects. RV Pelagia carried out a hydrographic survey of a single Agulhas Ring, named Astrid, in March 2000 and February 2001 during research cruises around Africa. In July/August 2000 the same ring was surveyed by the South African vessel SA Agulhas, with a scientific

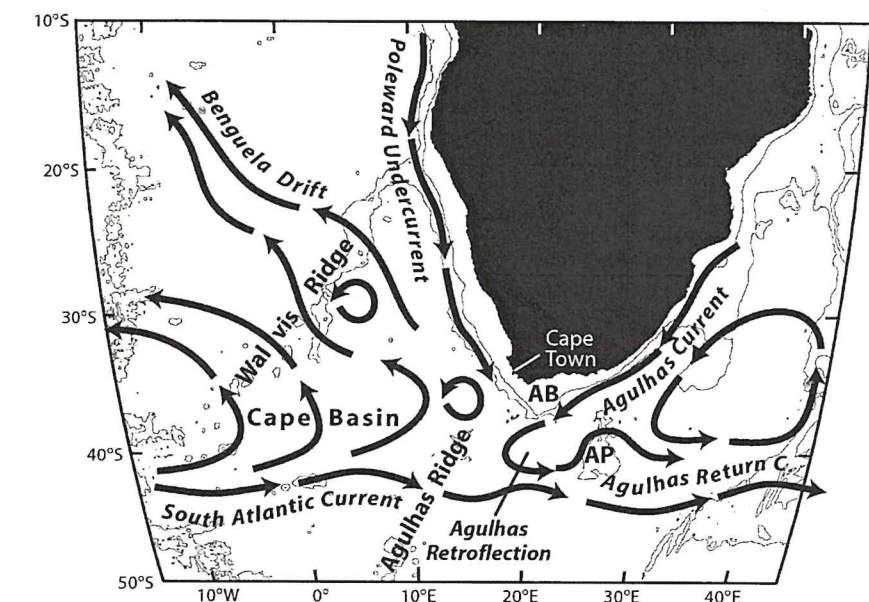


Fig. 1. Circulation scheme for the south-eastern South Atlantic and the south-western South Indian Ocean, where the Agulhas leakage takes place. In this process large rings, filled with warm and saline Indian Ocean water, drift from the Agulhas retroflexion into the Atlantic Ocean.

crew from NIOZ, IMAU, KNMI and the University of Cape Town. Observations were carried out with a CTD, measuring the salinity and temperature distribution. Water samples were taken for chemical analysis. The velocity field of the

ring could be measured by means of a lowered Acoustic Doppler Current Profiler (ADCP) as well as a hull-mounted ADCP on board RV Pelagia. During the first survey also a towed undulating CTD system was used to determine the

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temperature and salinity field in the upper 200 m in detail. During these three surveys also paleo-oceanographic observations were carried out.

Ring Astrid had been formed in December 1999 at the Agulhas Retroflection in the south-eastern Atlantic Ocean, and was quite young when it was surveyed in the austral autumn, March 2000. Then it was a nearly circular counter-clockwise rotating ring (Figure 2). The core of the ring consisted of warm and saline Indian Ocean Water, brought around South Africa by the Agulhas Current. The ring's diameter was about 275 km. The tangential velocity around the core of the ring reached maximum values of over 1.5 m/s. The high rotating velocity field of the ring was mainly confined to the upper 1000 m, although co-rotating velocities of about 10 cm/s were observed near the bottom at a depth of ~5000 m (Figure 3). During this survey the young ring already had started to decay. Especially below a depth of 200 m cold and relatively fresh water from the surrounding ocean had started to intrude into the ring, replacing the ring's warm Indian Ocean Water.

Already during the March survey the ring was losing huge amounts of heat to the overlying cold atmosphere. That heat loss increased in the following winter and during the survey in August 2000, the sea surface temperature in the centre had decreased with about 4.5°C, while the surface mixed layer had

reached a depth of over 150 m. Due to the seasonal cooling of the ring it was no longer visible in infrared satellite images, although its surface elevation could be followed by means of satellite altimetry. During this survey it was found that Ring Astrid had collided with another Agulhas ring, thereby

had decreased further, but the ring was still visible in satellite altimetry observations. During the second and third survey the ring had changed from nearly circular to strongly elliptic, similar to model predictions. In its first year of existence Astrid drifted slowly westward along an irregular path, inter-

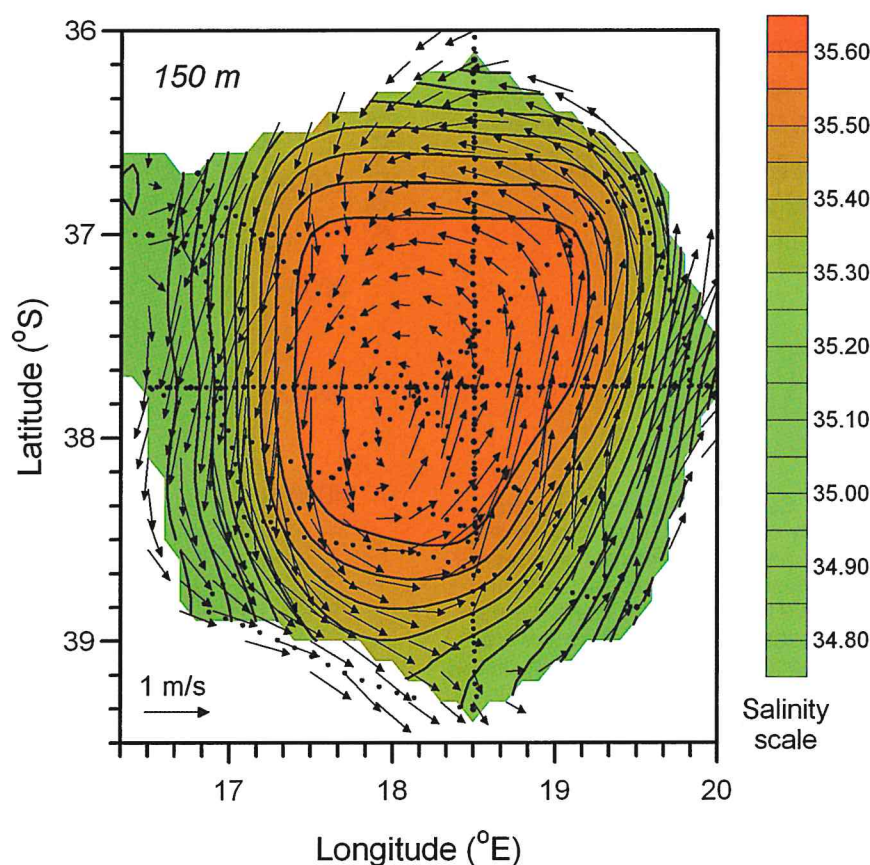


Fig. 2. The salinity distribution (coloured) and velocity field (arrows) at a depth of 150 m in Ring Astrid, observed in March 2000 during a survey with RV Pelagia.

exchanging a considerable amount of their contents.

In the following spring and summer the sea surface of the ring and its surroundings was heated again, while the salinity increased due to an evaporation excess. The sea surface height anomaly of the ring

spersed with short periods of fast motion. Analysis of the observed decay process of ring Astrid, and comparison with ring observations reported in literature, have led to the conclusion that heat loss to the atmosphere and intrusion of colder water from the surrounding ocean

are both important processes for the decay of Agulhas rings, diminishing its excess heat content and rotations rate. Their contributions to the heat loss of the ring are of about equal magnitude. When the ring drift speeds up, as occasionally occurs, Agulhas rings lose considerable parts of their deeper water.

In 2004 and 2005 the MARE programme has resulted in 3 academic promotions. It was funded by NWO-ALW as a Dutch contribution to the international CLIVAR programme.

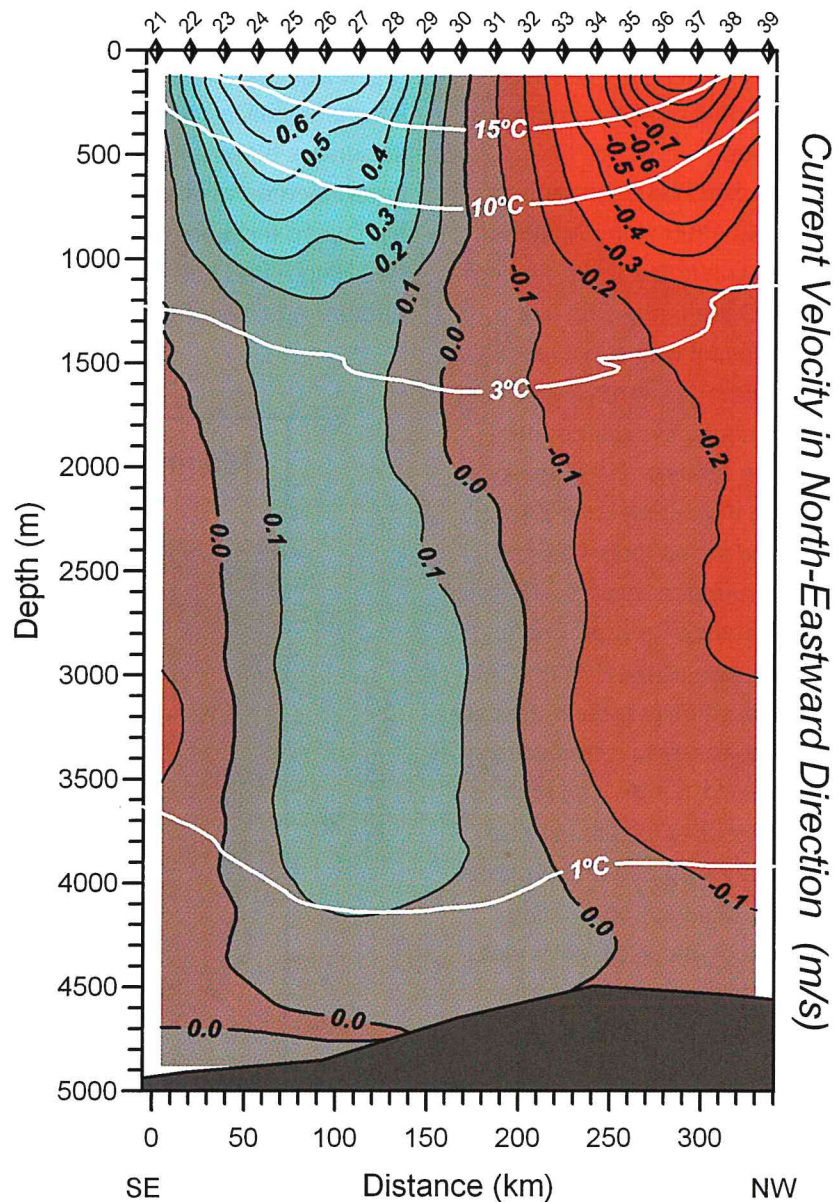
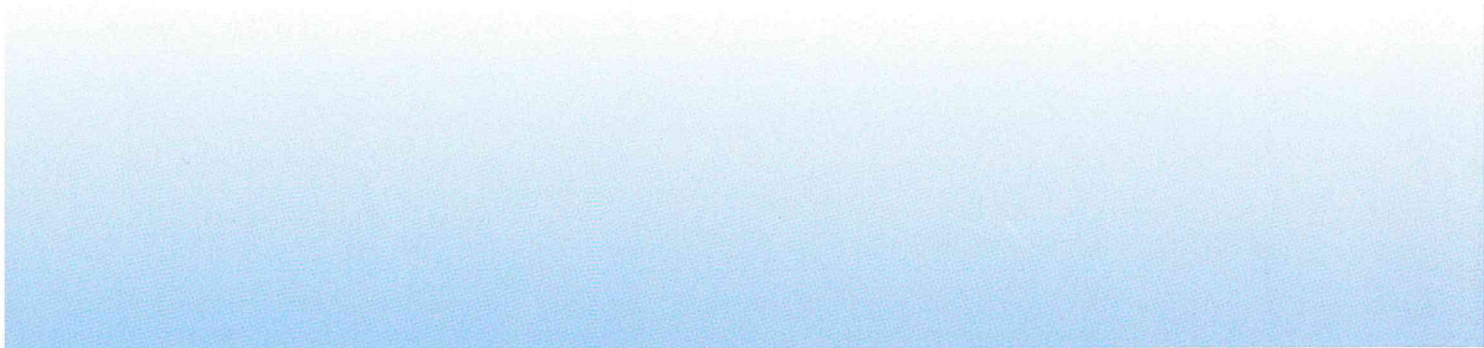


Fig. 3. Section of the northeastward velocity component (m/s) through ring Astrid, perpendicular to the southeast-northwest hydrographic section from station 21 to station 39. The red area shows the positive velocities (towards northeast). On top of the velocity distribution some isotherms are shown in white. Station numbers are indicated at the top.

EXTERNAL PROJECTS PHYSICAL OCEANOGRAPHY

- Secondary tides and quasi-periodically forced nonlinear oscillators (NWO-FOM).
L.R.M. Maas, G.M. Terra
- Long-term Ocean Climate Observations (LOCO) (NWO-groot)
H. Ridderinkhof, H. van Haren, L. Maas, H. van Aken, J.T.F. Zimmerman, T. Gerkema together with Utrecht University and KNMI
- Outer Delta Dynamics (NWO-ALW)
H. Ridderinkhof, J.T.F. Zimmerman, M. Buijsman
- The transport of suspended particulate matter in the Dutch coastal zone (NWO-LOICZ)
H. Ridderinkhof, L. Merckelbach
- From on-line oceanographic observations to environmental information (FerryBox, 5th FWP of EU)
H. Ridderinkhof, F. Eijgenraam
- Transport and circulation around Madagascar (NWO-ALW)
H. Ridderinkhof, M. Schouten
- North Atlantic Ocean Monitoring and Modelling (BSIK – Klimaat voor Ruimte)
H. Ridderinkhof, H. van Aken, L. Maas, H. van Haren, F. de Jong, 1 PhD to be appointed
- GYROSCOP; NWO, CNRS funded.
H. van Haren
- Climatology of Deep Inertial Motions (CLIMA-DIM); NWO
H. van Haren
- Slope Mixing; NERC, NWO
H. van Haren
- Theoretical analysis of 3D internal and inertial waves (NWO-ALW).
U. Harlander, L.R.M. Maas
(continuing contributions to terminated projects)
- Bay of Biscay Boundary Layers (TripleB); NWO
H. van Haren
- Processes at Continental Slopes (PROCS); NWO
H. van Haren
- Project Proostmeer, Monitoring blue-algae. (Gemeente Delfzijl, Waterschap Hunze en Aa, Stichting Toegepast Onderzoek Waterbeheer Utrecht)
M.R. Wernand & H. Gons (NIOO, Nieuwersluis).



MCG aims to identify and quantify key processes involved in the settling, transformation and burial of particulate matter in shelf seas, on the continental margin and in the deep ocean. The most rapid processes are resolved by direct observations, complemented by laboratory-controlled experiments and analytical studies. Decadal to long-term climate-driven variability is deciphered by exploiting shallow and deep-sea tracers in sedimentary archives as well as by geophysical techniques. MCG is strongly committed to multidisciplinary sea-going research in order to understand, reconstruct and predict the effects of ocean-climate change.

In the past year, research within the department has re-focused on the benthic boundary. Research questions of MCG are formulated by three related themes:

- Productivity controls on sediment deposition
- Sediment transport and early diagenesis
- Sediment accumulation and climate change

Productivity controls on sedimentary deposition aims at relating the physical forcing conditions of particle export from the water column to the temporal and spatial supply of sedimentary organic matter, carbonate particles and biogenic silica to the seafloor. Particle production, settling dynamics and seasonal to interannual variability in seabed deposition fluxes are determined using time-depth series sampling by bottom moored sediment traps, current profilers and turbidity sensors.

In 2005, sediment trap moorings provided the first time-series of changing particle export, transformation and deposition in the Mozambique Channel and the Irminger Sea (North Atlantic) in ongoing process studies with the Department of Physical Oceanography (LOCO). Preliminary results from the Mozambique Channel show a pronounced seasonality with two bursts in mass deposition towards the deep seafloor which seem related to the activity of large eddies at the origin of the Agulhas Current. The moorings were successfully re-deployed, now equipped with experimental cages to directly address the pressure related dissolution behaviour of biogenic silica, to be recovered in 2006.

In 2005, Neven Lončarić received his Ph.D.-degree at the Free University in Amsterdam. The main conclusions from his thesis are highlighted below.

Sediment transport and early diagenesis investigates the spatial and temporal scales of resuspension, transformation, recycling and burial of marine particles near the sediment-water interface. Sediment transport and rates of benthic production, microbial activity and sediment-water exchange are determined *in-situ* using autonomous benthic landers. Combining laboratory experiments with sea floor observations, we aim to understand the mechanisms controlling the recycling/preservation balance of organic matter, biogenic silicates and carbonates.

In 2005, a weekly sampling program addressing the cycling of dissolved organic matter in coastal waters started at the NIOZ jetty in the Marsdiep tidal inlet, complemented with measurements onboard the R.V. Navicula.

The 2005 Hermes-Canyons cruise with the RV Pelagia focused on the importance of Iberian Margin canyons systems as pathways for sedimentary transport, from the shelf down to the 5000 m deep ocean basin. Results, highlighted below, show that massive fluxes of recent sediments in the Nazaré and Lisbon/Setubal canyon are driven by internal tides in the upper canyon, and by episodic density-driven currents in the middle and lower canyon. During this cruise, the newly developed remotely operated bottom-tracking vehicle MOVE! underwent its first deep-ocean trial run at 1500m water depth.

Sediment accumulation and climate change traces climatic and oceanographic forcing conditions over anthropogenic, historical and geological time-scales, as recorded by shallow and deep cores, seabed imaging and deep seismic profiling, supported by XRF-core scanning and chemical analyses of the sediment.

In the NE Atlantic Ocean, research aims at further defining the climate-driven control on cold water coral mounds and on the accumulation of sediment drift deposits along the margins of the basin, to put quantitative constraints on North Atlantic circulation. In the SE Atlantic, the potentially important role of tropical regions in glacial-interglacial climate change is addressed.

Research cruises in the Gulf of Cadiz and Rockall Trough elucidated the distribution and structural build up of cold water coral mounds, and their relation to past climate change. Together with the Departments MEE and BIO, the controls on coral growth and the associated fauna were examined, while coral branches and sediment cores were sampled for use as natural climate archives. In collaboration with the Free University, MCG's research on deep corals is one of the finalists nominated for the national Academic Year Award (www.academischejaarprijs.nl).

Apart from the scientific themes, MCG is also responsible for the national marine research facilities (MRF) for nutrient analyses and XRF core scanning (CORTEX), and for providing state-of-the-art expertise for sediment trap, coring, bottom imaging and seismic profiling studies.

PRODUCTION AND SEDIMENTATION OF PLANKTIC FORAMINIFERS AND DIATOMS IN THE SOUTHEAST ATLANTIC OCEAN.

Neven Lončarić & Geert-Jan Brummer*

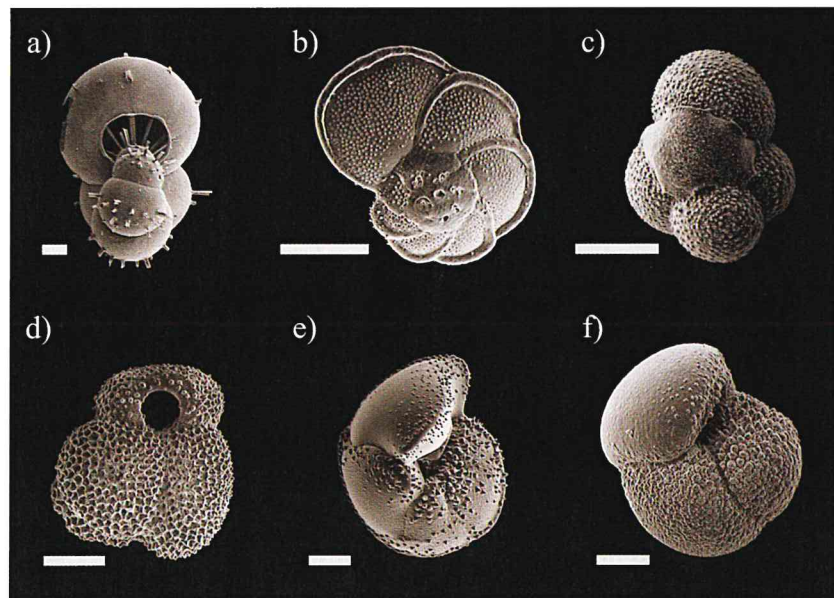
Planktic foraminifera are single cell animals (Protozoa) that secrete a carbonate shell composed of successive chambers arranged in a spire. They are abundant in the photic zone of the oceans, where most species live in symbiosis with photosynthetic organisms, but other species do without and calcify in the dark ocean at several hundreds meter depth. Upon death or reproduction, their shells sink to the ocean floor transferring over a gigaton of carbonate-carbon per year, despite their sub-millimeter size. Because large numbers of these shells remain preserved in marine sediments, they provide key-recorders for tracing ocean-climate as it changed through time. For an improved interpretation of the geological archives however, also the ecological behaviour of planktic foraminifera should become known, i.e. their response to the changing conditions during the year. Neven Lončarić analysed the seasonal shell production and sedimentation of species living in the south-eastern Atlantic Ocean far off Namibia and found important differences.

Most of the sediment layers accumulating on the deep sea floor are composed of biogenic carbonates and silica that were once produced by microscopic organisms living close to the surface of modern and past oceans. The shells of planktic foraminifera probably contributed most of the accumulating carbonates and thus preserve the responses to rapid ocean-climate change on geological time scales. In order to better understand how these sediment records form at present, we combined plankton tows down to 1000 m depth, sediment traps near the bottom, and sediment cores on a single site, on top of the 2700 m deep Walvis Ridge in the subtropical SE Atlantic.

Perhaps the most unexpected result was the find of lunar pulses in the arrival of shells of the species *Hastigerina pelagica* on the ocean bottom as intercepted by

the sediment traps. About every 12.5 days after full moon, we recorded a maximum in the deposition flux of *H. pelagica*, i.e. the number of shells per square meter per day that arrived in a sediment

trap we moored there close to the bottom for half a year. Thus we could show for the first time that lunar cycling in the upper ocean leads to strong pulses in shell fluxes on the deep ocean floor.



Common shell species of planktic foraminifera contributing to the carbonate flux on the 2700 m deep Walvis Ridge in the south-eastern Atlantic.. Scale (white bars) equals 0.1 mm. a) *Hastigerina pelagica*, b) *Globorotalia menardii*, c) *Globigerinita glutinata*, d) *Globigerinoides ruber*, e) right-coiled *Globorotalia truncatulinoides*, f) *Globorotalia inflata*. Scanning electron microscopy by J. van Ieperen.

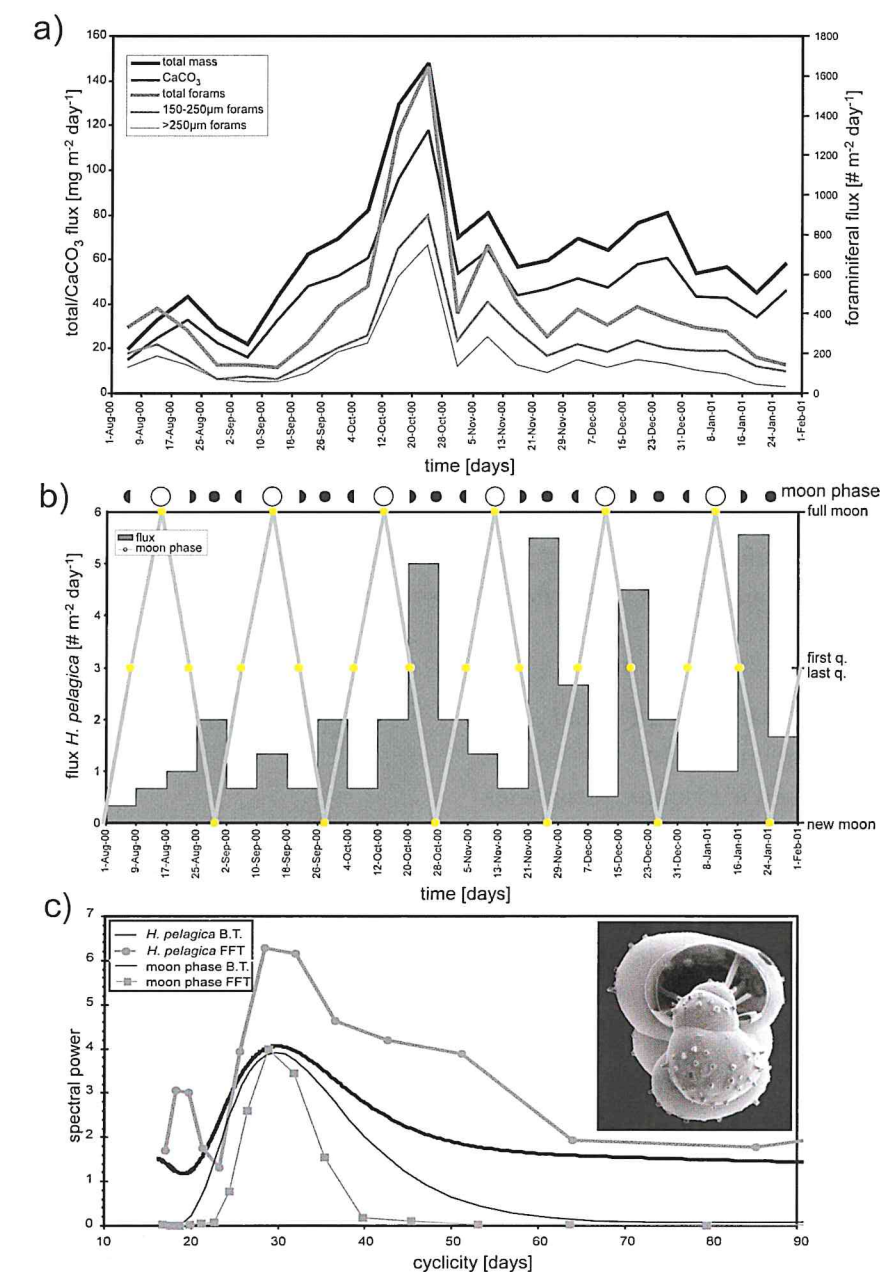


A large sediment trap is recovered from 2700 m depth after collecting samples and sensor data for half a year in the Southeastern Atlantic.



A boxcore is opened, filled up nearly to the top with foraminiferal sediment from the Walvis Ridge.

Earlier laboratory culturing of *H. pelagica* from off Bermuda in the North Atlantic had shown that lunar reproduction peaked just 5 days after full moon. This is 7 days earlier than we found, which is exactly the time it would need for the shells to sink to 2700 m depth, given independent estimates of the specific settling velocity. More importantly, this now allowed for tracing such lunar periodicity in any of the 27 species of planktic

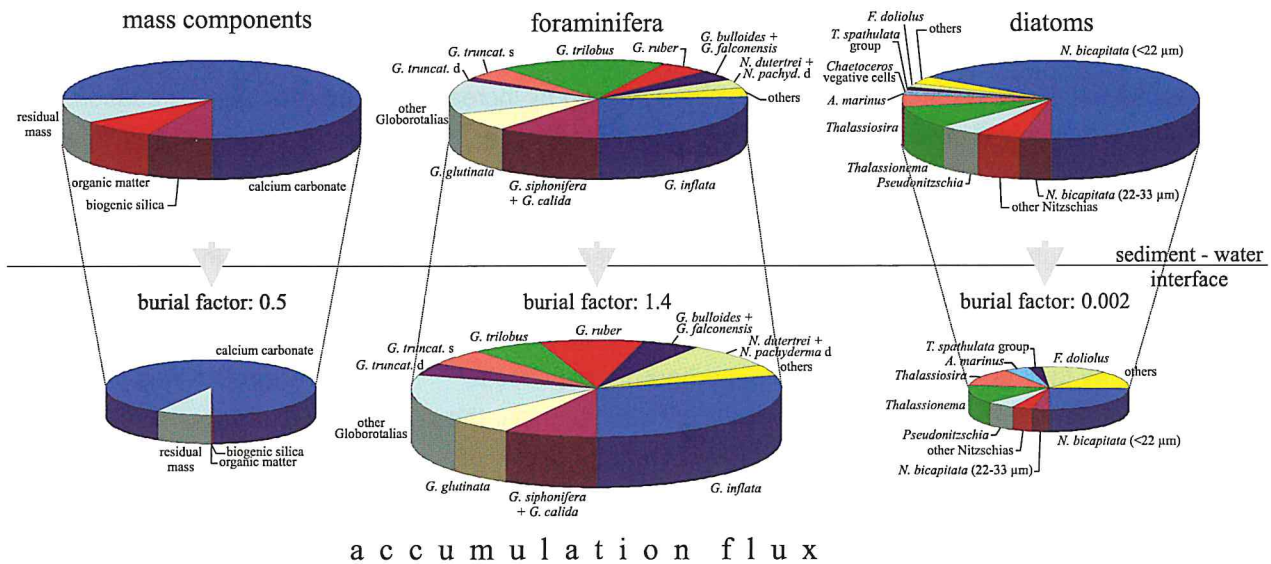


Deposition flux of foraminifera, calcium carbonate and total mass (a), and *H. pelagica* (dark grey bars) vs. phases of the moon (light grey line) (b) intercepted at the 2700 m Walvis Ridge site. Spectral analysis of the *H. pelagica* flux (c) shows the pronounced maximum at the 29-day lunar period.

foraminifera identified in the same samples and in the total mass flux of carbonate. Yet except *H. pelagica*, not a single other species did so, or showed any other oscillations in deposition flux within the 16 to 90 days domain resolved by

our samples. Rather, shell production and export to the ocean floor appears generated by continuously reproducing populations which live for 2 weeks for surface species and up to 6 weeks for deep dwelling species.

deposition flux



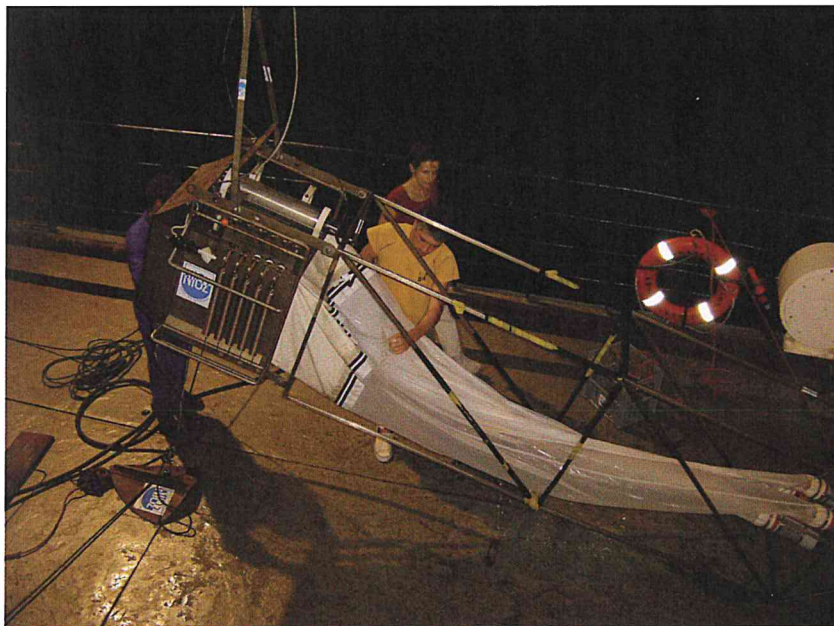
Comparison of the annual deposition flux as intercepted by the sediment traps, with the accumulation flux from the box-core sediment. Only the foraminiferal appear to be fully incorporated into the sediment, whereas the diatom species composition is severely affected by silica dissolution at the sediment-water interface.

During the year, maxima in shell numbers appeared closely associated with the algal blooms in spring that followed deep mixing of the surface ocean in winter. These blooms become restricted by the re-stratification of the upper ocean

as it heats up, which limits the supply of nutrients from deeper water. In response, about 25 % of the annual export of foraminifera is deposited on the ocean floor within a single month, together with organic matter and the siliceous

skeletons of diatom algae. The changeover from winter to summer communities of plankton is marked by short blooms of only a few species of siliceous diatom algae, followed by a productivity maximum in many species of zooplankton such as the calcareous foraminifera. Thus diatom diversity dropped sharply during the spring bloom whereas the foraminiferal diversity remained about constant despite their strongly enhanced shell production and export. The associated mass fluxes of organic matter, biogenic silica and carbonate carbon arriving at the ocean floor, showed a similar rapid succession in peak fluxes from winter to summer conditions. However, deep-dwelling species of foraminifera such as *Globorotalia truncatulinoides* behaved differently, even at the level of popula-

29



Neven Lončarić at work with the Multinet system for sampling living planktic foraminifera at successive depths.

tions differing in the proportion of left- and right-coiled specimens. These both showed maxima outside the spring bloom, but one in early winter as well as late spring and the other in late spring only. Such a different seasonal response of *G. truncatulinoides* subpopulations sheds a new light on the separate geographical distributions of cryptic species that have recently been identified by their genetic composition.

We also used the Central Walvis Ridge (CWR) data as the oceanic end member of a gradient across the entire Benguela system, from the oligotrophic Central Gyre to the highly productive upwelling near the coast of Namibia. Production maxima followed winter minima in sea surface temperature when the surface mixed layer reached deepest, but this occurred two months later in the open SE Atlantic than near the Namibian coast, where

the high productivity is supported by coastal upwelling of nutrients. Transition from the ocean desert towards more productive conditions was characterised by increasingly dominant *G. inflata* at the expense of warm-water foraminifers. In diatom assemblages, small and weakly silicified *N. bicapitata* were substituted by larger and heavier-silicified species, perhaps in response to reduced silica limitation. Near the coast, all warm-water species of foraminifera had disappeared and *G. inflata* declined, followed up by an increasing abundance of a few cold-water species in the most productive waters.

Despite such a complete change in species composition and biodiversity, the deposition fluxes of shells and of most other mass compounds only about doubled shoreward. However, due to rapid bacterial decay of the organic matter and dissolution of the silica

skeletons of the diatoms, less than 1 % survived after arrival on the seafloor, but the calcareous shells of foraminifers appeared much better resistant to degradation. These shells remained largely intact in the bottom sediment, preserving the seasonal responses of species during uptake in the geological archive.

This PhD-project was carried out within the collaborative NEBROC, MARE and DivCat-programmes supported by NWO and the DFG, as well as the AWI and Royal NIOZ within the RV Pelagia Around Africa programme.

Neven Lončarić received his PhD degree on December 15 at the Free University in Amsterdam with Prof. Dr. Dick Kroon as his promotor.

SUBMARINE CANYONS: PATHWAYS OF PARTICULATE MATTER TRANSPORT TO THE DEEP SEA.

Tjeerd van Weering*, Henko de Stigter, Wim Boer, Rineke Gieles, Eric Epping,
Erica Koning & Gert van den Bergh

Submarine canyons are important transport routes for the transfer of particulate matter from the coastal ocean to the deep sea. Accumulations of sedimentary material originating from land and shallow seas, now found at the foot of the continental slope around the lower end of submarine canyons, form clear evidence of activity of these submarine valleys. But are canyons active at present? What is their role, and which processes force the transport of organic matter and sediment from the shelf to the deep sea? How do these contribute towards sediment accumulation on the continental margin? The EUROSTRATAFORM project puts observations on present-day sediment dynamics in a geological perspective.

Submarine canyons are a common feature on most continental margins. Ranging from relatively shallow systems to deeply incised sinuous valleys of huge dimensions, submarine canyons show a great morphological similarity with erosional landforms found on land. This similarity, in combination with the character, composition and structure of sediments at the lower end of submarine canyons, argue that erosive turbidity currents descending over the continental slope were responsible for the formation of these submarine valleys. However, submarine canyons are presently mostly sites of sediment accumulation, rather than of erosion. It is therefore often assumed that canyons were mainly active in the past during periods of low sea level, when large volumes of sediment were directly delivered at the continental slope. In the framework of the EU-funded EUROSTRATAFORM project

(2002-2005), this hypothesis was tested in submarine canyons of the European Atlantic and Mediterranean continental margin. The wider scope of the project was to assess the presently active processes forcing particulate matter transport on the European margins in relation to the formation of

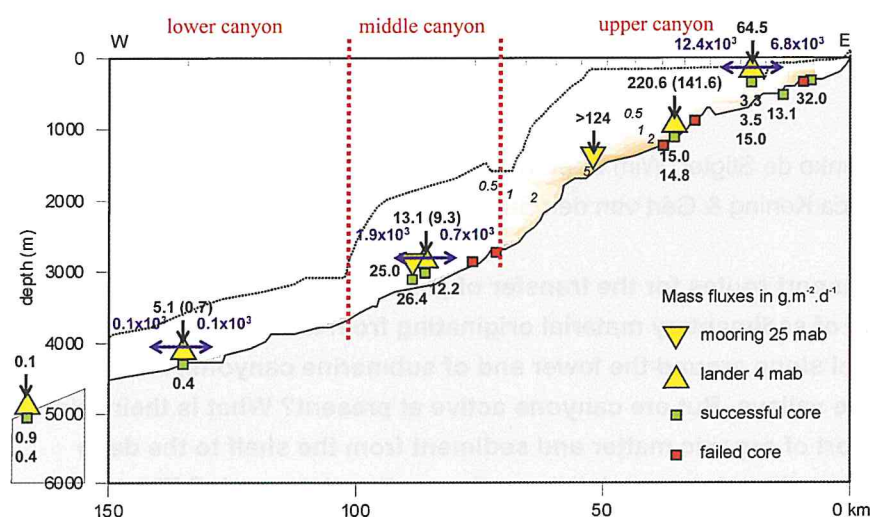
sedimentary strata, and to define amounts of sediment involved.

MCG research focused on canyons off Portugal and in the Gulf of Lions. On the Portuguese continental margin, very active sediment transport was found in the Nazaré Canyon. The presence of terrigenous mud of recent age



BOBO lander (right) and vibrocorer (left) on deck of RV Pelagia.

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Axial section of the Nazaré Canyon, showing concentrations of particulate matter in the water (small font), and average mass fluxes of horizontal suspended particulate matter transport up- and down-canyon (blue font), depositional flux in sediment traps (bold black font) and accumulation rate in sediment cores (bold black font). Trap fluxes between brackets are averages excluding episodic sedimentation events. Sediment trap moorings of Eurostrataform partners CSIC-ICM (Barcelona) and IH (Lisbon) are indicated by downward pointing yellow triangle. A section of the adjacent shelf and slope N of the canyon is indicated by the dashed line.

from 1 to 10 mg.l^{-1} . Net down-canyon flux of suspended sediment through a section of the upper canyon accounted for several kilograms $\text{m}^{-2}.\text{d}^{-1}$. Sediment deposition flux measured in sediment traps was several tens to hundreds of $\text{grams m}^{-2}.\text{d}^{-1}$. Permanent deposition on the canyon floor was in the order of a few grams to tens of $\text{grams m}^{-2}.\text{d}^{-1}$, two orders of magnitude higher than normally found at corresponding depths outside the canyon.

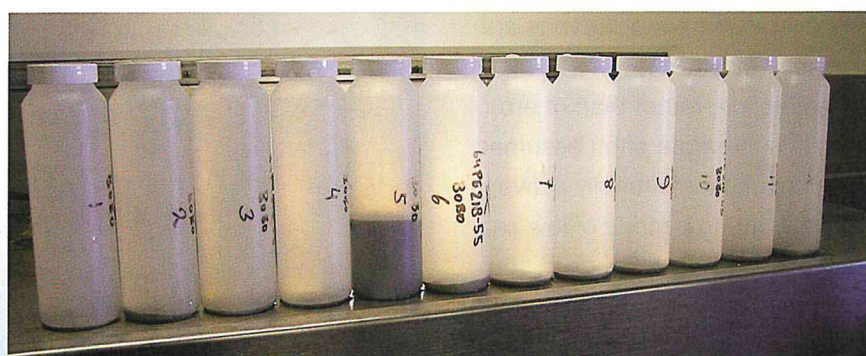
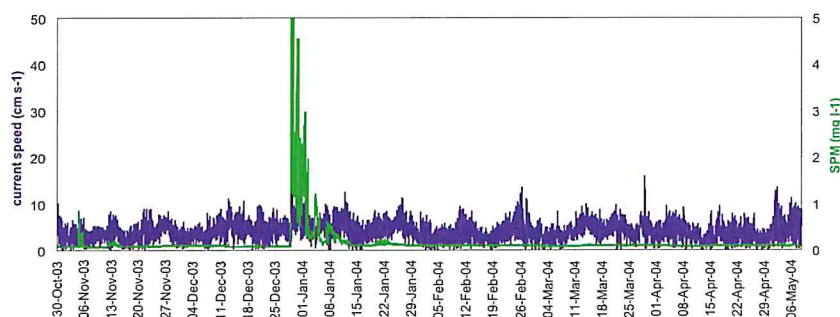
A drastic decrease in hydrodynamic energy in the middle part of the canyon around 3000 m leads to massive settling of suspended sediments and very high rates of sediment accumulation on the canyon floor of up to $25 \text{ grams m}^{-2}.\text{d}^{-1}$. Beyond this depth, bottom currents of $5\text{-}10 \text{ cm.s}^{-1}$ are insufficient to resuspend and transport sediments

32

from the head of the canyon down to 5000 m depth clearly shows that this canyon forms an active conduit for transport of particulate matter between the coastal seas and the deep ocean. Processes responsible for this transport were identified by means of multiple long-term (up to 1 year) deployments of BOBO landers, which recorded near-bed currents and particle transport at depths down to 5000 m, as well as salinity and temperature. These data were complemented with CTD water column observations and sediment sampling by multi-, box- and pistoncorer.

At depths between 100 and 2700 m in the canyon, tidal currents frequently exceeding 30 cm.s^{-1} resuspend the muddy sediment from the seabed and subsequently transport suspended sediment along the axis

of the canyon. Suspended particle concentrations near the bottom of the upper canyon typically range



BOBO lander record of near-bed current speed and concentration of suspended particulate matter at 4300 m depth in the Nazaré Canyon with corresponding sediment trap samples, showing turbidity current event.



Recovery of the TROL lander.

further down the canyon. The sediment flux of less than $1 \text{ gram m}^{-2} \cdot \text{d}^{-1}$ consists for a large part of skeletal carbonate produced by pelagic organisms that lived in the surface water. On longer timescales, however, sediment supply to the lower canyon appears to be dominated by episodic occurrence of fast turbidity currents carrying sediments from the upper canyon. These

events, possibly triggered by winter storms on the shelf, are usually only recorded in long time-series observations with bottom landers. One event occurring in December 2003 was recorded by a BOBO lander deployed at 4300 m depth.

On a geological timescale, particulate matter transport through the canyon is an active and relatively fast process, but from the perspective of deep-sea biota most

of the metabolizable organic material is degraded during transit through the upper half of the canyon. This was demonstrated by in-situ measurements of geochemical reactivity of canyon sediments with the TROL lander, and by assessment of meio- and macrofauna distribution in the canyon.

Future research in the canyons by the MCG group will be directed at the dispersal of anthropogenic contaminants in the Portuguese canyons, and characteristics of canyon biota in relation to the physical and biogeochemical environment.

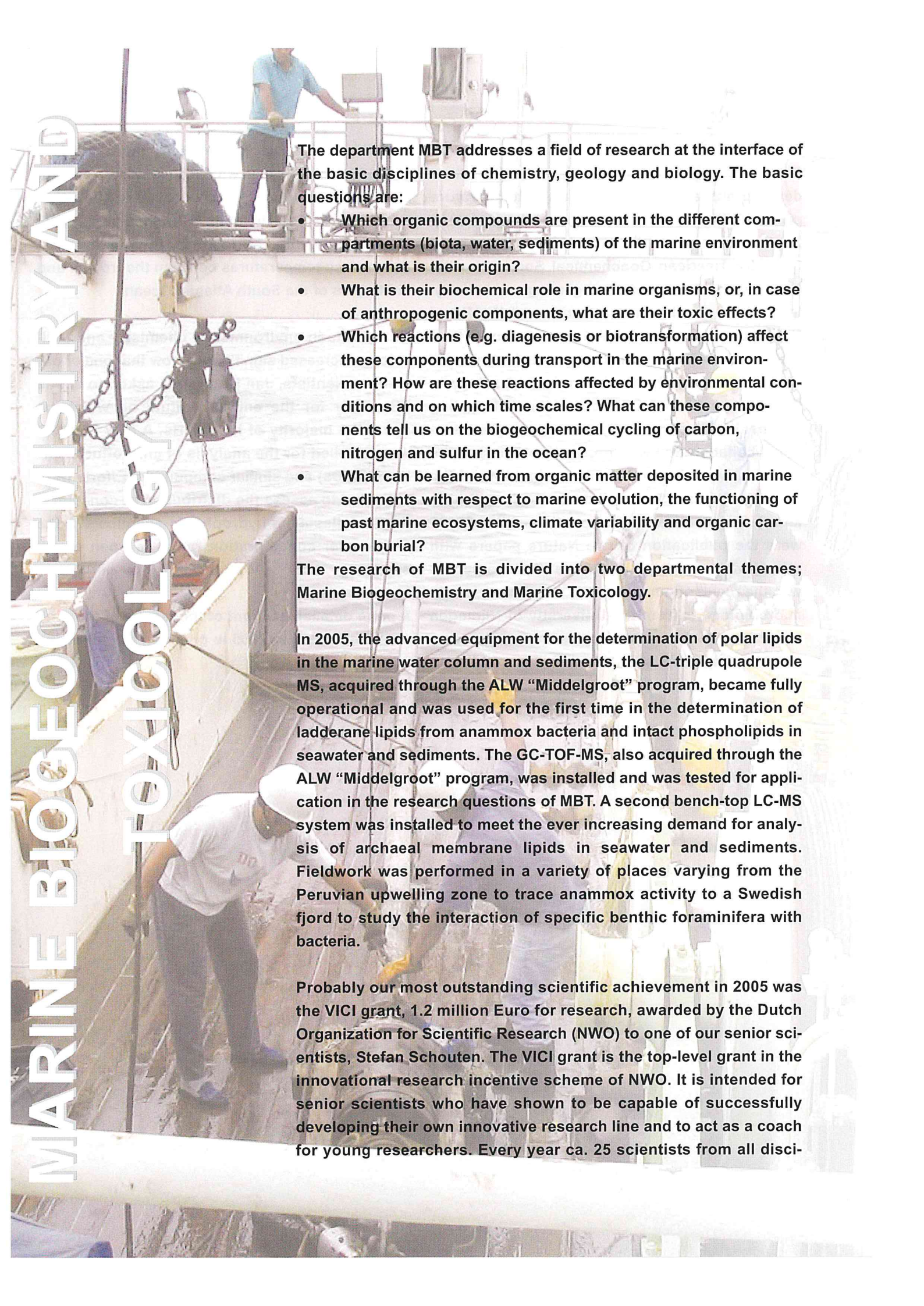
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Stalked crinoid and soft corals attached to a rocky wall of Nazaré Canyon, 2700 m. Width of the image is about 3 m.

EXTERNAL PROJECTS MARINE CHEMISTRY AND GEOLOGY

- Forcing of carbonate mounds and deep water coral reefs along the NW European continental margin (Moundforce, ESF/NWO-ALW).
T.C.E. van Weering, H. de Haas, F. Mienis
- Strata formation on the European margin (EUROSTRATAFORM, 5th FWP of EU)
T.C.E. van Weering, H.C. de Stigter, H. de Haas
- Past Climate Variability (PACLIVA, EU)
T.C.E. van Weering, T. Richter
- Hotspot Ecosystem Research on the Margins of European Seas (HERMES, 6th FWP of EU)
T.C.E. van Weering, H.C. de Stigter, G. Duineveld
- Lead in submarine canyons of the Portuguese margin (NWO-ALW)
T.C.E. van Weering, H.C. de Stigter, T. Richter
- A National Swath bathymetry system (NWO-Middelgroot)
T.C.E. van Weering, H. de Haas, M. Smit, B. Koster
- Forcing and development of carbonate mound formation along the NW European margin (NEBROC2, NWO)
T.C.E. van Weering, J.S. Sinninghe Damsté, C. van der Land
- Carbonate Chemistry, Carbon Cycle and Climate Change: a multidisciplinary view (6C, 5th FWP of EU).
S. Schouten, G.J.A. Brummer, J. Ossebaas
- Divalent cations: development and validation of proxies, from empirism towards a mechanistic understanding (NWO-DFG Bilateral Cooperation Programme).
G.J.A. Brummer, R.P.M. Bak, P. van Cappelen (UU)
- East Kalimantan Programme for Coastal Zone Research Netherlands-Indonesia, Pilot Phase (WOTRO/KNAW/ICO-MAR).
G.J.A. Brummer, G. van den Bergh, T.C.E. van Weering
- Variability of Atlantic Meridional Overturning Circulation (VAMOC; NWO-NERC-RCN trilateral programme RAPID).
G.J.A. Brummer, L.P. Jonkers, H. van Aken, T.C.E. van Weering; G.M. Ganssen (VU), F.J.C. Peeters (VU)
- Temperature and salinity proxies of ocean thermohaline circulation and climate change: development and verification (NEBROC2, NWO).
G.J.A. Brummer, U. Fallet; J. Bijma (AWI)
- Paleosalt (NWO/ESF-EuroClimate).
S. Schouten, G.J.A. Brummer, M. v.d. Meer; J. Bijma (AWI)
- Rapid climatic changes during the last deglaciation in the tropical ocean and equatorial Africa: a high-resolution study of biomarkers (NEBROC2, NWO).
S. Schouten, J.S. Sinninghe Damsté, J.H.F. Jansen, M. Rietkerk, PhD student.
- MOVE! Construction of a remotely controlled vehicle for benthic research (NWO-Middelgroot/BMBF).
H.G. Epping, J.W. de Leeuw, G. Duineveld
- Early diagenetic interactions between iron and silica and their role in the global marine cycle (NWO-ALW).
H.G. Epping, F.A. Koning, P. van Cappelen (UU)
- Dynamics of dissolved organic matter in a coastal environment (NWO-ALW).
H.G. Epping, M. Keuning, J.B.M. Middelburg (NIOO-CEME)
- Scientific Cooperation Netherlands/Russia (NWO)
T.C.E. van Weering, J.S. Sinninghe Damsté; H. Vonhoff, G. Ganssen (VU)
- Southern Indian Ocean/Tropical Pacific teleconnections assessed by a joint coral-in situ ocean monitoring database (SINDOCOM; NWO-climate change).
G.J.A. Brummer, PhD student; D. Kroon (VU), J. Zinke (VU)

The background of the page is a photograph of a research ship's deck. Several scientists in white lab coats and hard hats are visible, working with equipment. One scientist in the foreground is wearing a white t-shirt with 'DO' on it. The ship's railing and various pieces of scientific equipment are visible. The title 'MARINE BIOGEOCHEMISTRY AND TOXICOLOGY' is written vertically in large, white, sans-serif capital letters on the left side of the image.

MARINE BIOGEOCHEMISTRY AND TOXICOLOGY

The department MBT addresses a field of research at the interface of the basic disciplines of chemistry, geology and biology. The basic questions are:

- Which organic compounds are present in the different compartments (biota, water, sediments) of the marine environment and what is their origin?
- What is their biochemical role in marine organisms, or, in case of anthropogenic components, what are their toxic effects?
- Which reactions (e.g. diagenesis or biotransformation) affect these components during transport in the marine environment? How are these reactions affected by environmental conditions and on which time scales? What can these components tell us on the biogeochemical cycling of carbon, nitrogen and sulfur in the ocean?
- What can be learned from organic matter deposited in marine sediments with respect to marine evolution, the functioning of past marine ecosystems, climate variability and organic carbon burial?

The research of MBT is divided into two departmental themes; Marine Biogeochemistry and Marine Toxicology.

In 2005, the advanced equipment for the determination of polar lipids in the marine water column and sediments, the LC-triple quadrupole MS, acquired through the ALW "Middelgroot" program, became fully operational and was used for the first time in the determination of ladderane lipids from anammox bacteria and intact phospholipids in seawater and sediments. The GC-TOF-MS, also acquired through the ALW "Middelgroot" program, was installed and was tested for application in the research questions of MBT. A second bench-top LC-MS system was installed to meet the ever increasing demand for analysis of archaeal membrane lipids in seawater and sediments. Fieldwork was performed in a variety of places varying from the Peruvian upwelling zone to trace anammox activity to a Swedish fjord to study the interaction of specific benthic foraminifera with bacteria.

Probably our most outstanding scientific achievement in 2005 was the VICI grant, 1.2 million Euro for research, awarded by the Dutch Organization for Scientific Research (NWO) to one of our senior scientists, Stefan Schouten. The VICI grant is the top-level grant in the innovational research incentive scheme of NWO. It is intended for senior scientists who have shown to be capable of successfully developing their own innovative research line and to act as a coach for young researchers. Every year ca. 25 scientists from all disci-

plines are selected after a heavy competition. Stefan Schouten will apply this grant to further develop and apply the sea surface temperature proxy TEX₈₆. Our department head, Jaap Sinninghe Damsté was awarded the Treibs Award from the American Geochemical Society for his long-term achievements in organic geochemistry. In 2005 he also became a member of the Royal Netherlands Academy of Arts and Science. Last year we also obtained the first grants for graduate students from the Darwin Centre for Biogeology. In this virtual institute MBT is one of the participating groups. It will undoubtedly result in a more intensified collaboration with (micro-)biologists at the Dutch universities and the sister institute of the NIOZ, the Netherlands Institute for Ecology (NIOO-knaw). Other outstanding scientific results of 2005 were the publication of two Nature papers with strong involvement of MBT. One of these papers was the result of our continued collaboration with microbiologists from the University of Nijmegen and dealt with the methane cycle. In the other one, resulting from a collaboration with the universities

of Bremen and Kiel in Germany, the deuterium content of fossil leaf waxes in a core from the South East Atlantic Ocean was used to show that central African precipitation during the past 20,000 years was mainly controlled by the difference in sea surface temperatures between the tropics and subtropics of the South Atlantic Ocean.

Our efforts in environmental chemistry and toxicology decreased significantly now that one of our senior scientists, Jan Boon, was asked to act as PR-officer for the entire institute on which he spent the majority of his efforts. A new GC-ECD was installed for the analysis of chlorofluorocarbons (CFCs) and similar compounds. Efforts were extended to assess the distribution of concentrations of dissolved hydrophobic chemicals in the femtomolar concentration range in open ocean systems.

A more detailed account of the results of the projects that ended in 2005 is given on the following pages.



BIOGEOCHEMICAL PROCESSES OCCURRING AT FLUID/METHANE VENTING SITES AT THE SEAFLOOR.

Alina Stadnitskaia*, Michael .K. Ivanov, Tjeerd C.E. van Weering & Jaap S. Sinninghe Damsté

Places where subsurface fluids are discharging/erupting spontaneously are distributed all over the world, on land as well as at the sea-bottom. These events of subsurface fluid release, so called “cold seeps” or “methane seeps”, create specific structures such as mud volcanoes (MVs). Instead of lava, MVs expel a complex mixture of geofluids such as mud, rocks, oil and gases, especially methane (Fig. 1). In the totally dark environment of the deep-sea, constant and focused fluid supply induces the development of marked biological activity depending on chemosynthetic nutrition. The most important process fuelling these light-independent ecosystems is the anaerobic (i.e. in the absence of oxygen) oxidation of methane (AOM), which subsequently results in the precipitation of carbonates. AOM is a key-process in the global carbon cycle, since it prevents the escape of vast quantities of methane to the atmosphere. Methane is also a very important greenhouse gas besides carbon dioxide. We have shown that the microbial diversity involved in AOM is complex and involves ecologically contrasting types of microbes. AOM activities occur below the surface of the deep-sea floor, and where AOM-induced carbonates were found, the highest AOM activities were detected WITHIN these precipitants and not in the surrounding sediments.

Fluid/methane seepage and mud volcanoes (MVs) are distributed world-wide on- and offshore (Fig. 1). Migrating fluids contain organic and inorganic components offering sources of carbon and energy and other essential nutrients for the microbial chemosynthetic communities of the deep biosphere up to several km of water depth. Chemosynthesis is a process that certain organisms use to produce energy, similar to photosynthesis, but without the utilization of sunlight. Instead, the necessary energy comes from the oxidation of chemicals which seep from the subsurface. MVs and fluid/-methane venting locations in general are hot-spots for very diverse but still largely unknown chemosynthetic macro- and micro-

bial life (Fig. 2). More than 90 percent of the methane uprising from the subsurface of the World's Oceans is consumed (eaten) anaerobically (i.e. without any presence of oxygen) with sulfate (SO_4^{2-}) as electron acceptor (i.e. a compound that receives or accepts an electron during cellular respiration). It is an outstanding fact that the process of Anaerobic (e.g. a process progressing without oxygen) Oxidation (utilization, consumption) of Methane (AOM), significantly controls atmospheric concentrations of methane. This is fundamental for keeping our atmosphere in a balance in terms of the greenhouse factor. AOM is now considered one of the dominant methane sinks in marine environments. AOM can be accom-

37

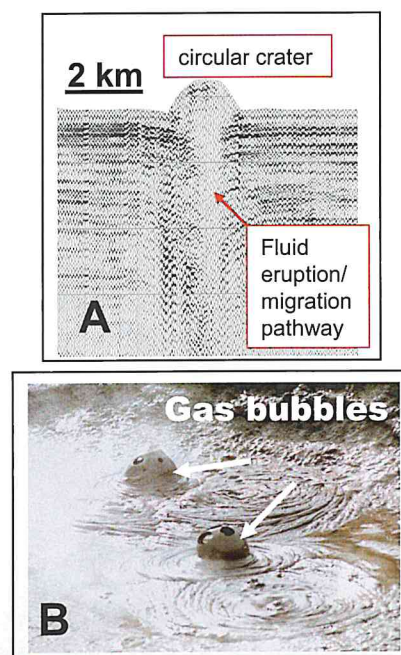


Fig. 1. Examples of (A) a deep-sea mud volcano: fragments of 2D seismic section; and (B) small seepage on land.

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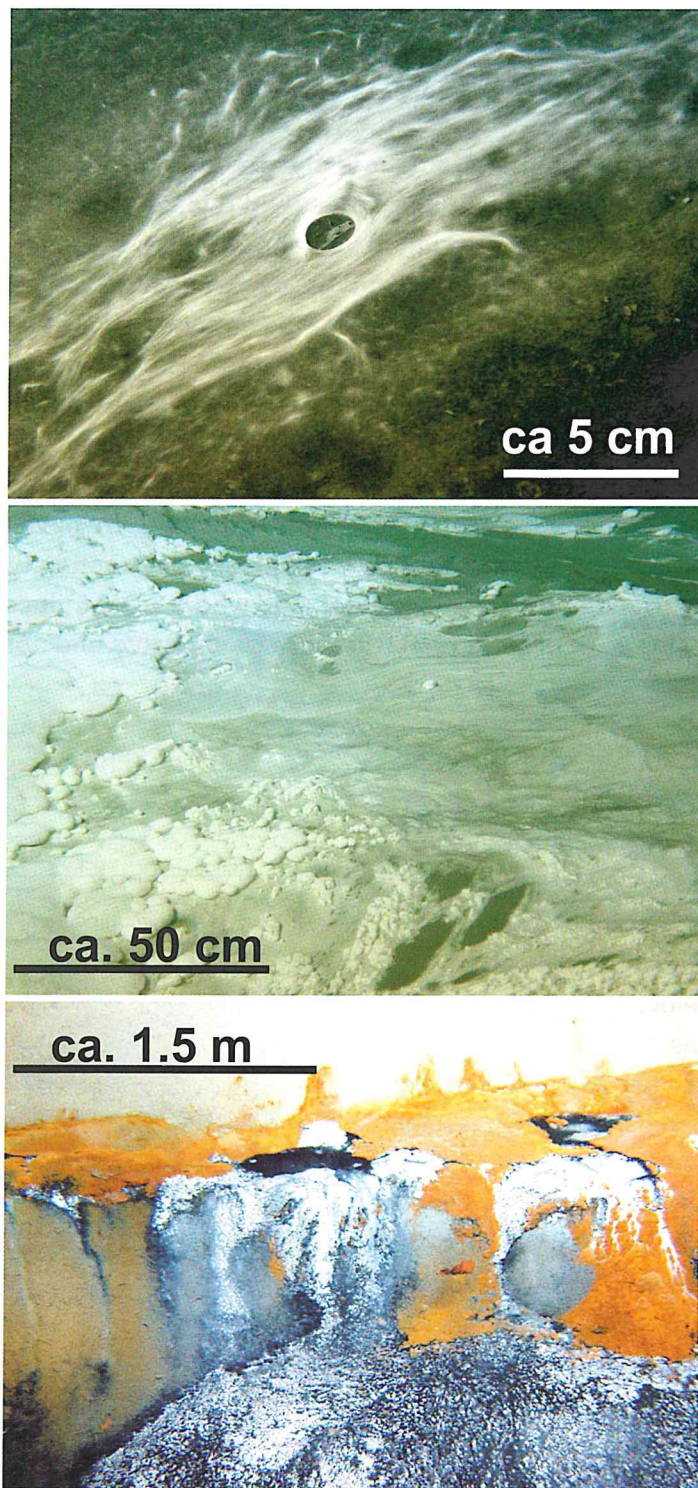


Fig. 2. Chemosynthetic life at depths of more than 2 km. Nile deep-sea fan, the Eastern Mediterranean.

plished by microorganisms belonging to the domain of Archaea.

These Archaea occur mostly in a consortium with sulfate reducing bacteria (SRB) of different phylogenetic groups developing in symbiotic aggregations of unknown functioning (Fig. 3). AOM results in the production of sulfide and carbonates in anoxic sediments (Fig 3). Such methane-related carbonates can occur in the form of crusts, concretions, pavements and chimneys, varying in sizes from few millimetres precipitants to several meters high chimneys and tenths meters extended carbonate pavements. They are frequently observed in areas of active seepage and are known in the geological record since ca. 350 million years ago.

We have visited and sampled a number of AOM-active areas in the Black Sea, the North and Northeast Atlantic and the Eastern Mediterranean; the latter by diving with the submersible Nautil (RV L'Atlante, France) of IFREMER to up to 3 km in the area of active fluid venting within the Nile deep-sea sedimentary fan. (Fig. 2).

The key factors determining the biogeochemical pathways and microbial mutual benefits in the various seepage environments are still largely unknown and our research is anxious for understanding and characterizing microbial processes based on the oxidation of methane, their regional or sequential variability, enzymatic capacities of microorganisms/-microbial consortia performing

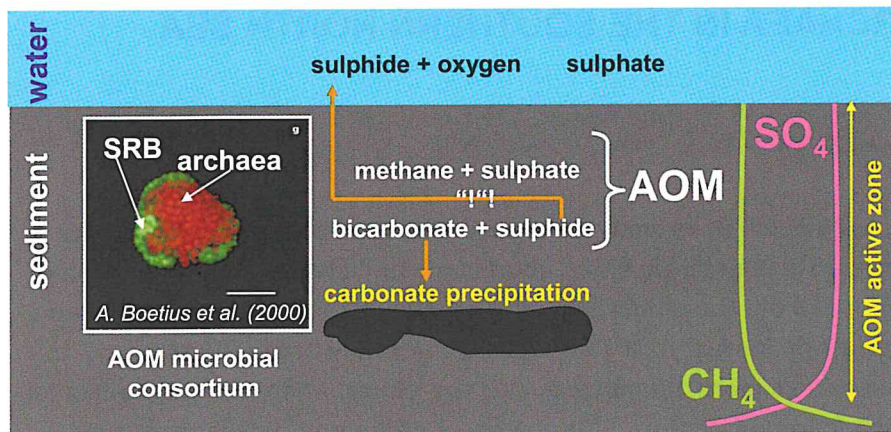


Fig. 3. Schematic interpretation of OM process

AOM and inducing carbonate formation under extreme, fluid seepage environments. Using chemical analyses of methane, biogeochemical proxies of organic molecules from microorganisms, and molecular biological techniques, we have obtained the following results:

- The presence of a variety of archaeal and bacterial biomarkers signifies different syntrophic and symbiotic interactions among prokaryotes. For instance, the occurrence of specific sterols (e.g. 4Me C_{27:1}Δ⁸), previously found in cultures of aerobic methanotrophic bacteria *Methylococcus capsulatus*

and *Methylosphaera hansonii*, signifies aerobic methanotrophy whereas archaeal lipid biomarkers, such as hydroxyarchaeol and specific glycerol dialkyl glycerol tetraethers (GDGTs) are characteristic for methane consumption in anaerobic environments. Simultaneously, the $\delta^{13}\text{C}$ values of bacterial (sterols, diplopterol) and archaeal (archaeal and hydroxyarchaeol) biomarkers are all substantially depleted (-60‰ to -90‰), indicating that carbon from methane is used for biomass production. The co-occurrence of these biomarkers

would imply local changes in the seepage environments reflected in consequent alteration of syntrophic associates. This indicates that either archaeal lipids or the specific sterols are “relicts” from prior times when the redox zones in the sediment were differently positioned or it points to a co-existence of contrasting ecological groups of microorganisms in the same environments, using methane as a carbon source.

- Differences in $\delta^{13}\text{C}$ values between archaeol and hydroxyarchaeol indicates presence of at least two types of archaea. Archaea biosynthesizing hydroxyarchaeols were using methane as a carbon source, whereas archaea producing archaeol clearly did not (Fig. 4).

39

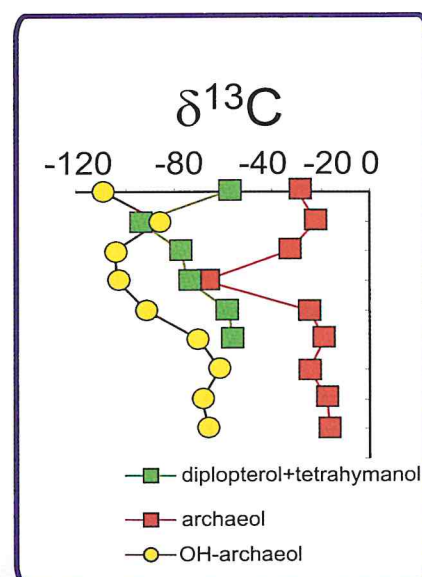


Fig. 4. Depth profiles of $\delta^{13}\text{C}$ values of selected biomarkers, showing a possible co-existence of contrasting ecological groups of microorganisms in the same seepage environments.

ECOLOGY OF ARCHAEA IN THE SOUTHERN NORTH SEA

Lydie Herfort*, Stefan Schouten, Jan P. Boon, Marco Coolen & Jaap S. Sinninghe Damsté

Recently, we came to know that Archaea occur in virtually all oceans and shelf seas. To gain a better understanding of the ecology of Archaea in coastal seas, the abundance and diversity of the two main groups of Archaea, the Crenarchaeota and the Euryarchaeota, was studied in the Southern North Sea during three cruises with the RV Pelagia in February 2003 and April 2004 and with the RV Alkor in August 2004. Overall, the Crenarchaeota are more abundant during the winter, when nutrient concentrations were high and light was too dim for algae to grow. With the onset of the phytoplankton spring bloom, they are outcompeted and Euryarchaeota become more abundant. In the two areas that were characterized by the highest nutrient concentrations, crenarchaeotal cell number remained high throughout the year. The Crenarchaeota obtain their energy from nitrification, a process whereby ammonium is oxidized into nitrite. Our data show that crenarchaeotal nitrification may explain the observed seasonal and spatial differences in archaeal community structure and abundances.

Following considerable advances in genetics in the last decades, life on Earth has been divided into three domains: Bacteria, Archaea and Eukarya. The first two domains comprise unicellular organisms, while the latter include all higher plants and animals. Traditionally Archaea were thought to only dwell in extremely warm or salty environments, but new approaches have clearly established that they are abundant in the water column of all marine environments. Marine Archaea consist of two major groups, the Crenarchaeota and the Euryarchaeota. Recent time series analysis carried out at the Royal NIOZ revealed that Crenarchaeota were abundant in the Wadden Sea in late autumn and winter, while Euryarchaeota were present in spring and summer. We found a similar pattern at six out of eight stations in the Southern North Sea (Fig.1.). Qualitative DNA analysis

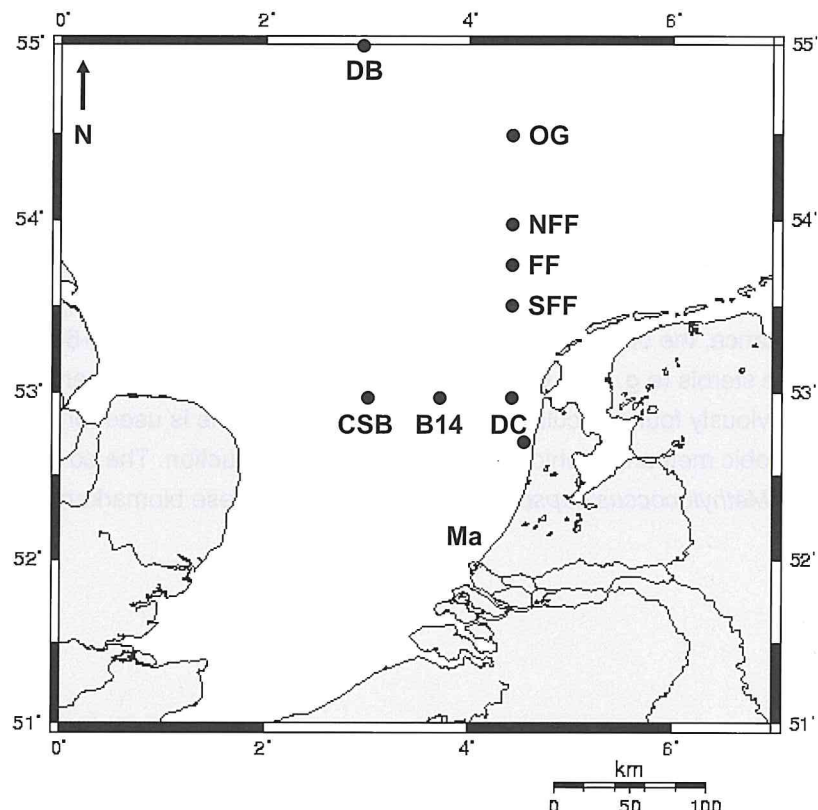
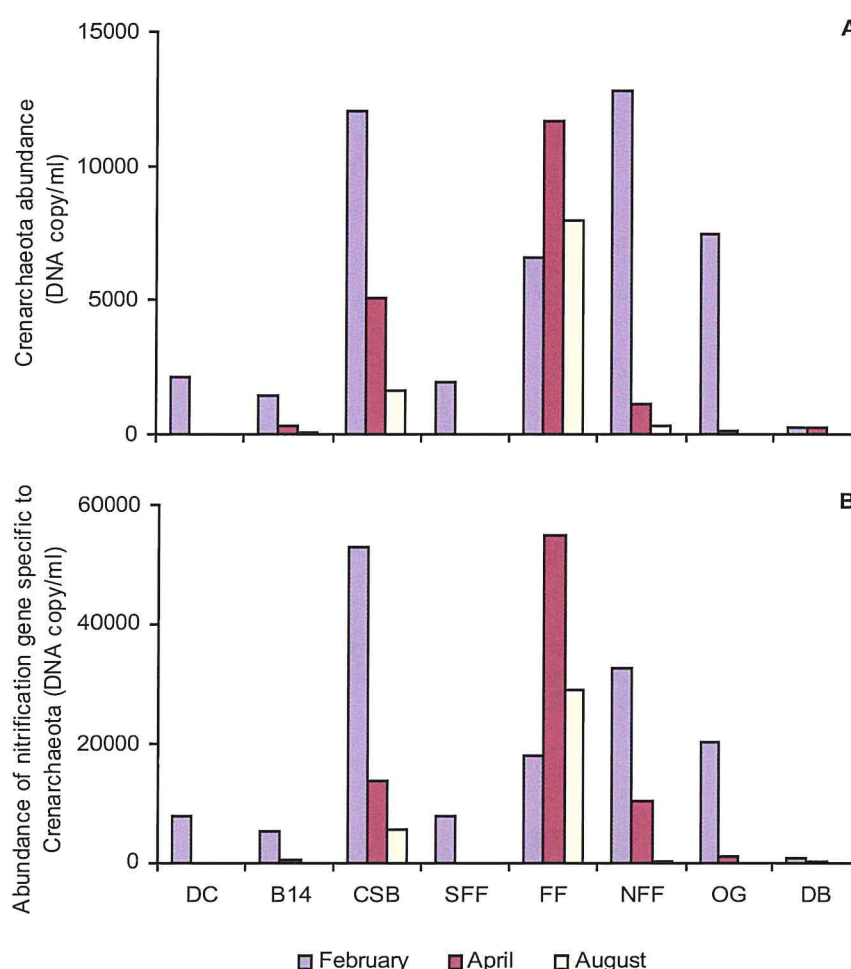


Fig. 1. Map showing the location of the study sites in the Southern North Sea. Abbreviations = DC: Dutch Coast; CSB: Central Southern Bight; B14: Breeveertien; SFF: South Frisian Front; FF: Frisian Front; NFF: North Frisian Front; OG: Oyster Grounds; DB: Dogger Bank.

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Fig. 2. Abundances of Crenarchaeota (A) and of the nitrification gene specific to Crenarchaeota (B) in the surface seawater of the Southern North Sea in three different seasons. Station abbreviations are explained in Fig. 1.



showed that there is a clear overall seasonality, with crenarchaeotal DNA detected in February and Euryarchaeota mostly occurring in April and August. The Frisian Front and the Central Southern Bight are the exceptions since crenarchaeotal DNA was also detected in April and August. These two stations also show the highest abundances of Crenarchaeota in all seasons (Fig. 2.).

One of the major questions to ask in microbial ecology is 'what is the energy source of an organism'. Nitrification, the process of energy generation whereby ammonia is first oxidized to nitrite and then to nitrate, was thought to be used by bacteria only. Very recently, however, data from different laboratories, including ours, have demonstrated that marine Crenarchaeota are also able to oxidize ammonia into nitrite. Our North Sea data confirm that Crenarchaeota are nitrifiers, since their abundances

correlate well with the amount of their nitrification gene (Fig. 2.). In addition, high ammonium concentrations in winter are always associated with elevated crenarchaeotal abundances and, inversely, low levels in spring and summer concur with low crenarchaeotal cell numbers.. So, fluctuations in ammonium concentrations throughout the year can explain the strong seasonality in crenarchaeotal abundance. The spatial variability may also be explained by differences in ammonium concentrations, since a high correlation was, for instance, found in August between crenarchaeotal abundances and ammonium con-

centrations at different stations (Fig. 3.).

Our study shows that In summer crenarchaeota in the Southern North Sea are mostly nitrifiers. This implies that Crenarchaeota play an important role in the oceanic biogeochemical nitrogen cycle. On the other hand, the energy source of Euryarchaeota is still unknown and remains one of the major challenges for our future research on this topic.

This research was funded by the Netherlands Organisation for Scientific Research, Division Earth and Life Sciences (NWO-ALW) via the programme Land Ocean Interactions in the Coastal Zone (LOICZ) .

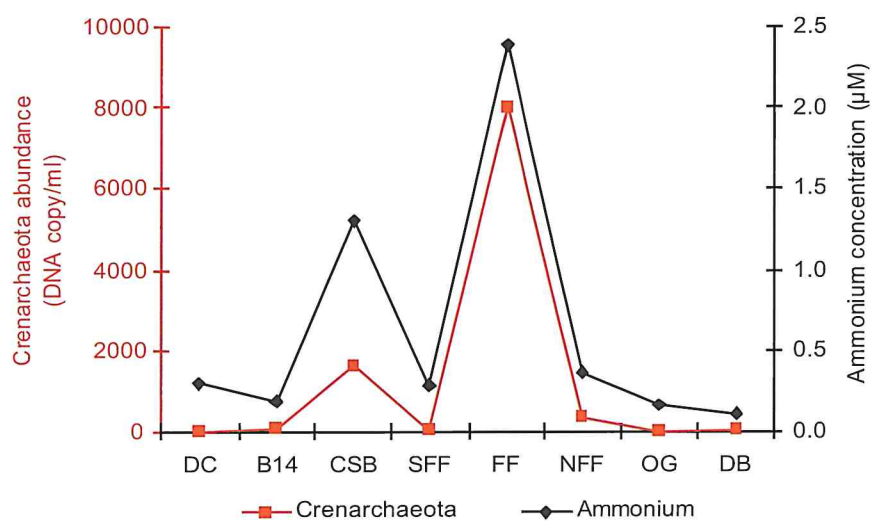


Fig. 3: Abundances of Crenarchaeota and ammonium concentrations in the surface seawater of the Southern North Sea, sampled in August 2004. Station abbreviations are explained in figure 1.



In the framework of the Ocean Facilities Exchange Group (OFEG), the last North Sea cruise of this programme was with the German RV Alkor.



Seawater sampling from the CTD-frame for DNA and lipid analysis on the RV Pelagia.

RECONSTRUCTING PAST CO₂ CONCENTRATIONS USING MOLECULAR FOSSILS

Jort Ossebaar, Geert Jan Brummer & Stefan Schouten*

We have assessed the possibility to reconstruct past oceanic CO₂ concentrations using organic molecules derived from algae as a molecular barometer. In particular, the stable carbon isotopic composition of long chain lipids (alkenones) was used. Our results show that the pattern of reconstructed CO₂ concentrations from alkenones resemble that found in air-bubbles trapped in deep ice-cores of the same age. However, the impact of differences in growth-rates of the algae on carbon isotope composition and, thus, nutrient levels at the time of active growth, are needed before this biogeochemical technique can be successfully applied.

The element carbon occurs in two stable forms or isotopes. The great majority consists of the light isotope (¹²C) and only about 1% of the heavy isotope (¹³C). For the reconstruction of past oceanic CO₂ concentrations, we applied the concept of the “paleobarometer” and used the ¹³C-contents of alkenones (Fig. 1.). Reconstruction of the CO₂ levels in the environment relies on the fact that the ratio of the stable carbon isotopes ¹²C and ¹³C in phytoplankton varies with the ambient concentration of CO₂. Carbon fixation by photosynthesis takes place in the photic zone of seas and oceans, of which the surface constantly exchanges CO₂ with the atmosphere. Therefore, changes in the atmospheric concentration of CO₂ influence the ¹³C/¹²C ratio (δ¹³C) of the phytoplankton. A small part of the organic material will be archived in the sediment at the seabottom and thus conserves information on the CO₂ level in the upper mixed layer of the oceans.

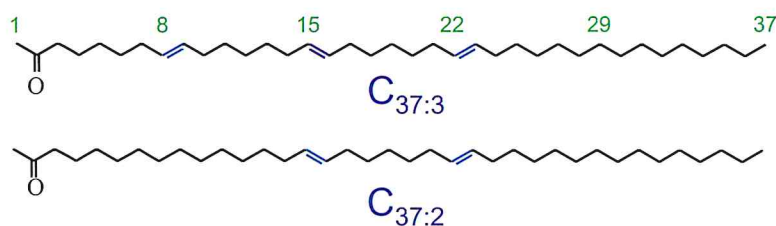


Fig. 1. Structure of the alkenones investigated.

At high CO₂ concentrations in air and surface water, the difference between the ¹³C-contents of alkenones and the ¹³C-contents of CO₂ will be large, but at low CO₂ concentrations, the difference will be smaller.

Application in the Arabian Sea.

For reconstruction of past CO₂ levels, we analysed the stable carbon isotope composition of C₃₇ alkenones in samples from discrete time intervals in sediment core NIOP 464 recovered from the central Indian Ocean.

Stable carbon isotope compositions varied between -21.7 ‰ and -24.0 ‰. The CO₂ concentrations calculated from these data showed large differences for the successive

time intervals given in fig. 2.

Clearly, all CO₂-concentrations we reconstructed in this manner are well above those directly measured in air bubbles from the Vostok ice core. This suggests that the Indian Ocean was over-saturated at times and thus remained a source for atmospheric CO₂ just like it is today. Interestingly, the pattern of changes in our biogeochemically reconstructed CO₂ concentrations parallels that of atmospheric CO₂ from the ice-core (Fig. 2.). However, before these reconstructions can be confidently used, the algal growth rates need to be assessed. When inorganic nutrients are amply available, the ¹³C/¹²C ratio of algae tends to become smaller than when nutri-

ents are scarce and limit algal growth. Thus, when these constraints on growth rates will become available, for example by the analysis of the ratio of cadmium and calcium in the shells of foraminifera occurring in the same sediment layers, better insights can be obtained on the reliability of this proxy for paleo-CO₂ reconstructions.

This research was part of the EU-project "C6", Carbon Cycle, Carbonate Chemistry and Climate Change.

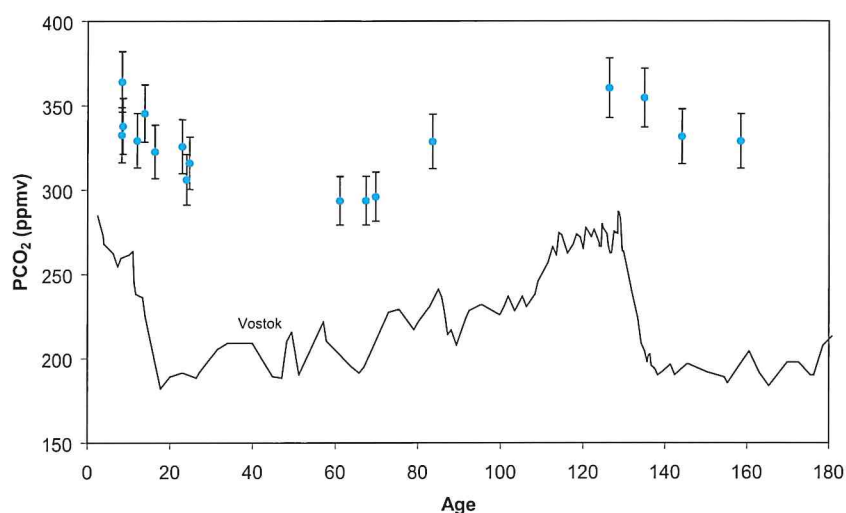


Fig. 2. Calculated CO₂ levels based on the alkenone isotope composition is given as vertical bars. The continuous profile represents the CO₂ levels from air bubbles in the Vostok ice-core.

EXTERNAL PROJECTS MARINE BIOGEOCHEMISTRY AND TOXICOLOGY

- Environmental controls on present and past microbial diversity as revealed by extant and fossil DNA from Antarctic Ace Lake and Ellis Fjord (NAAP/NWO-ALW).
B. Abbas, J.S. Sinninghe Damsté, J.K. Volkman, M. Coolen.
- Rapid global change during the Cenomanian/Turonian oceanic anoxic event in the tropical ocean: Examination of a natural climatic experiment in Earth history (UU).
E. van Bentum, A. Forster, G.-J. Reichart, J.S. Sinninghe Damsté.
- Fossil DNA as recorder of global change and ancient biodiversity in Quaternary marine settings (NWO-ALW, SPIN-OZA).
A. Boere, M. Coolen, S. Schouten, J.S. Sinninghe Damsté.
- Bioavailability of surfactants in marine sediments (ERASM).
K. Booij, Aquasense, IRAS (UU).
- Project FIRE: Risk assessment of brominated flame retardants (BFRs) as suspected endocrine disrupters for human and wildlife health (EU).
J.P. Boon, Y. van Breugel.
- Project Whale-Farøer: Biochemical and in vitro biotransformation analyses on hepatic microsomes of pilot whales. ('Denmarks og Grønlands Geologiske Undersøgelser', Copenhagen, DK).
J.P. Boon, M. Dam.
- Marine Environmental Awareness Courses for the Dutch Maritime Universities of professional education. ('ProSea' foundation).
J.P. Boon, ProSea, EcoMare.
- The biophysical properties of newly-discovered membrane lipids: Insights into the functioning of cell membranes of marine microorganisms (NWO-Molecule to Cell program).
H. Boumann, S. Schouten, E.C. Hopmans, J.S. Sinninghe Damsté, M. Strous, M.S.M. Jetten, P. Stroeve, M. Longo, A.C.T. van Duin.
- The nitrogen cycle: foraminifera, bacteria and molecular paleontology of the marine deeper redox zone (NWO-ALW).
J. Brandsma, M.S.M. Jetten, B. van der Zwaan, S. Schouten, J.S. Sinninghe Damsté.
- Environmental controls on ancient microbial diversity and metabolic processes as revealed by stratigraphic analysis of fossil and extant functional genes. (NWO-Vernieuwingsimpuls, VENI grant).
M. Coolen.
- Palaeothermometry of the mid-Cretaceous greenhouse world using a new sea surface temperature proxy based on crenarchaeal membrane lipids (NWO-ALW).
A. Forster, E.C. Hopmans, S. Schouten, J.S. Sinninghe Damsté.
- Archaeal carbon fixation and burial and terrestrial organic matter input in the coastal system as revealed by tetraether membrane lipids (NWO-ALW, LOICZ and SPINOZA).
L. Herfort, E.C. Hopmans, S. Schouten, J.S. Sinninghe Damsté.
- A new sea surface temperature proxy based on planktonic archaeal membrane lipids, the TEX86 (NWO-ALW, SPIN-OZA).
C. Huguet, M. Woltering, E.C. Hopmans, S. Schouten, J.S. Sinninghe Damsté.
- The impact of Anammox on the present-day and past oceanic nitrogen cycle (NWO-ALW).
A. Jaeschke, M. Strous, M.S.M. Jetten, S.G. Wakeham, S. Schouten, J.S. Sinninghe Damsté.
- Global anoxic events (Ministry of Economic Affairs, Shell).

A. Müller, J. van der Zwan, J.S. Sinninghe Damsté, P. de Boer, R. van de Wal, H. Dijkstra, P. Meijer, F. Hilgen, N. Frewin.

- 6C: Climate change, carbon cycle and carbonate chemistry (EU).
J. Ossebaar, G.J. Brummer, S. Schouten.
- Long-chain diols as palaeoproductivity proxies (NWO-ALW).
S. Rampen, K. Timmermans, G.-J. Brummer, S.G. Wakeham, S. Schouten, J.S. Sinninghe Damsté.
- Anaerobic ammonium oxidation (anammox): A new shunt in the oceanic nitrogen cycle? (NWO-ALW).
J.E. Rattray, M.M.M. Kuypers, M. Strous, M.S.M. Jetten, S. Schouten, J.S. Sinninghe Damsté, E.C. Hopmans.
- Tropical environmental change and its teleconnections during the last deglaciation: a lipid biomarker study dated with ¹⁴C wiggle-matching (NWO-ALW).
M. Rietkerk, G.J.M. Versteegh, J.H.F. Jansen, J.S. Sinninghe Damsté.
- MEDIFLUX: An integrated study of seepage through the seabed of the Nile deep sea fan (ESF/NWO-ALW).
A. Stadnitskaia, J. Woodside, G.J. de Lange, J.S. Sinninghe Damsté.
- Recycling of respired CO₂ in stratified marine systems: Consequences for the interpretation of the stable carbon isotope record (NWO-ALW).
Y. van Breugel, S. Schouten, J.S. Sinninghe Damsté.
- Land-ocean interaction and oceanic response in the Mid-Cretaceous western tropical Atlantic (DFG).
I. Stusser, T. Wagner, P. Hofmann, S. Schouten, J.S. Sinninghe Damsté.
- Biomarker and isotope studies of organic matter cycling in the Black Sea: A focus on bacteria and archaea (NSF).
S.G. Wakeham, S. Schouten, J.S. Sinninghe Damsté.
- Development, evaluation and application of organic geochemical tracers for terrestrial carbon input into the marine environment (NWO-ALW).
J.W.H. Weijers, E.C. Hopmans, S. Schouten, J.S. Sinninghe Damsté.
- Tetraether membrane lipids in the water column and sediments: Insights into the evolution and ecology of marine pelagic archaea.
C. Wuchter, S. Schouten, J.S. Sinninghe Damsté.
- International Census on Marine Microbes (Sloan Foundation).
J.W. de Leeuw, S. Schouten, G. Herndl, W. Pool, M.T.J. van der Meer.
- High-resolution reconstruction of Late-Glacial and Holocene climate variability in equatorial East Africa, based on laminated lake sediments from Mt. Kilimanjaro (CHALLACEA, ESF).
J. Ossebaar, S. Schouten, J.S. Sinninghe Damsté.
- Evolution and ecology of cold seep structures in the Gulf of Cadiz, NE Atlantic: interaction between the geosphere and the biosphere (NWO/RFBR program for scientific cooperation between the Netherlands and the Russian Federation).
T.C.E. van Weering, M.K. Ivanov, V.A. Soloviev, H. de Haas, H.B. Vonhof, G. Ganssen, J.S. Sinninghe Damsté.



BIOLOGICAL OCEANOGRAPHY

The goal of the research of the department of Biological Oceanography (BIO) is to obtain insight into the behavior and life strategies of the components of the lower marine food web, to elucidate intra-and interspecific interactions and to identify key species for specific ecological conditions and ecosystem functioning.

Research in BIO ranges therefore from autecological studies of single key species to food web studies including a modelling component. In 2005, the more biologically oriented parts of the department Marine Chemistry and Geology (MCG) became part of BIO.

In 2005, we have participated in cruises in the North Sea, the Atlantic and the Southern Ocean. From 10 January until 23 February, members of the BIO participated in the KEOPS field study in the Southern Ocean on board the French research vessel Marion Dufresne. The central research goal was to study the distribution of iron and iron binding ligands, and the effects of iron on the growth and physiology of phytoplankton and viruses. From 20 June until 21 July the first NWO-funded BIOSYS research cruise to the Rockall Trough in the NE Atlantic Ocean was conducted with the RV Pelagia in collaboration with members of the department Marine Ecology and Evolution. Experimental studies were performed dealing with the nutrition of cold-water corals and sponges collected at coral mounds between 500 and 700m depth. From 11 November to 12 December, the NWO funded research cruise ARCHIMEDES-1 was conducted in the subtropical North Atlantic with RV Pelagia in collaboration with members of the department of Fysical Oceanography. The biogeochemistry and microbial community composition and activity of the main deep water masses were followed. We paid special attention to the comparison of the deep water microbial activity measured under in situ pressure and under surface pressure conditions using the new NIOZ high pressure sampling and incubation device constructed by our Marine Technology department.

Three students defended their PhD theses this year, Jesus Maria Arrieta, Micha Rijkenberg and Yann Bozec. A summary of Yann Bozec's thesis is given below. Summaries of the theses of Jesus Maria Arrieta and Micha Rijkenberg have already been presented in the NIOZ Annual Report 2004 (the summary of Micha's thesis was given under the department MCG).

SUMMERTIME OVERPRODUCTION OF CARBON IN THE NORTH SEA

Yann Bozec, Helmuth Thomas, Laure-Sophie Schiettecatte, Alberto V. Borges, Khalid Elkalay & Hein J.W. de Baar*

The North Sea has been proven to act as a highly efficient continental shelf pump for the absorption of CO₂ from the atmosphere. Also, in the summer, the Net Community Production based on the carbon budget, exceeds almost threefold the carbon production derived via the Redfield ratio C:N:P=106:16:1 from budgeting of nutrient nitrogen. This confirms some previous indications of carbon overproduction in other coastal seas, thus showing that the common practice of deriving carbon productivity from nutrient budgets seriously underestimates the high productivity of coastal seas.

For carbon, a completely new field database was established. The North Sea was successfully covered during four seasons by an adapted 1° by 1° grid corresponding to 97 stations for each season/cruise. At each station the total Dissolved Inorganic Carbon (DIC) was accurately measured at up to 12 depths. Moreover while in transit between these stations some ~22,000 data points per cruise were collected of the partial pressure of CO₂ in surface seawater (pCO₂) versus air. During late summer, the bottom topography of the North Sea has a strong impact on the distributions of DIC and pCO₂. The surface distributions of these two parameters showed a clear boundary located around 54°N. South of this boundary the DIC and pCO₂ ranged from 2070 to 2130 μmol kg⁻¹ and 290 to 490 ppm, respectively, whereas in the northern North Sea, values ranged between 1970 to 2070 μmol kg⁻¹ and 190 to 350 ppm, respectively. The vertical profiles measured in the two different areas showed that the vertical mixing regime of the water column was the major factor determining the surface distribu-

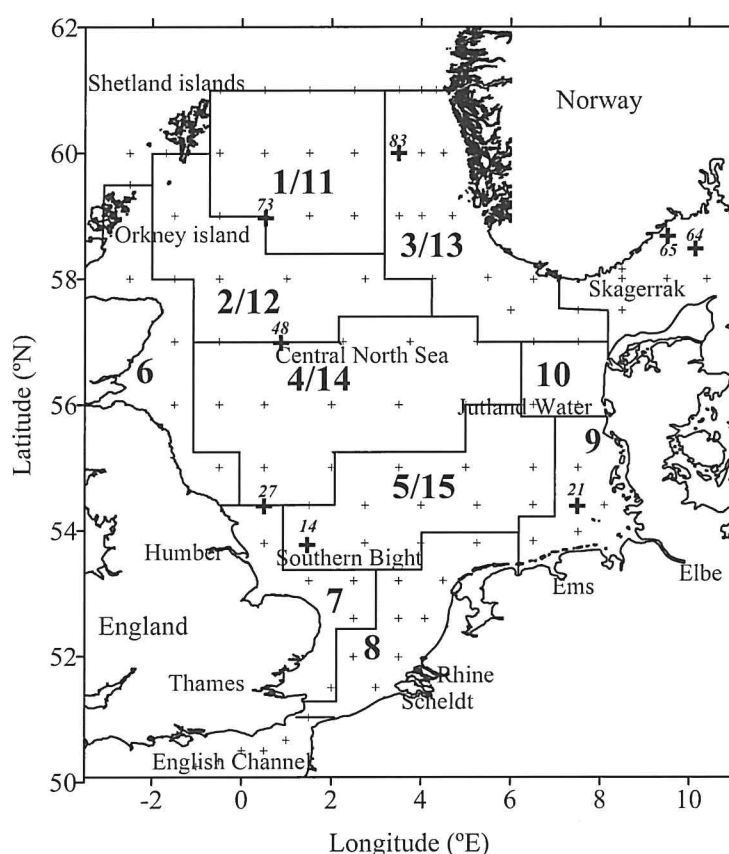


Fig. 1. Map of the study area and the International Commission for the Exploration of the Seas (ICES) boxes. Boxes 1, 2, 3, 4, and 5 represent the first 30 meters of the water column, whereas boxes 11, 12, 13, 14, and 15 are below the boxes 1-5 representing the bottom layer of the water column. The other boxes are one-layer boxes and represent the whole water column. Crosses represent the stations sampled during the four cruises.

tions. The entirely mixed water column of the shallow southern North Sea was heterotrophic (carbon release by respiration exceeding carbon fixation by photosynthesis), whereas the surface layer of the

stratified water column in the deeper northern North Sea was close to metabolic balance. During late summer, the southern North Sea acts as a source of CO₂ for the atmosphere within a range of

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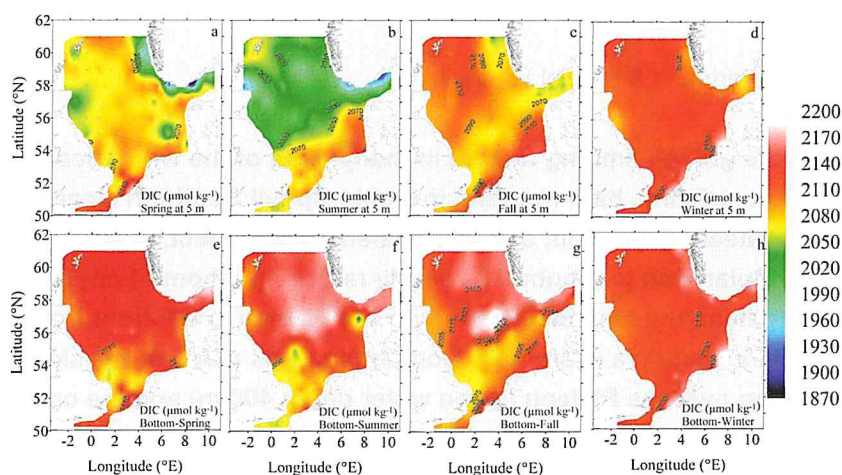


Fig. 2. Maps of DIC concentrations for the (a) spring, (b) summer, (c) fall, and (d) winter surface waters (5 m depth). Maps of DIC concentrations for the (e) spring, (f) summer, (g) fall, and (h) winter in bottom waters.

+0.8 to +1.7 mmol m⁻² day⁻¹, whereas the northern North Sea absorbs CO₂ within a range of -2.4 to -3.8 mmol m⁻² day⁻¹. The North Sea as a whole acts as a sink of atmospheric CO₂ of -1.5 to -2.2 mmol m⁻² day⁻¹ during late summer.

The annual air-sea exchange of CO₂ for the whole North Sea was obtained from the ~22,000 surface measurement of pCO₂ for each season, during the four consecutive cruises carried out during this thesis, thus constituting one of the most accurate estimates of the net annual air-sea flux of CO₂ for a coastal sea to date. As mentioned above, because of the absence of stratification during summer, the southern North Sea (south of 54°N) is an annual weak source of CO₂ for the atmosphere with a flux of 0.2 mol C m⁻² yr⁻¹. The northern North Sea (situated between 54° and 61°N) is a strong sink of CO₂ for the atmosphere with a flux of 1.7 mol C m⁻² yr⁻¹. The North Sea as a whole is a sink of CO₂ for the

atmosphere and takes up 1.4 mol C m⁻² yr⁻¹, from which approximately 93% are then transported to the deeper layer of the North Atlantic Ocean. The overall North Sea thus acts as a highly efficient continental shelf pump for the absorption of CO₂ from the atmosphere.

The seasonally resolved dataset of DIC, pCO₂ and inorganic nutri-

ents was interpolated per month, and regionally by using the 15-box scheme of the International Council for the Exploration of the Seas (ICES). The complete CO₂ system dataset allowed the first estimate of the Net Community Production based on inorganic carbon (NCP_C) in the different regions of the North Sea. An annual NCP_C of 4.3 ± 0.4 mol C m⁻² yr⁻¹ was estimated in the surface layer of the North Sea (513,000 km²), which accounts for 20-30% of the latest estimate of Global Primary Production (GPP) in the surface layer of the North Sea of 17.5 mol C m⁻² yr⁻¹. The NCP_C was almost threefold higher than the calculated NCP_N of 1.6 ± 0.2 mol C m⁻² yr⁻¹ based on the budget of nutrient nitrate. This summertime overproduction of carbon versus nitrogen is ascribed to a combination of preferential nitrogen cycling and intra-cellular mechanisms.

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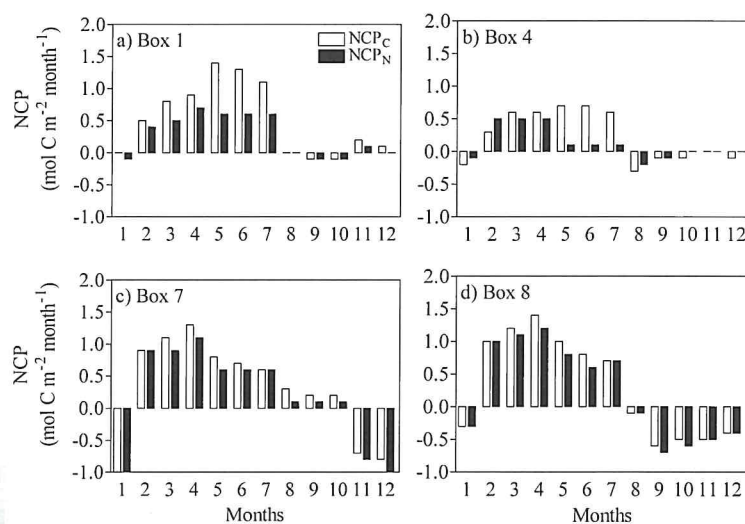


Fig. 3. Monthly net community production calculated from DIC (NCP_C) and NO_x (NCP_N) converted in C units using the Redfield ratio of 6.6 for two (a) northern and (b) central boxes as well as for (c) and (d) two southern boxes of the North Sea.

THE NATURAL LABORATORY OF THE KERGUELEN PLATEAU

Klaas Timmermans & Marcel Veldhuis

It is generally assumed that iron is one of the growth limiting factors in many parts of the world oceans, including the Southern Ocean. Contact of the pristine, high nutrient, low chlorophyll Southern Ocean water with sediments from the Kerguelen Plateau may result, due to the island mass effect, in an increased iron concentration, causing phytoplankton to bloom. The yearly returning bloom of phytoplankton over the Kerguelen Plateau strengthens the idea that water over the Plateau is different from that on the open ocean. During the KEOPS expedition a systematic comparison was made of physical, chemical and biological conditions prevailing over the Plateau (mean water depth 400 m) and the open ocean (mean water depth 4000 m). The contrasts as they were found in the research area confirmed the hypothesis that iron, most likely from the Plateau sediment results in more healthy phytoplankton. Internal waves are likely to provide for the transport mechanism of iron from the sediments to the surface waters.

50 The KEOPS (Kerguelen: compared study of Ocean and Plateau in Surface water) project studied the mechanisms and effects of natural fertilisation of the oceanic water by the Kerguelen plateau. Central themes of the KEOPS cruise were the investigation of 1) the sources of iron fertilisation and 2) the impacts of natural iron fertilisation on the biological CO₂ pump. The study was done using a systematic comparison of the contrasting sites of the open ocean (iron-poor) and the Plateau (iron-rich), under otherwise fully natural conditions.

Measurements of dissolved iron in surface waters indicated that in the whole research area, both on the Plateau as on the open ocean, concentrations were low (< 1 nM). Only on the Plateau, close to the sediment elevated iron concentrations were measured. Also dissolved organic ligands, keeping iron from precipitating back into the sediment, are elevated near the

sediment. Since the sediment appears to be the source of iron, physical research addresses the role of internal waves on mixing and transport of iron to the surface. In the water over the Plateau high abundances of phytoplankton, mainly large, chain-forming diatoms, and viruses were found. From the large diatom species it is known that they can only proliferate under relative high-iron conditions and they are probably the cause of the relative low iron concentration in the waters over the Plateau. These diatoms were in physiological healthy condition, and caused a significant reduction in CO₂ concentration in the atmosphere over the Plateau. On the open ocean on the contrary, low numbers of phytoplankton and viruses were present. Their cell size was smaller and they were less healthy than the phytoplankton found over the Plateau.

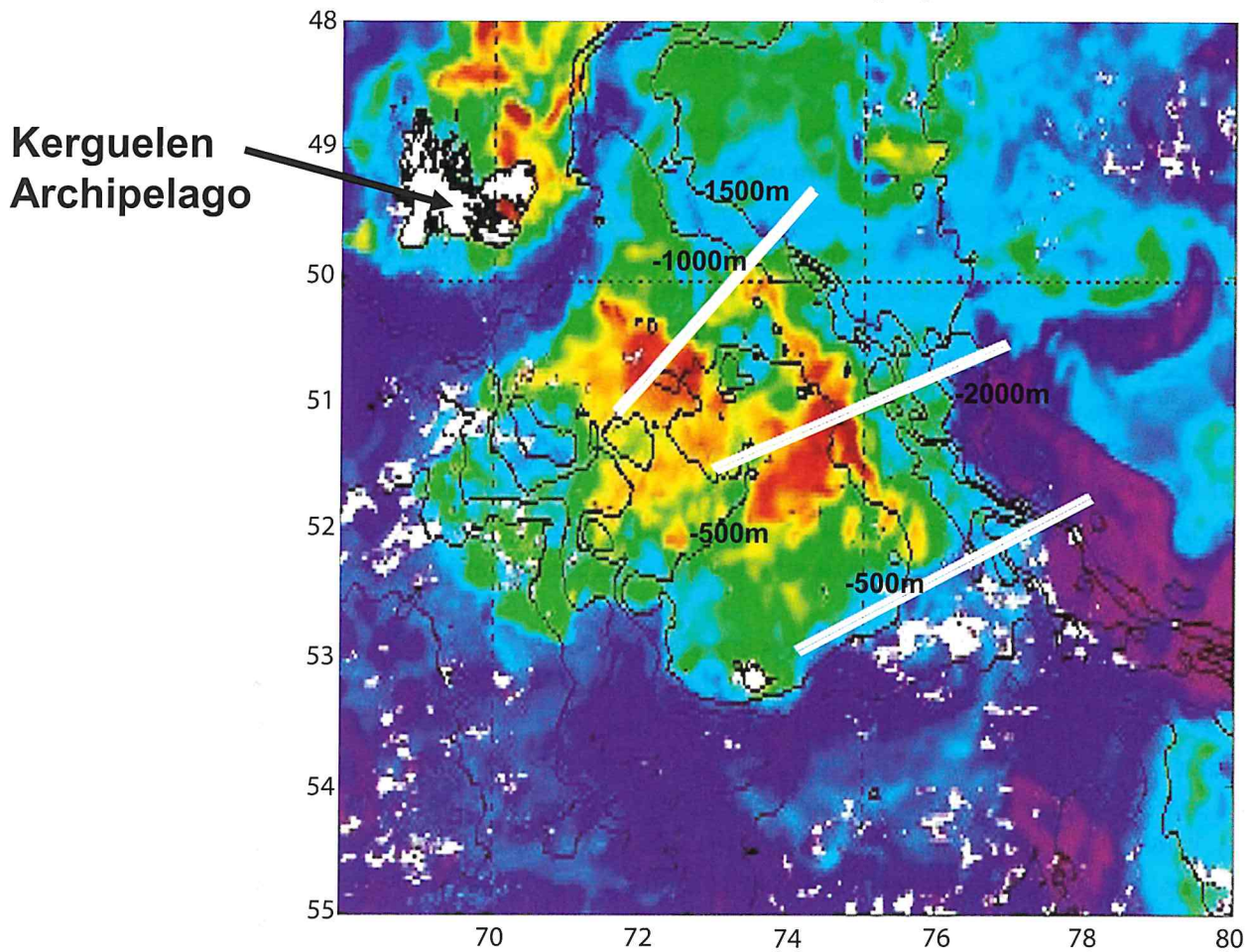
This research was funded by ALW (KEOPS small cruises pro-



Patrick Laan collects "iron-free" water with GoFlo bottle attached to kevlar cable in the Southern Ocean.

gramme) with travel grants for participants from the Netherlands Antarctic Programme, NAAP

25/01/05 chlorophyll



51

Composite satellite image of the area SE of the Kerguelen archipelago (in white in the NW corner), indicating chlorophyll content of the surface on 25 January 2005 in the middle of the KEOPS cruise. White lines indicate the position of the three transects with each ten sampling stations. The effect of the archipelago can be seen by the relative high concentrations of chlorophyll over the plateau SE of the island (black lines indicating equal water depth), whereas in the waters SE of the plateau extremely low concentrations prevail.

BACTERIAL GROWTH IN THE OPEN OCEAN

Thomas Reinthaler* & Gerhard J. Herndl

The main function of heterotrophic bacterioplankton in marine carbon cycling is the conversion of dissolved organic carbon (DOC, a mixture of uncharacterized organic molecules and characterizable organics released by organisms such as proteins, sugars and lipids) into cellular biomass and carbon dioxide (CO₂). The relative importance of bacterial biomass production (BP) versus bacterial respiration (BR) is expressed by the bacterial growth efficiency ($BGE = BP / (BP + BR)$). Thus, the bacterial growth efficiency provides information on whether bacteria act more as a 'sink' or a 'link' of organic carbon to higher trophic levels. Bacterial biomass production measurements are frequently performed, but respiration measurements are scarce. Instead, respiration of natural bacterial communities has often been derived from bacterial production measurements alone, assuming constant bacterial growth efficiency, which is usually determined in laboratory experiments. To advance our knowledge on the dynamics of bacterial growth efficiencies in natural systems, an extensive dataset of bacterial production and concomitant bacterial respiration measurements was collected at different trophic sites of the open ocean.

Bacterioplankton represent the largest living biomass in the world's ocean and they are the only group of organisms able to take up the large pool of DOC in aquatic systems. Their main ecological role is to take up and digest the dissolved organic carbon (DOC) pool in seawater by incorporating a part of it into biomass and respire the remaining major fraction to CO₂. Depending on the trophic state of the environment, bacterioplankton contribute between 10% and more than 80% to the respiration of the total food web in the open ocean.

While the importance of bacterial respiration in the ocean was recognized already in the 1970s, the research focus to unravel the oceanic carbon cycle until today was on primary production by algae and bacterial secondary production rather than on heterotrophic processes. This bias towards productivity measure-

ments is probably due to the relatively simple and seemingly straightforward methods to measure algal- or bacterial production with radiolabeled substrates. Respiration was mainly modelled from these production measurements, leading to the assumption of a highly efficient conversion of

DOC into cellular mass of bacteria. Consequently, bacteria were mainly seen as a food source to higher trophic levels. Our work in different parts of the open ocean (Fig. 1) using direct measurements of bacterial production and respiration showed, however, that bacteria are all but efficient in producing

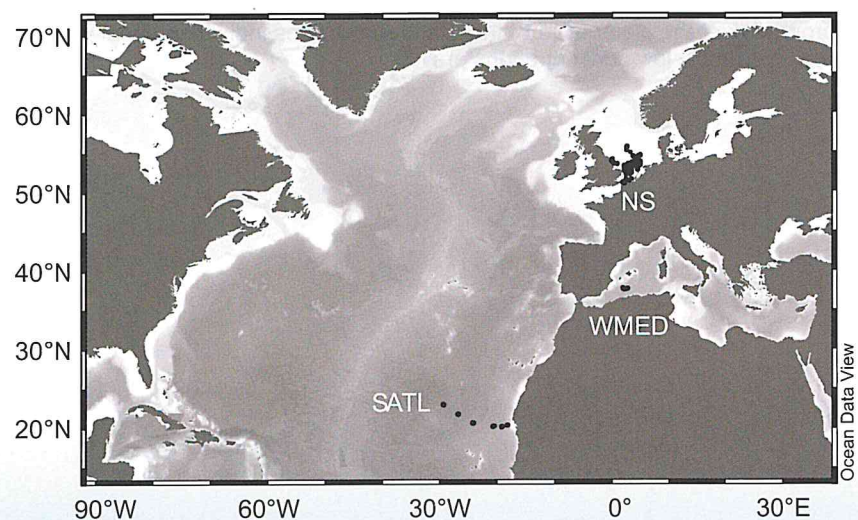


Fig. 1. Map of the study sites in the North Sea (NS), the western Mediterranean Sea (WMED) and the subtropical Atlantic (SATL). Black dots indicate the stations where bacterial production and respiration measurements were performed.

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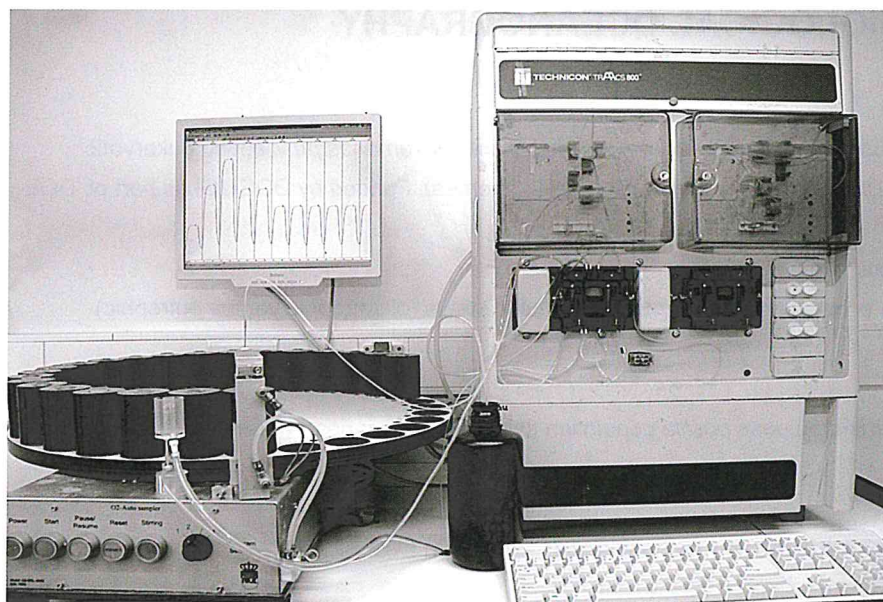


Fig. 2. Continuous-flow analyzer with autosampler to measure oxygen concentrations in seawater.

biomass. To determine bacterial respiration efficiently and accurately, a newly designed semi-automated oxygen determination system, based on the Winkler method was used (Fig. 2).

In eutrophic as well as oligotrophic environments the bacterial growth efficiency was on average 20% (Fig. 3). This means that only 20% of organic carbon is incorporated in the cells and is thus available to higher trophic levels, whereas around 80% of the carbon

taken up by bacteria is respired as CO_2 . In fact, the oxidation of DOC to CO_2 mediated by the bacterioplankton in the open ocean is so high, that questions on the supply mechanisms of organic substrates to these remote places arise.

Future research will show whether the horizontal transport of organic carbon from highly productive coastal areas or the local primary production in the ocean is

sufficient to fuel the carbon demand of bacteria in the open ocean. Budget calculations on the organic carbon production and bacterial respiration for the North Atlantic indicate, that the bacterioplankton carbon demand is higher than the surface primary production can provide. Thus, transport from other areas has to fill this gap in the mass balance.

Financial support for this research was provided by the Netherlands Organisation for Scientific Research (NWO-ALW) ARCHIMEDES project and the European Commission through the COMETand ARWIN project.

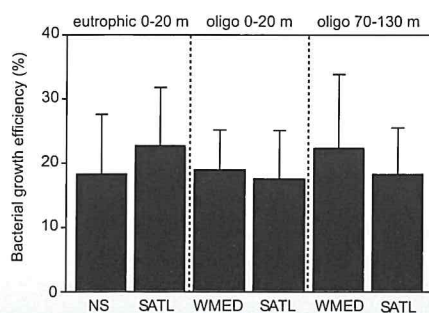


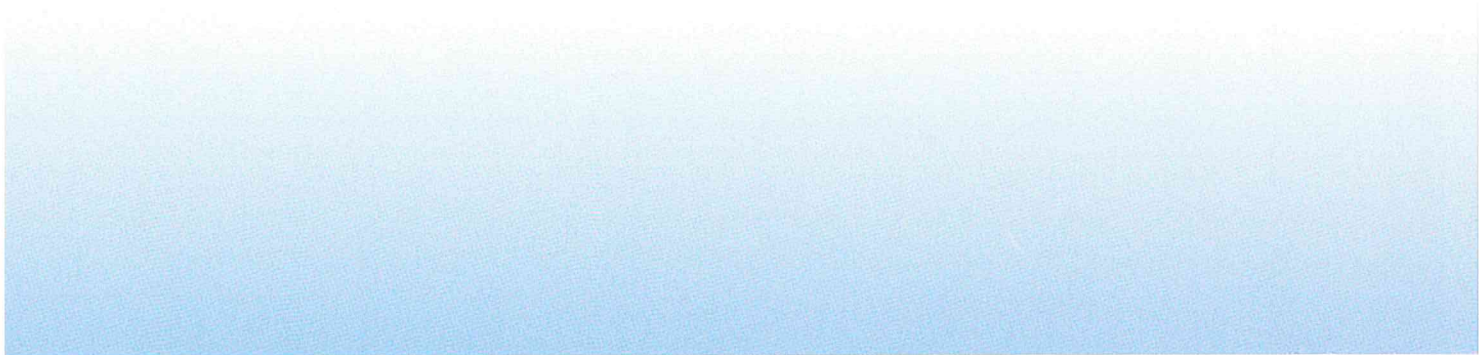
Fig. 3. Bacterial growth efficiency (%) at different trophic sites and depths of the open ocean. For sites sampled and abbreviations see Fig 1.

Intermezzo: While the main interest in bacterioplankton respiration is actually CO_2 evolution, the measurement of concomitant oxygen consumption, is a more reliable and sensitive method for the often minute respiration rates. Oxygen consumption rates are converted to units of carbon with the respiratory quotient ($\text{RQ} = \text{CO}_2/\text{O}_2$). Traditionally, the Winkler titration was the method of choice and it still forms the golden standard for oxygen measurements. However, manual titration is labour intensive and exact measurements demand a high degree of analytical experience. At NIOZ, we have developed an automated spectrophotometric analysis of oxygen concentrations in seawater samples for this purpose, which provides precision and accuracy similar to the Winkler method (Fig. 2).

EXTERNAL PROJECTS BIOLOGICAL OCEANOGRAPHY

- Comparative genomic analysis of viruses infecting *Phaeocystis globosa* and *Micromonas pusilla*, two eukaryotic microalga of global distribution. (US-DOE project for sequencing viral genomes). Funded by DOE JGI as part of 'DOE 2005 Microbes'.
C.P.D. Brussaard, Co-PI: E. Wommack
- MOrtality of MArine Phytoplankton in ecosystems with contrasting trophic status (oligotrophic versus eutrophic) (MOMAP, NWO-ALW).
C.P.D. Brussaard
- Virus control of the picophytoplankter *Micromonas pusilla* population dynamics in European waters (MICROVIR, NWO-ALW).
C.P.D. Brussaard
- Fast Advanced Cellular and Ecosystems Information Technologies (FACEiT, 6th FWP of EU).
C.P.D. Brussaard
- CARBOOCEAN (Integrated Project of the 6th FWP of EU)
H.J.W. de Baar
- Ocean Carbon Cycle (Netherlands Bremen Oceanography Program, NEBROC-2).
L.J.A. Gerringa, H.J.W. de Baar
- Incorporation of the carbon cycle in the European Regional Seas Ecosystem Model (ERSEM) (ALW-NWO 014.27.000).
H.J.W. De Baar, H. Thomas, K. Elkalay, P. Ruardij
- The continental shelf pump: a pilot study in the North Sea. (ALW-NWO 810.33.004).
H.J.W. de Baar, H. Thomas, Y. Bozec
- Uptake of anthropogenic carbondioxide in the Southern Ocean. (ALW-NWO 813.03.003).
H.J.W. de Baar, R. Middag, E. van Weerlee.
- Transformation of dissolved organic matter (DOM) in the North Atlantic Deep Water and intermediate waters: assessing the functional and phylogenetic variability of marine bacterioplankton communities in relation to the quality of DOM (TRANSAT, ALW-NWO).
G.J. Herndl
- Bacterioplankton cell death: competition between flagellate grazing and viral lysis and the role of bacterioplankton cell wall-derived dissolved organic matter in the ocean (BADE, ALW-NWO).
G.J. Herndl
- Activity, rates, carbon use and high-pressure microbial ecology of the deep sea (ARCHIMEDES, ALW-NWO).
G.J. Herndl
- Application of capillary electrophoresis for isolating bacteria and assessing Ectoenzyme diversity and kinetics (ACE, Marie Curie Host Fellowship of EU).
G.J. Herndl
- Capillary electrophoretic separation of dissolved carbohydrates of the aquatic realm (CAESAR, Marie Curie Fellowship, 5th FWP EU).
G.J. Herndl
- Prokaryotic activity in the North Atlantic deep waters assessed by MICRO-CARD-FISH in relation to bulk activity (PROACTINOR, Marie Curie Fellowship, 6th FWP EU)
G.J. Herndl

- Bacterial single-cell approaches to the relationship between diversity and function in the Sea (BASICS, 5th FWP of EU).
G.J. Herndl
- Microbial diversity and ecosystem functioning: concepts, open questions and recommendations for integration of microbes into general ecological frameworks. (Responsive Mode Project, MARBEF, 6th FWP EU)
G.J. Herndl
- MFSTEP: Mediterranean Forecasting System Toward Environmental Prediction. Sub project : Ecosystem Modelling (MFSTEP, FWP Energy, Environment and Sustainable Development of EU)
P. Ruardij
- Rapid development of an ecosystem/ecological modelling capacity at CEFAS (Dep. for Environment, Food and Rural Affairs, England)
P. Ruardij
- Participation in the KEOPS cruise on board the research vessel Marion Dufresne (KEOPS klein vaarprogramma ALW)
K.R. Timmermans
- Travelgrant for participation in KEOPS cruise (Nederlands Antarctisch Programma, NAAP)
K.R. Timmermans
- Improved quantification of Southern Ocean diatoms as indicators for carbon fixation (Kerguelen). (SRON beurs ,Van Der Woerd)
K.R. Timmermans, M.R. Wernand (FYS)
- Iron light co-limitation of phytoplankton photosynthesis (Euroceans, 6th FWP EU, coordinated by R. Geider, Essex, UK)
K.R. Timmermans
- Sustainable production, physiology, oceanography, natural products, genetics and economics of sponges (Sponges, 6th FWP EU coordinated by W.E.G. Müller, Mainz, Germany)
F.C. van Duyl
- Biodiversity and ecosystem functioning of deep water coral reefs in the Mediterranean Sea and the NE Atlantic (NWO-ALW 814.01.005)
F.C. van Duyl, C. Maier
- Dissolved organic matter cycling on coral reefs: Are coral cavities sinks of DOM? (NWO-WOTRO, W84-547)
F.C. van Duyl, J.M. De Goeij
- Removal of pico-and nanoplankton by coral reef benthos along the east coast of Kalimantan (Indonesia): coupling pelagic benthic heterotrophy to coral reef status (NWO-WOTRO, Wt84-560)
F.C. van Duyl
- The role of native and/or invasive ecosystem engineers in explaining biodiversity. (Responsive Mode Project, MARBEF, 6th FWP EU)
F.C. van Duyl, C. Maier, R.P.M. Bak (MEE), G.C.A. Duineveld (MEE),
- OceanSaver: new developments to reduce the presence of viable organisms in ballast water (Holding OceanSaver and EU).
M.J.W. Veldhuis



The department aims for a mechanistic understanding of the structure and dynamic behaviour of marine macrobenthos populations and communities. Taking up one of the great challenges in modern ecology, we try to understand the properties of populations and communities on the basis of characteristics of individual organisms. We focus on the role of bottom-up (food input and competition for food and other resources) as well as top-down (predation) processes in structuring benthic communities.

The work within the department of MEE covers three major themes:

1. The structuring role of top-predators in marine ecosystems
2. Competition, life-history strategies and dynamic energy budgets
3. Recruitment and dispersal in relation to spatial and genetic structure of benthic invertebrate populations

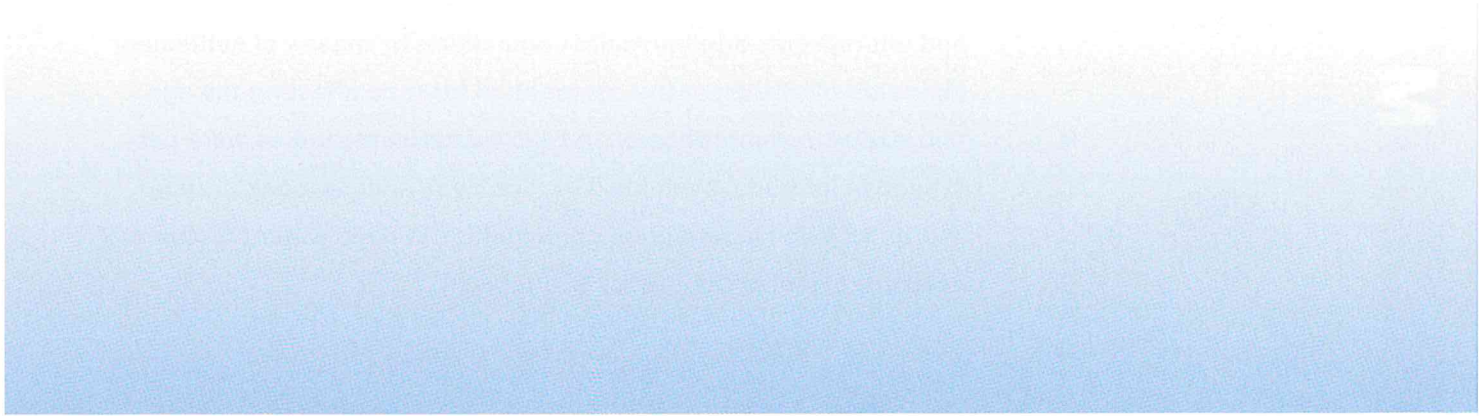
In 2005 we continued our work on an avian predator, the red knot *Calidris canutus* and its bivalve prey in the Wadden Sea, and extended the research program on the Banc d'Arguin, Mauritania. The red knot colour ring programme which started there five years ago, now begins to reveal reliable estimates of annual survival rates in relation to habitat choice. Interference among foraging turnstones *Arenaria interpres* and among foraging shorecrabs *Carcinus maenas* was studied in further detail in laboratory experiments.

At the level of the individual benthic invertebrate, interest was directed towards performance (e.g. growth, age and size at maturity, fecundity, survival, or more generally energy budgets) in response to food availability and other environmental conditions, and a start was made with studying the consequences of choosing a specific energetic strategy for competitive interactions and fitness.

At the population level, it has been observed that the period around the settlement of the recruits is extremely important in marine benthic population regulation. Henceforth over the last few years we focused intensively on recruitment processes (e.g. intra- and interspecific adult-juvenile competition by means of settlement inhibition by adults, or the competition for food affecting the age and size at metamorphosis). In 2005 recruitment studies were performed in intertidal systems (Wadden Sea), shallow coastal seas (North Sea) and in coral reef communities in deep water (continental shelf edge) and in the tropics (Caribbean).

In 2005 Teresa Amaro (on the performance of North Sea benthos in response to changing environmental conditions), Oscar Bos (on processes in the pelagic realm affecting the recruitment success of the bivalve *Macoma balthica*) and Sander Scheffers (on the benthic-pelagic

coupling in coral reefs) defended their PhD theses. Teresa Amaro's work is summarized below. The research of Oscar Bos and Sander Scheffers was presented in previous annual reports.



THE BENTHIC SHIFT IN THE FRISIAN FRONT ECOSYSTEM POSSIBLE MECHANISMS

Teresa Amaro & Gerard Duineveld*

Annual monitoring of the bottom fauna living at the Frisian Front (southern North Sea) has shown a shift from a stable state dominated by the brittlestar *Amphiura filiformis* to another stable state dominated by the burrowing mud shrimp *Callianassa subterranea*. Due to this shift, a substantial increase of the bottom roughness, especially in the summer, is expected. Resuspension of silt increases, which makes the habitat unfavourable for the restoration of an *A. filiformis* population.

From brittle star to mud shrimp population

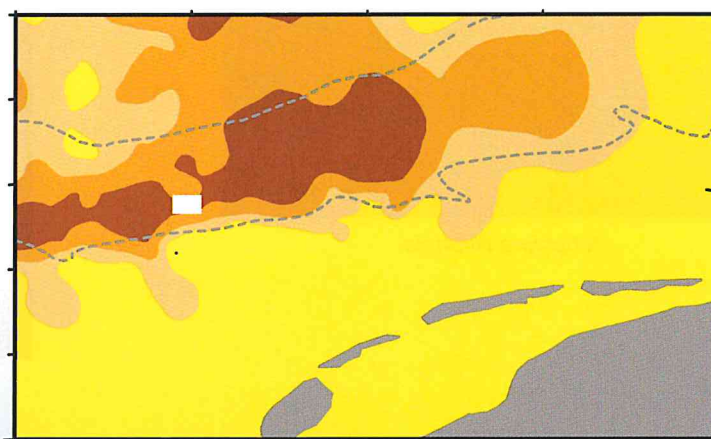
The Frisian Front is situated about 40 miles north of Texel at the southern edge of the Oyster Ground. It is known as a rich area with a high level of biological productivity. It is positioned at the transition between the shallow waters of the Southern Bight (25 m depth) and the deeper water of the Oyster Ground (depth >35 m). The coastal waters are well mixed all the year round, but a vertical layering occurs in the Oyster Ground between May and October, with a warm surface layer (up to 20°C) developing above a cold lower layer ($\approx 12^\circ\text{C}$) during summer. Many nutrients become available as fuel to promote the growth of algae, forming the basis for the biological productivity in and on the seabed of the Frisian Front. In the period 1992-1997, the populations of the brittle star (*Amphiura filiformis*) and the mud shrimp (*Callianassa subterranea*), underwent striking changes. In 1992, the density of brittle stars was at its

peak, at 1750 per m^2 . At that time, the population consisted primarily of adults. After a 10-year period of high densities, the population decreased to a density of 100 per m^2 . In the meantime, the numbers of mud shrimps, which live in tunnels in the seabed, increased from about 40 per m^2 in 1992 to more than 300 per m^2 in 2000 and following years. The seabed ecosystem of the Frisian Front seems to have moved from one stable situation to another. Apparently, ecosystems can have more than one stable situation.

Sediment stability

Laboratory experiments showed that high brittle star densities lead to a sticky sediment, less vulnerable to erosion by currents than a seabed dominated by mud shrimps. Mud shrimps produce piles of sediment that are easily resuspended by turbulence. The shift from a community dominated by *A. filiformis* to *C. subterranea* might have aggravated the resuspension and turbidity at the Frisian Front. The effect of *C. subterranea* seems to be even more pronounced when northerly and west-

59



White box: Location of the Frisian Front

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erly winds are above 10 m/s (Bft 6). Erosion might prevent planktonic larvae of *A. filiformis* to settle or cause that settled stages are transported away. In contrast, *C. subterranea* lives deep in the sediment and is hardly affected by resuspension. It is hypothesized that resuspension of bottom material affects the quality of food for benthic filterfeeders like *A. filiformis*. This may affect their condition and survival and lead to a reduced reproductive output. The change in sediment conditions keeps the community in its present state and prevents the recovery towards the former situation. Once initiated, this shift in the abundance of the two species might have developed a persistent character. Given the negative impact of resuspension and turbidity on seton feeders in general, it appears unlikely that the *A. filiformis* popu-

lation will be restored. Since *A. filiformis* and Thalassinid shrimps like *C. subterranea* and *Upogebia* spp., are likely to compete for the same food source, a recovery of *A. filiformis* is also hampered by concurrence.

The cause

Although we identified possible reasons for the apparent stability of the two contrasting states, it was not possible to clarify what factors initially caused the decrease and increase of *A. filiformis* and *C. subterranea* populations, respectively. Trawl fishing is intensive in the area. In general the passage of demersal fishing gear flattens the contours of the sediment surface and can severely damage the burrows or tube systems of the infauna. It is likely that commercial bottom trawling affects the composition of the benthic community.

However, the decrease in abundance of *A. filiformis* took place over a period of 5 years (1992-1997). The Frisian Front has been fished for many years before that period, without any effect on the *A. filiformis* population. So this makes it an unlikely trigger for the observed shift. Another explanation for the shift may be found in the population structure of *A. filiformis* itself. During the time that the species was abundant (1982 to 1992) there were only very few juveniles. So, it could be that when the adult population started to die off the few juveniles were not able to restore the population. This might have opened the way for other organisms, with the mud shrimp eventually coming out as the winner.

This work was supported by a grant from FCT (Lisboa, Portugal).



Amphiura filiformis



Callinassa subterranea

SEASONAL CHANGES IN PREEN WAX COMPOSITION OF MARINE BIRDS

Jeroen Reneerkens*, Theunis Piersma & Jaap S. Sinninghe Damsté

Marine shorebirds live in environments with low temperatures and often high wind speeds. Their plumages keep their body heat inside and wing feathers make them fly and are required to escape from live-threatening predators. Thus, it is important for birds to maintain their plumage. One of the aspects of plumage maintenance is the application of waxes onto the feathers. Wax compounds are synthesised in a small gland at the base of birds' tail, the preen gland. The secreted waxes are distributed over the plumage through preening with the bill. The hydrophobic nature of the waxes might aid in keeping birds' plumages waterproof. Our research shows that the waxes might also protect feathers against malicious bacteria and temporally even keep foxes and other predators away from the nest with eggs.

Birds maintain their plumage by the application of preen waxes from the preen gland. There are a lot of chemical studies on the often complex composition of the preen wax secretions of many species.

Despite considerable knowledge of the species-specific chemical composition of the waxes, much remains unknown about their function(s). It is generally assumed that preen wax keeps feathers waterproof, but an expected positive correlation between size of the preen gland and the degree of birds' contact with water has never been found. Here we briefly review our chemical studies as well as experimental work on the function of preen waxes in red knots, a marine shorebird that winters in tropical and temperate intertidal areas and reproduces on the tundra in the high Arctic.

Seasonally changing preen wax compositions

Small amounts of preen wax can directly be collected from birds'

preen gland by use of a cotton bud. The preen wax composition of red knots appeared to change with season. In spring, when the shorebirds are fully prepared to depart on a long-distance flight to the arctic breeding grounds, complex preen wax mixtures usually consisting of so-called 'monoesters' are replaced with mixtures solely consisting of 'diesters'. Diesters are generally larger molecules than monoesters and therefore less volatile and probably more difficult to smear onto the plumage. It now became interesting not only to find out what the functions of preen waxes are, but also to find a functional explanation for the seasonal shift in preen wax composition.

The shift in preen wax composition took place just before departure to the Arctic and diester secretions were first found in a red

knot in early June in arctic Canada when the birds were involved in mate choice and courtship during which they display their red plumage to impress possible mates. It was therefore hypothesised that the diester preen waxes were of use for the birds during reproductive behaviour. A function during the migratory flight was excluded because red knots departing to and after arrival at a stop-over site on the east coast of the United States secreted the usual monoester preen waxes.

61



The collection of preen waxes from the preen gland of a red knot by use of a cotton bud. Photo by Jeroen Reneerkens.

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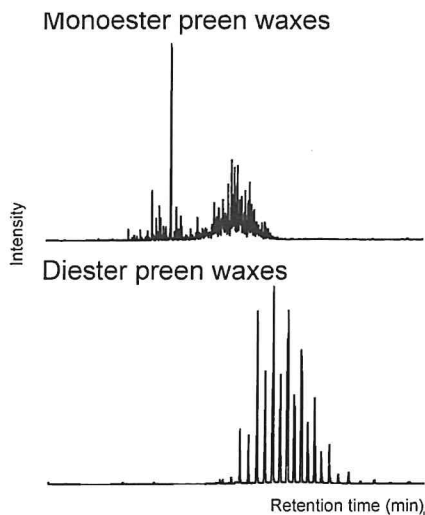
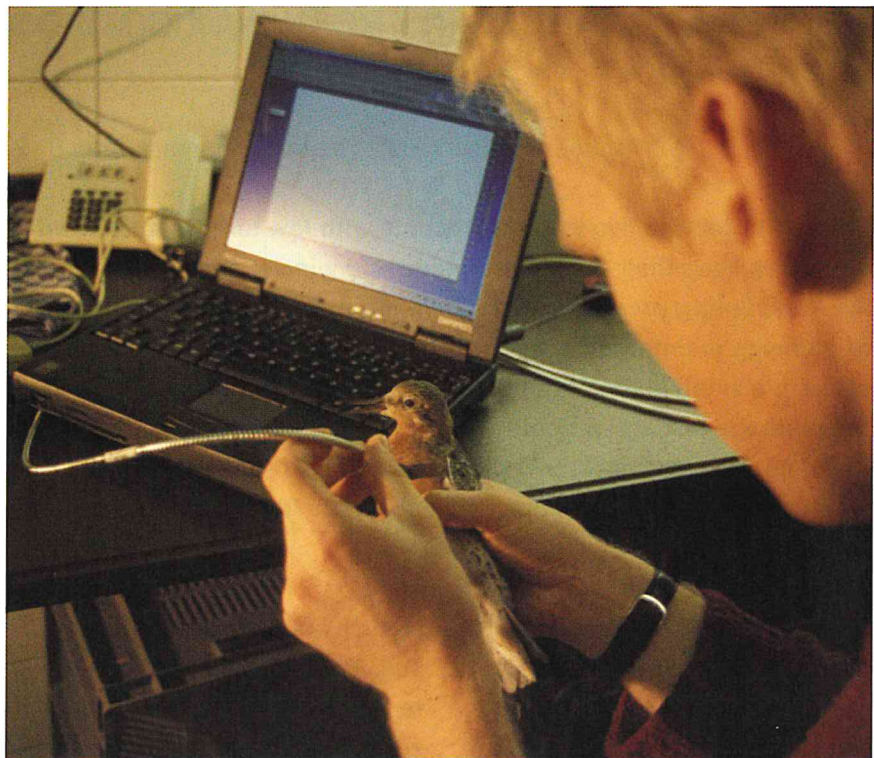


Fig. 2. Gas chromatograms of monoester and diester preen waxes of red knots. The higher retention time (x-axis) of diesters is indicative of a lower volatility than monoesters.

Colour, protection or smell?

Some experimental tests.

Because of the timing of the preen wax shift, we thought that a coat of diester preen waxes would increase the redness or shininess of the plumage and thereby function as a kind of 'avian make-up'. However, by use of spectrophotometry, no colour change could be measured after the shift in wax composition. It appeared also that diester preen waxes were not only secreted during the short period of courtship, but also during the following period of incubation of eggs. Interestingly, only those birds that were actually involved in incubation, secreted diesters during the breeding period. For example, in ruffs of which only females breed, it is also only the female in which preen wax composition shifts to diesters. The showy males of this species surprisingly secreted no diester waxes at all. This suggests



Photospectrometry of the plumage of a red knot. Photo by Jeroen Reneerkens.

that the diester waxes are especially important when the birds are incubating their eggs. Because feather-degrading bacteria that damage birds' plumage are active under warm and humid conditions (which occur in the nest of a breeding bird) it was suggested that

diester preen waxes might offer a better protection against bacteria. An experiment with feathers of red knots showed that feathers with preen waxes were less degraded than feathers without preen waxes. However, the chemical composition of the waxes did not matter.



Breeding red knots secrete diesters. Photo by Jeroen Reneerkens.

As shorebirds are ground-breeders, another aspect of incubation is the threat of losing a clutch to mammalian predators, such as arctic foxes. Although the plumage of shorebirds is very well camouflaged, foxes often search for prey by smell. We used a sniffer dog to test the idea that less volatile diester preen waxes are more difficult to find by predators than monoester waxes. We varied the amount as well as the composition of the preen waxes. After several trials it appeared that the dog was less often able to locate diester waxes than monoester waxes. This suggests that diester preen waxes reduce shorebirds' smell when incubating and thereby reduce predation risk.

This work was funded by ALW.

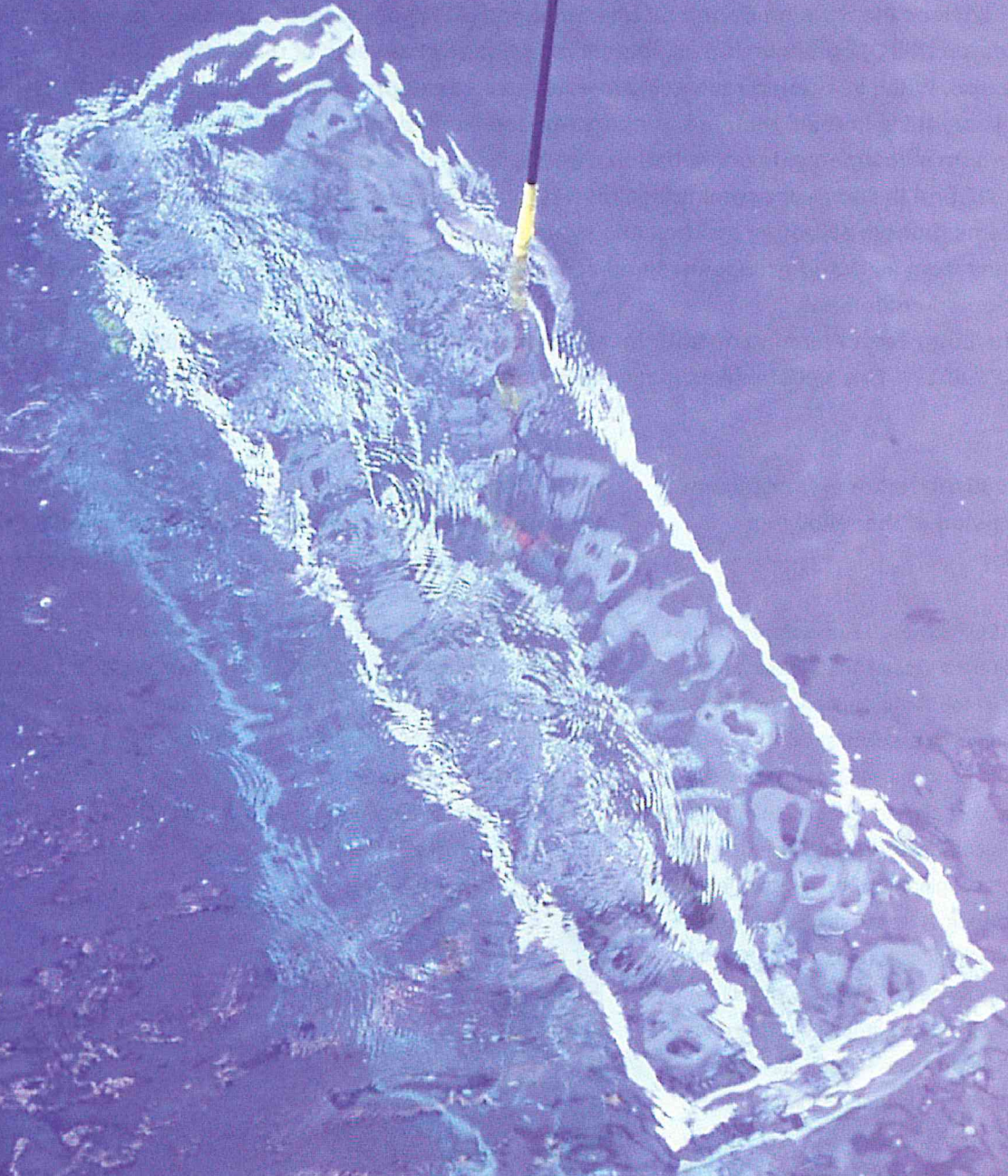


A sniffer dog using its nose to find small amounts of preen waxes of red knots.
Photo by Jeroen Reneerkens.

EXTERNAL PROJECTS MARINE ECOLOGY AND EVOLUTION

- Biological monitoring programme North Sea and Outer Delta (MON*BIOLOGIE, RWS-RIKZ)
R. Daan, M. Mulder
- Long-term effects of former discharges of oil contaminated drill cuttings in the North Sea (NOGEPA)
R. Daan, M. Mulder
- Macrozoobenthos monitoring in Wadden Sea and Ems-Dollard (BIOMON, RWS-RIKZ).
R. Dekker
- Pan-European Gradients in Propagation and Settlement Events (EU Network of Excellence on Marine Biodiversity and Ecosystem Functioning).
C.J.M. Philippart
- Review of the conservation status of shorebirds in the Wadden Sea (BirdLife Netherlands).
T. Piersma, B. Spaans, J. Reneerkens
- Bazaruto National Park (Mozambique) Strategic Environmental Assessment (Commissie M.E.R. / Netherlands Commission for Environmental Impact Assessment).
R.P.M. Bak
- Kennisvraag Vogels en Zeezoogdieren Noordzee (E-Connection, Bunnik)
C.J. Camphuysen
- Beached bird survey monitoring programme (North Sea Directorate, Rijswijk)
C.J. Camphuysen
- Oiled Guillemot EcoQO (North Sea Directorate, Rijswijk)
C.J. Camphuysen
- Critical interactions between species and their implications for a precautionary fisheries management in a variable environment - a modelling approach (BECAUSE project, Leibniz Institut für Meereswissenschaften an der Universität Kiel, Germany)
C.J. Camphuysen
- Conservation of marine areas in Portuguese waters (SPEA/BirdLife, Lisboa)
C.J. Camphuysen
- Interactions between the marine environment, predators, and prey: implications for sustainable sandeel fisheries (IMPRESS, EU)
C.J. Camphuysen, J. van der Meer
- Chronic Oil Pollution in Europe (IFAW, Brussels)
C.J. Camphuysen
- Whale detection and identification (TNO, Rijswijk)
C.J. Camphuysen
- Protected marine areas in the North Sea (Alterra, Wageningen)
C..J. Camphuysen

SCIENTIFIC SUPPORT SERVICES



THE NETHERLANDS MARINE RESEARCH FACILITIES (MRF)

Marieke J. Rietveld

MRF advises the division Earth and Life Sciences (ALW) of the Netherlands Organisation for Scientific Research (NWO) on the technical, logistic and financial aspects of the National Programme for sea research. When sea-going research projects have been approved and granted by ALW, MRF assists the chief scientists in their planning, preparation and execution of the cruises. MRF advises ALW also on long-term investments, in consultation with the financial department and marine technology department of NIOZ and the advisory committees on CTD systems, auto-analyser systems, moored instrumentation systems, bottom sampling and seismic systems and biological sampling systems. Scientists and technicians from all Dutch groups involved in sea-going research participate in these advisory committees for pooled-equipment.

The Long Term Planning on MRF investments was updated for the years 2005 – 2009 and submitted to NWO/ALW. This update takes place every year.

In 2005 the National Programme consisted of the following cruises:

- 1 KEOPS (KErguelen: compared study of Ocean and Plateau in Surface water. Netherlands contribution chief scientist Dr. K.R. Timmermans, NIOZ). The KEOPS project aims to study the effect on algae growth of iron and silicate that originates from the Kerguelen islands. A large international group of scientists joined the KEOPS 42 day research cruise on board the RV Marion Dufresne of the French Polar Institute Paul Emile Victor (IPEV) in January/February 2005.
- 2 CO₂ UPTAKE (WECCON/ANTDEEP III. Netherlands contribution chief scientist Dr. H. Thomas, NIOZ). To measure carbon dioxide uptake in the southern Ocean, Dutch scientists joined the research cruise Weddell Sea Convection Control WECCON/ ANTDEEP III, on board

the RV Polarstern of the German Alfred Wegener Institute for Polar and Marine Research (AWI) in January – April 2005.

- 3 BIOSYS (BIODiversity and EcoSYStem Functioning of Deep Water Coral Reefs in the Mediterranean and N.E. Atlantic; chief scientist Dr. F. van Duyl, NIOZ). A 21 day cruise was performed in the Rockall Trough mar-

gin in the North Atlantic Ocean West of Ireland on board RV Pelagia. Aspects of the ecology and biology of deep water coral reefs were studied.

- 4 ACHIMEDES (Activity, Rates, Carbon use and High-pressure Microbial Ecology of the DEEp Sea; project manager Prof.dr. G. Herndl, NIOZ). A 28 day cruise was per-



formed in the Atlantic Ocean in the Canary Basin on board RV Pelagia

5 PASS-2 2005, Palaeoceanographic, Palaeoclimatic, Palaeo-environmental and diagenetic Aspects of Sapropel formation in the Eastern Mediterranean (PASS-2). Project manager and cruise leader Dr. G.J. de Lange, Institute of Earth Sciences, Utrecht University. The project is the sea-going contribution to the EU-programme Sapropels and Paleoceanography (SAP). The overall aim is a better understanding of the (paleo)functioning of the Eastern Mediterranean and to determine the role in the global environment by studying the characteristic biogeochemical processes. The Project is a co-operation with Italian research groups. A 12 day cruise was performed on board the Italian RV *Universitatis*.

For the investment subsidy NWO large for the LOCO project (Long-Term Ocean Climate Observations) two cruises were performed.

- 6 LOCO/North Atlantic project manager Dr. H. van Aken, NIOZ): A 24 day cruise was performed in combination with the NIOZ CLIVAR cruise CAMP and the turn-around of the German CIS moorings on RV Pelagia, in the Irminger Sea for the recovery and redeployment of the 4 LOCO moorings.
- 7 LOCO/Mozambique project manager Dr. Ir. H. Ridderinkhof, NIOZ). A 20 day cruise on board the UK research vessel RRS Discovery

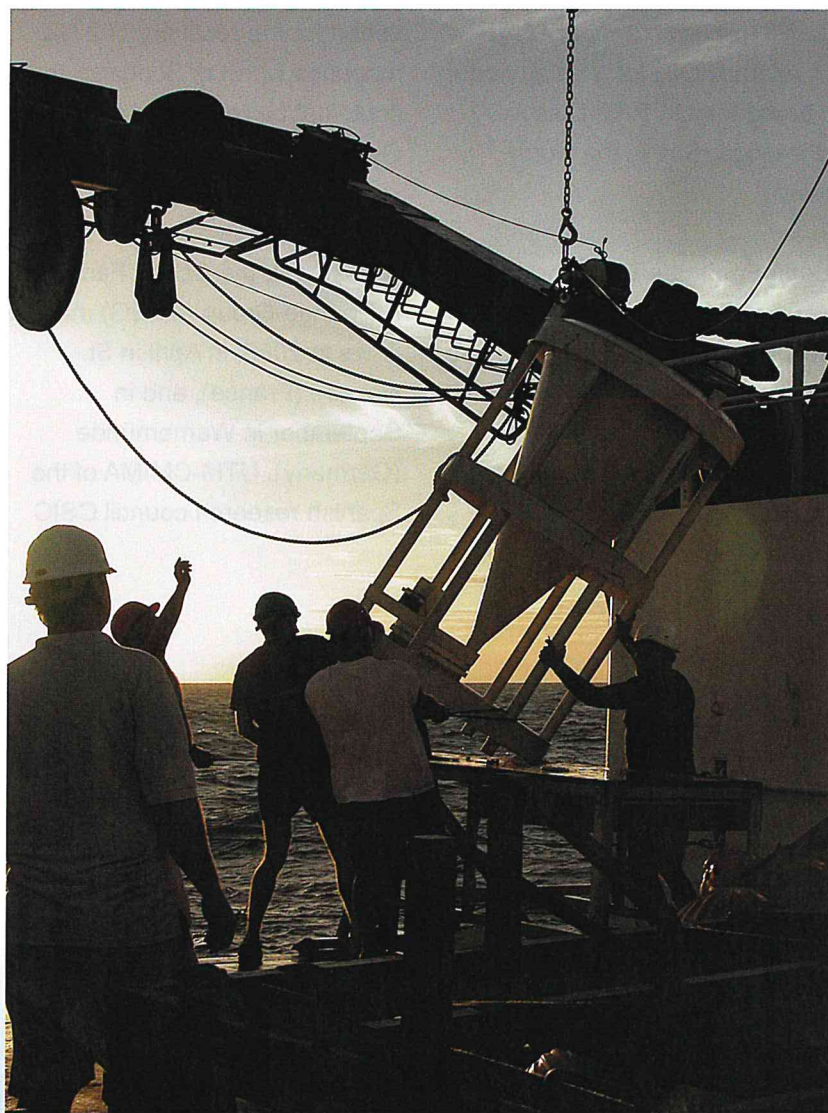
was performed in March 2005 in the Mozambique Strait.

The MRF advice to NWO/ALW for the National Programme of 2006:

For the new project HERMES-CANYONS (Hotspot Ecosystem Research on the Margins of European Seas – Canyons off Portugal); project manager Prof.dr. T.C.E. van Weering, chief scientist Dr. H. de Stigter, NIOZ, a 21 day cruise was advised in the Atlantic off Portugal on board RV Pelagia

BIOSYS (BIODiversity and EcoSYSTEM Functioning of Deep Water Coral Reefs in the Mediterranean and N.E.Atlantic); chief scientist Dr. C. Maier, NIOZ, a 14 day cruise was advised in the North Atlantic Ocean West of the Hebrides and Mingulay area on board RV Pelagia.

For the ongoing project ARCHIMEDES (Activity, Rates, Carbon use and High-pressure Microbial Ecology of the DEep Sea; project manager Prof.dr. G. Herndl, NIOZ) a 28 day cruise was



advised in the Equatorial North Atlantic on board RV Pelagia.

For the investment subsidy NWO large for the LOCO project (Long-Term Ocean Climate Observations) three ongoing cruises were advised. One cruise for LOCO/Mozambique (project manager Dr. Ir. H. Ridderinkhof, NIOZ) for another 20 day cruise on board the UK RRS Discovery in the Mozambique Strait, one cruise for LOCO/IW (Internal Waves), project manager Dr. ir. H. van Haren, for a 24 day cruise in the Canary Basin, and for LOCO/North Atlantic (project manager Dr. H. van Aken, NIOZ) for a 6 day barter on board the UK RRS Discovery in the Irminger Sea in the North Atlantic.

Ocean Facilities Exchange Group (OFEG)

The OFEG was established to use research vessels from different institutes more efficiently by exchanging shiptime. Participants in OFEG are: NERC and NOCS (UK), IFREMER (Fr), BMBF (De)

and NIOZ (NL). In 2005 a number of cruises were performed in this framework. A 24 day cruise for the RANAMOX project of the Queen Mary University of London (Chief Scientist Dr. M. Trimmer/Dr. J. Nicholls) on board RV Pelagia in the Celtic Seas; A 20 day cruise for the NIOZ LOCO/Mozambique cruise on the UK RRS Discovery in the Indian Ocean.

During the CAMP/LOCO cruise on RV Pelagia recovery and redeployment took place of the huge German CIS mooring.

In September RV Pelagia intervened for the recovery of 2 UK moorings North of Scotland, that could not be recovered by the German RV Poseidon due to bad weather.

In the framework of the Tripartite Agreement, the Ocean Facilities Exchange Group (OFEG) met two times in 2005, in April in St. Nazaire (France), and in September in Warnemünde (Germany). UTM-CMIMA of the Spanish research council CSIC

attended the meetings as an observer.

M.J. Rietveld chaired the 19th meeting of the International research Ship Operators Meeting (ISOM), hosted by the National Institute of Ocean Technology (NIOT) in Chennai, India, in October 2005. M.J. Rietveld also took part in the Ocean Fleets Working Group (OFWG) of the ESF Marine Board. In 2005 the OFWG met three times, in Amsterdam, Barcelona and Brest to prepare its report on the European Research Fleets. For the Marine Infrastructure Forum (MIF) of the EU/ESF MarinERA programme M.J. Rietveld participated in the meetings in Brest and Athens. As a member of the Partnership for Observation of the Global Oceans (POGO) workshop on research cruise data bases, she also took part in the meeting organised by the POGO directorate in Washington DC.

The European Research Vessel Operators convened in April in Lisbon.

DATA MANAGEMENT GROUP

Taco F. de Bruin*, Ronald X. de Koster, Margriet A. Hiehle, Jan Nieuwenhuis & Herman Ridderinkhof.

The Data Management Group (DMG) is a separate group within the department of Physical Oceanography, funded by NWO-ALW and NIOZ.

It has a national role as data centre for the academic oceanographic community. It also serves as the National Antarctic Data Centre (NADC).

The main tasks of the DMG are to:

- **assist scientists during all phases of a project with data management**
- **archive and keep available and accessible all relevant data of NWO-ALW and NIOZ cruises.**

One of the highlights of the activities of the DMG in 2005 was the work carried out in the final phase of the European SeaSearch project and in the first phase of the new national NODC-i project. Both projects seek to build a European (SeaSearch) or a national (NODC-i) oceanographic data infrastructure. As a result, all the metadata of the CTD profiles in the Centralized Oceanographic Data and Information System (CODIS) can now also be viewed and queried through the SeaSearch Common Data Index (CDI) interface at <http://www.sea-search.net/cdi/welcome.htm>. The CDI interface also provides direct access to the data in the CODIS database.

Another highlight was the development of a geographic interface to the data managed by the DMG, based on the popular GoogleEarth software. An example of this interface has been printed on the cover of this annual report.

Meanwhile, the day to day work of populating the CODIS data base continued, resulting in a total of over 4800 CTD profiles in the hydrological database by the end of the year.

In 2005, the COREBASE database (<http://www.nioz.nl/corebase>) was further improved and new functionality was added. COREBASE is an online archive of stored sediment cores, developed in close cooperation with the Department of Marine Chemistry and Geology, to give a detailed inventory of the cores, their status and the analyses, performed on those cores. COREBASE also contains high resolution images of sediment cores obtained from the XRF-CoreScanner.

Both the CODIS and the COREBASE database prove to be very popular and are used with an increasing frequency. This year, the COREBASE database was accessed 172 times per day on

average and the CODIS database 235 times per day.

DMG staff participated in a series of national and international meetings related to oceanographic and Antarctic data management. At these meetings, DMG staff members gave 22 oral presentations and presented 5 posters on various aspects of scientific data management.

Three members of the DMG staff took an introductory course on ArcGIS, organized by and at the NIOZ.

The DMG also maintains a series of databases and project websites and pages. A part of these are dynamically linked. This activity includes the daily update of the cruise diary pages on the NIOZ website www.nioz.nl/cruises. The actual position of RV Pelagia is dynamically obtained from the US National Data Buoy Centre and shown on an online map. In addition to this, the software to gain an

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overview of the archive CDs and DVDs was improved and support was given for the in-house developed mooring software.

Another ongoing activity is assistance of scientists with data handling questions. Many requests for data and (graphical) data products, both from within the institute as from outside, were answered. These requests are very diverse and range from questions on the availability of data from scientists within the institute to providing assistance with graphical format conversion to scientists working at other institutes. Answering these requests fits perfectly in the end-to-end data management philosophy, adopted by the DMG since its inception.

During the CAMP-2005 cruise (64PE240), the DMG assisted the scientists onboard with the delivery and interpretation of weather information.

Staff of the DMG participated in the LOCO cruise onboard the RV Discovery (D289B) and in the LOCO - Towed ADCP (64PE235) and MOVE (64PE236) cruises onboard RV Pelagia, as well as in several 13-hours cruises within the Marsdiep-project. Part of the post processing of the CTD data for these and other cruises, was carried out by the DMG.

All relevant digital data, collected during the Pelagia cruises, have been archived on DVD-RAM and are stored in a safe, for use in case of permanent loss of data by the scientist. Following technical devel-

opments and due to the increased size of the collected datasets, the DMG has stopped using CDs for data archiving and has completely transferred to using DVDs. Developments concerning the expected lifetime of both CDs and DVDs are closely watched.

Furthermore, web sites for the secretariats of the NODC and the International Research Ship Operators' Meeting (ISOM) are maintained by the DMG.

The DMG represents NIOZ and the Dutch academic oceanographic community within the National Oceanographic Data Committee (NODC). The DMG representative is the NODC Chairman.

As participant in the NODC, NIOZ actively participates in international projects and organizations such as the EU-SeaSearch project, the new EU-SeaDataNet project, the IOC Committee on International Oceanographic Data and Information Exchange (IODE) and the ICES-Working Group on Marine Data Management.

An additional task of the DMG is the development and maintenance of the Netherlands Antarctic Data Inventory (NADI, <http://www.nadi.nl>) for the Antarctic research projects in the Netherlands. Taco de Bruin is the Chief Officer of the Joint SCAR/COMNAP Committee on Antarctic Data Management (JCADM), which currently has representation from 30 countries. He is also one of the co-chairs of the

International Polar Year Subcommittee on Data Policy and Management.

The Data Management Group of the NIOZ maintains several databases of which the inventory of research cruises including hydrographical and related measured data (CODIS) and the inventory of cores (COREBASE) are the most typical examples. Both databases are now also published in a Google Earth™ compatible format, taking advantage of its nice and smooth interface to display stations and cores on the globe (Fig. 1.). Additional information about each station or core can easily be obtained by clicking on its marker on the map. If relevant, one can even trigger graphics of measured data from the presented list. This picture shows an example of a vertical salinity profile from station 101-1 of the ACSEX-2 cruise, taken on 23 march 2001 (Fig. 2.).

Google Earth is a registered trademark of Google, see <http://earth.google.com>

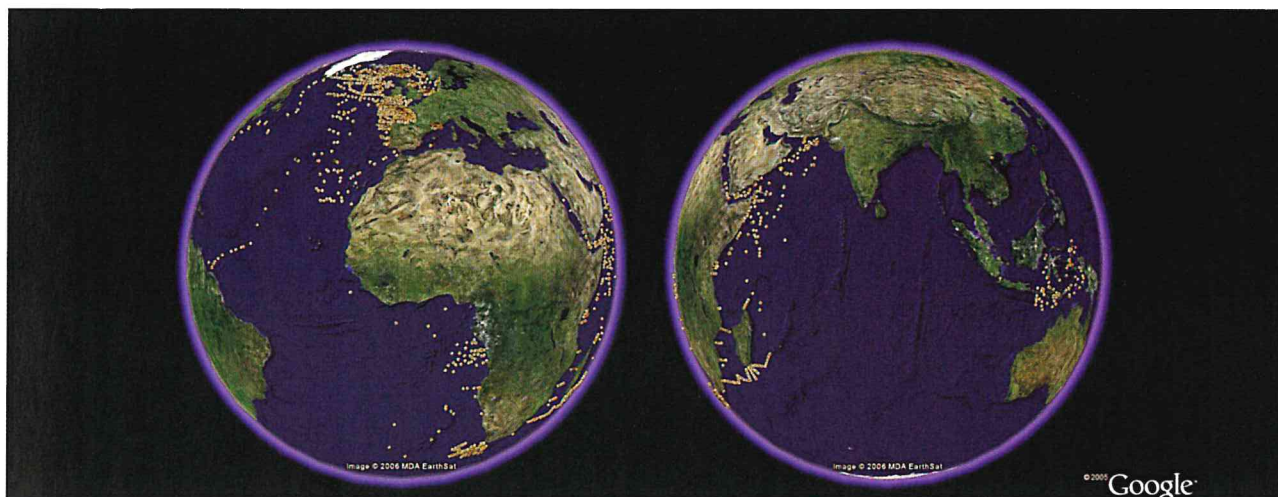


Fig. 1. Display of CTD stations through Google Earth.

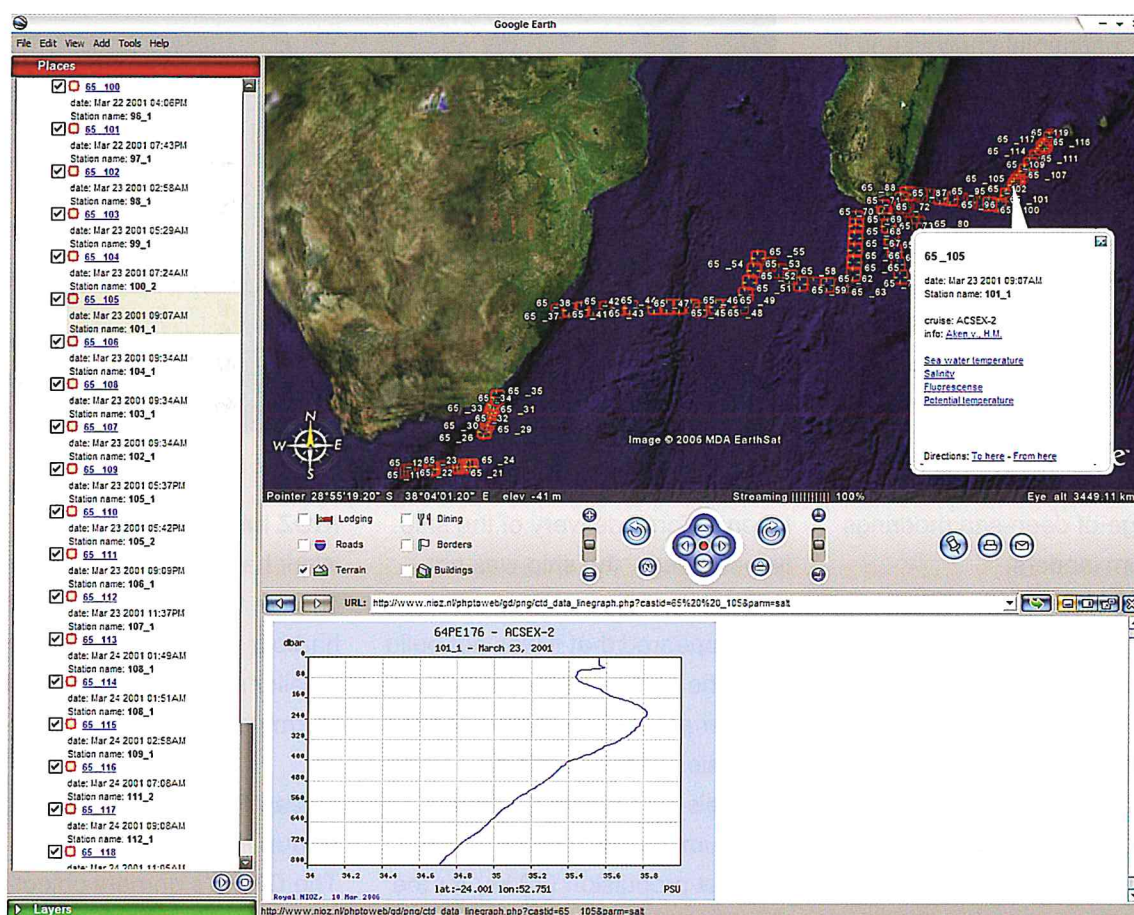


Fig. 2. Detailed information of the ACSEX-2 cruise using the Google Earth interface.

VESSELS AND LOGISTICS

Marieke J. Rietveld & Marck Smit

NIOZ owns and operates several marine research facilities, not only to accommodate its own scientific programme but also for the oceanographic community in the Netherlands. As a consequence of its position as a national institute and in relation to its mission NIOZ co-ordinates and takes care of the execution of sea-going research programmes funded by NWO in the framework of the national programme for sea-going research. A report on these MRF activities is given previously.

Research Vessel Pelagia

The largest sea-going facility is RV Pelagia, a 66 m multipurpose research vessel developed for oceanographic research in coastal seas, on continental shelves and in the blue ocean. RV Pelagia (built 1991, ISM Certified) is specially designed as a multipurpose research vessel. It is a very stable platform and has most favourable nautical properties. Since 1991 she has experience in CTD-deployment, biological sampling methods, seismic surveys, coring activities (box-, multi-, piston, gravity, vibro-, CPT) as well as in deployment and recovery of deep-sea moorings and bottom landers.

Smaller research vessels

Research Vessel Navicula: NIOZ has a 25 m research ship specially designed for working in the shallow Wadden Sea. She was built in 1980, and was elongated in 1999. In 2004 major upgrading was completed.

For the newly built RV Nereis (20m) that was planned for delivery early 2004 a procedure before the Court in The Hague was under-



RV Pelagia during recovery of the MOVE. Photo: Erica Koning (NIOZ).

taken to force delivery of the ship. Nevertheless, the ship was not delivered on the required date and as it appeared that it was not build up to the contract specifications another procedure was started for rescission of the contract.

Nereis is meant to be a small fast aluminum twin hull RV with waterjet propulsion (20 kn) for the shallow Wadden Sea (draught: 0.8m) and nearby coastal work. A shared ship with the Netherlands Organisation for Applied Technology (TNO)

NIOZ harbour

Work has been completed to change the lay-out of the NIOZ harbour in order to protect the smaller ships from damage by stormy easterly winds.

Ocean Facilities Exchange Group

The OFEG's primary objective is bartering shiptime and exchange of major marine equipment without the need to exchange money. This arrangement has significant advantages. It allows scientists access to a wider range of facilities and

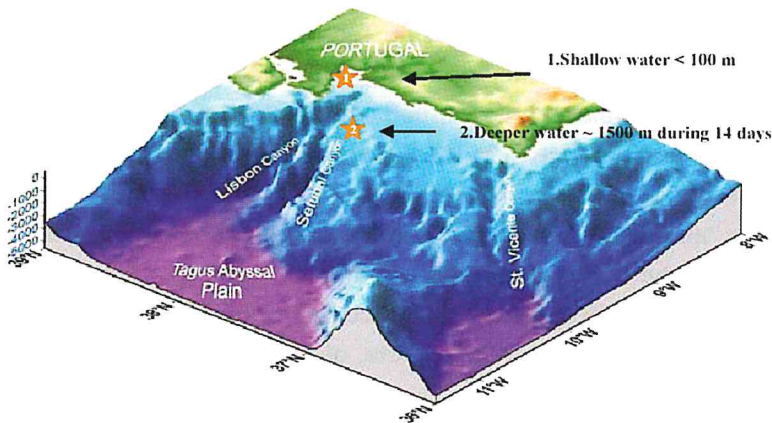
equipment than would otherwise be possible, and also it reduces wasted time, and therefore wasted costs on long transit passages. In 2005 Dutch scientists sailed on UK ships under this arrangement, and a UK and German team sailed on RV Pelagia for a three week research cruise in the Celtic Sea and for recovery of moorings in the Irminger Sea.

Also RV Pelagia intervened for the recovery of two UK moorings that could not be recovered by the German RV Poseidon due to bad weather.

Another favourable development evolving from the partnership is the impulse to international co-operation and exchange of marine technicians for training and support on board.

Cruise programme 2005

After maintenance, RV Pelagia sailed for 245 operational days, including 2 barter cruises, totalling 29 days. There were no commercial charters.



Research area off Portugal where the MOVE! has been tested in shallow and deeper water.

Projects were funded by the Netherlands Research Council NWO (also funding 65 days ship-time, the European Union (HERMES and EUSTRATAFORM – no shiptime funds), and NIOZ (179 days of which 152 matching EU/IGBP projects). Test cruises were performed for the bottom crawler MOVE! and for Ultra Clean sampling system.

To accommodate these cruises diplomatic clearance has been

requested from Denmark, France, Iceland, Ireland, Norway, Portugal, Spain and UK.

Besides calling at homeport Texel, port calls for change of crew and scientific party as well as (un)loading scientific equipment took place in Funchal (Madeira – Portugal), in Cadiz (Spain), Galway (Ireland), Las Palmas (Canary Islands – Spain), Lisbon (Portugal), and Peterhead (Scotland – UK)

Cruise number	Project	Departure	Arrival	Specific Area	Chief Scientist
64PE233	BSIK	7th February, Texel	8th February, Texel	North Sea (Frisian Front)	Ir. M. Bergman
64PE234	NERC-barter	24th March, Texel	14th April, Texel	Celtic Sea	Dr. J. Nicholls
64PE235	Towed ADCP	20th April, Texel	27th April, Vigo (Spain)	N.Atlantic Ocean	Dr. H. van Haren
64PE236	MOVE!/HERMES-C (CANYONS)	27th April, Vigo (Spain)	17th May, Lisbon (Portugal)	N.Atlantic Ocean (off Portugal)	Dr. E. Epping/Dr. H. de Stigter
64PE237	EUROMARGINS - MOUNDFORCE (M2005)	20th May, Lisbon (Portugal)	19th June, Galway (Ireland)	Gulf of Cadiz, Rockall Through, Hatton Bank	Dr. H. De Haas
64PE238	BIOSYS/HERMES-D	22nd June, Galway	22nd July, Texel	N.Atlantic Ocean (Rockall Through)	Dr. F. van Duyl/ Drs. G. Duineveld
64PE239	CARBOOCEAN	17th August, Texel	7th September, Peterhead (U.K.)	North Sea	Prof. Dr. H. de Baar
64PE240	BSIK/CAMP/LOCO/CIS	8th September, Peterhead (U.K.)	5th October, Texel	N.Atlantic Ocean	Drs. K. Veth
64PE241	'Ultra-Clean' Test	1st November, Cadiz (Spain)	10th November, Las Palmas (Canary Islands)	NW.Atlantic Ocean	Prof. Dr. K. Timmermans
64PE242	ARCHIMEDES	13th November, Las Palmas (Canary Islands)	11th December, Las Palmas (Canary Islands)	NW.Atlantic Ocean	Prof. Dr. G. Herndl

MARINE TECHNOLOGY

The new organization of the Marine Technology department that was implemented in 2004 was able to settle down in 2005. In the beginning of the year Bob Koster became the new head of the Electronics department, a position he swapped with Ruud Groenewegen. Being part of the national Marine Research Facilities (MRF) of NIOZ, we were very glad to be evaluated for the first time by the International Peer Review Committee. The contribution of the MRF-facilities to the mission of NIOZ was seen as “absolutely essential” and the overall assessment was rated “very good to excellent”. This view strengthens our vision that we are developing in the adequate direction - being expressed in our motto: “Effective Technology for Excellent Science”

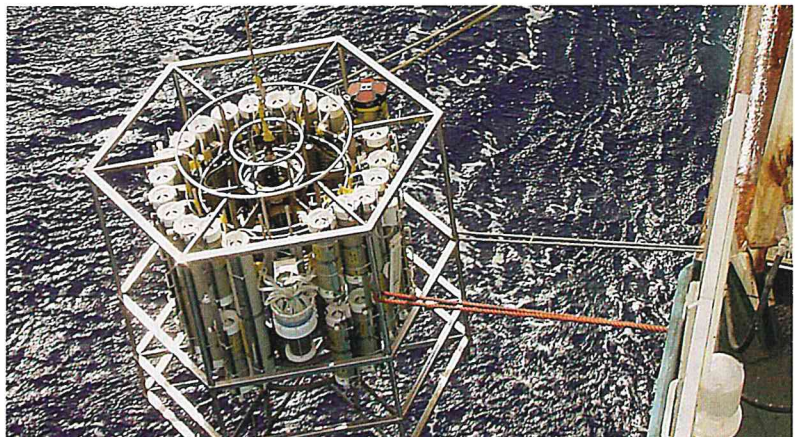
In 2005 we worked on 280 projects, of which a few are highlighted in this paragraph.

Improved flushing of CTD water sampling system

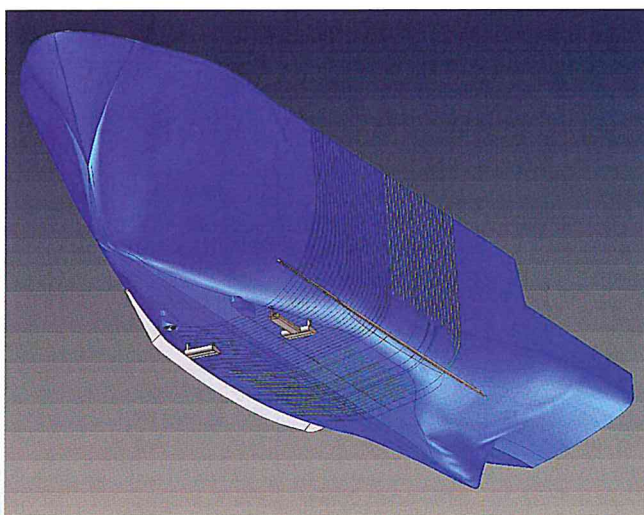
The CTD water sampling system is an important basic tool in the great majority of our research cruises. When small differences in water quality should be detected, the system was restricted by insufficient refreshment of the sampled water. The flushing capability of the entry- and exit valves could be

increased by changing the triggering system from a vacuum system to a pressure system. Tests of the

innovated system showed a significantly improved flushing rate of the sample bottles.



CTD water sampling system



“Looking up” view of the RV Pelagia’s hull showing the mounting of the multibeam

Multibeam Echosounder study

For a seagoing research vessel a Multibeam Echosounder is often a standard part of the ship-board equipment. Therefore NIOZ was very happy that an application to the NWO-middelgroot programme was granted to purchase such a system. One of the first questions to be answered was which of the several options should be chosen to mount the system to the RV Pelagia. An extensive study resulted in an Add-On solution, because in this way optimal data quality could be combined with a limited effect on the ship’s resistance.

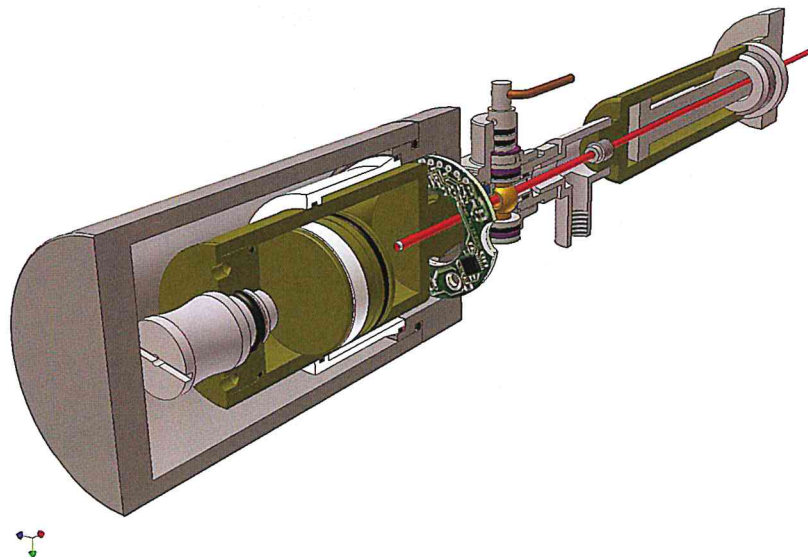
Progress in Pressure Retaining Deep Sea Sampler

The activity of bacterial life recovered from the deep sea proved to be heavily affected by the drastic changes in pressure when samples were raised to the sea surface. The bacteria "did not like" the strong decompression they experienced when taken from 5km depth at 500 bar to 1 bar at the sea surface. To cope with this, we started to develop a High Pressure Sampler in 2004. Although the progress of the project was severely restricted by funding drawbacks, a small scale start-up could yet be realized and several titanium samplers - complex but effective - were produced.

In cooperation with the Old Dominion University in Norfolk, USA, equipment was constructed which allowed for the addition of

nutrients to the samples while maintaining their original high pressure environment in the sampler. In this way, the bacteria could be fed at 600 bar. The samplers were

used during the Archimedes cruise 2005 and proved to be technically and scientifically successful.



3 D model of the Pressure Retaining Deep Sea Sampler in combination with the nutrient injector-unit

Sensors in MOONPOOL on new Texel ferry

The on-line monitoring of the tidal inlet Marsdiep using the TESO ferry sailing between Texel and Den Helder entered a new era by the introduction of a new ferry. The christening of the new ferry "Dr Wagemaker" in July allowed us to start using a flexible and retrievable monitoring platform, in a moon-pool set-up which makes servicing and replacement of equipment much easier. As on the old ferry Schulpengat, the passengers can see several on-line data on two big plasma screens in the passengers saloons.



Current sensors at Texel ferry monitoring platform



Bottom lander before deployment



Bottom lander after recovery

Improvements in Recruitment bottom landers

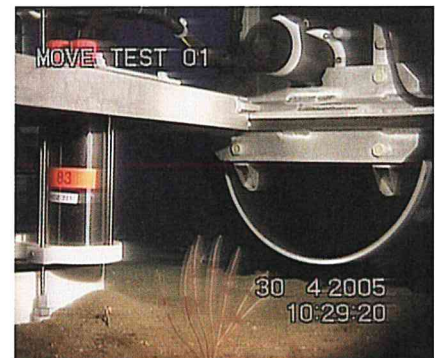
For the study of settling of bivalve larvae in the North Sea, autonomous bottom landers are used. These landers have a deployment period of approximately six weeks. Especially in the spring heavy bio-fouling can easily endanger reliable data sampling and lander recovery. Improvements were implemented on the larval collector, the recruitment trays and the pop-up recovery system to tackle this severe problem.

76

Progress MOVE (MOBILE VEhicle for benthic research)

The MOVE is a deep sea crawler designed to perform bottom research at several stations. Successful trials were performed on the continental slope west of Portugal at a depth of 1300 m.

Video snapshot of the MOVE in action showing bottom measurements and bottom water sampling



Sediment Trap Sample Splitter

A sediment trap collects the slowly falling particles (marine snow) that will form the future seafloor sediment layers. Splitting one valuable recovered sample into several exactly the same subsamples requires special equipment. An improved version of the existing Tennant and Baker high precision splitter (NOAA) was developed.

The sediment trap sample splitter, filter bottle and control unit.

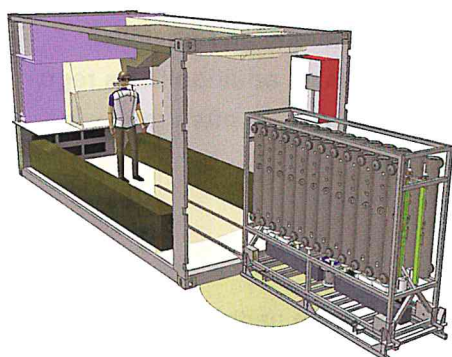


Ultra Clean water sampling

For measuring very low concentrations of trace metals (mainly iron) the standard CTD-water sampling systems are inadequate because the background levels of metals

are far too high. In order to allow for contamination free sampling, an entirely new system was developed. The main issues in the new solution are: the use of a Titanium CTD-frame, the use of a container-

ized clean room (class 10.000) and clean, effective shipboard handling. The system will participate in 2 cruises in the International Polar year 2007 – 2008.



Clean container for sub-sampling



The rectangular Titanium frame can be driven into the Clean Container



Trials onboard of the RV Pelagia

Operational assistance for Utrecht University on the Italian RV Universitatis

Besides the common technical assistance during sea-going cruises on the RV Pelagia, cruises on other research vessels such as the British RSS Discovery (NOC) and the Italian RV Universitatis were supported by NIOZ technicians.

Utrecht University cruise: deployment of sediment traps on board of the RV Universitatis



JOURNAL OF SEA RESEARCH

C.J.M. Philippart, B. Bak-Gade, J.J. Beukema, G.C. Cadée & E.H.G. Epping

The Journal of Sea Research is an international and multidisciplinary periodical on marine research, with an emphasis on the functioning of marine ecosystems in coastal and shelf seas, including inter-tidal, estuarine and brackish environments. As several subdisciplines add to this aim, papers are being published from the fields of marine biology, marine chemistry, marine sedimentology and physical oceanography, provided they add to the understanding of ecosystem processes. In addition to its regular issues, the Journal publishes special issues which bundle articles addressing, and often reviewing, a specific scientific theme.

In 2005, the Journal published volumes 53 and 54, each consisting of four issues and together comprising 50 research papers. One of the special issues, viz. 53(1-2) presented the main results of the multidisciplinary EU-program Iron Resources and Oceanic Nutrients - Advancement of Global Environmental Simulations (IRON-AGES). The other special issue, viz. 54(1), published the proceedings of a workshop on worldwide phytoplankton responses to coastal nutrient enrichment (EutWork). We received 111 manuscripts for regular issues, which represents an increase of almost 25% compared to last year, and is in concordance with the positive trend in the number of submitted manuscripts that started in the late 1990s.

The article on sperm whale strandings published by Klaus Heinrich Vanselow and Klaus Ricklefs published in JSR 53 (319-327) became worldwide news this year. The authors found out that of the 97 stranding events reported around the coastal countries of the North Sea over the last 291 years, 90 per cent occurred when the sun spot cycles were below average in duration. They suggested that vari-

ations of the earth's magnetic field, due to variable energy fluxes from the sun to the earth, lead to temporary disorientation of migrating animals causing them to run aground in the North Sea. Once this article was published, its contents quickly found their way in major international news networks such as the British (BBC) and Australian (ABC) Broadcasting Cooperation.



THE NORTH SEA – WHERE TO GO IN THE FUTURE?

An overview of the North Sea Days on Texel at 13 and 14 October.

The 'North Sea Days' are organized annually to promote the exchange of knowledge and opinions between scientists, policy-makers and stake-holders using the North Sea for their own professional purposes. The symposium, hosted by NIOZ and Alterra Texel, was co-sponsored by the Netherlands Organisation for Scientific Research (NWO).

The part of the North Sea that belongs to our country - the Dutch Continental Shelf (DCS) - is even larger than the dry part of our country, and we carry out many activities in the area: intensive shipping, gas, oil and sand exploitation, recreation, fisheries, pipe-lines, etc. In the near future, we would also like to establish wind-mill parks and marine protected areas. Can all these wishes be united?

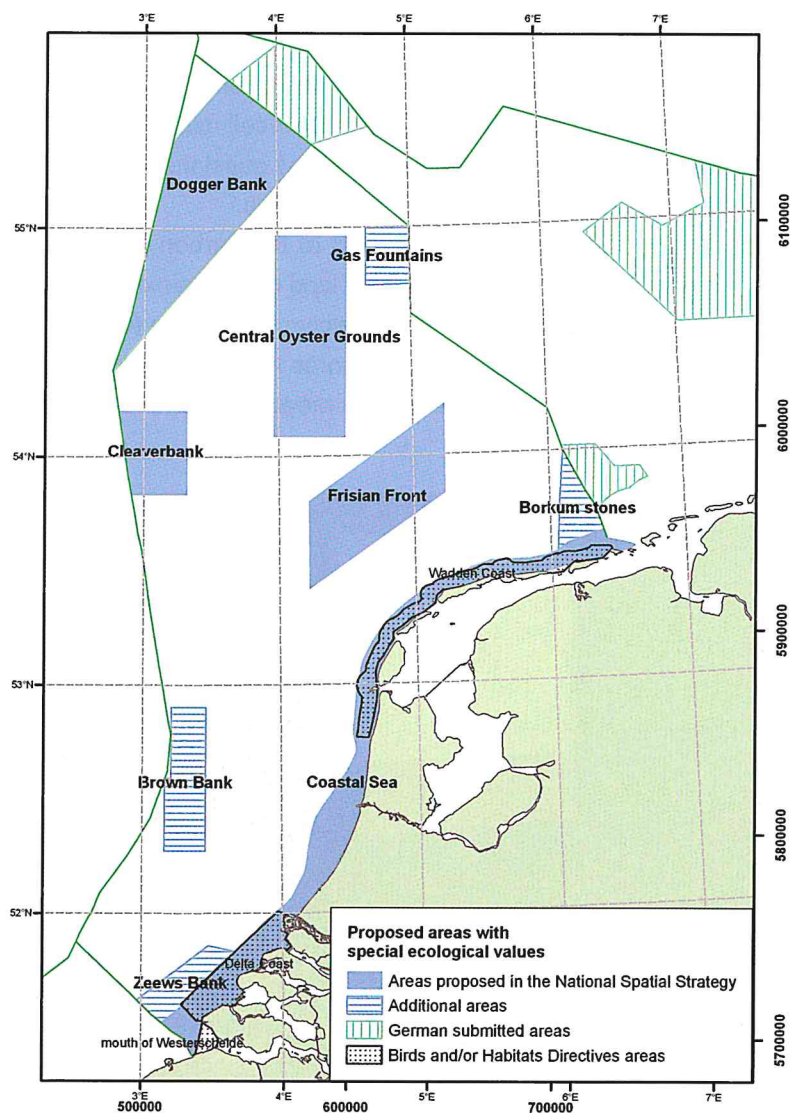
About 150 people gathered to exchange their views on the latest scientific results, political visions, and professional wishes. The subjects that came up for discussion were divided into five sessions, of which the highlights are presented here.

Policy developments:

The leading policy frameworks for the coming decade are the Integrated Management Plan 2015 of the Ministry of Transport, Public Works and Water Management, the Water Directive, the Bird and Habitat Directive, and the European Marine Strategy. The unifying central focus is a healthy marine environment where at the same time a number of sustainable and profitable economic activities can be carried out. Within the framework of "Natura 2000", our country is obliged to stop a further habitat destruction and decrease of species biodiversity by 2010. With regard to human activities, an installed capacity of 6000 Megawatt of wind energy is envisaged on the DCS for the year 2020. In general, there will be less space for the present methods of fishery.

A number of Marine Protected Areas on the DCS are proposed for the near future by the ministry of Agriculture, Nature and Food Quality, following a commitment of The Netherlands within the European Union.

Policy measurements are only useful when the changes occurring after their



installation are adequately monitored to increase our knowledge about the basic functioning and reactions to changes in human impact of the North Sea ecosystem. At the same time not all changes are caused by human impact, as illustrated by the regime shifts in the years 1978/1979 and 1988/1989. Also, the general public should be much better informed. Therefore, NIOZ, Alterra and EcoMare have jointly developed the website "Zeeinzicht" (See the Sea; www.zeeinzicht.nl). This web-site is co-sponsored by the Netherlands Oil Company (NAM) and British Petroleum.

New ecological developments

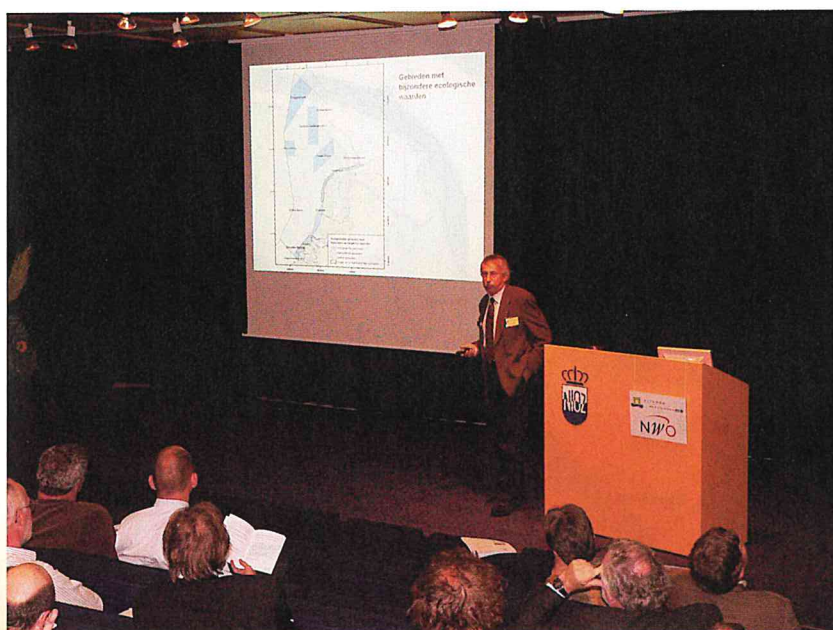
The answer to the question: "What is an ecologically healthy system?" is mainly determined by the –often unspoken– philosophy that people have in their minds. Three possible answers are:

- A system that is running perfectly; like an expensive Swiss watch.
- The romantic view of the prehistoric nature without any influence of man
- The exploitation version in which nature is being optimized for maximum profit.

Therefore, more α - and γ -scientists should be involved in research on the cultural backgrounds of the expectations of people with regard to the phenomenon "nature".

What happens in the North Sea depends largely on the Gulf Stream in the Atlantic Ocean. However, since the North Sea is much richer in nutrients than the open ocean, populations of algae grow faster and incorporate relatively high amounts of carbon dioxide in their cell material. This mechanism is called the biological CO₂ pump. Due to this CO₂ trapping mechanism, shallow coastal seas are much more important on a global scale than expected on the basis of their small surface area.

A second and relatively unknown part of the carbon dioxide problem, is the anticipated acidification of the sea. As a paradox, higher levels of dissolved carbon dioxide and bicarbonate (HCO₃⁻) will concur with lower levels of carbonate (CO₃²⁻). Precipitated calcium carbonate (CaCO₃) forms the calcareous skeletons of shellfish, snails, sea-stars, corals, fish and even some families of algae. This acidification is by no means a theoretical problem, but it is expected to be already measurable in the coming decades and is likely to inhibit the growth of calcareous organisms.



Changes in nutrient availability have had large consequences on the composition of the algal spring bloom in the Dutch coastal region (Marsdiep) over the last three decades. Three different periods can be discerned by various nutrient regimes and species of algae: The period before 1977 is characterized by small algae in combination with limitation by nitrogen and silica. The period between 1978 and 1987 represents the decade with the highest eutrofication, resulting in a dominance of large algae. The last period is characterized by a particularly strong decline in phosphate levels, resulting in a bloom of mainly

small flagellates. Important questions are: do these different types of algae have different nutritional values for higher trophic levels, and has the algal bloom intensity also changed? When algae are being grazed by animal plankton, their biomass can become available as food for the highest trophic levels of the food web, such as fish, birds, marine mammals and fishermen. But sometimes algal blooms are finished by viral attacks and their cellular material is degraded again by the bacteria. This is negative for fishermen, but cannot be avoided.

Another group of micro-organisms which is apparently common in the North Sea and the Wadden Sea are the Archaea, of which there are two groups active, the Crenarchaeota and the Euryarchaeota. The Crenarchaeota thrive in winter when light limits algal growth. Like algae, they use carbon dioxide as carbon source for their cell material. Nitrogen serves as energy source through oxidation of ammonia to nitrate (nitrification). In spring and summer, algae oppress the Crenarchaeota, but in summer, the population of the Euryarchaeota rises.

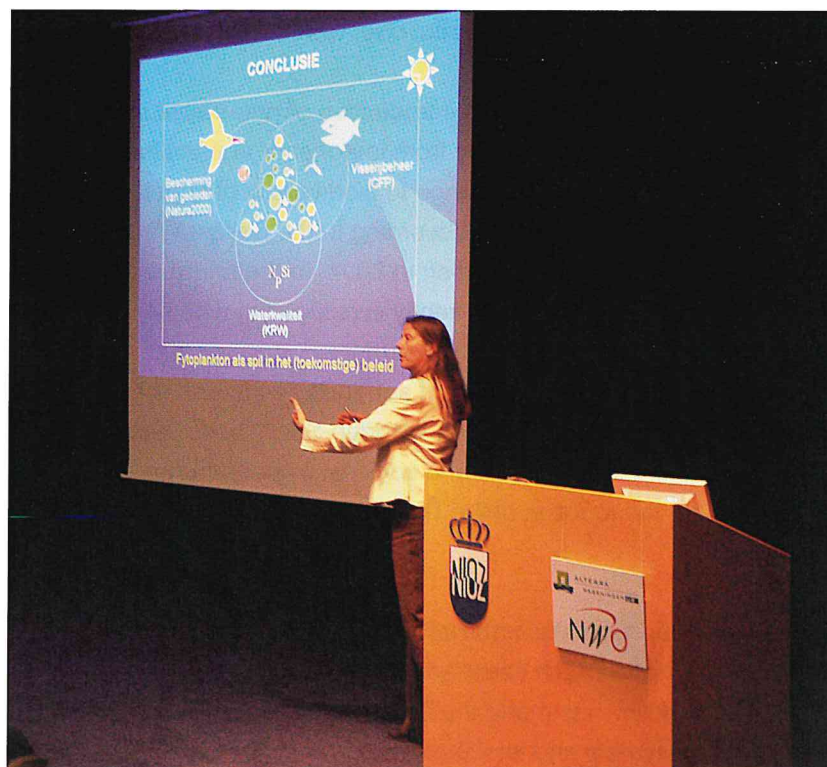
The densities of juvenile plaice and sole are changing in the Dutch coastal zone. The year classes 0 and 1 of plaice have decreased by at least a factor of ten. The average length of 0- and 1-year old sole is increasing and spawning occurs earlier in the year, allowing the 0-group sole to grow longer before winter arrives. The most likely explanations for the different development of plaice and sole are changes in sea-water temperature and in nutrient levels.

In total, there are forty bird species on the DCS, but they do not have the same 'conservation value'. It would be best when policy would focus on species that either reproduce slowly, have a very small population, or for which the DCS is more important than other parts of the North Sea. The health of a bird population can be best estimated from the breeding success in the colony. If you only look at the development of the numbers and the health of adults, effects will only be noticed when it is already too late to react. Because the densities of birds are changing rapidly, the assignment of the exact locations of Marine Protected Areas cannot be a one time affair.

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Emerging dangers

One of the Ecological Quality Objectives for the North Sea concerns levels of floating litter as measured by the number and weight of plastic items in stomachs of fulmars (*Fulmarus glacialis*). Over time, the situation for industrial plastic granules has improved slightly, but for garbage the situation is still deteriorating, with a 100% score for the presence of municipal plastics in fulmar stomachs in the Dutch coastal region, which is the most polluted area of the North Sea. Recently, the financial system of the collection of garbage in the major Dutch



harbours has changed to an indirect one, where the cost for waste disposal is already included in the harbour fee.

A second emerging risk is the introduction of non-native species in our waters, which they enter from discharged ballast water of ships or from imports for aquaculture. This problem is regarded as one of the most serious threats after climate change to biodiversity of coastal environments. From 2009 onwards, ballast water has to be treated on new ships according to the Ballast Water Convention that has been adopted by the International Maritime Organization in 2004. In the future, ballast water will have to be treated on board with special installations. NIOZ is currently investigating whether it could act as an international test centre for the certification such new treatment equipment.

The most threatening example of aquaculture imports is the current expansion of the Japanese oyster in the coastal waters of Zeeland and the Wadden Sea. These oysters compete for food with other filter-feeding shellfish, but in contrast to mussels and cockles, oysters do not serve as food for higher trophic levels. This could well endanger the function of the Delta and the Wadden Sea as a crucial refuelling station for many migratory bird species.

Transport of particulate material along the coast

The defence of the Dutch coast and the islands depends entirely on the transport of sand and silt along the coast. Dutch policy has made the following choices for coastal defence:

- Monitor the system and let it have its own natural development as long as this is acceptable from a safety point of view.
- When this is no longer possible, sand from the North Sea will be supplied to the coastal foundation. More research is necessary to decide whether the -20m depth contour is the optimal choice to mark the seaward end of the coastal foundation. A shallower border would save a lot of ship time and thus costs of the trailing hopper suction dredgers.
- Only in exceptional cases, a hard-substrate coastal defence using concrete or basalt, or a tarmac coating is considered, like the dam near the lighthouse in the north-western part of Texel.

Model calculations at Utrecht University show, that the historical 100-150 year cyclicity of the Marsdiep / Noorderhaaks tidal delta will not be interrupted by the consequences of the construction of the 'Afsluitdijk' in 1932.

Large sand particles do not move in suspension, but as 1-15 m high sand dunes on the sea bottom that move at a velocity of meters per year in the direction of the residual current. These observations have direct consequences for constructions at sea. These sand dunes are also observed in the Marsdiep tidal inlet. The Texel ferry (TESO-) project of NIOZ has also shown that most of the suspended particulate matter is transported well below the sea surface. As a consequence, satellite observations underestimate this transport through the Marsdiep tidal inlet by an order of magnitude. These results will be used in a research project on the consequences of building the "Maasvlakte-II" for the transport of sediment along the Dutch coast.

New Gateways for Marine Research

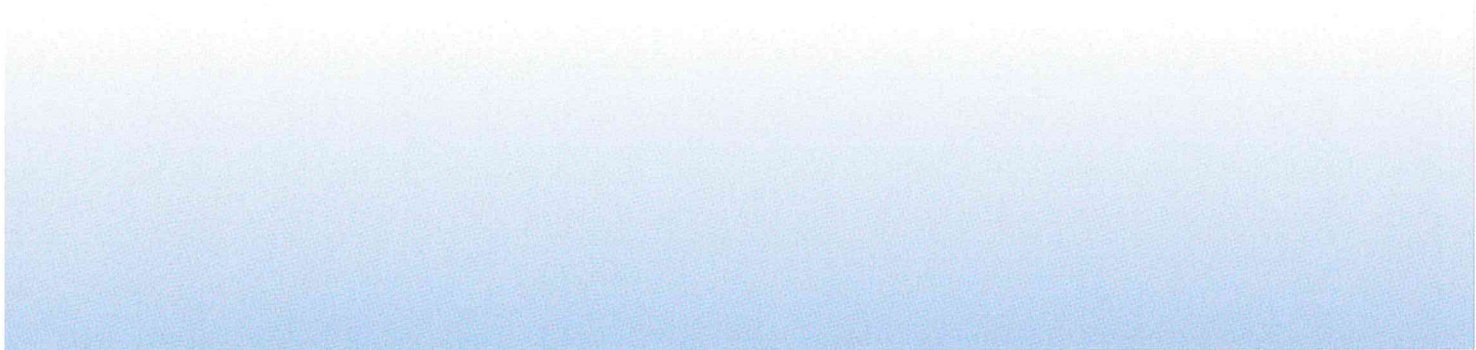
Contacts between research, policy, non-governmental organizations and stakeholders using the North Sea should be intensified and implemented policy measurements should be thoroughly evaluated before new changes are introduced; with the goal to learn from each other and optimize our practices in interaction with high quality survey programmes.

Recently, a number of reports on the organisation of marine research in the Netherlands have appeared. They all conclude that the quality of research is very good to excellent and for our country highly relevant, but they also criticise the fragmentary organization. In reaction, the field has started to reorganize itself.

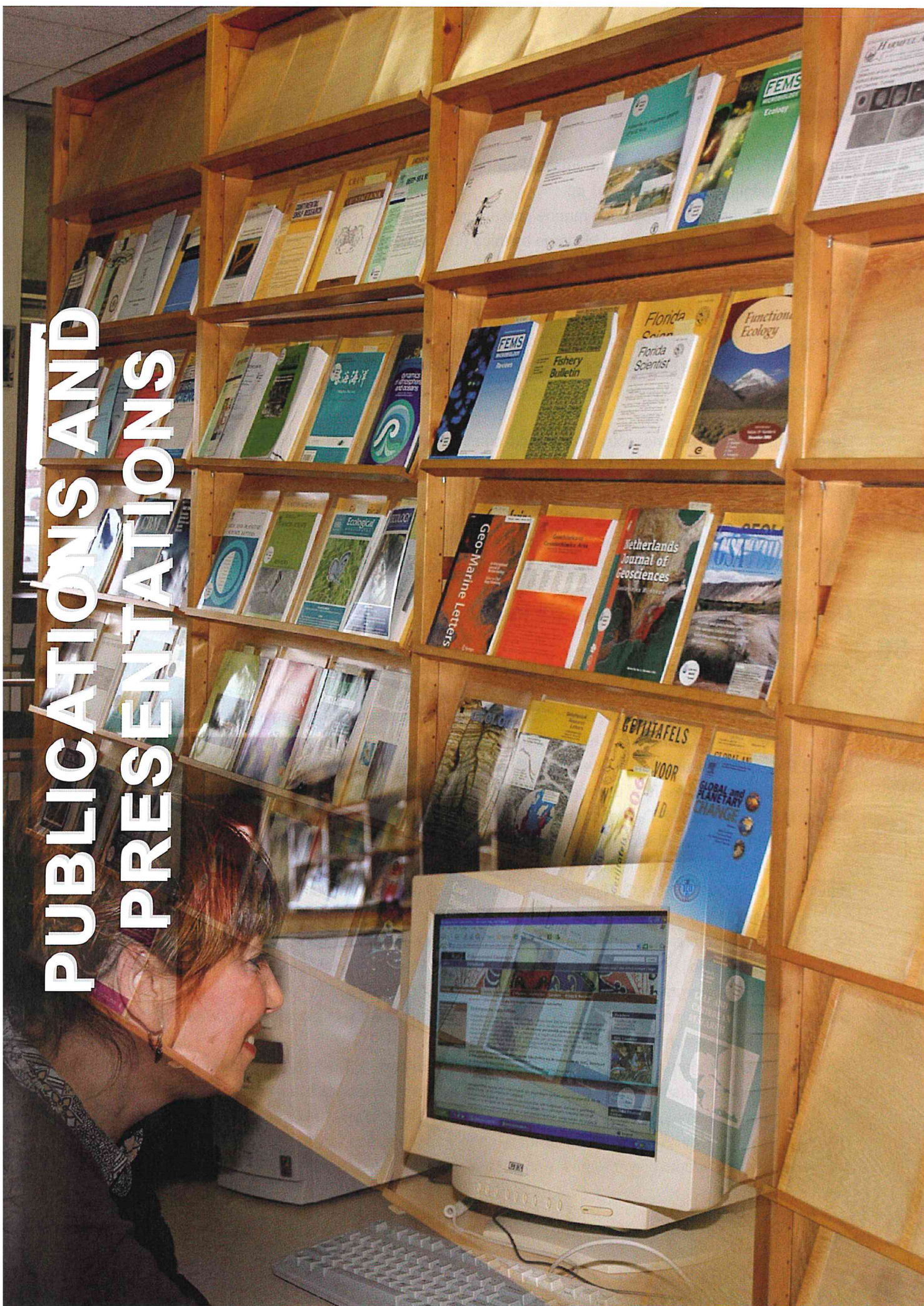
- The new Delta-institute will be an applied research institute with a primary focus on civil and engineering expertise. Delft Hydraulics, GEO-Delft and parts of the Institute for Coastal and Marine Management-RIKZ and TNO will participate in it.
- Wageningen TNO Marien will supplement the Delta-institute in that it will focus primarily on applied marine ecology, with biology and chemistry as its primary disciplines. Participants are RIVO, Alterra and TNO. This organization has formally started on 1 January 2006.
- The National Programme for Marine and Coastal Research of NWO focuses on sustainable human use and conservation of marine environments. The challenges are most urgent in the intensively used Wadden Sea and the Dutch coastal zone of the North Sea, but they also play a role in the open oceans and Polar Regions.

More information on the North Sea days is given on the web-site www.noordzeedagen.nl (in Dutch)

On behalf of the organizing committee,
Jan Boon (boon@nioz.nl)



PUBLICATIONS AND PRESENTATIONS



Dissertations

- Amaro, T.P.F. The benthic shift of the Frisian Front (Southern North Sea) ecosystem – Possible mechanisms. Wageningen University, 201 pp.
- Arrieta, M.J. Diversity and activity in marine prokaryotes. University of Groningen, 99 pp. (cum laude).
- Bos, O.G. Recruitment variation of *Macoma balthica* (L.): is there a role for larval food limitation? Groningen University, 160 pp.
- Bozec, Y. Process studies of the biological pump of CO₂ in the North Sea and Southern Ocean. Groningen University, 215 pp.
- Hosegood, P.J. Observations of the impact of flow-topography interactions on mixing processes within a confined basin: the Faeroe-Shetland Channel. Utrecht University, 213 pp (cum laude).
- Loncaric, N. Planktic foraminiferal response to changing SE Atlantic oceanography. Free University Amsterdam, 184 pp.
- Rijkenberg, M.J.A. Photochemistry and organic complexation of iron: Interactions in the Southern Ocean. University of Groningen, 222 pp.
- Scheffers, S.R. Benthic - pelagic coupling in coral reefs: Interaction between framework cavities and reef water. University of Amsterdam, 116 pp.
- Terra, G.M. Nonlinear tidal resonance. University of Amsterdam, 143 pp.
- van Veldhoven, A. Observations of the evolution of Agulhas rings. Utrecht University, 157pp.

Refereed papers in scientific journals

86

- Agogue, H., E. Casamayor, M. Bourrain, I. Obernosterer, F. Joux, G.J. Herndl & P. Lebaron. A survey on bacteria inhabiting the sea surface microlayer of coastal ecosystems. *FEMS Microb. Ecol.* 54: 269-280.
- Amaro, T., G. Duineveld & P. Tyler. Does *Mya truncata* reproduce at its southern distribution limit? Preliminary information. *J. Shellfish. Res.* 24: 24-25.
- Bak, R.P.M, G. Nieuwland & E.H. Meesters. Coral reef crisis in deep and shallow reefs: 30 years of constancy and change in reefs of Curaçao and Bonaire. *Coral Reefs* 24: 475-480.
- Bakker D.C.E, Y. Bozec, P.D. Nightingale, L. Goldson, M.-J. Messias, H.J.W. de Baar, M. Liddicoat, I. Skjelvan, V. Strass & A.J. Watson. Iron and mixing affect biological carbon uptake in SOIREE and EisenEx, two Southern Ocean iron fertilisation experiments. *Deep Sea Research Part I* 52: 1001-1019.
- Banciu, H., D.Y. Sorokin, W.I.C. Rijpstra, J.S. Sinninghe Damsté, E.A. Galinski, S. Takalchi, G. Muyzer & J.G. Kuenen. Fatty acid, compatible solute and pigment composition of obligately chemolithoautotrophic alkaliphilic sulfur-oxidizing bacteria from soda lakes. *FEMS Microbiol. Lett.* 243: 181-187.
- Bartkow, M.E., K. Booij, K.E. Kennedy, J.F. Müller & D.W. Hawker. Passive sampling theory for atmospheric semivolatile organic compounds. *Chemosphere* 60: 170-176.
- Battley, P. F. & T. Piersma. Body composition and flight ranges of bar-tailed godwits (*Limosa lapponica baueri*) from New Zealand. *Auk* 122: 922-937.
- Battley, P. F., D.I. Rogers, J.A. van Gils, T. Piersma, C.J. Hassell, A. Boyle & Y. Hong-Yan. How do red knots *Calidris canutus* leave Northwest Australia in May and reach the breeding grounds in June? Predictions of stopover times, fuelling rates and prey quality in the Yellow Sea. *J. Avian Biol.* 36: 494-500.
- Bauchinger, U., C. Both & T. Piersma. Are there specific adaptations for long-distance migration in birds? The search for adaptive syndromes. *Ann. New York Acad. Sci.* 1046: 214-215.

- Baudoux, A.-C. & C.P.D. Brussaard. Characterization of different viruses infecting the marine harmful algal bloom species *Phaeocystis globosa*. *Virology* 341: 80-90.
- Besemer, K., M.M. Moeseneder, J.M. Arrieta, G.J. Herndl & P. Peduzzi. Complexity of bacterial communities in a river-floodplain system (Danube, Austria). *Appl. Environ. Microbiol.* 71: 609-620.
- Beukema, J.J. & R. Dekker. Decline of recruitment success in cockles and other bivalves in the Wadden Sea: possible role of climate change, predation on postlarvae and fisheries. *Mar. Ecol. Prog. Ser.* 287: 149-167.
- Bonnin, J., E. Koning, E. Epping, G.-J. Brummer & M. Grutters. Geochemical characterization of resuspended sediment on the southeast slope of the Faeroe-Shetland Channel. *Marine Geology* 214: 215-233.
- Boom, A., J.S. Sinninghe Damsté & J.W. de Leeuw. Cutan, a common aliphatic biopolymer in cuticles of drought-adapted plants. *Org. Geochem.* 36: 595-601.
- Both, C., T. Piersma & S.P. Roodbergen. Climatic change explains much of the 20th century advance in laying date of northern lapwing *Vanellus vanellus* in The Netherlands. *Ardea* 93: 79-88.
- Boyé, M., J. Nishioka, P.L. Croot, P. Laan, K.R. Timmermans & H.J.W. de Baar. Major deviations of iron complexation during 22 days of a mesocoscale iron enrichment in the open Southern Ocean. *Mar. Chem.* 96: 257-271.
- Bozec, Y., D.C.E. Bakker, C. Hartman, H. Thomas, R. Bellerby, U. Riebesell, H.J.W. de Baar & A.J. Watson. The CO₂ system in a Redfield context during an iron enrichment experiment in the Southern Ocean. *Mar. Chem.* 95: 89-105.
- Bozec Y., H. Thomas, K. Elkalay & H.J.W. de Baar. The continental shelf pump for CO₂ in the North Sea - evidence from summer observation. *Marine Chemistry* 93: 131-147.
- Brussaard, C.P.D., B. Kuipers, & M.J.W. Veldhuis. A mesocosms study of *Phaeocystis globosa* population dynamics. I. Regulatory role of viruses in bloom control. *Harmful Algae* 4: 859-874.
- Brussaard, C.P.D., X. Mari, J.D.L. van Bleijswijk & M.J.W. Veldhuis. A mesocosm study of *Phaeocystis globosa* population dynamics. II. Significance for the microbial community. *Harmful Algae* 4: 875-893.
- Cadée, G.C. Drifting branches of *Crambe maritima* L. with fruits. *Cah. Biol. Mar.* 46: 217-219.
- Cadée, G.C. Gastropod shells cracked by hooded crows by dropping. *Basteria* 69: 1-5.
- Cadée, G.C. Predator-prey interactions in the fossil record. *Ichnos* 12: 75-77.
- Camphuysen, C.J. & F. de Vreeze. De drieteenmeeuw *Rissa tridactyla* als broedvogel in Nederland. *Limosa* 78: 65-74.
- Camphuysen, C.J. & J. van der Meer. Wintering seabirds in Western Africa: foraging hot-spots off Western Sahara and Mauritania driven by upwelling and fisheries. *Afr. J. Mar. Sc.* 27: 427-437.
- Camphuysen, C.J. & M.F. Leopold. The Tricolor oil spill: characteristics of seabirds found oiled in The Netherlands. *Atlantic Seabirds* 6: 109-128.
- Camphuysen, C.J. Seabirds at sea in summer in the NW North Sea. *British Birds* 98: 2-19.
- Camphuysen, C.J. The return of the harbour porpoise (*Phocoena phocoena*) in Dutch coastal waters. *Lutra* 47: 135-144.
- Camphuysen, C.J. The Tricolor oil spill: an incident that should have been prevented. *Atlantic Seabirds* 6: 81-84.
- Croot, P.L., P. Laan, J. Nishioka, V. Strass, M. Boyé, K.R. Timmermans, R.G. Bellerby, L. Goldson, P. Nightingale & H.J.W. de Baar. Spatial and Temporal distribution of Fe(II) and H₂O₂ during EisenEx, an open ocean mesoscale iron enrichment. *Mar. Chem* 95: 65-88.

- Dachs, J., M.L. Calleja, C.M. Duarte, S. de Vento, B. Turpin, A. Polidori, G.J. Herndl & S. Agusti. High atmosphere-ocean exchange of organic carbon in the NE subtropical Atlantic. *Geophys. Res. Lett.* 32: L21807.
- de Baar, H., P.W. Boyd, K.H. Coale, M.R. Landry, A. Tsuda, Ph. Assmy, D.C.E. Bakker, Y. Bozec, R.T. Barber, M. Brzezinski, K.O. Buesseler, M. Boyé, P.L. Croot, F. Gervais, M.Y. Gorbunov, P.J. Harrison, W.T. Hiscock, P.L. Laan, Ch. Lancelot, C. Law, M. Levasseur, A. Marchetti, F.J. Millero, J. Nishioka, Y. Nojiri, T. van Oijen, U. Riebesell, M.J.A. Rijkenberg, H. Saito, S. Takeda, K.R. Timmermans, M.J.W. Veldhuis, A. Waite & C.S. Wong. Synthesis of 8 Iron Fertilizations experiments: from the Iron Age in the Age of Enlightenment. In: Orr, J. C., S. Pantoja, and H.-O. Pörtner (eds.) *The Oceans in High CO₂ World*, Special Issue of *J. Geophys. Res. (Oceans)* 110 (C9): C09S16, doi:10.1029/2004JC002601.
- de Jager, C. & G.J.M. Versteegh. Do planetary motions drive solar variability? *Solar Physics* 29: 175-179.
- de Ruijter, W.P.M., H. Ridderinkhof & M.W. Schouten. Variability of the South-West Indian Ocean. *Phil. Trans. Royal Soc. A*, 363 63-76
- Dutz, J., W.C.M. Klein Breteler & G. Kramer. Inhibition of copepod feeding by exudates and transparent exopolymer particles (TEP) derived from a *Phaeocystis globosa* dominated phytoplankton community. *Harmful Algae* 4: 929-940.
- Edelaar, P., T. Piersma & E. Postma. Retained non-adaptive plasticity: gene flow or small inherent costs of plasticity? *Evol. Ecol. Res.* 7: 489-495.
- Ellwood, M.J., C.M.G. van den Berg, M. Boyé, M. Veldhuis, J.T.M. de Jong, H.J.W. de Baar, P.L. Croot & G. Kattner. Organic complexation of cobalt across the Antarctic Polar Front in the Southern Ocean. *Marine and Freshwater Research* 56: 1069 - 1075.
- Elvert, E., E.C. Hopmans, T. Treude, A. Boetius & E. Suess. Spatial variations of methanotrophic consortia at cold methane seeps: Implications from a high-resolution molecular and isotopic approach. *Geobiology* 3: 195-209.
- Farnleitner, A.H., I. Wilhartitz, G. Ryzinska, A.K.T. Kirschner, H. Stadler, M.M. Burtscher, R. Hornek, U. Szewzyk, G.J. Herndl & R.L. Mach. Bacterial dynamics in spring water of alpine karst aquifers indicates the presence of stable autochthonous microbial endokarst communities. *Environ. Microbiol.* 7: 1248-1259.
- Gerkema, T. & V.I. Shrira. Near-inertial waves in the ocean: beyond the 'traditional approximation'. *J. Fluid Mech.* 529: 195-219.
- Gerkema, T. & V.I. Shrira. Near-inertial waves on the "non-traditional" beta plane. *J. Geophys. Res.* 110: C01003, doi:10.1029/2004JC002519.
- Gill, R.E. Jr., T. Piersma, G. Hufford, R. Servranckx & A. Riegen. Crossing the ultimate ecological barrier: evidence for an 11,000-km-long nonstop flight from Alaska to New Zealand and eastern Australia by bar-tailed godwits. *Condor* 107: 1-20.
- Harlander U. A high-latitude quasi-geostrophic delta plane model derived from spherical geometry. *Tellus A*, 57, 43-53.
- Heijs, S.K., J.S. Sinninghe Damsté & L.R. Forney. Characterization of a deep sea microbial mat collected from an active cold seep at the Milano mud volcano in the Eastern Mediterranean sea. *FEMS Microbiol. Ecol.* 54: 47-56.
- Herndl, G.J., T. Reinthaler, E. Teira, H. van Aken, C. Veth, A. Pernthaler & J. Pernthaler. Contribution of Archaea to total prokaryotic production in the deep Atlantic Ocean. *Appl. Environ. Microbiol.* 71: 2303-2309.
- Hoarau, G., E. Boon, D.N. Jongma, S. Ferber, J. Palsson, H.W. van der Veer, A.D. Rijnsdorp, W.T. Stam & J.L. Olsen. Low effective population size and evidence for inbreeding in an overexploited flatfish, plaice (*Pleuronectes platessa* L.). *Proc. R. Soc. Lond. B* 272: 497-503.

- Holmes, S.P. The effect of *Patella vulgata* pedal mucus on the settlement and development or propagation of *Skeletonema costatum* and *Fucus spirali*. J. Mollusc. Stud. 71: 53-67.
- Holmes, S.P., G. Walker & J. van der Meer. Barnacles, limpets and periwinkles: the effects of direct and indirect interactions on cyprid settlement and success. J. Sea Res. 53: 181-204.
- Hopmans, E.C., S. Schouten, W.I.C. Rijpstra & J.S. Sinninghe Damsté. Identification of carotenals in sediments. Org. Geochem. 36: 485-495.
- Hosegood, P., H. van Haren & C. Veth. Mixing within the interior of the Faeroe-Shetland Channel. J. Mar. Res., 63: 529-561.
- Ivanochko, T.S., R.S. Ganeshram, G.J.A. Brummer, G. Ganssen, S. Jung, S. Moreton & D. Kroon. Variations in tropical convection as an amplifier of millennial scale climate change. Earth and Planetary Science Letters 235: 302-314.
- Jacobsen, A. & M.J.W. Veldhuis. Growth characteristics of flagellated cells of *Phaeocystis pouchetii* revealed by diel changes in cellular DNA content; effects of different day lengths, light intensities, N:P ratios and temperature. Harmful Algae 4: 811 - 821.
- Kaandorp, J.A., P.M.A. Sloom, R.M.H. Merks, R.P.M. Bak, M.J.A. Vermeij & C. Maier. Morphogenesis of the branching reef coral *Madracis mirabilis*. Proc. R. Soc. Lond., B, 272 (1559):127-133.
- Kellett, D., A. Scheffers & S.R. Scheffers. Holocene tsunami deposits on the Bahaman Islands of Long Island and Eleuthera. Zeitschrift für Geomorphologie 48: 519-540.
- Kim, J., L. Dupont, H. Behling & G.J.M. Versteegh. Impacts of rapid sea level rise on mangrove deposit erosion: application of taraxerol and *Rhizophora* records. J. Quaternary Sc. 20: 221-225.
- Klein Breteler, W.C.M., N. Schogt & S.W. Rampen. Effect of diatom nutrient limitation on copepod development: role of essential lipids. Mar. Ecol. Prog. Ser. 291: 125-133.
- Kolonic, S., T. Wagner, A. Forster, J.S. Sinninghe Damsté, B. Walsworth-Bell, E. Erba, S. Turgeon, H.-J. Brumsack, E.H. Chellai, H. Tsikos, W. Kuhnt & M.M.M. Kuypers. Black shale deposition on the north-west African Shelf during the Cenomanian/Turonian oceanic anoxic event: Climate coupling and global organic carbon burial. Paleoceanography 20: PA1006 doi:10.1029/2003PA000950.
- Koski, M., J. Dutz & W.C.M. Klein Breteler. Selective grazing of *Temora longicornis* in different stages of a *Phaeocystis globosa* bloom – a mesocosm study. Harmful Algae 4: 915-927.
- Kramer, G.D., C. Pausz & G.J. Herndl. Elemental composition of dissolved organic matter and bacterioplankton production in the Faroe-Shetland Channel of the North Atlantic. Deep Sea Res. I, 52: 85-97.
- Kuypers, M.M.M., L. Lourens, W.I.C. Rijpstra, R.D. Pancost, I.A. Nijenhuis & J.S. Sinninghe Damsté. (2004) Orbital forcing of organic carbon burial in the proto-North Atlantic during Oceanic Anoxic Event 2. Earth Planet. Sci. Lett. 228, 465-482.
- Laberg, J.S., M.S. Stoker, K.I.T. Dahlgren, H. de Haas, H. Hafliðason, B.O. Hjelstuen, T. Nielsen, P.M. Shannon, T.O. Vorren, T.C.E. van Weering & S. Ceramicola. Cenozoic alongslope processes and sedimentation on the NW European Atlantic margin. Mar. Pet. Geol. 9-10: 1069-1088.
- Landys, M.M., T. Piersma, C.G. Guglielmo, J. Jukema, M. Ramenofsky & J.C. Wingfield. Metabolic profile of long-distance migratory flight and stopover in a shorebird. Proc. R. Soc. Lond. B 272: 295-302.
- Loncaric, N., G.-J.A. Brummer & D. Kroon. Lunar cycles and seasonal variations in deposition fluxes of planktic foraminiferal shell carbonate to the deep South Atlantic (central Walvis Ridge). Deep-Sea Research I 52: 1178-1188.
- Maas, L.R.M. Wave attractors: linear yet nonlinear. Int. J. Bifurcation and Chaos 15: 2757-2782.

- Mari, X., F. Rassoulzadegan, C.P.D. Brussaard & P. Wassmann. Dynamics of transparent exopolymeric particles (TEP) production by *Phaeocystis globosa* under N- or P-limitation: a controlling factor of the retention/export balance? *Harmful Algae* 4: 895-914.
- Martinez-Alonso, M., J. van Bleijswijk, N. Gaju & G. Muyzer. Diversity of anoxygenic phototrophic sulfur bacteria in the microbial mats of the Ebro Delta: a combined and morphological and molecular approach. *Fems Microbiology Ecology* 52: 339.
- Mendes, L., T. Piersma, M. Lecoq, B. Spaans & R.E. Ricklefs. Disease-limited distributions? Contrasts in the prevalence of avian malaria in shorebird species using marine and freshwater habitats. *Oikos* 109: 396-404.
- Menzel, D., P.F. van Bergen, H. Veld & J.S. Sinninghe Damsté. The molecular composition of kerogen in Pliocene Mediterranean sapropels and associated homogeneous, calcareous ooze. *Org. Geochem.* 36: 1037-1053.
- Merckelbach, L.M. & H. Ridderinkhof. Estimating suspended sediment concentration using backscatterance from an acoustic Doppler profiling current meter at a site with strong tidal currents. *Ocean Dynamics* doi: 10.1007/s 10236-005-0036-2.
- Moeseneder, M.M., M.J. Arrieta & G.J. Herndl. A comparison of DNA- and RNA-based clone libraries from the same marine bacterioplankton community. *FEMS Microb. Ecol.* 51: 341-352.
- Morrison, R.I.G., N.C. Davidson & T. Piersma. Transformations at high latitudes: why do red knots bring body stores to the breeding grounds? *Condor* 107: 449-457.
- Naafs, D.F.W., K.G.J. Nierop, P.F. van Bergen & J.W. de Leeuw. Changes in the molecular composition of ester-bound aliphatics with depth in an acid andic forest soil. *Geoderma* 127: 130-136.
- Nishioka, J., S. Takeda, H. J. W. de Baar, P. Laan, P.L. Croot, M. Boyé, P. Laan & K. R. Timmermans. Changes in the concentration of iron in different size fractions during an iron enrichment experiment in the open Southern Ocean, EisenEx. *Marine Chemistry* 95: 51-63.
- Obernosterer, I., P. Catala, T. Reinthaler, G.J. Herndl & P. Lebaron. Enhanced heterotrophic activity in the surface microlayer of the Mediterranean Sea. *Aquat. Microb. Ecol.* 39: 293-302.
- Ouwehand, J., M.F. Leopold & C.J. Camphuysen. A comparative study of the diet of guillemots *Uria aalge* and razorbills *Alca torda* killed during the Tricolor oil incident in the south-eastern North Sea in January 2003. *Atlantic Seabirds* 6: 147-164.
- Pancost, R.D., C.L. Zhang, J. Tavacolia, H.M. Talbot, P. Farrimond, S. Schouten, J.S. Sinninghe Damsté & R. Sassen. Lipid biomarkers preserved in hydrate-associated authigenic carbonate rocks of the Gulf of Mexico. *Palaeogeograph. Palaeoclimatol. Palaeoecol.* 227: 48-62.
- Piersma, T., J. Perez-Tris, H. Mouritsen, U. Bauchinger & F. Bairlein. Is there a "migratory syndrome" common to all migrant birds? *Ann. New York Acad. Sci.* 1046: 282-293.
- Piersma, T., K.G. Rogers, H. Boyd, E.J. Bunschoke & J. Jukema. Demography of Eurasian golden plovers *Pluvialis apricaria* staging in The Netherlands, 1949-2000. *Ardea* 93: 49-64.
- Pirker, H., C. Pausz, K.E. Stoderegger & G.J. Herndl. Simultaneous measurement of metabolic activity and membrane integrity in marine bacterioplankton determined by confocal laser-scanning microscopy. *Aquat. Microb. Ecol.* 39: 225-233.
- Powers, L.A., T.C. Johnson, J.P. Werne, I.S. Castañeda, E. Hopmans, J.S. Sinninghe Damsté & S. Schouten. Large temperature variability in the southern African tropics since the Last Glacial Maximum. *Geophys. Res. Lett.* 32: L08706-10.1029/2004GL020214.
- Raghoebarsing, A.A., A.J.P. Smolders, M.C. Schmid, W.I.C. Rijpstra, M. Wolters-Arts, J. Derksen, M.S.M. Jetten, S. Schouten, J.S. Sinninghe Damsté, L.P.M. Lamers, J.G.M. Roelofs, H.J.M. Op Den Camp &

- M. Strous. Methanotrophic symbionts provide carbon for photosynthesis in peat bogs. *Nature* 436: 1153-1156.
- Reinthal, T. & G.J. Herndl. Seasonal dynamics of bacterial growth efficiencies in relation to phytoplankton in the Southern North Sea. *Aquat. Microb. Ecol.* 39: 7-16.
- Reinthal, T., C. Winter & G.J. Herndl. Relation between bacterioplankton richness, respiration, and production in the southern North Sea. *Appl. Environ. Microbiol.* 71: 2260-2266.
- Reneerkens, J., T. Piersma & J.S. Sinninghe Damsté. Switch to diester preen waxes may reduce avian nest predation by mammalian predators using olfactory cues. *J. Exp. Biol.* 208: 4199-4202.
- Reneerkens, J., T. Piersma, J. Jukema, P. de Goeij, A. Bol & H. Meltofte. Sex-ratio and body size of sandpiper chicks at Zackenberg, north-east Greenland in 2003. *Wader Study Group Bull.* 106: 12-16.
- Rijkenberg, M.J.A., A.C. Fischer, J.J. Kroon, L.J.A. Gerringa, K.R. Timmermans, H.Th. Wolterbeek & H.J.W de Baar. The influence of UV irradiation on the photoreduction of iron in the Southern Ocean. *Marine Chemistry* 93: 119-129.
- Robinson, R.A., N.A. Clark, R. Lanctot, S. Nebel, B. Harrington, J.A. Clark, J.A. Gill, H. Meltofte, D.I. Rogers, K.G. Rogers, B.J. Ens, C.M. Reynolds, R.M. Ward, T. Piersma & P.W. Atkinson. Long term demographic monitoring of wader populations in non-breeding areas. *Wader Study Group Bull.* 106: 17-29.
- Rocha, C., S. Forster, E. Koning & E. Epping. High-resolution permeability determination and two-dimensional pore water flow in sandy sediment. *Limnology and Oceanography Methods* 3: 10-23.
- Rogers, K.G. & T. Piersma. Monitoring vital rates of migrant shorebird populations: the case of 'wilsterned' Eurasian golden plovers. *Ardea* 93: 65-77.
- Ruardij, P., M.J.W. Veldhuis & C.P.D. Brussaard. Modelling bloom dynamics of the polymorphic phytoplankter *Phaeocystis globosa*: impact of grazers and viruses. *Harmful Algae* 4: 941-963.
- Sarthou, G., K.R. Timmermans, S. Blain, & P. Tréguer. Growth physiology and the fate of diatoms in the Ocean: a review. *J. Sea Res.* 53: 25-42.
- Scheffers, S.R., R.P.M. Bak & F.C. van Duyl. Why is bacterioplankton growth in coral reef framework cavities enhanced? *Mar. Ecol. Prog. Ser.* 299: 89-99.
- Schefuß, E., J.H.F. Jansen & J.S. Sinninghe Damsté. Tropical environmental changes at the mid-Pleistocene transition: insights from lipid biomarkers. In: Head, M.J. & Gibbard, P.L. (eds). *Early-Middle Pleistocene Transitions: The Land-Ocean Evidence*. Geological Society, London, Special Publications. 247: 35-63. 0305-8719/05/\$15© The Geological Society of London.
- Schefuß, E., S. Schouten & R.R. Schneider. Climatic controls on central African hydrology during the past 20,000 years. *Nature* 437: 1003-1006.
- Schmid, M.C., B. Maas, A. Dapena, K. van de Pas-Schoonen, J. van de Vossenberg, B. Kartal, L. Van Niftrik, I. Schmidt, I. Cirpus, J.G. Kuenen, M. Wagner, J.S. Sinninghe Damsté, M. Kuypers, N.P. Revsbech, R. Mendez, M.S.M. Jetten & M. Strous. Biomarkers for in situ detection of anaerobic ammonium-oxidizing (anammox) bacteria. *Appl. Environ. Microbiol.* 71: 1677-1684.
- Schouten, M.W., W.P.M. de Ruijter & H. Ridderinkhof. A seasonal intrusion of subtropical water in the Mozambique Channel. *Geophysical Res. Letters.*, 10.129/2005GL023131
- Schouten, S., S. Rampen, J.A.J. Geenevasen & J.S. Sinninghe Damsté. Structural identification of sterol alkyl ethers in marine sediments. *Org. Geochem.* 36: 1323-1333.
- Scourse, J., F. Marret, G.J.M. Versteegh, J.H.F. Jansen, E. Schefuß & J. van der Plicht. High resolution last deglaciation record from the Congo fan reveals significance of mangrove pollen and biomarkers as indicators of shelf transgression. *Quaternary Research* 64: 57-69.

- Sephton, M.A., C.V. Looy, H. Brinkhuis, P.B. Wignall, J.W. de Leeuw & H. Visscher. Catastrophic soil erosion during the end-Permian biotic crisis. *Geology* 33: 941-944.
- Shannon, P.M., M.S. Stoker, D. Praeg, T.C.E. van Weering, H. de Haas, T. Nielsen, K.I.T. Dahlgren & B.O. Hjelstuen. Sequence stratigraphic analysis in deep-water, underfilled NW European passive margin basins. *Mar. Pet. Geol.* 9-10: 1185-1200.
- Sinninghe Damsté, J.S., M. Baas, J.A.J. Geenevasen & F. Kenig. Structural identification of sedimentary C₂₁ and C₂₂ highly branched isoprenoid alkanes. *Org. Geochem.* 36: 511-517.
- Sinninghe Damsté, J.S., W.I.C. Rijpstra, J.A.J. Geenevasen, M. Strous & M.S.M. Jetten. Structural identification of ladderane and other membrane lipids of planktomycetes capable of anaerobic ammonium oxidation (anammox). *FEBS J.* 272, 4270-4283.
- Smittenberg, R.H., M. Baas, M.J. Green, E.C. Hopmans, S. Schouten & J.S. Sinninghe Damsté. Pre- and post-industrial environmental changes as revealed by the biogeochemical sedimentary record of Drammensfjord, Norway. *Mar. Geol.* 214: 177-200.
- Smittenberg, R.H., M. Baas, S. Schouten & J.S. Sinninghe Damsté. The demise of the alga *Botryococcus braunii* from a Norwegian fjord was due to early eutrophication. *Holocene* 15: 133-140.
- Solé, J., E. García-Ladona, P. Ruardij & M. Estrada. Modelling allelopathy among marine algae. *Ecological Modelling* 183: 373-384.
- Stadnitskaia, A., G. Muyzer, B. Abbas, M.J.L. Coolen, E.C. Hopmans, M. Baas, T.C.E. van Weering, M.K. Ivanov, E. Poludetkina & J.S. Sinninghe Damsté. Biomarker and 16S rDNA evidence for anaerobic oxidation of methane and related carbonate precipitation in deep-sea mud volcanoes of the Sorokin Trough, Black Sea. *Mar. Geol.* 217: 67-96.
- Stoderegger, K.E. & G.J. Herndl. Dynamics in bacterial surface properties of a natural bacterial community in the coastal North Sea during a spring phytoplankton bloom. *FEMS Microb. Ecol.* 53: 285-294.
- Stoker, M.S., R.J. Hoult, T. Nielsen, B.O. Hjelstuen, J.S. Laberg, P.M. Shannon, D. Praeg, A. Mathiesen, T.C.E. van Weering & A. McDonnell. Sedimentary and oceanographic responses to early Neogene compression on the NW European margin. *Mar. Pet. Geol.* 22: 1031-1044.
- Terra, G.M., W.J. van de Berg & L.R.M. Maas. Experimental verification of Lorentz' linearization procedure for quadratic friction. *Fluid Dyn. Res.* 36: 175-188.
- Thomas, H., Y. Bozec, H.J.W. de Baar, K. Elkalay, M. Frankignoulle, L.-S. Schiettecatte & A. V. Borges. The Carbon budget of the North Sea. *Biogeosciences* 2: 82-96.
- Timmermans, K.R., B. van der Wagt, M.J.W. Veldhuis, A. Maatman & H.J.W. de Baar. Physiological responses of three species of picophytoplankton to nitrogen, phosphorus, iron and light limitation. *J. Sea Res.* 53: 109-120.
- Vahl, W.K., J. van der Meer, F.J. Weissing, D. van Dullemen & T. Piersma. The mechanisms of interference competition: two experiments on foraging waders. *Behav. Ecol.* 16: 845-855.
- Vahl, W.K., T. Lok, J. van der Meer, T. Piersma & F.J. Weissing. Spatial clumping of food and social dominance affect interference competition among ruddy turnstones. *Behav. Ecol.* 16: 834-844.
- van Aken, H.M., L.R.M. Maas & H. van Haren. Observations of inertial wave events near the continental slope off Goban Spur. *J. Phys. Oceanogr.* 35: 1329-1340.
- van Aken, H.M. Dutch oceanographic research in Indonesia in colonial times. *Oceanography*, 18: 30-41.
- van Breugel, Y., S. Schouten, M. Paetzel, J. Ossebaar & J.S. Sinninghe Damsté. Reconstruction of $\delta^{13}\text{C}$ of chemocline CO₂ (aq) in past oceans and lakes using the $\delta^{13}\text{C}$ of fossil isorenieratene. *Earth. Planet. Sc. Lett.* 235: 421-434.

- van Breugel, Y., S. Schouten, M. Paetzel, R. Nordeide & J.S. Sinninghe Damsté. The impact of recycling of organic carbon on the stable carbon isotopic composition of dissolved inorganic carbon in a stratified marine system (Kyllaren fjord, Norway). *Org. Geochem.* 36: 1163-1173.
- van der Meer, M.T.J., S. Schouten, M.M. Bateson, U. Nübel, A. Wieland, M. Kühl, J.W. de Leeuw, J.S. Sinninghe Damsté & D.M. Ward. Diel variations in carbon metabolism by green nonsulfur-like bacteria in alkaline siliceous hot spring microbial mats from Yellowstone National Park. *Appl. Environ. Microbiol.* 71: 3978-3986.
- van Drooge, B.L., J.O. Grimalt, K. Booij, L. Camarero & J. Catalan. Passive sampling of atmospheric organochlorine compounds by SPMDs in a remote high-mountain area. *Atmos. Environ.* 39: 5195-5204.
- van Gils, J. A., A. Dekinga, B. Spaans, W.K. Vahl & T. Piersma. Digestive bottleneck affects foraging decisions in red knots *Calidris canutus*. II. Patch choice and length of working day. *J. Anim. Ecol.* 74: 120-130.
- van Gils, J. A., P.F. Battley, T. Piersma & R. Drent. Reinterpretation of gizzard sizes of red knots world-wide emphasises overriding importance of prey quality at migratory stopover sites. *Proc. R. Soc. Lond. B* 272: 2609-2618.
- van Gils, J. A., S.R. d Rooij, J. van Belle, J. van der Meer, A. Dekinga, T. Piersma & R. Drent. Digestive bottleneck affects foraging decisions in red knots *Calidris canutus*. I. Prey choice. *J. Anim. Ecol.* 74: 105-119.
- van Haren, H. & C. Millot. Gyroscopic waves in the Mediterranean Sea. *Geophys. Res. Lett.* 32: L 24614, doi:10.1029/2005GL023915.
- van Haren, H. Details of stratification in a sloping bottom boundary layer of Great Meteor Seamount. *Geophys. Res. Lett.*, 32: L07606, doi:10.1029/2004GL02298.
- van Haren, H. Internal waves near the buoyancy frequency in a narrow wave-guide. *J. Sea Res.* 53: 121-129.
- van Haren, H. Sharp near-equatorial transitions in inertial motions and deep-ocean step-formation. *Geophys. Res. Lett.* 32: L01605, doi:10.1029/2004GL021630.
- van Haren, H. Tidal and near-inertial peak variations around the diurnal critical latitude. *Geophys. Res. Lett.*, 32: 23611, doi:10.1029/2005GL024160.
- van Haren, H., R. Groenewegen, M. Laan & B. Koster. High sampling rate thermistor string observations at the slope of Great Meteor Seamount. *Ocean Science*, 1: 17-28, SRef-ID: 1812-0792/os/2005-1-17.
- van Marlen B., M.J.N. Bergman, S. Groenewold & M. Fonds. New approaches to the reduction of non-target mortality in beam trawling. *Fisheries Research* 72: 333-345.
- van Oijen, T., M.J.W. Veldhuis, M.Y. Gorbunov, J. Nishioka, M.A. van Leeuwe & H.J.W. de Baar. Enhanced carbohydrate production by Southern Ocean phytoplankton in response to *in situ* iron fertilisation. *Marine Chemistry* 93: 33-52.
- Veldhuis, M.J.W. & P. Wassmann. Bloom dynamics and biological control of high biomass HAB species in European coastal waters: A *Phaeocystis* case study. *Harmful Algae* 4: 805 – 809.
- Veldhuis, M.J.W., C.P.D. Brussaard & A.A.M. Noordeloos. Living in a *Phaeocystis* colony; a way to be a successful algal species. *Harmful Algae* 4: 841-858.
- Veldhuis, M.J.W., H.J.W. de Baar. Iron resources and oceanic nutrients: advancement of global environment simulations. *J. Sea Res.* 53: 1 - 6.
- Veldhuis, M.J.W., K.R. Timmermans, P.L. Croot & B. van der Wagt. Picophytoplankton; a comparative study of their biochemical composition and photosynthetic properties. *J. Sea Res.* 53: 7 - 24.
- Versteegh, G.J.M. Solar forcing of climate. 2: Evidence from the past. *Space Science Reviews*, 120: 243-286.
- Volkov, D. & H.M. van Aken. Climate-related change of sea level in the extratropical North Atlantic and North Pacific in 1993–2003. *Geophysical Research Letters*, 32: L14611, doi:10.1029/2005GL023097.

- Werne, J. & J.S. Sinninghe Damsté. Mixed sources contribute to the molecular isotopic signature of methane-rich mud breccia sediments of Kazan mud volcano (eastern Mediterranean). *Org. Geochem.* 36: 13-27.
- Winter, C., A. Smit, G.J. Herndl & M.G. Weinbauer. Linking prokaryotic richness with viral abundance and prokaryotic activity. *Limnol. Oceanogr.* 50: 968-977.
- Winter, C., A. Smit, T. Szöke-Dénes, G.J. Herndl & M.G. Weinbauer. Modeling viral impact on bacterioplankton in the North Sea using artificial neural networks. *Environ. Microbiol.* 7: 881-893.
- Witbaard, R., G.C.A. Duineveld, T. Amaro & M.J.N. Bergman. Growth trends in three bivalve species indicate climate forcing on the benthic ecosystem in the southeastern North Sea. *Clim. Res.* 30: 29-38.
- Witbaard, R., R. Daan, M. Mulder & M. Lavaleye. The mollusc fauna along a depth transect in the Faroe Shetland Channel: Is there a relationship with internal waves? *Mar. Biol. Res.* 1: 186-201.
- Wuchter, C., S. Schouten, S.G. Wakeham & J.S. Sinninghe Damsté. Temporal and spatial variation in tetraether membrane lipids of marine Crenarchaeota in particulate organic matter: Implications for TEX₈₆ paleothermometry. *Paleoceanography* 20: PA3013 doi: 10.1029/2004PA001110
- Zegers, B.N., A. Mets, R. van Bommel, C. Minkenberg, T. Hamers, J.H. Kamstra, G.J. Pierce & J.P. Boon. Levels of hexabromocyclododecane (HBCD) in harbor porpoises and common dolphins from Western European seas, with evidence for stereo-isomer specific biotransformation by cytochrome P450. *Environ. Sci. Technol.* 39: 2095-2100.

Refereed chapters in books

- Bailey, K.M., H. Nakata & H.W. van der Veer. The planktonic stages of flatfishes: physical and biological interactions in transport processes. In: Gibson, R.N. (Ed.). *Flatfishes. Biology and exploitation.* Fish and Aquatic Resources Ser. 9, Blackwell Oxford, London, pp. 94-119.
- Bakker, J.P. & T. Piersma. Restoration of intertidal flats and tidal salt marshes. In: Van Andel, J. & J. Aronson (eds.). *Restoration ecology.* Blackwell Publishing, Oxford, pp. 174-192.
- Battley, P.F. & T. Piersma. Adaptive interplay between feeding ecology and features of the digestive tract in birds. In: Starck, J. M. & T. Wang (eds.). *Physiological and ecological adaptations to feeding in vertebrates.* Science Publishers, Enfield, USA, pp. 201-228.
- Blamart, D., C. Rollion-Bard, J.-P. Cuif, A. Juillet-Leclerc, A. Lutringer, T.C.E. van Weering & J.-P. Henriët. C and O isotopes in a deep-sea coral (*Lophelia pertusa*) related to skeletal microstructure. In: Freiwald, A. & J.M. Roberts (eds.). *Cold-water Corals and Ecosystems.* Springer-Verlag, Berlin, Heidelberg, pp. 1005-1020.
- Camphuysen, C.J., D.M. Fleet, B. Reineking & H. Skov. Oil pollution and seabirds. In: Essink K., C. Dettmann, H. Farke, K. Laursen, G. Lürßen, H. Marencic & W. Wiersinga (eds). *Wadden Sea Quality Status Report 2004, Common Wadden Sea Secr., Wilhelmshaven,* pp. 115-123.
- Costello, M.J., M. McCrea, A. Freiwald, T. Lundälv, L. Jonsson, B.J. Bett, T. van Weering, H. de Haas, J.M. Roberts & D. Allen. Role of cold-water *Lophelia pertusa* coral reefs as fish habitat in the NE Atlantic. In: Freiwald, A. & J.M. Roberts (eds). *Cold-water corals and ecosystems.* Springer-Verlag, Berlin, Heidelberg, pp. 771-805.
- de Baar, H.J.W. Role of the Oceans in the high-CO₂ World. In: L.C. van Geuns and L. Groen (eds.) *Fossil Fuels, Reserves and Alternatives - a Scientific Approach,* Royal Netherlands Academy of Sciences, ISBN 90-6984-441-9, pp. 49-60.
- Frank, N., A. Lutringer, M. Paterne, D. Blamart, J.-P. Henriët, D. van Rooij & T.C.E. van Weering. Deep-water corals of the northeastern Atlantic margin: carbonate mound evolution and upper intermediate water

- ventilation during the Holocene. In: Freiwald, A. & J.M. Roberts (eds.). Cold-water Corals and Ecosystems. Springer-Verlag, Berlin, Heidelberg, pp. 113-133.
- Huvenne, V.A.I., A. Beyer, H. de Haas, K. Dekindt, J-P. Henriët, M. Kozachenko, K. Olu-Le Roy, A.J. Wheeler, the TOBI/Pelagia 197 & CARACOLE cruise participants. The seabed appearance of different coral bank provinces in the Porcupine Seabight, NE Atlantic: results from sidescan sonar and ROV seabed mapping. In: Freiwald, A. & J.M. Roberts (eds.). Cold-water corals and ecosystems. Springer-Verlag, Berlin, Heidelberg, pp. 535-569.
- Jetten, M., M. Schmid, K. van de Pas-Schoonen, J.S. Sinninghe Damsté & M. Strous. Anammox organisms: enrichment, cultivation, and environmental analysis. *Methods Enzymol.* 397: 34-57.
- Pancost, R.D., B.E. van Dongen, A. Esser, H. Morgans-Bell, H.C. Jenkyns & J.S. Sinninghe Damsté. Variation in organic-matter composition and its impact on organic-carbon preservation in the Kimmeridge Clay Formation (Upper Jurassic, Dorset, southern England). In: *The Deposition of Organic-Carbon Rich Sediments: Models, Mechanisms and Consequences* (Ed., N.B. Harris), SEPM Spec. Publ. 82, pp 261-278.
- Piersma, T. Energy-saving flights: Copper knots and a cost-benefit analysis of migration. In: Drent, R., J.P. Bakker, T. Piersma & J.M. Tinbergen (eds.). *Seeking Nature's Limits: Ecologists in the field*. KNNV Publishing, Utrecht, pp. 37-43.
- Piersma, T., D.I. Rogers, P.M. Gonzalez, L. Zwarts, L.J. Niles, I. de Lima Serrano do Nascimento, C.D.T Minton & A.J. Baker. Fuel storage rates before northward flights in red knots worldwide: facing the severest ecological constraint in tropical intertidal environments? In: Greenberg, R. & P.P. Marra (eds.). *Birds of two worlds: ecology and evolution of migration*. Johns Hopkins University Press, Baltimore, pp. 262-273.
- Reijnders, P.J.H., B. Reineking, K.F. Abt, S.M.J.M. Brasseur, C.J. Camphuysen, M. Scheidat, U. Siebert, M. Stede, J. Tougaard & S. Tougaard. Marine mammals. In: Essink K., C. Dettmann, H. Farke, K. Laursen, G. Lürßen, H. Marencic & W. Wiersinga (eds). *Wadden Sea Quality Status Report 2004*, Common Wadden Sea Secr., Wilhelmshaven, pp. 317-330.
- Van der Meer, J. From individual to population and back: Simple models of a complicated reality. In: Drent, R., J.P. Bakker, T. Piersma & J.M. Tinbergen (eds.). *Seeking Nature's Limits: Ecologists in the field*. KNNV Publishing, Utrecht, pp. 177-181.
- van der Meer, J., C.H. Heip, P.J.M. Herman, T. Moens & D. van Oevelen. Flow of energy and matter in marine benthic animal populations. In: Eleftheriou, A. (ed.). *Methods in marine benthos studies*. Blackwell, Oxford, pp. 326-409.
- van der Veer, H.W. & W.C. Leggett. Recruitment. In: Gibson, R.N. (Ed.). *Flatfishes. Biology and exploitation*. Fish and Aquatic Resources Ser 9, Blackwell Oxford, London, pp. 120-137
- White, M., C. Mohn, H.C. de Stigter & G. Mottram. Deep-water coral development as a function of hydrodynamics and surface water productivity around the submarine banks of the Rockall Trough, NE Atlantic. In: Freiwald, A. & J.M. Roberts (eds.). Cold-water Corals and Ecosystems. Springer-Verlag, Berlin, Heidelberg, pp. 503-514.

Monographs

- Brochard, C.E.J. & G.C. Cadée. Tropische zaden van de Nederlandse kust. SWG Tabellenserie 30. 66 pp.
- Drent, R., J.P. Bakker, T. Piersma & J.M. Tinbergen (eds.). Seeking Nature's Limits: Ecologists in the field, KNNV Publishing, Utrecht, 312 pp.

Non-refereed papers

- Cadée, G.C. & F. Wesselingh. Van levend schelpdier naar fossiele schelp: tafonomie van Nederlandse strand-schelpen. *Spirula*, 343: 36-52.
- Cadée, G.C. & H.W. Nijhuis. Geeft Terschellinger zeemeermin haar geheim prijs? *Het Zeepaard* 65: 86-89.
- Cadée, G.C. & H.W. Nijhuis. Will Terschelling's mermaid tell us her secrets? *The Drifting Seed* 11: 3-4.
- Cadée, G.C. & W. Kruiswijk. Can they float? A nutmeg *Myristica fragrans* from the Dutch coast. *The Drifting Seed* 10: 5-6.
- Cadée, G.C. Blaaswier transporteert levende Japanse oester. *Spirula* 345: 102.
- Cadée, G.C. Cork floats. *Beachcombers' Alert!* 9: 4.
- Cadée, G.C. Een groot oceanograaf (in memoriam prof. dr. H. Postma). *Nieuwsbrief KNGMG/ALW/KTFG* Sept. 8-9.
- Cadée, G.C. In de winter 2004/2005 aangespoelde *Sepia officinalis* schilden op Texel. *Het Zeepaard* 65(3): 94-100.
- Cadée, G.C. In Memoriam Prof. Dr. Henk Postma 26 juli 1921-19 juli 2005. *Bionieuws* 15: 14.
- Cadée, G.C. Mysterious floating grains. *The Drifting Seed* 10: 17.
- Cadée, G.C. Riddle of mysterious floating grains solved! *The Drifting Seed* 11: 5-6.
- Cadée, G.C. *Gnaticnus pentax*, bijtspoor van reguliere zee-egel op Texelse oesterschelp. *Grondboor & Hamer* 59: 128-130.
- Camphuysen, C.J. & A.L. Spaans. Beobachtungen und Wiederfunde in Deutschland von farbberingten Silbermöwen *Larus argentatus* aus den Niederlanden, 1986-2005. *Seevögel* 26: 20-24.
- Camphuysen, C.J. & G. van der Bent. High-tech hulpmiddelen ter beoordeling visserij-effecten: jan van genten met een GPS aan de staart. *Visserijnieuws* 21/10: 6.
- Camphuysen, C.J. & M.F. Leopold. Het voedsel van roodkeelduikers *Gavia stellata*, zeekoeten *Uria aalge* en alken *Alca torda* voor de Noord-Hollandse kust in de winter van 2004/2005. *Nieuwsbrief NZG* 6: 8-9.
- Camphuysen, C.J. Zilvermeeuwen en kleine mantelmeeuwen met kleurringen. *Nieuwsbrief NZG* 6: 4-5.
- Camphuysen, C.J. Gekleurringde zilvermeeuwen en kleine mantelmeeuwen. *Dutch Birding* 27: 47.
- Camphuysen, C.J. Walvissen en dolfijnen in Nederland in de tweede helft van 2004. *Nieuwsbrief NZG* 6: 2-4.
- Camphuysen, C.J. Wat een jonge zeekoet al niet uit een eikenbos kan halen. *Nieuwsbrief NZG* 6.
- Camphuysen, C.J. Witsnuitdolfijnen in Nederland. *Zoogdier* 16: 8-12.
- Camphuysen, C.J. Zogen in het water. *De Water* 110: 16.
- Daan, R. & M. Mulder. De otterschelp *Lutraria lutraria* (Linnaeus, 1758) op het Nederlands Continentaal Plat. *Het Zeepaard* 65: 187-188.
- de Leeuw, J.W. On the evolution of academic organic geochemistry in the Netherlands. *Abstracts of Papers of the American Chemical Society* 229.
- de Leeuw, J., H. Lindeboom & W. Mook. LOICZ-IPO and NIOZ: a happy beneficial and fruitful relationship for 13 years. *LOICZ Newsletter* 36:1-2.

- de Vooy, C.G.N. De groei van de mossel *Mytilus edulis* op een kustboei in de Noordzee vergeleken met die op een kweekperceel in de Waddenzee (Doove balg). *Spirula* 345: 106-107.
- de Vooy, C.G.N. Wulkenvisserij in de Waddenzee in de periode van 1900 tot 1970. *Visserijnieuws* 39: 44-45.
- Gerdes, D., J.M. Gilli, E. Isla, M. Lavaleye, J. Michels, A. Pasternak, A. Rodriguez y Baena, S. Rossi, B. Vendrell & T. Brey. Multidisciplinary spring bloom studies. In: W.E. Arntz & T. Brey. The expedition ANTARKTIS XXI/2 (BENDEX) of RV "Polarstern" in 2003/2004. *Berichte zur Polar- und Meeresforschung* 503: 36-37.
- Herfort, L., J.P. Boon, S. Schouten, M. Woltering, M. Baas & J.S. Sinninghe Damsté. Terrestrial organic matter input in the coastal system as revealed by tetraether membrane lipids. *LOICZ Newsletter* 36: 4-6.
- Lavaleye, M., S. Thatje, G. Duineveld & W.E. Arntz. Pelagic larvae and juveniles of benthic invertebrates in the near-bottom environment. In: W.E. Arntz & T. Brey. The expedition ANTARKTIS XXI/2 (BENDEX) of RV "Polarstern" in 2003/2004. *Berichte zur Polar- und Meeresforschung* 503: 31-35.
- Lavaleye, M.S.S., G.C.A. Duineveld & M. Bergman. Long-term lander recovered and spectacular videos from Rockall Bank. RV Pelagia and NIOZ investigate cold water corals. *HERMES newsletter* 2: 8.
- Piersma, T. Atleten op vet. 42-literair hardlooptijdschrift 2: 68-74.
- Piersma, T. & J. Reneerkens. Mechanical cockle fisheries banned from the Dutch Wadden Sea at last. *Wetlands* 13: 13.
- Reneerkens, J. & T. Piersma. Waarom produceren steltlopers ander stuitklierwas tijdens het broedseizoen? *Limosa* 77: 149-156.
- Ridderinkhof, H. Long-term ferry observations in the Marsdiep tidal inlet. *LOICZ newsletter*, December.
- Thatje, S., M. Lavaleye & W.E. Arntz. Reproductive strategies of Antarctic decapod crustaceans. In: W.E. Arntz & T. Brey. The expedition ANTARKTIS XXI/2 (BENDEX) of RV "Polarstern" in 2003/2004. *Berichte zur Polar- und Meeresforschung* 503: 28-30.
- van Haren, H. Shear, stratification and mixing in the North Sea. 9th Workshop on physical processes in natural waters, 4-6 September. Lancaster University, U.K. (ed. A. Folkard & I. Jones), 9-15.

Internal reports

- Dekker, R. & D. Waasdorp. Het macrozoöbenthos op twaalf raaien in de Waddenzee en de Eems-Dollard in 2004. NIOZ report 2005-1, 60 pp.
- Piersma, T., G.B. Pearson, R. Hickey & M. Lavaleye (eds.) The long mud. Benthos and shorebirds of the fore-shore of Eighty-mile Beach, Western Australia. NIOZ report 2005-2, 218 pp.
- Daan, R. & M. Mulder. The macrobenthic fauna in the Dutch sector of the North Sea in 2004 and a comparison with previous data. NIOZ report 2005-3, 95 pp.
- Reneerkens, J., T. Piersma & B. Spaans. De Waddenzee als kruispunt van vogeltrekwegen. Literatuurstudie naar de kansen en bedreigingen van wadvogels in internationaal perspectief. NIOZ report 2005-4, 125 pp.
- Camphuysen, C.J. (ed.). Understanding marine foodweb processes: an ecosystem approach to sustainable sandeel fisheries in the North Sea. IMPRESS Final Report, NIOZ report 2005-5, 240 pp.
- Bergman, M.J.N., G.C.A. Duineveld & M.S.S. Lavaleye. Long term closure of an area to fisheries at the Frisian Front (south-eastern North Sea): effects of the on the bottom fauna. NIOZ-report 2005-6, 18 pp.

Cruise reports

- Camphuysen, C.J. Whales and dolphins observed, HNLMS Mercuur Expedition, Nemo 2005, Taranto (S Italy) - La Coruña (NW Spain), 29 June-7 July.
- de Haas, H., F. Mienis, & Shipboard Scientific Crew. Cold water corals and carbonate mound formation at the Pen Duick Escarpment (Gulf of Cadiz) and Rockall Bank. RV Pelagia, cruise M2005 (64PE237), 19 May-19 June.
- Gerringa, L.J.A. Dissolved organic ligands of Fe near the Kerguelen. KEOPS Cruise Report Marion Dufresne, 10 January-23 February.
- Herndl, G.J. Transformation of dissolved organic matter (DOM) in the North Atlantic Deep Water and intermediate waters: assessing the functional and phylogenetic variability of marine bacterioplankton communities in relation to the quality of DOM (TRANSAT). RV Pelagia, cruises 64PE202 & 64PE211, 6 September – 4 October 2002, 9 May – 6 June 2003.
- Middag, R., M. Hoppema & E. van Weerlee. Carbon and Nutrients in the Weddell Sea, Report of RV Polarstern cruise ANT XXII/3 (21 January - 6 April), 25p.
- Ridderinkhof, H. RRS Discovery Cruise Report: cruise D289B Mozambique Channel, 26 February – 15 March.
- Timmermans, K.R. Ultra clean test cruise. RV Pelagia cruise 64PE241, Cadiz-Las Palmas, 1 - 10 November.
- Van Duyl, F.C., G.C.A. Duineveld & shipboard scientific crew. Biodiversity, ecosystem functioning and food web complexity of deep water coral reefs in the NE Atlantic (Rockall and Porcupine Bank) BIOSYS-HERMES Cruise Report. RV Pelagia cruise 64PE238, 21 June-21 July.
- van Haren, H. Towed ADCP- Bay of Biscay. RV Pelagia cruise 64PE235, 20-27 April , 15 pp.
- Veth, C. Project CLIVARNET Atlantic Monitoring Programme (CAMP). Including: CAMP , LOCO, CIS, VAMOC, CarbOcean. RV Pelagia, cruise 64PE240, September 7th – October 5th.

Other Reports (non-refereed)

- Buehler, D.M. A budget traveller's guide to immunity and disease: Individual, seasonal, environmental and genetic variation in immune function and disease risk in a long distance migrant, the red knot *Calidris canutus*. Introductory Essays in Functional Ecology, 6: 1-36.
- Camphuysen, C.J. Olieslachtoffers op de Nederlandse kust, 2004/2005. Report to the Ministry of Transport, Public works and Water Management.
- Camphuysen, C.J., J. Chardine, M. Frederiksen & M. Nunes. Review of the impacts of recent major oil spills on seabirds. In: Anonymous (ed.) Report of the Working Group on Seabird Ecology, Oceanography Committee, ICES CM 2005/C:05, Copenhagen, Denmark.
- Honkoop, P.J.C., G. Pearson, T. Piersma & M. Lavaleye. Intertidal benthic community structure: role of sediment characteristics. In: Piersma, T., G.B. Pearson, R. Hickey & M. Lavaleye (eds.): NIOZ-report 2005-2: 151-162.
- Lavaleye, M., G. Pearson, T. Piersma & P. de Goeij. Atlas of the macrozoobenthic fauna. In: Piersma, T., G.B. Pearson, R. Hickey & M. Lavaleye (eds.): NIOZ-report 2005-2: 73-149.
- Lavaleye, M.S.S. & G.C.A. Duineveld. Scientific report of the Dutch research during the Antarctica expedition with the RV. Polarstern to the Weddell Sea from 17 Nov. 2003 to 18 Jan 2004 for ALW/NWO. Research on the quantity and identity of pelagic larvae and juveniles of benthic invertebrates, and the near-bottom abiotic environment in Antarctica (Weddell Sea). 2 pp

Ten Hallers-Tjabbes, C.C. Ecotoxicological impact of contamination on the ecosystem of the Ems-Dollard estuary. Report to RIKZ, Rijkswaterstaat, December.

van Weering, T.C.E., H.C. de Stigter & WP 2 partners. Comparative data sets (currents, SPM, sediment fluxes) on Mediterranean margins. (Deliverable 19) EU Strataform Report

van Weering, T.C.E., H.C. de Stigter & WP 2 partners. Model of forcing conditions governing sediment transport along transects from the shallow shelf via canyons to the deep sea. (Deliverable 20) EU Strataform Report

van Weering, T.C.E., H.C. de Stigter & WP 2 partners. Synthesis of Recent and Late Cenozoic sediment transport pathways and fluxes from the shallow shelf via canyons to the deep sea. (Deliverable 21) EU Strataform Report

Public Outreach

Together with Alterra-Texel and EcoMare, Royal NIOZ also maintains the educational web-site 'ZeeinZicht' (Sea in Sight) at www.zeeinzicht.nl. This contains a wide variety of information about the marine environment with emphasis on the North Sea and the Wadden Sea. "Zee in zicht" is directly connected with the digital encyclopaedia 'De Vleet' (The Skate), edited by EcoMare.



99

On 13 and 14 October, NIOZ and Alterra-Texel jointly organized the 'Noordzeedagen'. This 2 day symposium is organized every year to enhance the exchange of information and opinions among scientists, policy makers, fishery, industry and non-governmental organizations; 150 people attended the successful symposium on Texel. An overview of the presentations is given in the central pages of this annual report.

NIOZ scientists Hendrik van Aken and Katja Philippart gave lectures on indications for climate change in the 'Marsdiep' tidal inlet between Texel and Den Helder during the 'Wetenweek' on 24 October. The 'Wetenweek' is especially organised to bring science closer to a general audience living in the neighbourhood of universities and scientific institutions.

Together with team-members Norbert Dankers of Alterra-Texel and Sarah Kraak of the Netherlands Institute for Fisheries Research (RIVO) in IJmuiden, Kees Veth of NIOZ formed a marine dream team, which succeeded to win the national popular science event the 'Nationale Wetenschapsquiz' which was broadcasted on the Dutch television on the evening of 24 December.



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In 2005, articles and opinions of NIOZ scientists were mentioned 2 times in international newspapers, 19 times in the national newspapers 'De Volkskrant', 'NRC', 'Algemeen Dagblad' and 'De Telegraaf', 48 times in regional newspapers, mostly the 'Noord Hollands Dagblad' and 'De Texelse Courant', and 16 times in professional news magazines, such as 'Bionieuws', the news magazine of the Netherlands Institute for Biology (NIBI). NIOZ news items on important publications, PhD thesis defences, prizes and other important news items also become rapidly available in the 'latest news' section on our web-site at www.nioz.nl.

Posters

- Agis, M., C. Maier & M. Weinbauer. DNA extraction and genetic fingerprinting of prokaryotes on deep water corals and associated invertebrates. Third International Symposium on Deep-Sea Corals, Miami, Florida, USA, 28 November-2 December.
- Amaro, T., G. Duineveld, E. van Nes & M. Scheffer. Consequences of shifts in the macrofauna of the Frisian Front (S. North Sea). ASLO Meeting, Santiago de Compostela, Spain, 19-24 June.
- Andersen, L.T., J.O. Leth, A. Kuijpers, P. Terrinha & H.C. de Stigter. Sedimentation and structures of the Nazaré canyon on the Portuguese Atlantic Margin. Joint Eurostrataform / Promess1 Annual Meeting, Salamanca, Spain, 24-27 October.
- Berges J.A. & C.P.D. Brussaard. Detection of programmed cell death induced by viruses in marine phytoplankton. The 4th Algal Virus Workshop, Amsterdam, 17-21 April.
- Boere, A., B. Abbas, J.S. Sinninghe Damsté & M.J.L. Coolen. Fossil DNA as a species-specific recorder of alkenone biosynthesizing haptophytes: Implications for UK'₃₇ -based palaeothermometry (P). 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.

- Boumann, H.A., E.C. Hopmans, M. Strous, J.S. Sinninghe Damsté & S. Schouten. Biophysical properties of newly-discovered membrane lipids: Insights into the functioning of cell membranes of marine micro organisms. Annual Dutch Meeting on Molecular and Cellular Biophysics, Lunteren, 10-11 October.
- Brandsma, J., A.M. Langezaal, M. Schmid, S. Schouten, E.C. Hopmans, G.J. van der Zwaan, M.S.M. Jetten & J.S. Sinninghe Damsté. The influence of bacteria on microhabitat selection by benthic foraminifera. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Brandsma, J., A.M. Langezaal, M. Schmid, S. Schouten, E.C. Hopmans, G.J. van der Zwaan, M.S.M. Jetten & J.S. Sinninghe Damsté. The interaction between benthic foraminifera and nitrate reducing bacteria. SPOT-ON, Warnemünde, Germany, 26 June – 1 July.
- Cadée, G.C. Is the increase in tropical drift seeds found on the Dutch coast related to Global Warming? Noordzeedagen, Texel, 13-14 October and Annual Meeting Palaeontological Association, Oxford, UK, 18-21 December.
- de Baar, H.J.W. & co-authors. Synthesis of Iron Fertilizations: from the Iron Age in the Age of Enlightenment. Poster presented at symposium *Phaeocystis*, major Link in the Biogeochemical Cycling of Climate-relevant Elements (SCOR Working Group 120), Haren, 30 August - 3 September.
- de Bruin, T. F. The SCAR/COMNAP Joint Committee on Antarctic Data Management (JCADM). International Marine Data and Information Systems Conference, Brest, France, 31 May – 3 June.
- de Bruin, T. F. Metadata. Noordzeedagen , 13-14 October 2005.
- de Bruin, T. F. (NIOZ), W.T.B. van der Lee (RIKZ). The Netherlands National Oceanographic Data Committee. Noordzeedagen 2005, 13-14 October.
- de Bruin, T. F. Toegang tot gegevens van de Noordzee. Noordzeedagen 2005, 13-14 October 2005.
- de Haas, H., F. Mienis, T.C.E. van Weering, H.C. de Stigter & T.O. Richter. Morphology and sedimentology of (clustered) cold water coral mounds at the south Rockall Trough margins, NE Atlantic Ocean. European Geosciences Union, 2nd General Assembly, Vienna, Austria, 24 - 29 April.
- de Koster, R.X., R. Gieles, W. Boer & T.F. de Bruin. COREBASE – The database of sediment samples and results at the Royal Netherlands Institute for Sea Research. International Marine Data and Information Systems Conference, Brest, France, 31 May – 3 June.
- de Leeuw, J.W. International Census of Marine Microbes; Unveiling the ocean's hidden majority. 2nd All Program meeting Census of Marine Life, Frankfurt, Germany, 3 November.
- Duineveld, G.C.A., M. Lavaleye, M. Bergman, F. Mienis, T. van Weering, H. de Stigter & H. de Haas. Long term observations on abiotic and biotic conditions in the SW Rockall coral communities. 3rd International Symposium on Deep-Sea Corals, Miami, USA, 28 November.
- Dumitrescu, M., S.C. Brassell, S. Schouten, E.C. Hopmans & J.S. Sinninghe Damsté. Cooling cycles in the tropics during the Early Cretaceous greenhouse. AGU meeting, San Francisco, USA, 5-9 December.
- Esparza, M., J.O. Grimalt, T.O. Richter & T.C.E. van Weering. The Holocene alkenone SST record from Feni Drift (NE Atlantic ocean) at 18 yrs resolution. European Geosciences Union, 2nd General Assembly, Vienna, Austria, 24-29 April.
- Gontharet, S., C. Pierre, M.M. Blanc-Valleron, J.M. Rouchy, Y. Fouquet, G. Bayon, A. Stadnitskaia, J.S. Sinninghe Damsté, I. Bouloubassi, J.P. Foucher, J. Masle, O. Boudouma and the NAUTINIL scientific party. Methane-related carbonates from mud volcanoes and pockmarks of the Nile deep-sea fan. European Geosciences Union, Vienna, Austria, 24-29 April.
- Gorski, K., T. Compton & T. Piersma. Physiological adaptation of bivalves to a tropical and temperate climate. Benelux Congress, Wageningen, the Netherlands, November.

- Harlander, U. & L.R.M. Maas. On zonally symmetric equatorial waves trapped in the meridional-depth plane. EGU General Assembly, Vienna, Austria, 24-29 April.
- Herfort, L., C. Wuchter, J. Boon, S. Schouten & J.S. Sinninghe Damsté. Ecology of marine Archaea in the North Sea. International Union of Microbiological Societies. San Francisco, USA, 23-28 July.
- Hopmans, E.C., M.V.M. Kienhuis, J.E. Rattray, A. Jaeschke, S. Schouten & J.S. Sinninghe Damsté. Analysis of ladderane lipids in cultures, water samples, and sediments using HPLC/MS/MS. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Huckins, J.N., K. Booij, W.L. Cranor, D.A. Alvarez, R.W. Gale, M.E. Bartkow, G.L. Robertson, R.C. Clark & R.E. Stewart. Fundamentals of the use of performance reference compounds (PRCs) in passive samplers. SETAC North America 26th Annual Meeting, Baltimore, USA, 13-17 November.
- Jaeschke, A., E.C. Hopmans, S.G. Wakeham, S. Schouten & J.S. Sinninghe Damsté. The sedimentary fate of ladderane lipids, characteristic membrane lipids of bacteria performing anaerobic ammonium oxidation. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Koho, K.A., T.J. Kouwenhoven, G.J. van der Zwaan, H.C. de Stigter & T.C.E. van Weering. Recent (Rose Bengal stained) benthic foraminifera from Portuguese margin canyons. European Geosciences Union, 2nd General Assembly, Vienna, Austria, 24-29 April.
- Koho, K.A., T.J. Kouwenhoven, G.J. van der Zwaan, H.C. de Stigter & T.C.E. van Weering. Benthic foraminiferal ecology of Atlantic margin canyons. Netherlands Research School of Sedimentary Geology, 12th Annual Symposium, Amsterdam, 30 November.
- Kuipers, B.R. & G.N. van Noort. Bacterial bioassays confirm: recent small spring phytoplankton blooms in Dutch Coastal Water are phosphate-limited. Noordzeedagen, NIOZ, 13-14 October.
- Maier, C. & J. Pätzold. Slope of isochronic skeletal $\delta^{13}\text{C}/\delta^{18}\text{O}$ of zooxanthellate corals as potential proxy for water depth and sea level change. EGU, 2nd General Assembly, Vienna, Austria, 24-29 April.
- Meyers, P.A. & A. Forster. Origin and accumulation of organic matter in Albian to Santonian black shales on the Demerara Rise. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Mienis, F., T.C.E. van Weering, H.C. de Stigter, H. de Haas & T.O. Richter. Near bed hydrodynamic conditions of carbonate mounds in the Northeast Atlantic Ocean. European Geosciences Union, 2nd General Assembly, Vienna, Austria, 24 - 29 April.
- Parada, V., E. Sintes, M. Parada, V., E. Sintes, M.G. Weinbauer & G.J. Herndl. Virioplankton dynamics in the surface microlayer in an anticyclonic eddy of the northwestern Mediterranean Sea. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.
- Parada, V. & G.J. Herndl. Dynamics of newly produced virioplankton in the coastal North Sea. 9th Symposium on Aquatic Microbial Ecology, Helsinki, Finland, 21-25 August.
- Philippart, C.J.M. Responsive Mode Project "Pan-European gradients in propagation and settlement events". Marbef Annual meeting, Porto, Portugal, March.
- Rampen, S.W., S. Schouten, B. Abbas, F.E. Panoto, G. Muyzer, C.N. Campbell, J. Fehling & J.S. Sinninghe Damsté. The origin of 24-norcholestanes and their use as age diagnostic biomarkers. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Rampen, S.W., S. Schouten, B. Abbas, K.R. Timmermans, G. Muyzer, S.G. Wakeham & J.S. Sinninghe Damsté. Sources and seasonal production of long-chain diols and mid-chain hydroxy methyl alkanolates. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Rattray, J.E., E.C. Hopmans, M.V.M. Kienhuis, M.M.M. Kuypers, J.L.C.M. van de Vossenberg, S. Schouten & J.S. Sinninghe Damsté. Selective detection of anammox lipids in environmental samples: application of a new HPLC-MS/MS method. SPOT-ON, Warnemünde, Germany, 26 June – 1 July.

- Rattray, J.E., E.C. Hopmans, M.V.M. Kienhuis, M.M.M. Kuypers, J.L.C.M. van de Vossenberg, S. Schouten & J.S. Sinninghe Damsté. Selective detection of anammox lipids in environmental samples: application of a new HPLC-MS/MS method. Gordon Research Conference on Applied and Environmental Microbiology, Connecticut College, New London, USA, 24 - 29 July.
- Rejas, M., C. Taberner; S. Schouten, M. de Baas, P. Mata, J.M. De Gibert, V. Díaz del Río & L. Somoza. Anaerobic methane oxidation and carbonate precipitation in the carbonate crusts from The Gulf of Cadiz. European Geosciences Union, Vienna, Austria, 24-29 April.
- Scheffers, A. & S.R. Scheffers. Paleo-tsunami in the Intra-Americas Sea. NSF Tsunami Deposit Workshop, Seattle, USA, 12-15 June.
- Schouten, S., A. Forster, E.C. Hopmans, T. Wagner, I. Stüsser, M. Dumitrescu, S.C. Brassell & J.S. Sinninghe Damsté. Reconstruction of sea surface temperatures during Cretaceous oceanic anoxic events using archaeal paleothermometry. AGU meeting, San Francisco, USA, 5-9 December.
- Schouten, S., J. Ossebaar, M. Kienhuis, E. Schefuß, J. Bijma & J.S. Sinninghe Damsté. Hydrogen isotope fractionation patterns of long chain alkenones. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Stadnitskaia, A., J.S. Sinninghe Damsté & NAUTINIL 2003 scientific party. Biomarker evidence for aerobic and anaerobic oxidation of methane in diverse fluid venting environments in the Nile Deep-Sea Fan, Eastern Mediterranean. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Stoica, E. & G.J. Herndl. Bacterioplankton community composition of the coastal Black Sea as revealed by single cell analysis (CARD-FISH). Semmering, Austria, 24-27 May.
- Terra, G. Oceaancirculatie en golven in een notendop. Woudschotenconferentie, Noordwijkerhout, 16 December.
- van der Veer, H.W., K. Guindon-Tisdell, J.M. Miller & J.I.J. Witte. Latitudinal variation in the population structure of *Achirus lineatus*, a subtropical flatfish species. 6th International Symposium on Flatfish Ecology, Maizuru, Japan, 20-25 October.
- Veldhuis, M.J.W. & J.P. Boon Treatment of ballast water testing a system with a modular concept Marine Science and Technology for Environmental Sustainability, ENSUS 2005-04-19 University of Newcastle upon Tyne, Newcastle U.K. 13 – 15 April.
- Versteegh, G.J.M., J.W. de Leeuw & P. Blokker. On the macromolecular structure of algal cell walls, notably dinoflagellate walls. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Wagner, T., I. Stüsser, S. Schouten, J. Sinninghe Damsté, J. Herrle & P. Hofmann. The Cretaceous oceanic anoxic event 1b as revealed by cm-scale TEX₈₆-based SST and isotope records from the Eastern subtropical Atlantic (Mazagan Plateau off NW-Africa, DSDP 545). 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Weijers, J.W.H., S. Schouten, E.C. Hopmans, E. Schefuß, T. Wagner & J.S. Sinninghe Damsté. Reconstruction of terrestrial organic matter input in marine sediments off the coast of Western Africa. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Weijers, J.W.H., S. Schouten, E.C. Hopmans, J.A.J. Geenevasen, O.R.P. David, J. Coleman, R.D. Pancost & J.S. Sinninghe Damsté. Membrane lipids of mesophilic anaerobic bacteria have typical archaeal traits. Annual Dutch Meeting on Molecular and Cellular Biophysics, Luntenen, 10-11 October.
- Weijers, J.W.H., S. Schouten, E.C. Hopmans, J.A.J. Geenevasen, O.R.P. David, R. Pancost, J. Coleman & J.S. Sinninghe Damsté. Anaerobic bacteria biosynthesise membrane-spanning tetraether lipids. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.

Wilke, I., F.J.C. Peeters & G.J. Brummer. Planktic foraminiferal fluxes associated with Agulhas Rings. EGU-general assembly, Vienna, Austria, 24-29 April.

Will, A., U. Harlander & W. Metz. Energy, Entrophy and the Climatological Relevance of Leading Seasonal Singular Vectors. EGU General Assembly, Vienna, Austria, 24-29 April.

Oral presentations

Arrieta, J.M., W. Snoek, H.M. van Aken & G.J. Herndl. Coupling deep-water circulation and microbial communities of the North Atlantic. European Geophysical Union, Vienna, Austria, 24-29 April.

Arrieta, J.M., W. Snoek, H.M. van Aken & G.J. Herndl. Linking ocean circulation and prokaryotic communities in meso- and bathypelagic layers of the North Atlantic. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.

Bak, R.P.M. Coral Reef Ecosystems (Master Course Limnology and Oceanography) Lecture series, University of Amsterdam, November.

Bao, R., D. Bigas, J. Castelló, L. García, M. Dopico, M. Fernández Boán, A. Ramos & C. J. Camphuysen. Edad, sexo y origen de los Frailecillos Atlánticos (*Fratercula arctica*) afectados por la marea negra del Prestige en A Coruña. VI Congreso Galego de Ornitoloxía e V Jornadas Ornitológicas Cantábricas, Lugo, Spain, 29-31 October.

Baudoux, A.-C. & C.P.D. Brussaard. Contribution of viral induced mortality to the termination of *Phaeocystis globosa* spring bloom. American Society of Limnology and Oceanography (ASLO) Summer Meeting, Santiago de Compostela, Spain, 19-24 June.

Baudoux, A.-C. & C.P.D. Brussaard. Contribution of viral induced mortality to the termination of *Phaeocystis globosa* spring bloom. The 4th Algal Virus Workshop, Amsterdam, 17-21 April.

Baudoux, A.-C. & C.P.D. Brussaard. Viruses as mortality agents for *Phaeocystis globosa* in the field. Final meeting SCOR *Phaeocystis* working group #120: *Phaeocystis*, major link in the biogeochemical cycling of climate-relevant elements, Groningen 30 August-3 September.

Bergman, M.J.N. Larval ecology studies - new methods and perspectives. Workshop marine ecology - perspectives. NIOZ, 13 May.

Bijleveld, A., E.O. Folmer & T. Piersma. All knots are equal. But some are more equal than others. International Wader Study Group Conference, Cork, Ireland, 8 October.

Blinova, V., A. Stadnitskaia, M. Ivanov, E. Bileva & L. Pinheiro. Hydrocarbon gases from the mud volcanic deposits of the Gulf of Cadiz. Geosphere-Biosphere Coupling Processes: the TTR interdisciplinary approach towards studies of the European and N. African margins. Marrakech, Morocco, 2-5 February.

Blinova, V., M. Ivanov, A. Stadnitskaia, E. Bileva & L. Pinheiro. Hydrocarbon gases and gas hydrates from the mud volcanic deposits of the Gulf of Cadiz area. European Geosciences Union Meeting, Vienna, Austria, 24-29 April.

Blinova, V., M. Ivanov, E. Bileva, A. Stadnitskaia & L. Pinheiro. Geochemical characteristic of HC gases from mud volcanic deposits in the Gulf of Cadiz area. 8th International conference "New ideas in geology and geochemistry of oil and gas: petroleum systems of sedimentary basins". Moscow State University, Moscow, Russia, 31 May- 2 June.

Bonilla-Findji, O., G.J. Herndl & M.G. Weinbauer. Effect of viruses and flagellates on prokaryotic productivity and diversity in the offshore Mediterranean Sea. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.

- Booij, K. Chemical and toxicological background of the MARPOL treaty. Marine Environmental Awareness Course, NIOZ, 11 October.
- Boon, J.P. Bioaccumulation of hexabromocyclododecanes (HBCDs) in fish and marine mammals. Workshop of the EU-CREDO cluster. Prague, Czech Republic, 8-12 May.
- Boon, J.P., M.J.W. Veldhuis & C.C. Ten Hallers-Tjabbes. Environmental Problems associated with ballast water transport. Maritieme Ontmoetingsdag Koninklijke Nederlandse Vereniging voor Technici op Scheepvaartgebied (KNVTS) en de Vereniging Nederlandse Scheepsbouw Industrie (VNSI), Rotterdam, 1 November.
- Brandsma, J. Analysis of intact polar membrane lipids of benthic foraminifera and associated bacteria. Darwin Meeting "The Nitrogen Cycle: foraminifera, bacteria and molecular paleontology of the marine deeper redox zone", Utrecht, 6 October.
- Brussaard, C. & C.J.M. Philippart. Fytoplankton, de basis van het voedselweb - en daarmee van het beleid. Noordzeedagen, NIOZ, 13-14 October.
- Brussaard, C.P.D. & G. Bratbak. *Phaeocystis* and the role of viruses. Final meeting SCOR *Phaeocystis* working group #120: *Phaeocystis*, major link in the biogeochemical cycling of climate-relevant elements, Groningen 30 August-3 September.
- Brussaard, C.P.D. Ecological perspectives of virally-induced algal mortality. Gordon Research Conference on Applied and Environmental Microbiology. New London, Connecticut, USA, 24-29 July.
- Brussaard, C.P.D. Viral control of phytoplankton. The 4th Algal Virus Workshop, Amsterdam, 17-21 April.
- Brussaard, C.P.D. & A.-C. Baudoux. How different irradiance levels affect the interactions between virus and algal host. American Society of Limnology and Oceanography (ASLO) Summer Meeting, Santiago de Compostela, Spain, 19-24 June.
- Cadée, G.C. Fragmented shells more interesting than entire? Identifying traces on shells. NET, Texel, 24 February, NMV Naturalis Leiden, 9 April, KNNV Haarlem, 28 May, KNNV Den Helder, 7 October.
- Cadée, G.C. History of NIOZ, in particular diatom research at NIOZ. NVKD symposium, NIOZ, 20 May.
- Cadée, G.C. Identification and ecology of shells from the Dutch coast. WadCom, Ecomare, Texel, 25 November.
- Calleja, L.I., J. Dachs, C.M. Duarte, S. Agustí & G.J. Herndl. Evidence for an important role of authochthonous and atmospheric inputs of volatile organic carbon in the subtropical Atlantic Ocean. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.
- Calleja, M., L.I., C.M. Duarte, Y. Prairie, S. Agustí & G.J. Herndl. Evidence for an important role of surface water layer processes on air-water gas transfer in the subtropical Atlantic Ocean. 37th International Liege Colloquium on Ocean Dynamics, Liege, Belgium, 2-6 May.
- Camphuysen, C.J. & J. van der Meer. De zandspiering en zijn predatoren: gedetailleerd onderzoek aan een complex marien voedselweb om visserijeffecten te kunnen beoordelen. Noordzeedagen, NIOZ, 13-14 October.
- Camphuysen, C.J. Colour ringed herring gulls *Larus argentatus*: a dream project or a major headache. 1st European Colour-ring Meeting, Jezus-Eik/Overijsse, Brussels, Belgium, 2-4 September.
- Camphuysen, C.J. De herkenning van walvissen en dolfijnen in de Noordzee Een introductie. Ecomare, Texel, 24 March.
- Camphuysen, C.J. Ecological quality objectives on oiled guillemots. Beached bird survey meeting, Royal Society for the Protection of Birds, Edinburgh, Scotland, 12 May
- Camphuysen, C.J. Seabirds and climate change. NOU symposium on climate change, Naturalis, Leiden, 12 March
- Camphuysen, C.J. Walvissen in Nederland. Ecomare, Texel, 24 March.

- Camphuysen, C.J. Washed ashore: what dead birds have to say. Introduction to the Dutch beached bird survey, 1915-2005. Beached bird survey meeting, Royal Society for the Protection of Birds, Edinburgh, Scotland, 12 May.
- Cardoso, J.F.M.F., D. Langlet, J.F. Loff, A.R. Martins, J.I.J. Witte & H.W. van der Veer. Spatial and temporal variability in growth and reproduction of the Japanese cupped oyster *Crassostrea gigas* (Thunberg, 1793). Workshop on Aquatic invasive species and the functioning of European coastal ecosystems, Sylt, Germany, 27-30 January.
- Compton, T., J. Drent, R. Kentie & T. Piersma. Species Packing in bivalves from a tropical and temperate mud-flat, Benelux Congress, Wageningen, November.
- Coolen, M.J.L., B. Abbas, S. Schouten, G.M. Muyzer, J.K. Volkman, J. Overmann & J.S. Sinninghe Damsté. Fossil DNA as a recorder of ancient microbial communities and palaeoenvironments. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- de Baar, H.J.W. A Brief History of the Trippenhuis, Introductory lecture of the First Annual Meeting of CAR-BOOCEAN Integrated Project, Amsterdam, 22 November.
- de Baar, H.J.W. Biologische productie in de Noordzee: veel hogere CO₂ opname dan gedacht. Nationale Noordzeedagen, Texel, 13 October.
- de Baar, H.J.W. De Rol van IJzer in Algengroei en CO₂ Opname van de Antarctische Oceaan, Koninklijke Maatschappij voor Natuurkunde onder de zinspreuk Diligentia, 's-Gravenhage, 12 December.
- de Baar, H.J.W. Initial Condition of the *in situ* Iron Enrichment Experiments. SOLAS Expert Workshop on Iron Addition Experiments in the Oceans, Wellington, New Zealand, 31 October.
- de Baar, H.J.W. Lecture series introductory oceanography, University of Groningen, Biological Centre, Haren, 7-18 February.
- de Baar, H.J.W. On the Different Physical-Chemical States of Iron in Seawater during the *in situ* Iron Enrichments, SOLAS Expert Workshop on Iron Addition Experiments in the Oceans, Wellington, New Zealand, 2 November.
- de Baar, H.J.W. Role of the Oceans in the High-CO₂ World, high school project lecture for MolenpleinSchool, Texel, 30 March; Current Themes Colloquium in Top-Masters Program, Centre for Evolutionary and Ecological Studies, Haren, 25 April.
- de Baar, H.J.W. Synthesis of 8 Iron Fertilization Experiments with Implications for CO₂ and Climate; ASLO Summer Meeting, Santiago de Compostela, Spain, 21 June 2005; Workshop of KEOPS Antarctic expedition, Marseille, 30 September.
- de Baar, H.J.W. Towards SCOR-GEOTRACES in the International Polar Year, France BONUS initiative workshop, Paris, France, 9 May; Contributed lecture at Joint SCAR/SCOR Panel on Polar Oceanography, Venice, Italy, 7 October.
- de Bruin, T. F. Roles in the IPY: The Joint Committee on Antarctic Data Management (JCADM). Open Consultative Meeting for the IPY, Paris, France, 10-11 March.
- de Bruin, T. F. Achievements of the Joint SCAR/COMNAP Committee on Antarctic Data Management (JCADM). JCADM Review meeting, Texel, The Netherlands, 31 March – 1 April.
- de Bruin, T. F. The Joint SCAR/COMNAP Committee on Antarctic Data Management (JCADM). IODE-XVIII meeting, Ostend, Belgium, 25 – 30 April.
- de Bruin, T. F. Questionnaire on CTD operations – The Sequel. ICES-MDM annual meeting, Sopot, Poland, 9 – 11 May.
- de Bruin, T. F. Other guidelines – How to proceed. ICES-MDM annual meeting, Sopot, Poland, 9 – 11 May.

- de Bruin, T. F. NODCi - A national infrastructure for access to oceanographic and marine data and information. ICES-MDM annual meeting, Sopot, Poland, 9 – 11 May.
- de Bruin, T. F. The SCAR/COMNAP Joint Committee on Antarctic Data Management (JCADM). SCAR MarBIN Implementation meeting, Brussels, Belgium, 25 – 26 May.
- de Bruin, T. F. Marine physical and chemical data in the context of SCAR MarBIN. SCAR MarBIN Implementation meeting, Brussels, Belgium, 25 – 26 May.
- de Bruin, T. F. The SCAR/COMNAP Joint Committee on Antarctic Data Management (JCADM). International Marine Data and Information Systems Conference, Brest, France, 31 May – 3 June.
- de Bruin, T. F. COREBASE – The database of sediment samples and results at the Royal Netherlands Institute for Sea Research. International Marine Data and Information Systems Conference, Brest, France, 31 May – 3 June.
- de Bruin, T. F. The Netherlands National Oceanographic Data Committee: The Netherlands platform for data exchange and advisory services on data management. 20th meeting of the UK Marine and Environmental Data Action Group (MEDAG) Bangor, United Kingdom, 5 July.
- de Bruin, T. F. The SCAR/COMNAP Joint Committee on Antarctic Data Management. SCAR Executive meeting, Sofia, Bulgaria, 11-13 July.
- de Bruin, T. F. The SCAR/COMNAP Joint Committee on Antarctic Data Management. STADM meeting, Sofia, Bulgaria, 13 July.
- de Bruin, T. F. The SCAR/COMNAP Joint Committee on Antarctic Data Management. Joint SCAR/COMNAP Executive meeting, Sofia, Bulgaria, 13 July.
- de Bruin, T. F. Antarctic data management and JCADM – SCAR, COMNAP and JCADM-history and current status. 2nd Latin-American Capacity building workshop for NADCs, Buenos Aires, Argentina, 12-13 September.
- de Bruin, T. F. The JCADM web site as a tool for capacity building. 2nd Latin-American Capacity building workshop for NADCs, Buenos Aires, Argentina, 12-13 September.
- de Bruin, T. F. JCADM Chief Officer's Report. JCADM-9 annual meeting, Buenos Aires, Argentina, 14-16 September.
- de Bruin, T. F. A report from the SCAR and COMNAP Executives meetings. JCADM-9 annual meeting, Buenos Aires, Argentina, 14-16 September.
- de Bruin, T. F. The Netherlands AntArctic Programme (NAAP). JCADM-9 annual meeting, Buenos Aires, Argentina, 14-16 September.
- de Bruin, T. F. Oceanografisch en Antarctisch data management. NWO bijeenkomst over data management. Den Haag, 10 November.
- de Bruin, T. F. "Laat zien wat je hebt", data management in het kader van het International Polar Year 2007/2008. Arctisch Weekend 2005, De Rijp, 20 November.
- de Bruin, T. F. Datamanagement for the SCAR Science Research Programmes. SCAR Cross Linkages Workshop, Amsterdam, 22-24 November.
- de Goeij, J.M. & F.C. van Duyl. The important role of sponges in dissolved organic matter (DOM) removal in coral cavities. 32nd Scientific Meeting of the Association of Marine Laboratories of the Caribbean (AMLC), Curaçao, Netherlands Antilles, 13-17 June.
- de Haas, H., T.C.E. van Weering, H.C. de Stigter, F. Mienis & T.O. Richter. Carbonate mounds and reefs of the Rockall trough and Gulf of Cadiz; Moundforce progress. International Conference and TTR post-cruise meeting. Geosphere biosphere coupling processes: the TTR interdisciplinary approach towards studies of the European and North African margins, Marrakech, Morocco, 2-5 February.

- de Leeuw, J.W. & M.L. Sogin. Microbes: The invisible rulers of our world. 2nd All Program meeting Census of Marine Life, Frankfurt, Germany, 3 November.
- de Leeuw, J.W. The International Census of Marine Microbes and MICROBIS, its data management environment. Workshop: "eGenomics: Cataloguing our Current Genome Collection II", European Bioinformatics Institute (EBI), Cambridge, UK, 10-11 November.
- de Leeuw, J.W., I. Poole, P. Blokker & P.F. van Bergen. Resistant bio- and geomacromolecules in fossil spores, pollen and wood. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- de Stigter, H.C. Sediment fluxes in the Nazaré and Setúbal Canyon, Portuguese Atlantic margin. Hermes Kick-Off Meeting, Rhodes, Greece, 3-9 April.
- de Stigter, H.C., T.C.E. van Weering, G.D. van den Bergh & W. Boer. Particulate matter transport and deposition in the Nazaré Canyon, Portuguese Atlantic margin. European Geosciences Union, 2nd General Assembly, Vienna, Austria, 24-29 April.
- de Stigter, H.C., T.C.E. van Weering, G.D. van den Bergh & W. Boer. Fluxes of particulate matter in the Nazaré and Lisbon/Setúbal Canyons, Portuguese Atlantic margin. Joint Eurostrataform / Promess1 Annual Meeting, Salamanca, Spain, 24-27 October.
- Dekker, R. & K. Essink. Development and competitive abilities of the North American spionid polychaete *Marenzelleria cf. wireni* in the Dutch Wadden Sea. MARBEF workshop on aquatic invasive species and the functioning of European coastal waters, Sylt, Germany, 27-30 January.
- Dekker, R. Changes in Wadden Sea macrozoobenthos and the impact of immigrants. Karel Essink farewell-symposium, Haren, 21 October.
- Dopico M., A. Ramos & C.J. Camphuysen. Dieta invernal de la población de Arao Comun (*Uria aalge*) afectada por el vertido del petrolero Prestige en la provincia de A Coruña. VI Congreso Galego de Ornitoloxía e V Jornadas Ornitológicas Cantábricas, Lugo, Spain, 29-31 October.
- Duineveld, G.C.A. Temporal trends in feeding guilds among the macrobenthos at the NCP. ICES group North Sea Benthos Project, VLIZ, Oostende, Belgium, 16 November.
- Duineveld, G.C.A., M.S.S. Lavaleye & M. Bergman. Does the fauna in closed areas around Production Platforms in the Southern North Sea reflect different fishing intensity? ICES Benhos Ecology Working Group, Copenhagen, Denmark, 18-22 April.
- Fernández Boán M., L. García, A. Ramos, M. Dopico, D. Bigas, J. Castelló, R. Bao & C.J. Camphuysen. Características generales de la población de Arao Común (*Uria aalge*) afectada por el accidente del petrolero Prestige en la costa de A Coruña. VI Congreso Galego de Ornitoloxía e V Jornadas Ornitológicas Cantábricas, Lugo, Spain, 29-31 October.
- Forster, A., S. Schouten & J.S. Sinninghe Damsté. From the Cretaceous paleoequator to the Arctic: sea-surface temperature reconstruction in a greenhouse world based on the TEX₈₆-proxy. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Forster, A., S. Schouten & J.S. Sinninghe Damsté. Sea-surface temperature reconstruction in a greenhouse world based on the TEX₈₆-proxy: from the Cretaceous paleoequator to the Arctic. 7th Intern. Symposium on the Cretaceous, Neuchatel, Switzerland, 5-9 September.
- Ganssen, G.M., G.J.A. Brummer, S.J.A. Jung, D. Kroon & F.J.C. Peeters. The oxygen isotope composition in planktic foraminifera shells as recorder of maximal SST variation. EGU-general assembly, Vienna, Austria, 24-29 April.
- Garcia, A.C., H. Coelho, P.A. de Jesus Mendes, H.C. de Stigter, T.C.E. van Weering, L. Thomsen & R. Neves. Using Lagrangian tracers to model bottom sediment transport along the Nazaré and Setubal submarine canyons. Joint Eurostrataform / Promess1 Annual Meeting, Salamanca, Spain, 24-27 October.

- Garcia, A.C., H. Coelho, P.C. Leitão, H.C. de Stigter, T.C.E. van Weering & R. Neves. Internal tide influence on sediment resuspension in the Nazaré Submarine Canyon and adjacent areas. European Geosciences Union, 2nd General Assembly, Vienna, Austria, 24-29 April.
- Gerkema, T. & V.I. Shrira. 'Non-traditional' internal-wave propagation in the deep ocean. IAG/IAPSO/IABO Joint Assembly, Cairns, Australia, 23 August.
- Gerkema, T. Geophysical flows. NCK Summer School. NIOZ, 30 June - 1 July.
- Gerkema, T. Geophysical flows. NEBROC-ECOLMAS Introductory Course in Marine Sciences. Bremen, Germany, 24 October.
- Gerkema, T. Internal waves in the ocean: a 'non-traditional' view. CWI, Amsterdam, 15 June.
- Gerkema, T. Internal waves: the ocean's inner unrest. IMAU, Utrecht University, 20 December.
- Gerkema, T. La marée interne: taux de conversion, propagation, et effets non linéaires. Laboratoire de Météorologie Dynamique, ENS, Paris, France 13 October.
- Gerkema, T. Near-inertial waves in the ocean: non-traditional and non-linear effects. International Symposium 'Topical Problems of Nonlinear Wave Physics', St. Petersburg, Russia, 6 August.
- Gerkema, T., F.P.A. Lam & L.R.M. Maas. Tides and residual currents over the shelf-edge in the Bay of Biscay. IAG/IAPSO/IABO Joint Assembly, Cairns, Australia, 23 August.
- Harlander, U. & L. R. M. Maas. Internal boundary layers in the equatorial waveguide. European Meteorological Society, Utrecht, 12.-16. September.
- Harlander, U. Internal boundary layers in a well-mixed equatorial atmosphere. Ecole Normale et Supérieure Lyon, 21 November.
- Heip, C., P. Herman, J. Olsen, W. Wolff, J. van der Meer & C.J.M. Philippart. Perspectives in coastal benthic research: the link between biodiversity and ecosystem functioning. National symposium on challenges in marine sciences 2005-2010. NIOZ, 12 April.
- Herfort, L., C. Wuchter, S. Schouten & J.S. Sinninghe Damsté. Ecology of marine archaea in the North Sea. ASLO Summer Meeting, Santiago de Compostela, Spain, 19-24 June.
- Herndl, G.J., E. Teira, E. Sintès, T. Reinthaler & C. Maier. Quantifying single-cell activity by MICRO-CARD-FISH: potential and limitations. Symposium on Single-cell analysis of planktonic microbes, Banyuls sur mer, France, 17-20 October.
- Herndl, G.J., E. Teira, T. Reinthaler & H.M. van Aken. Distribution and activity of planktonic archaea in the North Atlantic. Symposium on Single-cell analysis of planktonic microbes, Banyuls sur mer, France, 17-20 October.
- Herndl, G.J., J.M. Arrieta, E. Teira & H.M. van Aken. Planktonic archaea in the North Atlantic: linking water masses to archaeal activity and community composition. 9th Symposium on Aquatic Microbial Ecology, Helsinki, Finland, 21-26 August.
- Hopmans, E.C. TSQ Quantum applications in oceanographic research. Thermo LC-MS/MS user meeting, Utrecht, 12 April.
- Huguet, C., J.E. Cartes & S. Schouten. Archaeal lipids in decapod faecal-pellets: hitching a ride to the bottom of the ocean. ASLO Summer Meeting, Santiago de Compostela, Spain, 19-24 June.
- Jansen, J.H.F. Paleoceanography, General circulation. NEBROC-ECOLMAS Introductory Course in Marine Sciences. Bremen, Germany, 2 November.
- Jansen, J.H.F. Paleoceanography, Terrigenous proxies. NEBROC-ECOLMAS Introductory Course in Marine Sciences. Bremen, Germany, 2 November.
- Jansen, J.H.F. Why ice ages, and what does the ocean floor tell about them? Openbare Scholengemeenschap De Hogeberg, Den Burg, 24 November, 25 November.

- Johnson, T.C., L. Powers, J.P. Werne, E. Brown, I.S. Castañeda, S. Schouten & J.S. Sinninghe Damsté. Linking the North Atlantic oscillation to rainfall over northern Lake Malawi. EOS Transactions, AGU Fall Meeting, San Francisco, USA, 5-9 December.
- Kentie, R., V. van den Brink, J. Schröder, C. Both, J. Hooijmeijer, N. Groen & T. Piersma. Individual quality and the timing of breeding in black-tailed godwits (*Limosa limosa limosa*). International Wader Study Group Conference, Cork, Ireland, 8 October.
- Lavaleye, M.S.S. & G.C.A. Duineveld. Research cruises with RV Pelagia for HERMES. Kick-off meeting HERMES, Rhodes, Greece, 3-9 April.
- Lavaleye, M.S.S. & G.C.A. Duineveld. The exploration of the trophic foodweb of a cold-water coral community of the Rockall Trough by means of analysis of stable isotope ($\delta^{15}\text{N}$) signatures of the main biota. 3rd International Symposium Deep-Sea Corals, Miami, USA, 30 November.
- Lavaleye, M.S.S. & J.I.J. Witte. Veertien programma's over diverse onderwerpen uit het natuurleven in zee. Natuurwijzer, Radio Texel.
- Lavaleye, M.S.S. Zeesnot. Wegwerp slijmhuizen van giga-mantelvisjes om nanoplankton te vangen. Radio programma Noorderlicht, VPRO, 14 June.
- Lavaleye, M.S.S., G.C.A. Duineveld & J. Craeymeersch. Preliminary results of the distribution of the feeding guilds of macrobenthos of the North Sea. ICES group North Sea Benthos Project, Copenhagen, Denmark, 12-15 April.
- Lavaleye, M.S.S., G.C.A. Duineveld & J. Craeymeersch. Functional groups of the macrobenthos of the North Sea. ICES group North Sea Benthos Project, Oostende, Belgium, 16-18 November.
- Legrand, C. & C.P.D. Brussaard. Phytoplankton allelochemicals: lytic and sublytic effects on competitors. American Society of Limnology and Oceanography (ASLO) Summer Meeting, Santiago de Compostela, Spain, 19-24 June.
- Maas, L.R.M. Inertial wave attractors. The dynamics of rotating fluids conference. University College London, 7 January.
- Maas, L.R.M. Wave Attractors. Burgersdag. Delft Technical University, 14 January.
- Maas, L.R.M. Wave Attractors: linear yet nonlinear. Keynote Lecture 5th Euromech Nonlinear Dynamics Conference (ENOC), Eindhoven Technical University, 7-12 August.
- Maas, L.R.M. Wave Attractors: linear yet nonlinear. Ecole Normale et Supérieure Lyon, 14 November.
- Maas, L.R.M. & H. van Haren. Is fair-weather drowning caused by dead-water? LOCEAN, Institut Pierre Simon Laplace, Université Pierre et Marie Curie, Paris, France, 17 November.
- Maas, L.R.M. & H. van Haren. Is fair-weather drowning caused by dead-water? Ecole Normale et Supérieure Lyon, 21 November.
- Maas, L.R.M. & H. van Haren. Is fair-weather drowning caused by dead-water? Laboratoire Géophysique et Industriels, Université Joseph Fourier, Grenoble, France.
- Maas, L.R.M. Wordt ons klimaat beïnvloed door de maan? - de rol van enkele oceanografische processen. Woudschotenconferentie, Noordwijkerhout, 16 December.
- Maier, C., A. de Kluijver, W.-R. Abraham, F.C. van Duyl, M. Agis & M. Weinbauer. Potential food sources for deep water corals from Rockall Trough (NE Atlantic) assessed by aquarium feeding experiments. Third International Symposium on Deep-Sea Corals, Miami, Florida, U.S.A., 28 November- 2 December.
- Mazzini, A., M.K. Ivanov, J. Parnell, A. Stadnitskaia, B. Cronin, E. Poludetkina, L. Mazurenko & T.C.E. van Weering. Methane-related authigenic carbonates from the Black Sea: Geochemical characterization and relation to seeping fluids. International Workshop on: Methane in sediments and water column of

- the Black Sea: Formation, transport pathways and the role within the carbon cycle. Sevastopol, Ukraine, Russia, 17-22 May.
- Mazzini, A., M.K. Ivanov, J. Parnell, A. Stadnitskaia, B. Cronin, E. Poludetkina, L. Mazurenko & T.C.E. van Weering. Methane-related authigenic carbonates from the Black Sea: Geochemical characterization and relation to seeping fluids. 8th International conference "New ideas in geology and geochemistry of oil and gas: petroleum systems of sedimentary basins". Moscow State University, Moscow, Russia, 31 May- 2 June.
- Moeseneder, M., M.J.M. Arrieta & G.J. Herndl. A comparison of DNA- and RNA-based clone libraries from the same marine bacterioplankton community. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.
- Nauw, J.J., H.M. van Aken, J.R.E. Lutjeharms & W.P.M. de Ruijter. The South East Madagascar Current and undercurrent. European Geophysical Union, Vienna, Austria, 24-29 April.
- Pagani, M., N. Pedentchouk, M. Huber, A. Sluijs, S. Schouten, H. Brinkhuis, J.S. Sinninghe Damsté & G. Dickens. Atmosphere-ocean CO₂ disequilibrium and the hydrologic response to climate change during the perm: an Arctic perspective. GSA Annual Meeting, Salt Lake City, USA, 17 October.
- Pernthaler, J., F. Warnecke, M. Schattenhofer, R. Sommaruga & G.J. Herndl. Local distribution optima of aquatic microbes: evidence from two kilometres above and below the sea level. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.
- Philippart, C.J.M., G.C. Cadée, J. Hegeman & J. van Iperen. Thirty year of diatom observations in the Marsdiep tidal inlet: causes and consequences of long-term trends. NVKD Symposium, NIOZ, 20 May.
- Philippart, C.J.M., G.C. Cadée, J. Hegeman & J. van Iperen. Veranderingen in algenbloeien. Wetenweek 2005, Texel, 19-26 October.
- Philippart, C.J.M., J. J. Beukema, G.C. Cadée, R. Dekker, P.W. Goedhart, J.M. van Iperen, M.F. Leopold & P.M.J. Herman. Possible consequences of changing nutrient conditions for the Wadden Sea ecosystem: what goes up must come down? "Ecosystems in Changing Estuaries", a special retirement symposium in honour of Prof. Dr W.J. Wolff, Groningen, 28-29 November.
- Philippart, C.J.M., O.G. Bos, E. Gontikaki & S.A.L.M. Kooijman. The role of phenotypic plasticity of feeding organs in the early life survival of marine benthic invertebrates. Summer Meeting, SS16: Environmental effects on reproduction of marine invertebrates, Santiago de Compostela, Spain, June 19-24.
- Philippart, C.J.M., J.J. Beukema, G.C. Cadée, R. Dekker, P.W. Goedhart, J.M. van Iperen, M.F. Leopold & P.M.J. Herman. Impact of nutrient reduction on coastal food chains. Estuarine Research Federation 2005, SYM03: Examining nutrient enrichment effects on coastal ecosystems through comparative ecological approaches and perspectives. Norfolk, Virginia, USA, 17-21 October.
- Piersma T. Digestive constraints and the distributional ecology of a shellfish-eating, worldwide migrating shorebird. Seminars in Ecology and Evolution of the Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, 24 February
- Piersma T. Distributional ecology of a molluscivore shorebird predator. Seminar at the Cornell Laboratory of Ornithology, Cornell University, Ithaca, N.Y., USA, 2 February
- Piersma, T. Adaptation, biocomplexity and conservation. Lecture series, Topmaster course, Centre for Ecological and Evolutionary Studies, University of Groningen, Haren, November-December
- Piersma, T. Demography of Eurasian golden plovers in The Netherlands. International Wader Study Group Conference, Cork, Ireland, 10 October
- Piersma, T. Ecology of intertidal flat systems. Introductory course of Leiden Pre-University students, NIOZ, 3 June

- Piersma, T. Ecology of the Banc d'Arguin. Symposium in recognition of Prof. W.J. Wolff at the Centre for Ecological and Evolutionary Studies, University of Groningen, Haren, 28 November.
- Piersma, T. Evolution and functional morphology of the vertebrates. Lecture series, First year Biology, University of Groningen, Haren, November
- Piersma, T. Experimental ecology: fisheries biology, disease problems and dispersal. Lecture series in Master Course on Experimental Ecology, University of Groningen, Haren, March.
- Piersma, T. Is there such a thing as a migratory syndrome? Workshop European Science Foundation at the Max Planck Institute for Ornithology, Seewiesen, Germany, 8 January.
- Piersma, T. Phenotypic flexibility and the ecology of organismal design. University of Vienna, Austria, 22 June.
- Piersma, T. Status of and threats to shorebirds in the Wadden Sea. Press conference BirdLife Netherlands, NIOZ, 27 October.
- Piersma, T. The flexible phenotype, illustrated by organisms from salty and silty environments. Benelux Congress of Zoology, Wageningen, 26 October
- Piersma, T. Towards an integrated research programme on ecosystem functioning of the Banc d'Arguin. Planning Workshop at the Parc National du Banc d'Arguin, Nouakchott, Mauritanie, 30 November.
- Piersma, T. What is animal ecology. Introductory day for prospecting biology students, University of Groningen, Haren, 15 April.
- Piersma, T. What Leo Zwarts found out. Meeting in recognition of Leo Zwarts, Workum, 27 September.
- Piersma, T. Why tundra-breeding birds avoid inland habitats. Dutch National Ornithology Day, Nijmegen, 26 November.
- Piersma, T., J. van der Meer, C. Heip, P. Herman & J. Olsen. Large-scale ecological processes in intertidal flat systems and nearshore waters. National Symposium on Seagoing Research, NIOZ, 12 April.
- Piersma, T. Knots and their food; and the problems caused by mechanical shellfish dredging. Annual Meeting Wadgidsengroep Noord-Nederland and Arenicola, Zoutkamp, 8 March.
- Powers, L.A., J.P. Werne, T.C. Johnson, E.C. Hopmans, J.S. Sinninghe Damsté & S. Schouten. The development of TEX₈₆ for continental paleotemperature reconstruction. GSA North Central Regional Meeting, Minneapolis, USA, 19-20 May.
- Powers, L.A., J.P. Werne, T.C. Johnson, E.C. Hopmans, J.S. Sinninghe Damsté & S. Schouten. The development of TEX₈₆ for continental paleotemperature reconstruction: problems and promise. Goldschmidt Conference, Moscow, Idaho, USA, 20-25 May.
- Powers, L.A., J.P. Werne, T.C. Johnson, E.C. Hopmans, J.S. Sinninghe Damsté & S. Schouten. The calibration and application of TEX₈₆ in lacustrine systems: a powerful tool for independent continental paleotemperature reconstruction. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Powers, L.A., T.C. Johnson, J.P. Werne, E.C. Hopmans, J.S. Sinninghe Damsté & S. Schouten. Worldwide calibration of the molecular paleotemperature proxy TEX₈₆ in lacustrine systems and application to a tropical African sediment record through the LGM. ASLO Winter Meeting, Salt Lake City, USA, 20-25 February.
- Ramos A., M. Dopico, M. Fernández Boán, L. García, D. Bigas, J. Castelló, R. Bao & C.J. Camphuysen. Caracterización de las poblaciones de *Alca torda* L., 1758 afectadas por el vertido del petrolero Prestige y comparación con otras mareas negras. VI Congreso Galego de Ornitoloxía e V Jornadas Ornitológicas Cantábricas, Lugo, Spain, 29-31 October.

- Rampen, S.W., S. Schouten, B. Abbas, F.E. Panoto, G. Muyzer & J.S. Sinninghe Damsté. Lipiden en DNA van diatomeeën: inzicht in evolutie en classificatie. Nederlands-Vlaamse kring van Diatomisten studiedagen, NIOZ, 20 & 21 May.
- Reinthal, T. & G.J. Herndl. Bacterial and dark community respiration in the euphotic layer along a transect from the Mauritanian upwelling into the subtropical Atlantic gyre. European Geophysical Society meeting, Vienna, Austria, 25-29 April.
- Reinthal, T. & G.J. Herndl. Bacterial respiration and growth efficiency: a system comparison of oceanic sites. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.
- Reinthal, T. & G.J. Herndl. Prokaryotic respiration of the meso- and bathypelagic realm. Workshop on Respiration Measurements in the Aquatic Environment, Vigo, Spain, 12-16 June.
- Reneerkens, J. Bescherming van wadvogels: de noodzaak van wetenschappelijk onderzoek. Wetlandwachten weekend, Vogelbescherming Nederland, Kollumerpomp, 19-20 March.
- Reneerkens, J. De kanoetstrandloper: aanpassingen aan een arctisch broedseizoen. IMAKA/Arctisch Centrum, Groningen, 24 February.
- Reneerkens, J. Fysiologische oplossingen voor ecologische problemen: maaggruote en stuitklierwas bij kanoeten. Vogelwerkgroep Asten/IVN Asten-Someren, Asten, 11 November.
- Reneerkens, J., J. Jukema, J. Wijmenga & S. Gomboobaatar. The Northeastern Mongolian steppes: a stopover site of importance for Pacific golden plovers. International Wader Study Group Meeting, Cork, Ireland, 6-11 October.
- Reneerkens, J., T. Piersma & J.S. Sinninghe Damsté. Seasonally changing preen wax composition in shorebirds. Biologisch Centrum, Groningen University, Haren, 18 January.
- Reneerkens, J., T. Piersma & J.S. Sinninghe Damsté. Why do shorebirds seasonally change the secretions of the uropygial gland? Verwey Dagen, NIOZ, 31 January.
- Ridderinkhof, H. 'Lange termijn in-situ metingen bij het NIOZ'. Hydrographic Society Benelux, Utrecht, 23 September.
- Ridderinkhof, H. 'Sediment transport in het Marsdiep'. Noordzeedagen, Texel, 14 October.
- Ridderinkhof, H. Estimating suspended sediment fluxes from long-term ferry observations. TU Delft, 25 January.
- Ridderinkhof, H. Estimating suspended sediment fluxes through a tidal inlet using long-term ADCP observations from a ferry. ASLO, Santiago de Compostela, Spain, 23 June.
- Ridderinkhof, H. Estimating suspended sediment fluxes through a tidal inlet using long-term ADCP observations from a ferry. POL, Liverpool, U.K., 8 September.
- Ridderinkhof, H. Long-term current observations in the Mozambique Channel. EGS, Vienna, Austria, 26 April.
- Ruardij, P., C.P.B. Brussaard, D. van der Wal & M.J.W. Veldhuis. The role of colony formation by *Phaeocystis globosa* in the development and the decay of the bloom: a model study. SCOR working group #120 "Phaeocystis Symposium on Taxonomic Aspects, Distribution, Life Cycle, Ecophysiology, Biotic Interactions, Biogenic Sulfur, Gases and Fate in the Atmosphere and Modelling, Haren, 30 August - 3 September.
- Schefuß, E., T.I. Eglington, S. Schouten, P.M. Grootes, J. Rullkötter, R.R. Schneider & J. Hayes. Molecular-isotopic approaches to continental climate reconstructions from marine sediments: African aridity, vegetation and terrestrial carbon export to the ocean. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Schouten, S. Application of a new organic proxy to reconstruct sea surface temperatures. Symposium "Paleoclimate Change: High-latitudes & Ocean Circulation", London, UK, 2-3 June.

- Schouten, S., C. Wuchter, C. Huguet, S.G. Wakeham, S. Bohaty, J. Zachos, E. Hopmans & J. Sinninghe Damsté. Recent advances in TEX₈₆ paleothermometry. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Schouten, S., J. Ossebaar, M. Kienhuis, E. Schefuß & J. Bijma. First biogeochemical applications of compound specific hydrogen isotopes, 6th Benelux IRMS User Group Meeting, Gent, Belgium, 10-11 March.
- Scott, B.E., J. Sharples, O.N. Ross & C.J. Camphuysen. Marine top predator foraging habitat predicted from a detailed understanding of temporal and spatial oceanographic processes. ICES CM 2005, Aberdeen, Scotland, September.
- Sinninghe Damsté J.S., Het sedimentaire archief: moleculen van vroeger leven. Invited lecture at the NWO Mozaïek Meeting, Utrecht, 14 April.
- Sinninghe Damsté J.S., Moleculaire paleontologie: Gebruik van chemische fossielen voor reconstructie van de geschiedenis van de Aarde. The Museon, The Hague, 4 November.
- Sinninghe Damsté, J.S. Acceptance lecture Treibs medal. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 13 September.
- Sinninghe Damsté, J.S. Molecular fossils: how can fossil chemicals be used to reconstruct ancient climates? Faculty of Chemistry, Utrecht University, Utrecht, 21 April.
- Sinninghe Damsté, J.S. Molecules from the past: Chemistry and application. Invited lecture at the yearly symposium of the Holland Research School of Molecular Chemistry (HRSMC), Amsterdam, 2 December.
- Sinninghe Damsté, J.S. Paleothermometrie van de oceanen in de afgelopen 100 miljoen jaar. Natuurkundig Genootschap, Utrecht, 17 May.
- Sinninghe Damsté, J.S. The Black Sea: a natural anaerobic wastewater treatment plant. Paques BV, Texel, 23 June.
- Sinninghe Damsté, J.S., A.A. Raghoebarsing, A.J.P. Smolders, M.C. Schmid, W.I.C. Rijpstra, M. Wolters-Arts, J. Derksen, M.S.M. Jetten, S. Schouten, L.P.M. Lamers, J.G.M. Roelofs, H.J.M. Op Den Camp & M. Strous. The methane cycle in peat bogs revisited: methanotrophic symbionts provide carbon for photosynthesis. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Sinninghe Damsté, J.S., C. Wuchter, L. Herfort, M.J.L. Coolen, P. Timmers, M. Strous G.J. Herndl, J.J. Middelburg & S. Schouten, Archaeal nitrification in the North Sea. LOICZ Meeting, Egmond aan Zee, 28 June.
- Sinninghe Damsté, J.S., C. Wuchter, L. Herfort, M.J.L. Coolen, P. Timmers, M. Strous, G.J. Herndl, J.J. Middelburg & S. Schouten, Oerbacteriën: een nieuwe link in de stikstofcyclus van de Noordzee. Noordzeedagen, Texel, 13 October.
- Sinninghe Damsté, J.S., J. Ossebaar & S. Schouten TEX₈₆ paleothermometry of Lake Challa sediments: Preliminary results. CHALLACEA workshop, Berlin, Germany, 2 September.
- Sinninghe Damsté, J.S., S. Schouten, S. Rampen, B. Abbas & G. Muyzer. Age-related molecular fossils in oils and sediments derived from diatoms. Shell Rijswijk, Rijswijk, 10 February.
- Sintes, E. & G.J. Herndl. Bacterial activity in the air-sea microlayer of the subtropical Atlantic: interaction between solar radiation, DOM and substrate utilization. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.
- Sintes, E. & G.J. Herndl. Dynamics of bacteria in the sea surface microlayer in the open ocean. 9th Symposium on Aquatic Microbial Ecology, Helsinki, Finland, 21-26 August.
- Sluijs, A., S. Schouten, M. Pagani, H. Brinkhuis, J.S. Sinninghe Damsté, G.R. Dickens, M. Huber, G.-J. Reichart, R. Stein & L.J. Lourens. Ultra-high late Paleocene - early Eocene sea surface temperatures on the North Pole. AGU Meeting, San Francisco, USA, 5-9 December.

- Smallegange, I.M., J. van der Meer & M.W. Sabelis. Interference and the spatial distribution of shore crabs *Carcinus maenas* (L.). NIOO-CEME, Yerseke, 19 January.
- Smallegange, I.M., J. van der Meer & M.W. Sabelis. Interference and the ideal free distribution in shore crabs. Seminars on Ecology and Evolution. Special Iustrum symposium University of Amsterdam, 27 October.
- Stadnitskaia, A. & J.S. Sinninghe Damsté. Lipid patterns of methane consuming microorganisms and precipitation of carbonates in diverse seepage environments. Invited presentation Max-Planck-Institut für marine Mikrobiologie, Bremen, Germany, 7 July.
- Stadnitskaia, A., G. Muyzer, B. Abbas, M.J.L. Coolen, E.C. Hopmans, M. Baas, T.C.E. van Weering, M.K. Ivanov, E. Poludetkina & J.S. Sinninghe Damsté. Biomarker and 16S rRNA evidence for anaerobic oxidation of methane and related carbonate precipitation in deep-sea mud volcanoes of the Sorokin Trough, Black Sea. International Workshop on: Methane in sediments and water column of the Black Sea: Formation, transport pathways and the role within the carbon cycle. Sevastopol, Ukraine, 17-22 May and 8th International conference "New ideas in geology and geochemistry of oil and gas: petroleum systems of sedimentary basins". Moscow State University, Moscow, Russia, 31 May- 2 June.
- Stadnitskaia, A., J.S. Sinninghe Damsté & NAUTINIL 2003 scientific party. Lipid patterns of methane consuming microorganisms in diverse seepage environments. Nile deep-sea fan, Eastern Mediterranean. European Geosciences Union Meeting, Vienna, Austria, 24-29 April.
- Stadnitskaia, A., M.K. Ivanov, T.C.E. van Weering & J.S. Sinninghe Damsté. Fluid venting and mud volcanism in the deep sea: geology and biogeochemistry. Shell International E&P, Rijswijk, 2 August
- Teira, E. & G.J. Herndl. Prokaryotic distribution and activity in the deep waters of the North Atlantic. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.
- Ten Hallers-Tjabbes, C.C. & P. Verlaan. The Environmental Aspects of Ship Recycling, Meeting on Ship Recycling, Centre for Maritime Research (CMR), London, UK, 23 April.
- Ten Hallers-Tjabbes, C.C. Orientation and Navigation in the wider Environment. Opening Address, Fifth International Conference Orientation and Navigation, Birds, Humans and other Animals, Royal Institute of Navigation, Reading, UK, 6 April.
- Timmermans, K.R. Diatoms in the natural laboratory around the Kerguelen. Nederlands Vlaamse diatomisten kring, Texel, 20 May.
- van der Meer, J. Invited lecture. International Wadden Sea Symposium, Esbjerg, Denmark, 4-8 April.
- van der Meer, J. Flow of energy and matter in marine benthic animal populations. Lecture series in student Course on Marine Ecosystem Ecology, University of Groningen, Haren, 9-10 June.
- van der Meer, J. Metabolic theories in ecology. International workshop on DEB modelling, Nantes, France, 4-6 July.
- van der Meer, J. Cockle fisheries: a case study in applied ecology. Lecture series in student Course on Marine Biology, University of Utrecht, Utrecht, 31 October -1 November.
- van der Meer, J. Flow of energy and matter in marine benthic animal populations. Lecture series in student Course on Marine Biology, University of Utrecht, 12-13 December.
- van der Veer, H.W. Carrying capacity of coastal nursery areas, North Carolina State University, Raleigh, USA, 8 December.
- van der Veer, H.W. DEB models as a powerful tool in marine ecology. University of South Carolina, Columbia, USA, 6 December.
- van der Veer, H.W., J. van der Meer, J.F.M.F. Cardoso & S.A.L.M. Kooijman. Physiological performance of flatfishes can be predicted by dynamic energy budgets. 6th International Symposium on Flatfish Ecology, Maizuru, Japan, 20-25 October

- van Duyl F.C. & J.M. De Goeij. Sources of nutrition for encrusting coral cavity sponges. EU Sponges Kick-off meeting, Mainz, Germany,, 12 November.
- van Duyl, F.C., M.M. Van Oostveen & J.D.L. van Bleijswijk. Cryptic sponges: nitrification hotspots in coral reef cavities. 9th Symposium Aquatic Microbial Ecology, Helsinki, Finland, 21-26 August
- van Duyl, F.C. Microbial Ecology of Coral Reefs. Invited lecture University of Amsterdam, Amsterdam, 17 November.
- van Duyl, F.C., C. Maier, A. Hoogstraten & J. Hegeman. Productivity and abundance of invertebrate-associated microbes in sponges and corals of cold water coral reefs (Rockall Trough, NE Atlantic). 3rd International Symposium on Deep-Sea corals. Miami, Florida, USA. 28 November – 2 December.
- van Haren, H. Near-inertial internal motions in the North Sea and the Mediterranean Sea. IMAU, Univ. Utrecht, 17 March.
- van Haren, H. Shear, stratification and mixing in the North Sea, Keynote Lecture 9th European Workshop on Physical Processes in natural waters, Lancaster, U.K., 4 September.
- van Iperen, J.M., C.J.M. Philippart, G.C. Cadée & J. Hegeman. Marsdiep phytoplankton time series. Results of 2004. 8th Advanced Phytoplankton Course, Taxonomy and Systematics, Naples, Italy, 2-23 April.
- van Weering, T.C.E. Mariene Geowetenschappen, uitdagingen voor de toekomst. Sedimentologische Kring van het KNGMG, Delft, 2 December.
- van Weering, T.C.E. Particle flux in the Gollum Channel. Hermes Kick-Off Meeting, Rhodes, Greece, 3-9 April.
- van Weering, T.C.E. The dynamic continental margin: geo-biosphere coupling and exchange processes. NIOZ, 12 April
- van Weering, T.C.E., H.C de Stigter, H. de Haas & F. Mienis. Koudwaterkoralen in de diepzee. 25 jarig bestaan v/h Arctisch Genootschap, De Rijp, 19/20 November.
- Veldhuis, M.J.W. & J.P. Boon. Ballast water and (IMO) policy. Noordzeedagen NIOZ 13 - 14 October
- Veldhuis, M.J.W. & J.P. Boon. Ballast Water Test Facilities. Lloyds List Events, London, United Kingdom, 20 – 21 October.
- Veldhuis, M.J.W., J.P. Boon, F. Fuhr & C. ten Haller. Treatment of Ballast water: how to test a system with a modular concept. KVNIR in association with Dutch Maritime Network. Putten, 31 March.
- Veldhuis, M.J.W. Measuring phytoplankton biodiversity at different time scales. NECOV-Ecology of aquatic microorganisms functional biodiversity in aquatic microorganisms. Yerseke, 20 December.
- Vézina, F., K.M. Jalvingh, A. Dekinga & T. Piersma. Red knots acclimate to cold through modulation of body mass. International Wader Study Group Conference, Cork, Ireland, 8 October
- Wakeham, S.G., I.F. Putnam, K.M. Arzayus, E. Hopmans, S. Schouten, J. Sinninghe Damsté, X. Lin & G.T. Taylor. Linking organic geochemistry and microbial ecology in the Black Sea. 22nd Intern. Meeting on Organic Geochemistry, Seville, Spain, 12-16 September.
- Wernand, M.R. The arcane colouring of natural waters, from Bacon to Raman. GIN meeting on modern methods in hyperspectral remote sensing & advances in image processing. Utrecht University, 22 April.
- Wernand, M.R. The history of ocean and coastal colour. Working group Light and Water, Institute for Environmental Studies, Vrije Universiteit, Amsterdam, 26 April.
- Werne, J., L.A. Powers, E.C. Hopmans, J.S. Sinninghe Damsté & S. Schouten. Archaeal membrane lipids in lakes. ASLO Summer Meeting, Santiago de Compostela, Spain, 19-24 June.
- Werne, J.P., T.W. Lyons, D.J. Hollander & J.S. Sinninghe Damsté. Pathways of diagenetic organic matter sulfurization and sedimentary sulfur cycling revealed through molecular sulfur isotope analysis. American Chemical Society Spring Meeting, San Diego, USA, 13-17 March.

Werne, J.P. The molecular isotopic signature of anaerobic methane oxidation. Gordon Research Conference on Chemical Oceanography, Tilton School, New Hampshire, USA, 7-12 August.

Winter, C., A. Smit, G.J. Herndl & M.G. Weinbauer. Linking bacterial richness with viral abundance and prokaryotic activity. ASLO meeting, Santiago de Compostela, Spain, 20-24 June.

External professional functions

M.A. Baars

- Advisor Rijkswaterstaat project: Towards Remote Sensing Supported Monitoring of the North Sea (ToRSMoN, National Program GO).

R.P.M. Bak

- Professor Tropical Marine Biology, University of Amsterdam
- Editorial advisor Marine Ecology Progress Series
- Member Board Foundation for Scientific Research Surinam and the Netherlands Antilles
- Member Visitation Committee Wissenschaftsrat ZMT

M.J.N. Bergman

- Member ICES Working Group on Benthos Ecology
- Member ICES Working Group on Ecosystem Effects of Fishing Activities
- Member Raad van overleg voor het fysisch-oceanografisch onderzoek Noordzee - overleggroep Bodem

W. Boer

- Member of inter-laboratory validation group for normalisation of "Methoden voor de radiochemische bepaling van polonium-210 en lood-210" (NNI-NVN 5694)
- Member of the Nederlandse Werkgroep Deeltjeskarakterisering

J.P. Boon

- Member of the ICES Marine Chemistry Working Group
- Member "Commissie voor de Milieu-Effect Rapportage (CMER)"
- Member "Platform Wetenschapscommunicatie"
- Member of the POGO News & Information Group

G.-J.A. Brummer

- Coordinator Bilateral Cooperation Programme NWO-DFG "Divalent cations: development and validation of proxies"
- Advisory member ESF-EUROCLIMATE programme
- Member NWO/ALW 'Gebruikers-adviesgroep verankerde instrumentatie'

C.P.D. Brussaard

- Full Member of the SCOR Working Group 126 on the Role of Viruses in Marine Ecosystems.
- Member referee panel NWO GeoBiosphere.
- Organizer 4th Algal Virus Workshop, Amsterdam
- Board member NECOV Working Group Ecology of Aquatic Microorganisms.

G.C. Cadée

- Editor Journal of Sea Research
- Associate editor ICHNOS
- Board member 'Nederlands Vlaamse Kring van Diatomisten
- Associate editor Senckenbergiana Maritima

- Member Commissie voor de geschiedenis van de aardwetenschappen, KNAW
- Editorial board Natura, KNNV

C.J. Camphuysen

- Editor Atlantic Seabirds
- Member editorial board Marine Ornithology
- Editor Ardea
- Co-ordinator Dutch beached bird survey
- Database manager Marine Mammal Database and Club van Zeetrekwaarnemers
- Chairman European Seabirds at Sea database
- Member scientific committee Prestige Oil Spill, University A Coruña, Spain
- Member ICES Working Group Seabird Ecology

H.J.W. de Baar

- Professor of Chemical Oceanography, Dept. of Marine Biology, University of Groningen
- Associate editor Marine Chemistry
- Vice chair Scientific Steering Committee of CarboOcean Integrated Project, European Union Framework Program VI.
- Chairman, Netherlands SCOR Committee of Royal Academy of Sciences (KNAW)
- Chair, Users Advisory Group Nutrients, national Marine Research Facilities
- Chair ad interim, Scientific Steering Committee Netherlands-Bremen Oceanography (NEBROC)
- Member, Global Change Committee of Royal Netherlands Academy of Sciences (KNAW)
- Corresponding member, SCOR Working Group for the GEOTRACES International Initiative
- Member, meetings committee of the American Society for Limnology and Oceanography (ASLO)
- Member, Users Advisory Group, CTD systems, national Marine Research Facilities
- External adviser, BELCANTO (Belgian research Carbon uptake in the ANTArctic Ocean)
- Clare Hall College, Cambridge (Life member)

T.F. de Bruin

- Chair - Netherlands National Oceanographic Data Committee (NL-NODC)
- Chair - Joint SCAR/COMNAP Committee on Antarctic Data Management (JCADM)
- Co-Chair – International Polar Year (IPY) Data Policy and Management Subcommittee (IPY-SC on Data)
- IODE national coordinator for data management
- Member – ICES Working Group on Marine Data Management (ICES-WGMDM)

J.W. de Leeuw

- Member Board of European Association of Organic Geochemistry (EAOG)
- Member Editorial Advisory Board Organic Geochemistry
- Professorship in Geochemistry Univ. of Cataluna
- Member Royal Dutch Academy of Sciences (KNAW)
- Executive committee member Marine Board European Science Foundation (MB/ESF)
- Member CLIVARNET/Klimaatvariabiliteit committee NWO (till 1-8)
- Chair Science committee Hanse Wissenschaftskolleg Bremen
- Member Board Hanse Wissenschafts Kolleg
- Co-chair Netherlands BRemen Oceanography (NEBROC) board (till 1-7)
- Chair Partnership Observation of the Global Oceans (POGO)
- Chair Board IPO-LOICZ

- Member Scientific Committee Alfred Wegener Institut für Polar- und Meeresforschung
- Chair Club du Soleil (RAK/KNAW)
- Member Council Earth and Climate (RAK/KNAW)
- Member Programme Committee VLANEZO
- CoPI International Census of Marine Microbes (ICOMM)
- Chair Foundation "Zee in Zicht"

G.C.A. Duineveld

- Member ICES Benthos Ecology working group

E.H.G. Epping

- Editor Journal of Sea Research
- Chairman NWO/ALW 'Gebruikers-adviesgroep Nutrienten'

A. Forster

- Corresponding member "Deutsche Subkommission für Kreide-Stratigraphie" (Cretaceous stratigraphic sub-commission Germany)

T. Gerkema

- Associate Member SCOR Working-Group 121 on Deep-ocean mixing.
- Organization of meetings

S.R. Gonzalez

- Member of Nederlandse Vereniging voor Stralingshygiëne
- Member of IRPA (International Radiation Protection Association)

U. Harlander,

- Co-organizer of session on "New aspects of theoretical Geophysical Fluid Dynamics".
- European Geosciences Union, Vienna, Austria, 24-29 April.

G.J. Herndl

- Professor of Biological Oceanography, Dept. of Marine Biology, Univ of Groningen
- Member of the IMBER/SOLAS working group on Carbon Research
- President of the Microbiology Section of the CIESM (Commission of the Scientific Exploration of the Mediterranean Sea)
- Appointed Reviewer for and Adviser to the Research Council of Norway for Terrestrial and Aquatic Microbial Ecology and Biotechnology (2000-2003, 2004-2007)
- Associate member of the SCOR working group 126: Role of viruses in marine ecosystems
- Associate Editor of Aquatic Microbial Ecology
- Associate Editor of P.S.Z.N.I: Marine Ecology
- Associate Editor of Limnology & Oceanography: Methods

J.H.F. Jansen

- Member NIOC (Netherlands Integrated Ocean Drilling Program Committee).
- Member Working Group INQUA Nederland.

W.C.M. Klein Breteler

- Member users group Quantimet (Image Analysis)

M.S.S. Lavaleye

- Member of the ICES Study Group on the North Sea Benthos Project.

H.J. Lindeboom

- Chairman Scientific Steering Committee LOICZ
- Member Scientific Committee for the IGBP

- Member Board of the Sir Allistair Hardy Foundation of Ocean Sciences
- Member ICES working Group 'Effects of Fisheries'
- Member 'Commissie voor Milieueffectrapportage'
- Board member 'Onderzoekschool Functionele Ecology'
- Member Steering Committee WOTRO project 'Rivers and coastal zones'
- Member Steering Committee and working group Indonesian-Dutch Cooperative Research on Integrated Coastal Zone Management, Teluk Banten
- SYKON Advisory Committee, Hamburg, Germany
- Member 'MER workinggroup 'Winning van beton- en metselzand op de Noordzee'
- Member Scientific Committee 'North Sea 2000', 13th International Senckenberg conference
- Member organizing committee IGBP-science conference, Amsterdam 2001
- Member Editorial Board 'Archive of Fishery and Marine Research'
- Member International Steering Committee International Advanced School 'Leonardo da Vinci', Bologna

L.R.M. Maas

- Co-promotor thesis Guido Terra, Universiteit van Amsterdam, 27 October

S. Ober

- Member overleg-groep 'waarnemen en interpreteren', Raad van overleg fysisch-oceanografisch onderzoek Noordzee'

C.J.M. Philippart

- Editor-in-chief Journal of Sea Research
- Lecturer Marine Biology Course, IBED UVA, Amsterdam.
- Lecturer Sedimentology Course, University of Utrecht, Utrecht.
- Member 'Beoordelingscommissie Geo- en Biosfeer', ALW
- Member "Commissie MER" working group "Aardgaswinning Waddenzeegebied vanaf lokaties Moddergat, Lauwersoog en Vierhuizen"
- Member "Commissie MER" working group "PKB Derde nota Waddenzee"
- Chair of the Climate Change Working Group of the Marine Board of the European Science Foundation
- Chair of the Evaluation Panel of Long-term Monitoring of the Marine Environmental Change Network

T. Piersma

- Professor in Animal Ecology at the Centre for Ecological and Evolutionary Studies at the University of Groningen
- Vice-chairperson of the International Wader Study Group
- Chairman of the Biologysk Wurkferbân of Fryske Akademy, Ljouwert
- Editor of Journal of Avian Biology
- Member Editorial Board Current Ornithology, Plenum Press, New York
- Editorial board of Journal of Ornithology
- Board member of the Centre for African Wetlands, University of Ghana, Accra, Ghana
- Member Audit Committee Research component Nederland-Gruttoland, Vogelbescherming
- Member of Committee of Experts for vereniging Natuurmonumenten
- Member of Board It Fryske Gea

J. Reneerkens

- Editor Limosa

H. Ridderinkhof

- Member 'VENI selectie commissie ALW-NWO'
- Member 'Beleidsadviescommissie Aardwetenschappen ALW - NWO'
- Member 'Programma commissie NCK'
- Member 'NWO committee Marine Research Facilities'
- Member 'Raad voor Aarde en Klimaat (RAK – KNAW)'
- Member 'commissie Milieu Effect Rapportage (MER)'

M.J. Rietveld

- Chair International research Ship Operators Meeting' (ISOM)
- Member Ocean Facilities Exchange Group (OFEG)
- Member European Research vessel Operators (ERVO)
- Member ESF Marine Board Ocean Research Fleets Working Group (OFWG)
- Member POGO Working Group Research Vessels and Cruises Database
- Member Interdepartementaal Overleg Zeegaande Vaartuigen (IOZV)

S. Schouten

- Associate editor Organic Geochemistry
- Member of the editorial board of Geology
- Member of the steering committee International Census of Marine Microbes

J.S. Sinninghe Damsté

- Part time professor University of Utrecht, Faculty of Geosciences
- Member of the Royal Dutch Academy of Science (KNAW)
- Member of the scientific steering committee of the Darwin Centre for Biogeology
- Member of the Science Committee of the NIOO
- Member of the VICI selection committee of ALW-NWO
- Member of the equipment committee of ALW-NWO
- Associate editor Geology.

C.C. Ten Hallers-Tjabbes

- Advisor to IUCN for the London Convention 1972
- Advisor to IUCN for the International Maritime Organization, London (IMO)
- Advisor to IUCN for the Globalast UNDP-IMO-GEF Global Programme
- IUCN Representative for the Marine Environment Protection Committee of the IMO
- Advisor Netherlands Delegation Ballast Water Workgroup, IMO
- Lady Chairman Animal Navigation Group, Royal Institute of Navigation, London, UK

K.R. Timmermans

- Member Board Working Group Aquatic Ecology (Nederlands-Vlaamse vereniging voor Ecology (NECOV)).

H.M. van Aken

- Member ICES Oceanography Committee
- Member ICES Working Group on Oceanic Hydrography
- Chairman ALW "gebruikersadviesgroep CTD-systemen"
- Member "ALW Apparatuurcommissie"
- Member OCEANSITES International Time Series Science Team

M.A. van Arkel

- Member Working group 'Monitoring rond Mijnbouwininstallaties'

P. van den Hout

- Secretary Nederlandse Ornithologische Unie

S.J. van der Gaast

- Member editorial board of Applied Clay Science
- Member of the XRPD group of the NKV (Ned. Kristallografische Ver.)

H. van Haren

- Member editorial board Journal of Sea Research.
- Topic editor Ocean Science.
- Chairman "ALW gebruikersadviesgroep Verankerde Instrumentatie".
- External examiner PhD-thesis Rune Yttervik, NTNU Trondheim, Norway

J. van der Meer

- Member of the Science Advisory Board SOVON (Co-operative Ornithological Field Research in the Netherlands)
- Honorary Research Fellow of the School of Biological Sciences, University of Aberdeen

H.W. van der Veer

- Associate professor of Zoology, North Carolina State University, Raleigh, USA
- Adjunct associate professor of Marine Science, University of South Carolina, Columbia, USA
- Member of the ICES Working Group on Recruitment Processes.
- Member Organizing Committee 6th International Symposium on Flatfish Ecology, Kyoto, Japan
- Guest editor Proceedings 6th International Symposium on Flatfish Ecology
- Member Organizing Committee 7th International Symposium on Flatfish Ecology, Lisbon, Portugal
- Guest editor special volume J.Sea Res. DEBIB project (Dynamic Energy Budgets In Bivalves)

F.C. van Duyl

- Board member Treub-mij
- Member European Scientific Diving Committee
- Appointed Reviewer for the International Science Foundation (IFS)
- Appointed Reviewer Marine Ecology Progress Series

T.C.E. van Weering

- Member Editorial Board of Marine Geology
- Member Editorial Board Boreas
- Member Editorial Board International Journal of Earth Sciences/Geol.Rundschau
- Guest Editor Special issue of JASES Red River Delta
- Professor Paleoceanography Free University, Amsterdam
- Chairman GAG Bodem systemen en seismiek (NWO/ALW)
- Lid commissie Mariene Faciliteiten(NWO/ALW)
- Lid commissie Toekomst Pelagia (NIOZ)
- Lid commissie "East Kalimantan Programme for Coastal Zone Research Netherlands/ Indonesia" (NWO/KNAW)
- Lid beoordelingscommissie Promotiebeurzen IWT, Brussel
- Adjunct Professor Marine Geosciences International University of Bremen

M.J.W. Veldhuis

- Member Marine Biology Research
- Member flow cytometer working group NL
- Associate member SCOR working group 120: Phaeocystis
- Member ICES/IOC/IMO Working Group on Ballast Water and other Ship Vectors (WGBOSV)
- Member ICES/IOC/IMO Working Group on Introduction and Transfer of Marine Organisms
- Guest editor Journal of Sea Research special volume IRONAGES
- Guest editor Harmful Algae: special volume on Phaeocystis

G.J.M. Versteegh

- Fellow of the Hanse Wissenschaftskolleg Delmenhorst, Germany
- Board member European Graduate College EUROPROM. Joint educational cooperation of Universities of Bremen, Utrecht and Free University, Amsterdam
- Associated Scientist. Faculty of Geosciences, section Historical Geology and Palaeontology. Bremen University

C. Veth

- Member Working group Joint Ocean Global Flux Study NWO/GOA
- Member Editorial Board of Oceanologica Acta

J.T.F. Zimmerman

- Professor Physical Oceanography, Utrecht University

Meetings

NCK summerschool. 27 June – 8 July. (H. Ridderinkhof)

Annual meeting ICES Working Group for Seabird Ecology, 28 March – 1 April.

Meeting of the European Seabirds at Sea Database co-ordinating group, 1 April – 3 April

Nederlands-Vlaamse Kring van Diatomisten (NVKD), studiedag, 20-21 mei.

EU Strataform WP 2 Canyons Meeting, Lisbon, 2-4 March.(T.C.E.van Weering)

NIOp-2 preparatory meeting, VU-Amsterdam, 21 January.(G.J. Brummer)

VAMOC kick-off meeting, VU-Amsterdam, 12-13 May.(G.J. Brummer)

NIOp-2 preparatory meeting, VU-Amsterdam, 19 May.(G.J. Brummer)

Workshop "905", VU-Amsterdam, 12-13 June.(G.J. Brummer)

VAMOC/ORMEN meeting, VU-Amsterdam, 10-11 October.(G.J. Brummer)

First Annual Meeting of CARBOOCEAN Integrated Project, held at Royal Academy Building TrippenHuis, Amsterdam, 22-24 November, 110 participants; local organizers Josje Snoek & Hein de Baar

Noordzeedagen, organized by NIOZ & Alterra Texel, 13 & 14 October (organizing committee: J.E. Meulenkamp, H.J. Lindeboom & J.P. Boon)

Courses

Course "Introduction to Oceanography" (RUG). Contact person Prof. dr. ir. H.J.W. de Baar.

The course Introduction to Oceanography is part of the Marine Biology curriculum at the University of

Groningen and was attended by 28 students of five nationalities. Upon workshop style lectures mostly by the students themselves in Groningen, the practical part was held at Royal NIOZ from 21 March through 1 April. The course was set up in two Themes resulting in four final presentations, see below.

The students very much enjoyed the integration approach in these Themes. The activities, efforts, results and interpretations nicely merged at the final day in a suite of concerted powerpoint presentations by the students. Several NIOZ technicians, ships crew and scientists were actively involved throughout.

1) Sea-going research:

A) Estuarine mixing in the field: The "open" Wadden Sea is exchanging at one side via the deep Marsdiep channel with the southern North Sea, and at the other side until 1931 was exchanging freely with the Zuyderzee ("Eens ging de zee hier tekeer maar die tijd komt niet weer"). It is generally considered an estuary dominated by the tidal cycle. However the artificial Afsluitdijk dam with sluices is now regulating the fresh water inflow from rivers via the stagnant IJsselmeer. This is very different from a simple estuary of one single river flowing continuously into the sea. Moreover the system is further complicated by the eastward extension with increasingly shallow tidal flats all the way up to southern Denmark, and including a suite of barrier islands as well as several more rivers (Ems, Weser, Elbe) and their estuaries (Ems/Dollard). Overall the system is much more complex and dynamic than a simple one river estuary. Nevertheless the research theme "Wadden Sea Hydrography" is designed largely by pretending such simplicity by using the salinity as the backbone in the concept of linear mixing between one fresh water end-member (Den Oever) and one seawater end-member (the coastal North Sea).

During processing of the data one has to be alert about deviations due to the greater complexity of the Wadden Sea, to be mentioned at the final presentations. The dominance of mixing along salinity gradients is the background to be realized at all times while considering the interaction of trace constituents, both metals and organic contaminants, with the biota.

- B) Estuarine mixing in the laboratory: In the case of iron, manganese and DOM, it has been shown in other estuaries that dissolved iron is almost completely removed during estuarine mixing, that manganese can show anything between conservative and non-conservative behavior, and that DOM behaves almost conservative. The Wadden Sea is a very complex system and also depending for mixing with fresh water on the opening of the sluices in Den Oever. To demonstrate any of the above processes mixing will also be simulated in the laboratory. This is done with a twofold purpose, first as an alternative if there is no salinity gradient found, secondly to show estuarine mixing under controlled conditions. In the field, nature is not always behaving according to the books...
- C) Sea-going research: estuarine primary production. The NIOZ has a long tradition of *chlorophyll a* monitoring in the Marsdiep. These data are for example used to understand the link between nutrient regimes, Secchi-visibility (light regime) and chlorophyll *a* (phytoplankton biomass). During this course chlorophyll *a* will be measured in relation to the disturbance of conservative mixing of different oceanic chemicals. Growth of phytoplankton changes conservative mixing in non-conservative mixing because phytoplankton uses and produces these chemicals. This subject will concentrate on how and which of the measured chemicals are influenced by primary production and how this disturbs the conservative mixing.

II) Contaminants and optics:

Numerous organic contaminants have been introduced by mankind into the environment. Among these there are several quite toxic entities. There is a strong tradition at NIOZ for study of the toxic Polychlorobiphenyls (PCB's), some pesticides as well as the Polyaromatic Hydrocarbons (PAH's). The distribution of these various molecules over different compartments (water, sediment, organic tissue and fat) of the ecosystem is significant for their toxicity to biota.

The light climate in the sea is affected not only by the seawater itself but also by dissolved organic chromophores, by plankton particles as well as by mineral particles such as sand and clay. The resulting light climate defines the Photosynthetically Available Radiation (PAR) which is the ultimate driver for photosynthesis in the sea, i.e. the base of the complete marine food web and ecosystem.

125

Course marine ecosystems (RUG), 7-30 June

During the first week lectures were given at the University of Groningen (RUG) on the composition and regulation of pelagic and benthic food webs in the different ecological provinces of the world's seas and oceans in general and the North Sea in particular. The second and the third week were devoted to practical work performed at NIOZ in the BIO and MEE departments. The 24 students were distributed over 9 different topics. Some of the topics were more lab-oriented, whereas others involved more extensive field work. The program comprised research on the metabolism of selected benthic organisms and pelagic communities. Sampling was performed in the North Sea and the Wadden Sea with the R/V Navicula. Oral presentations on the underlying research questions, the methods used and a thorough discussion of the results were given by each group at the end of the course. Contact persons Prof. Dr. G.J. Herndl (herndl@nioz.nl) & Dr. J. van der Meer (meer@nioz.nl).

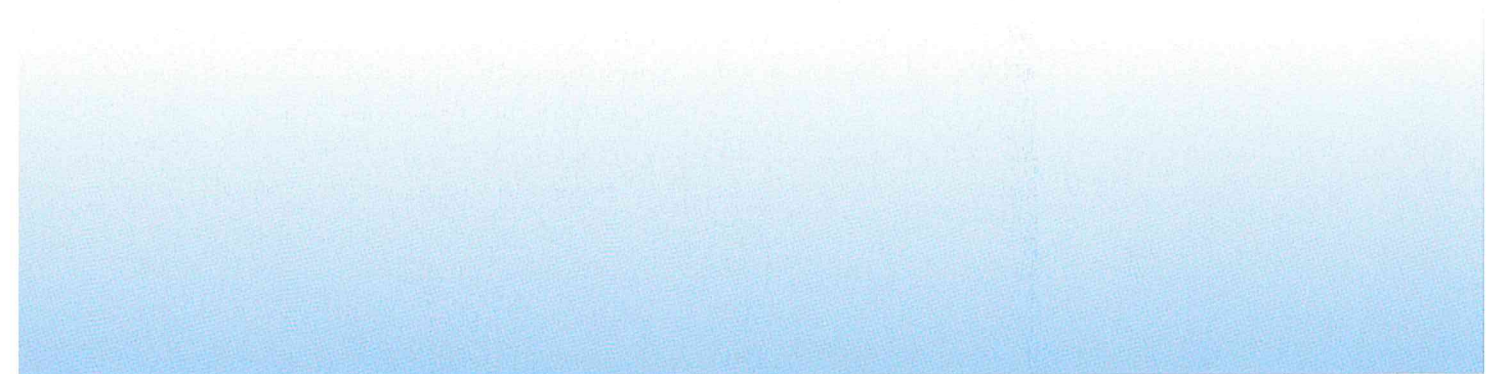
Introductory course in Marine Biology for Utrecht University, 31 October - 4 November

In this course, organized by the NIOZ departments BIO and MEE, the students were introduced to the fauna and flora of the intertidal and subtidal sediments and the water column of the Wadden Sea. Simple laboratory experiments on the metabolic activity of selected organisms were also performed. At the end of the course, the students presented their work in brief lectures followed by a general discussion. Contact person Prof. Dr. G.J. Herndl (herndl@nioz.nl).

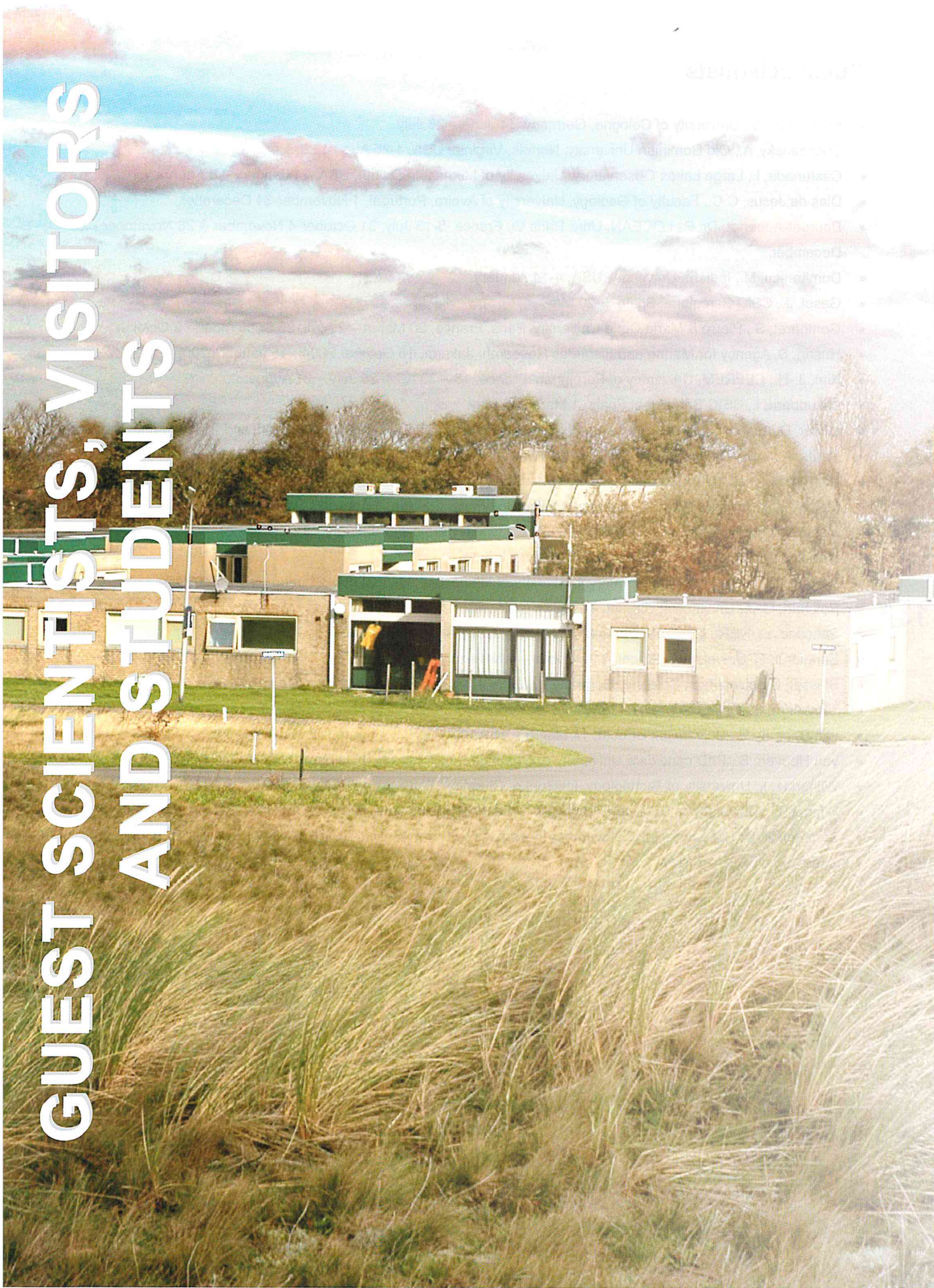
Colloquia

- 13 January. Paul del Giorgio (UQAM-Montreal, Canada). The measurement of bacterioplankton respiration and growth efficiency: problems and patterns across aquatic systems.
- 20 January. Frederic Gazeau (NIOO, Yerseke). Metabolism of coastal ecosystems: from the local scale (Randers Fjord, Palma Bay and Scheldt estuary) to the European scale.
- 27 January. Johan van de Koppel (NIOO, Yerseke). Self-organization and vegetation collapse in salt-marsh ecosystems.
- 3 February. Cornelia Wuchter (NIOZ-MBT). Temperature adaptation of marine crenarchaeotal membrane lipids: an approach to reconstruct sea surface temperature.
- 10 February. Marcel Wernand (NIOZ-FYS). The arcane colouring of natural waters; from Bacon to Raman.
- 24 February. Martien Baars (NIOZ-BIO). The usefulness of a wasted enzyme: free chitinase as tool to measure the in situ copepod production without catching copepods.
- 3 March. Katja Philippart (NIOZ-MEE). Climate-induced effects on the reproduction of marine benthic invertebrates.
- 10 March. Guido Terra (NIOZ-FYS). Nonlinear tidal dynamics, a chaotic tide?
- 24 March. Gesine Mollenhauer (NIOZ-MBT). Controls on the age of marine Organic matter: applications of compound-specific radiocarbon dating.
- 20 April. Cindy Clark (Scripps Institution of Oceanography). Navigating the World through Communications: A Scripps Institution of Oceanography Perspective.
- 21 April. Marcel Veldhuis (NIOZ-BIO). Invasive marine species and ballast water management
- 12 May. Pieter Honkoop (NIOZ-MEE). Energy acquisition by bivalves, adaptations in a changing world
- 9 June. Bert Schreuder (Salm en Kipp). How to remove the hidden costs of sample management
- 16 June. Lucas Merckelbach (National Oceanography Centre-Southampton). A model for high-frequency acoustic Doppler profiler backscatter from suspended sediment in strong currents
- 30 June. Lydie Herfort (NIOZ-MBT). Ecology of Marine Archaea in the North Sea
- 15 September. Jeroen Reneerkens (NIOZ-MEE). Functional aspects of seasonal changes in preen wax composition in shorebirds.

- 20 September. Ashley Rowden (NIWA, New Zealand). From bouncing above the North Sea to bumping along the bottom of the South Pacific.
- 21 September. John Volkman (CSIRO, Australia). Finfish aquaculture in southern Australia: effects on benthos and phytoplankton.
- 23 September. Michael Moldowan (Stanford Univ., USA). Age-related and taxon specific biomarkers as they apply to ancient sediments and petroleum.
- 29 September. Jan van Gils (NIOZ-MEE). Prey populations in danger: burying depth as a behavioural indicator of fitness prospects in *Macoma balthica*.
- 3 October. Mark Bertness (Brown Univ., USA). Why experimental community ecology matters to conservation biology
- 5 October. Bouwe Kuipers (retirement, NIOZ-BIO). What a bacterial bioassay tells about the future of the Wadden Sea.
- 20 October. Wouter Vahl (NIOZ-MEE). Studying competition among foraging waders: an experimental and theoretical approach.
- 27 October. Jens Zinke (VU, Amsterdam). Atmosphere-ocean dynamics in the western Indian Ocean recorded in corals.
- 3 November. Gert-Jan Reichart (UU, Utrecht). Trace metal incorporation in biogenic calcite and application as environmental proxy.
- 10 November. Ruud Kampf (Waterboard Hollands Noorderkwartier). Food-chain approach in re-use of treated waste water.
- 17 November. Rob Dekker (NIOZ, MEE). Recent changes in Wadden Sea macrozoobenthos.
- 24 November. Geert-Jan Brummer (NIOZ, MCG). What, if anything, are proxies for ocean-climate history?
- 1 December. Maarten Buijsman (NIOZ-FYS). Ferry observations of currents and bedforms in the Marsdiep tidal inlet.
- 16 December. Kate Darling (Univ. Edinburg, UK). Quaternary climate instability as the driver of genetic diversification in high latitude planktonic foraminifers.



GUEST SCIENTISTS, VISITORS AND STUDENTS



Guest scientists

- Beckmann, B., University of Cologne, Germany, 14 June – 28 July.
- Bochdansky, A., Old Dominion University, Norfolk, Virginia, USA, 1-25 August.
- Castenada, I., Large Lakes Observatory, University of Minnesota Duluth, USA, 21 January – 5 February.
- Dias de Jesus, C.C., Faculty of Geology, University of Aveiro, Portugal, 1 November-31 December.
- Bouruet-Aubertot, Dr. P., LOCEAN, Univ. Paris VI, France, 5-13 July, 31 October-4 November & 28 November - 2 December.
- Dumitrescu, M., Indiana University, USA, 4-14 January.
- Gasol, J., CSIC Barcelona, Spain, 9-20 May.
- Gontharet, S., Pierre & Marie Curie University, Paris, France, 20 March – 2 April; 25 September – 9 October.
- Husrin, S. Agency for Marine and Fisheries Research, Jakarta, 15 October 2004 - 15 January 2005
- Kim, J.-H., CEFREM, University of Perpignan, France, 18 – 30 April; 25 July – 21 August.
- Lekunberri, I., CSIC Barcelona, Spain, 1 March-20 May.
- Lymer, D., Evolutionary Biology Centre, Uppsala University, Sweden, 29 March-16 April and 21 November – 9 December.
- Malits, A., Laboratoire d'Océanographie de Villefranche, France, 9-20 May.
- Malkoc, M., Institut für Geologie, University Bochum, Germany, 19 – 30 September.
- Mathot, K.J., Fraser University, Burnaby, British Columbia, Canada, 1 August-1 December.
- Mendes, L. Department of Zoology, University of Lisboa, Portugal, 1 January - 31 December.
- Ménot-Combes, G., CEREGE, France, 17 May – 1 June.
- Powers, L., Large Lakes Observatory, University of Minnesota Duluth, USA, 21 January – 5 February.
- Reichart, G.-J., Universiteit Utrecht, 14 March – 9 April.
- Saccone, L., NERI, Roskilde, Denmark, 30 May-8 June, 14-25 November.
- Sangiorgi, F., Universiteit Utrecht, 31 October – 4 November.
- Stusser, I. University of Cologne, Germany, 14 June – 28 July; 26 September – 14 October.
- Tamburini, C., CNRS Marseille, France, 20-27 February.
- van Bentum, E., Universiteit Utrecht, 14 March – 16 April.
- van Heuven, S., PhD candidate University of Groningen, mid June to 3 October
- Wilhartitz, I., University of Technology, Institute of Chemical Engineering, Vienna, Austria, 8-30 November.
- Winget, D., University of Delaware, Delaware Biotechnology Institute, Newark, DE, USA, 22 April – 6 May.
- Zemelink, Dr H.J., June-July, November-December
- Zhao, M., USA, 2 – 7 May.

Visitors

- Sherwin, T. SAMS, Oban, Dunstaffnage Marine Laboratory, U.K., 11-12 May.
- Staquet, C. Laboratoire Geophysique et Industriels, Universite Joseph Fourier, Grenoble, 18-23 September.
- Maugé, R. Laboratoire de Physique des Océans, Université de Bretagne Occidentale, Brest, 20-24 May.
- Birkhead, T.R. University of Sheffield, UK, 29 April.
- Baker, A.J. Royal Ontario Museum, Toronto, Canada, 1-14 October.
- Fristrup, K. Bioacoustics Laboratory, Cornell Laboratory of Ornithology, Ithaca, USA, 14 October.
- Gonzalez, P.M. Fundacion Inalafquen, San Antonio Oeste, Rio Negro, Argentina, 1-14 October.
- Kooistra, Dr. W., Stazione Zoologica "Anton Dohrn" (SZN), Naples, Italy, 20-21 September.
- Kuiken, T. Erasmus University, Rotterdam, 16 May.
- Lindström, Å. Lund University, Lund, Sweden, 4-6 May.
- Rowden, Dr. A., Institute of Water & Atmospheric Research (NIWA), Wellington, New Zealand, 20 September.
- Santos, Prof. P. University of Porto, Portugal, 19-20 September.
- Stancyk, Prof. S., University of South Carolina, Columbia, USA, 20 September.
- Saher, M. Faculteit voor Aard- en Levenswetenschappen, VU, Amsterdam, 17 - 19 Jan.
- Foubert, A. University of Gent, Belgium, 22 March – 1 April.
- Segueni, F. Université Paris Sud, Paris, France, 4-6 April.
- Van Druten, T. University of Utrecht, 18 – 22 April.
- Knutz, P. University of Copenhagen, Denmark, 27 – 29 April.
- Pederson, J.T. University of Copenhagen, Denmark, 20 – 24 June.
- Ziegler, M. University of Utrecht, 1 July – 4 Aug.
- Courp, Th. University of Perpignan, France, 8 – 12-Aug.
- Seidenkranz, M.S. & P. Pryzybylo. University of Aarhus, Denmark, 26 – 30 Sept.
- Etoubleau, J. & G. Bayon. Ifremer, Brest, France, 26 – 28 Oct.
- De Vleeschouwer, F. & V. Renson. University of Liège, Belgium, 27 – 29 Nov.
- Moros, M. & Th. Leipe. Institute for Baltic Sea Research, Rostock-Warnemünde, Germany, 5 – 8 Dec.
- Jensen, J.B. Geological Survey of Denmark and Greenland, Copenhagen, Denmark, 5 – 8 Dec.
- Jilbert, T. University of Utrecht, 14 – 16 Dec.
- Peeters, Dr. F.J.C., Faculty of Earth and Life Sciences, Free University, Amsterdam.
- Moodley, Dr. L., Department of Ecosystem Studies, Netherlands Institute of Ecology (NIOO), Centre for Estuarine and Marine Ecology (CEME), Yerseke, 18 January & 16 November.
- Zinke, Dr. J., Faculty of Earth and Life Sciences, Free University, Amsterdam.
- Reichart, Dr. G.-J. Department of Earth Sciences – Organic Chemistry, Faculty of Geosciences, Utrecht University.
- Darling, Dr. K., Grant Institute of Earth Science, School of GeoSciences, University of Edinburgh, UK.
- Conley, Dr. D.J., NERI, Roskilde, Denmark, 14 November.
- Barbanti, S.M., Stanford University, USA, 23 September.
- Blaga, C., Universiteit Utrecht, 5-10 December.
- Brassel, S.C., Indiana University, USA.
- Moldowan, J. M., Stanford University, USA, 23 September.
- Volkman, J.K., CSIRO, Australia, 19- 23 September.
- Ward, D.M., Montana State University, USA, 28 - 30 November.
- Farnleitner, Dr. A., Technical University, Vienna, 17 February.
- Tijdens, M., NIOO-KNAW-Centre for Limnology, Maarssen, 17-18 February.

- Glibert, Dr. P., Hornpoint Marine Laboratories, US, 18 March.
- Osinga, Dr. R., Wageningen University and Research Centre, 13 December.
- Studenten en staf van de studierichting Moleculaire Wetenschappen, Universiteit van Wageningen, 13 June.
- Sidri, Dr. M., Wageningen University and Research Centre, 13 December.
- Schutter, Drs M., Wageningen University and Research Centre, 13 December.
- Rickards, Dr. L., British Oceanographic Data Centre (BODC), United Kingdom, 31 March – 1 April.
- Lyons, Prof. Dr. B., Byrd Polar Research Center and Ohio State University, United States, 31 March – 1 April.
- Capra, Prof. Dr. A., University of Bologna, Italy, 31 March – 1 April.
- Summerhayes, Dr. C., SCAR Secretariat, United Kingdom, 31 March – 1 April.
- Candidi, Dr. M., Institute for Interplanetary Physics, Italy, 31 March – 1 April.
- Huiskes, Dr. A., Netherlands Institute for Ecology - Centre for Estuarine and Marine Ecology, 31 March – 1 April.
- Schaap, D. & Thijsse, P. Marine Information Services, 19 July.
- Seitz, R. & Lipcius, R. Virginia Institute for Marine Science, USA, 27-30 September
- Bertness, M., Brown University, United States of America, 3 October.

Students

- Bakker, J., Universiteit van Amsterdam.
- Booij, J., Universiteit van Amsterdam, 1 October - 15 November.
- Brink, M., Hogeschool Arnhem Nijmegen, 1 November, 31 December.
- de Bie, Y., Friesland College, Leeuwarden, September 2005 – February 2006.
- Dedent, M., Vrije Universiteit Amsterdam, 1 mei – 31 december.
- de Kluijver, A., Universiteit Utrecht, 1 June-15 December.
- Dhital, S., International University Bremen, Germany, 3-18 June.
- Verwer, E., Universiteit Utrecht, 17 January – 31 December.
- Folstar, M., Mondriaancollege, Delft.
- Haloti, S., ROC, Amsterdam, 1 January, 31 March.
- Heng, J., ROC Amsterdam, September 2005 –February 2006.
- Hoogstraten, A., Universiteit Groningen, 1 June-15 December.
- de Bruijn, J. Universiteit Utrecht, 1 January- 30 July.
- Kester, L., Mondriaancollege, Delft.
- Kiselev, V., Moscow State University – UNESCO centre for Marine Geosciences, 19 May - 1 September.
- Klunder, M., Wageningen Universiteit, 1 May – 1 November.
- Kurvers, R.H.J.M., Wageningen Universiteit, 1 February - 1 May.
- Mai, D., ROC Amsterdam, September 2004-June 2005.
- Meester, P. Drente College, 1 January-1 July.
- Middag, R. Universiteit Groningen, 15 January, 10 April.
- Nadezhkin, D., Moscow State University.
- NiFhaitheantc, S., Wageningen Universiteit, 1 September – 31 December.
- Nobbe, I., Hogeschool Alkmaar, 1 October-31 December.
- Paas, M., Wageningen Universiteit, 21 June - 21 July.
- Palacz, A., University Bremen, 21 June - 21 July.
- Prick, A., Vrije Universiteit Amsterdam, 12-16 September.

- Puister, M., Hogeschool Utrecht, 1 February, 30 June.
- Robertson, C., School of Oceanography, Menai Bridge, UK, 17 September-31 December.
- Ruhl, M., Universiteit Utrecht, 1 April-15 May.
- Santos, S., University of Porto, 1 April - 30 November.
- Shaikh, D., International University Bremen, Germany, July 15-December 15.
- Shlomi, T., Wageningen Universiteit, 15 August-15 November.
- Sinke, M., Hogeschool Zeeland, 1 March – 31 December.
- Smit, N., TH Rijswijk, Haagse Hogeschool. 12 September – 31 December.
- Smith, J., University of South Carolina, 15 May - 30 November.
- Steenman, P., ROC Amsterdam.
- Kopecz, S., Stuttgart University, 31 August – 23 December.
- Stoker, A., Friesland College, Leeuwarden, September 2005 – February 2006.
- Thole, S., University of Bremen, 1 Augustus, 30 September.
- Thole, S., University Oldenburg, 1 June-15 September.
- Huussen, T., NIOZ Post-graduate student. 1 August – 31 December.
- van Dam, J., Wageningen Universiteit, 1 March-1 September.
- van den Donker, J., Universiteit Utrecht.
- van der Hall, N., Universiteit van Amsterdam.
- van der Meij, S., Universiteit Leiden, 1 March - 1 December.
- van Lierop, D., Fontys Hogescholen Eindhoven, 1 September, 31 January 2006.
- Veenstra, R., Friesland College, Leeuwarden, January – July.
- Verbeek, T., Drente College, 1 September-31 December.
- Vermeulen, F., Hogeschool Leiden, 1 July, 31 December.
- Vermeulen, F., Universiteit van Amsterdam.
- Versteegh, M., Universiteit Groningen.
- Veuskens, T., Fontys Hogescholen Eindhoven, 1 September, 31 January 2006.
- Winkelhagen, A., Universiteit van Amsterdam.

Groups visiting NIOZ

- Scholengemeenschap 'Molenplein' Den Helder' (30 March, 17 pers.)
- Open Universiteit o.l.v. prof. B. Boekschoten (19 April, 20 pers.)
- Hogeschool In Holland, chemie, Alkmaar (30 May, 6 pers.)
- Plantenziektkundige Dienst (2 June, 23 pers.)
- Leiden pre-university college (3 June, 53 pers.)
- BP-offshore (4 June, 10 pers.)
- NWO, Centrale Programma's en Instituten (8 June, 19 pers.)
- Marinebedrijf (16 June, 13 pers.)
- PAQUES (Microbial Technology Company; 23 June, 10 pers.)
- Werkgeversoverleg Werkgevers Vereniging Onderzoeksinstellingen WVOI en Onderzoeksinstituten (21 October, 12 pers.)
- Prot. Chr. Ouderenbond (2 November, 21 pers.)
- Directie marinebedrijf (12 December, 12 pers.)
- Werkbezoek H. Schipper, gedeputeerde provincie Noord-Holland en college B&W gemeente Texel (22 December)

SOCIAAL JAARVERSLAG



BESTUUR EN WETENSCHAPCOMMISSIE

Bestuur Stichting Koninklijk NIOZ

Per 31 december 2005 was het bestuur als volgt samengesteld:

prof.dr.ir. P. Vellinga, voorzitter
Vrije Universiteit van Amsterdam, Faculteit Aard- en Levenswetenschappen
prof.dr. E.A. Koster
Universiteit van Utrecht, Faculteit Geowetenschappen
prof.dr. J. Middelburg
NIOO-KNAW CEME

Per 15 december zijn prof.dr. L. van Vloten-Doting (voorzitter), G.H. Westerveld (penningmeester), prof.dr. P. Hoekstra en prof.dr. W. Wolff teruggetreden.

Het bestuur kwam in het verslagjaar 2005 zesmaal met de directie in vergadering bijeen, op 18 februari te Utrecht, op 14 maart te Utrecht, op 28 april te Utrecht, op 27 mei te Texel, op 15 juli te Texel en op 30 september te Utrecht.

De vergaderingen werden namens de algemeen directeur van NWO bijgewoond door drs. R.J.P. Dekker (NWO-CPI). Genotuleerd werd door mevrouw C.S. Blaauboer-de Jong.

136

Wetenschapcommissie Koninklijk NIOZ

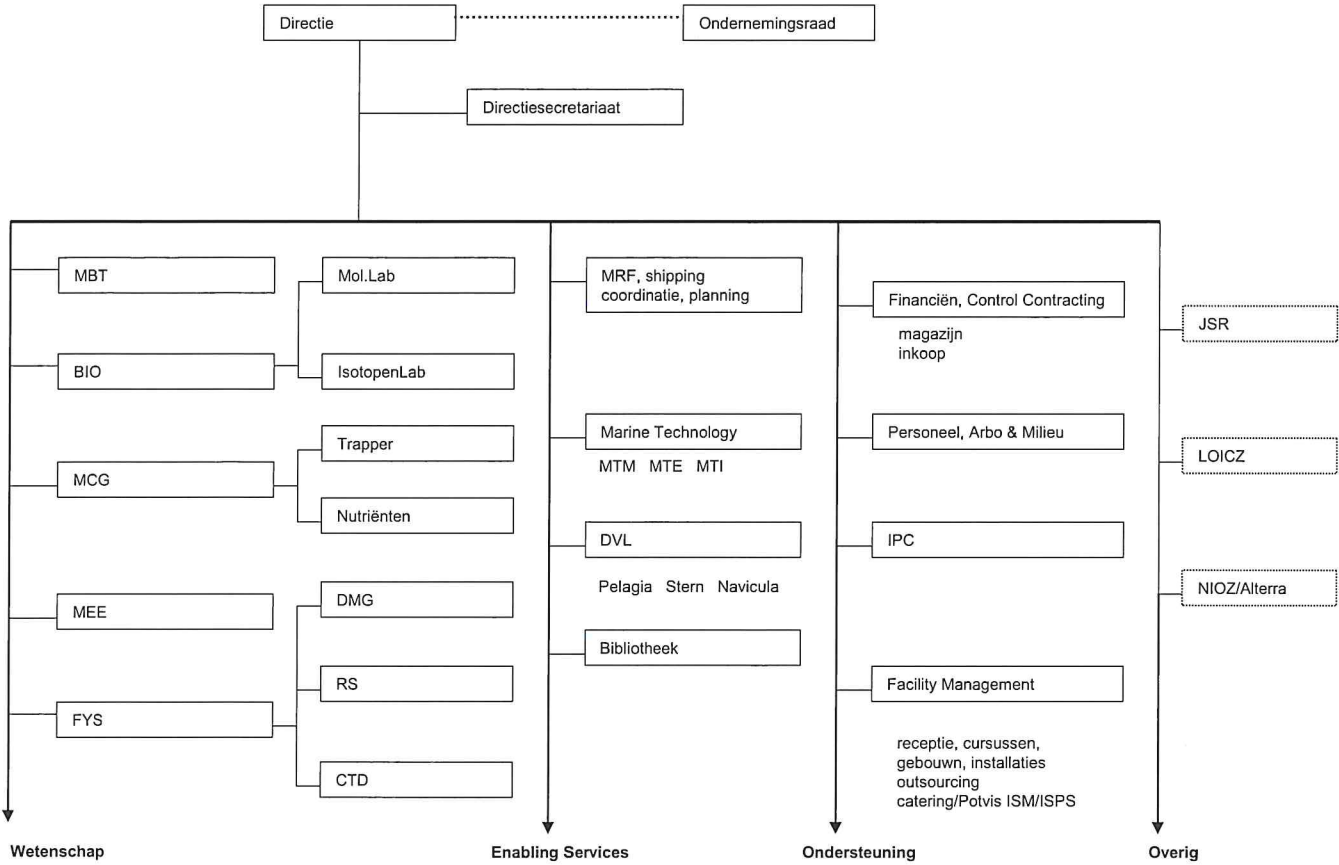
De Wetenschapcommissie adviseert het bestuur en de directie over het algemene wetenschappelijke beleid van de Stichting en het Instituut, zij evalueert periodiek het wetenschappelijke programma van het instituut.

De Wetenschapcommissie was per 31 december 2005 als volgt samengesteld:

prof.dr. J. Middelburg (voorzitter a.i.)
NIOO-KNAW CEME
prof.dr. J.-P. Henriët
RCMG/Mariene Geologie, Universiteit Gent, België
prof.dr. J. Simpson
School of Ocean Sciences/UCNW, Bangor, Groot-Brittannië
prof.dr. L. Labeyrie
Laboratoire des Sciences du Climat et de l'Environnement, Université Paris Sud-Orsay,
Gif sur Yvette, Frankrijk
prof.dr. P. Herman
Afdeling Spatial Ecology, NIOO-KNAW CEME
prof.dr. K. Richardson-Kristensen
Marin Økologi, Biologisk Institut, Aarhus Universitet, Århus, Denemarken
prof.dr. T.D. Jickells
School of Environmental Sciences, University of East Anglia, Norwich, Groot-Brittannië
prof.dr. W. Wolff is per 15 december teruggetreden als voorzitter.

De Wetenschapcommissie is in 2005 niet bijeengekomen.

ORGANOGRAM ROYAL NIOZ D.D. 31 DECEMBER 2005



PERSONEELSLIJST 31-12-05

DIRECTIE

Geerken B.M. dr. ir.	zakelijk directeur	vanaf 15-12
Meulenkamp J.E. prof. dr.	wetenschappelijk directeur	
Rietveld M.J. drs.	directie-secretaris	
Smit J. ir.	zakelijk directeur	tot 15-12

Directiesecretariaat	
Blaauboer-de Jong C.S.	dir. secretaresse

Boon J.P. dr.	voorlichter
Lindeboom H.J. dr.	senior onderzoeker

AFDELING FYSISCHE OCEANOGRAPHIE

Ridderinkhof H. dr.	hoofd	
Aken H.M. van dr.	senior onderzoeker	
Buijsman M.C.	projectmedewerker	
Eijgenraam F.	automatiseringsdeskundige	
Gerkema T. dr.	postdoc	
Haren J.J.M. van dr.	senior onderzoeker	
Harlander U. dr.	postdoc	
Hillebrand M.T.J.	senior onderzoekmedewerker	
Jong M.F. de	OIO	vanaf 01-02
Maas L.R.M. dr.	senior onderzoeker	
Merckelbach L.M. dr.	postdoc	tot 01-03
Ober S. Ing.	senior onderzoekmedewerker	
Veth C. drs.	senior onderzoeker	
Wernand M.R.	senior onderzoekmedewerker	
Zimmerman J.T.F. prof. dr.	senior onderzoeker	
<i>Data management group</i>		
Bruin T.F. de drs.	datamanager MRF	
Hiehle M.A.	medewerker DMG	
Koster R.X. de	medewerker DMG	
Nieuwenhuis J.	medewerker DMG	

AFDELING MARIENE CHEMIE EN GEOLOGIE

Epping H.G. dr.	wnd hoofd	
Weering T.C.E. van prof. dr.	wnd hoofd	
Bakker K.M.J.	onderzoekmedewerker	
Bergh G. van den dr.	postdoc	tot 15-02
Boer W. Ing.	senior onderzoekmedewerker	
Brummer G.J.A. dr.	senior onderzoeker	
Crayford S.J.	senior laboratoriummedewerker	

Fallet U.	OIO	vanaf 01-11
Gaast S.J. van der	senior onderzoekmedewerker	tot 01-03
Gonzalez S.R.	onderzoekmedewerker	
Haas H. de dr.	projectmedewerker	
Iperen J. van	onderzoekmedewerker	
Jansen J.H.F. dr.	senior onderzoeker	tot 01-11
Jonkers L.P.	OIO	vanaf 01-09
Keuning M.E.	OIO	
Koning F.A. dr.	onderzoeker	vanaf 01-04
Land C. van der	OIO	vanaf 01-11
Mienis F.	OIO	
Ooijen J.C. van	senior onderzoekmedewerker	
Richter T.O. dr.	onderzoeker	vanaf 15-05
Stigter H.C. de dr.	projectonderzoeker	
Schogt N.	laboratoriummedewerker	
Weerlee E.M. van	senior laboratoriummedewerker	
Witte A.J.M.	senior laboratoriummedewerker	

AFDELING MARIENE BIOGEOCHEMIE EN TOXICOLOGIE

Sinninghe Damsté J.S. prof. dr. ir.	hoofd	
Abbas B.A.	senior laboratoriummedewerker	
Baas M.	senior onderzoekmedewerker	
Boere A.C.	OIO	vanaf 01-01
Bommel R. van	onderzoekmedewerker	
Boon J.P. dr.	senior onderzoeker	
Booij K. dr.	onderzoeker	
Boumann H.A.	postdoc	
Brandsma J.	OIO	
Breugel Y. van	OIO/postdoc	tot 01-05/vanaf 01-09
Coolen M.J.L. dr.	postdoc	
Forster A. drs.	postdoc	
Herfort L.M.C.C. dr.	postdoc	
Hopmans E.C. dr.	onderzoeker	
Huguet M.C.	OIO	
Jaeschke A.	OIO	
Kienhuis M.V.M.	onderzoekmedewerker	
Meer M.T.J. van der dr.	postdoc	van. 06-02 tot 05-04
Mets A.	senior laboratoriummedewerker	
Mollenhauer G.dr.	postdoc	van 01-01 tot 01-07
Mueller A.	OIO	vanaf 01-09
Ossebaar J.	laboratoriummedewerker	tot 01-12
Panoto F.E.	senior laboratoriummedewerker	
Rampen S.W.	OIO	
Ratray J.E.	OIO	

Rietkerk M.D.A.	senior laboratoriummedewerker	
Rijpsstra W.I.C.	senior onderzoekmedewerker	
Schouten S. dr. ir.	senior onderzoeker	
Stadnitskaia A. drs.	postdoc	
Versteegh G.J.M. dr.	postdoc	tot 01-02
Weijers J.W.H.	OIO	
Woltering M.L.	laboratoriummedewerker	tot 31-12

AFDELING BIOLOGISCHE OCEANOGRAPHIE

Herndl G.J. prof.dr.	hoofd	
Amaro T.	senior laboratoriummedewerker	van 15-03 tot 31-12
Arrieta J.M.	postdoc tot 01-05	
Baars M.A. dr.	senior onderzoeker	
Baudoux A.C.	OIO	
Bleijswijk J.D.L. van dr.	hoofd mol. lab.	
Brussaard C.P.D. dr.	postdoc	
Duyf F.C. van dr.	senior onderzoeker	
ElKalay K. dr.	postdoc	tot 15-08
Goeij J.M. de	OIO	
Hegeman J.	senior onderzoekmedewerker	
Kramer G.D.	senior onderzoekmedewerker	vanaf 15-10
Kuipers B.R. dr.	onderzoeker	tot 30-11
Maier C. dr.	postdoc	
Martinez Martinez J. dr.	postdoc	vanaf 01-11
Noordeloos A.A.M. Ing.	onderzoekmedewerker	
Noort G.J. van	onderzoekmedewerker	
Oosterhuis S.S.	onderzoekmedewerker	
Parada V.S.	OIO	
Peperzak L. dr.	projectmedewerker	vanaf 01-12
Robertson C.M.	laboratoriummedewerker	vanaf 15-09
Sintes E. dr.	postdoc	
Smit A.T.	onderzoekmedewerker	
Reinthalder T. dr.	postdoc	
Ruardij P. drs.	onderzoeker	
Veldhuis M.J.W. dr.	senior onderzoeker	
Witte H.J.	senior onderzoekmedewerker	
<i>Biologische chemische oceanografie</i>		
Baar H.J.W. de prof. dr. ir.	senior onderzoeker	
Bozec Y.	OIO	tot 05-06
Gerringa A.L. dr.	postdoc	
Laan P.	onderzoekmedewerker	
Timmermans K.R. dr.	senior onderzoeker	
Snoek J.	onderzoekmedewerker	vanaf 15-04

AFDELING MARIENE ECOLOGIE

Meer J. van der dr.	hoofd	
Andresen H.	OIO	vanaf 01-07
Bak R.P.M. prof. dr.	senior onderzoeker	
Berghuis E.M.	senior onderzoekmedewerker	
Bergman M.J.N. ir.	onderzoeker	
Bol-den Heijer A.C.	senior laboratoriummedewerker	
Brugge M.C.	dierversorger	
Camphuijsen C.J.	projectonderzoeker	
Compton T.	OIO RUG	
Daan R. dr.	onderzoeker	
Dapper R.	automatiseringsdeskundige	
Dekinga A. drs. Ing.	senior onderzoekmedewerker	
Dekker R. drs.	onderzoeker	
Drent J. dr.	postdoc	tot 30-11
Duineveld G.C. drs.	onderzoeker	
Honkoop P.J.C. dr.	postdoc	
Hout P.J. van den	OIO	
Iperen J. van	onderzoekmedewerker	
Koutrik A. van Ing.	laboratoriummedewerker	
Kraan C.	OIO	
Lavaleye M.S.S. drs.	projectonderzoeker	vanaf 15-03
Mulder M.	onderzoekmedewerker	
Nieuwland G.	senior onderzoekmedewerker	
Philippart C.J.M. dr.ir.	onderzoeker	
Piersma T. prof. dr.	senior onderzoeker	
Reneerkens J.W.H.	OIO	
Smallegange I.M.	OIO	
Spaans B. drs.	senior onderzoekmedewerker	
Vahl W.K.	OIO RUG	tot 01-11
Veer H.W. van der dr. ir.	senior onderzoeker	
Waasdorp C.M.	senior laboratoriummedewerker	
Witbaard R. dr.	onderzoekmedewerker	van 18-04 tot 18-08
Witte J.IJ.	onderzoekmedewerker	
Wuchter C.	senior laboratoriummedewerker	van 01-06 tot 01-09

CORE PROJECT OFFICE (LOICZ/IGBP)

Kremer H.H. dr.	executive officer	tot 31-12
Whyte H.A.Y.	office-administrator	tot 31-12

PERSONEELS-, ARBO EN MILIEUZAKEN

Vooy's P.C.	hoofd
Bredewold J.J.H.	personeelsfunctionaris
Kuip T.	arbocoördinator
Mulder-Starreveld J.P.	medewerker

FINANCE, CONTROL & CONTRACTS

Vos T.	controller	vanaf 01-05
Gootjes J.P.	hoofd financiële administratie	

Arkel M.A. van drs.	projectcontroller	
Kalf J.	medewerker inventarisbeheer	
Keijser A.	medew. financiële administratie	
Kooijman-Biermans M.H.M.	medew. financiële administratie	
Nieuwenhuizen J.M.	medewerker inventarisbeheer	
Poleacov-Maraiala C.	medew. financiële administratie	
Tuinen H.A. van	medew. financiële administratie	
Wernand-Godee I.	medew. project-administratie	
Witbaard R. dr.	ass. projectcontroller	vanaf 18-08

FACILITY MANAGEMENT

Kralingen P. van Ing.	hoofd
Berbée-Bossen J.	telefoniste/receptioniste
Boks-Visser H.	telefoniste/receptioniste
Bonne E.	medewerker (detachering)
Daalder R.M.	medewerker
Dapper-Maas M.A.	telefoniste/receptioniste
Groot S.P.	medewerker
Heerschap J.H.	medewerker
Hillebrand-Kikkert A.	telefoniste/receptioniste
Lakeman R.	medewerker
Markesteyn A.M.	assistente
Trap B.	medewerker
Witte R.J.C.	medewerker

INFORMATIE EN PRESENTATIE CENTRUM

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Barten-Krijgsman N.	medewerker	
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Gerssen A.	medewerker	vanaf 01-08
Malschaert H. Ing.	systeem/netwerkbeheerder	
Manshanden G.M.	medewerker	

BIBLIOTHEEK

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Bruining-De Porto M.E.	medewerker

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Porto H.H. de

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Laan M.

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electronicus
senior electronicus
senior electronicus
senior electronicus

Marine Technology Mechanical

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Bakker M.C.
Blom J.J.
Boom L.
Gieles S.J.M.
Grisnich P.W.
Polman W.
Wuis L.M.
Witte Y.

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zeetechnicus
zeetechnicus
komvisser/chauffeur
chauffeur/medewerker logistiek
zeetechnicus
zeetechnicus
zeetechnicus

VAARTUIGEN EN LOGISTIEK

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hoofd

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Alkema P.R.
Betsema G.L.J.
Dresken J.T.
Duyn M.D. van
Ellen J.C.
Heide R. van der
Jongejan W.P.

havenmeester/schipper
medewerker
scheepstechnicus
scheepskok
stuurman
gezagvoerder
scheepstechnicus
medewerker

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Kikkert K.C.	hoofdwerktuigkundige	
Kleine M.D.M. de	2e werktuigkundige	
Leeuw C.O.	gezagvoerder	tot 21-07
List H.M.	2e werktuigkundige	vanaf 18-04
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Mik G.	scheepskok	
Puijman E.A.	stuurman	
Seepma J.	hoofdwerktuigkundige	
Stevens C.T.	scheepstechnicus	
Slikke R. van der	scheepstechnicus	
Star C.J. van der	schipper	
Vermeulen G.P.	scheepstechnicus	
Vis P.C.A. van der	machinist/motordrijver	
Vries H. de	scheepstechnicus/kok	

GASTMEDEWERKERS

Beukema J.J.
 Bik M.H.
 Cadée G.C.
 Frade P. Rodrigues
 Goeij P.J. de
 Hallers-Tjabbes C.C. ten
 Leeuw J.W. de
 Vézina F.
 Vooy's C.G.N. de
 Wolf P. de

ARBEIDSVOORWAARDEN

Collectieve Arbeidsovereenkomst Onderzoekinstellingen (CAO-OI)

Loonontwikkeling

Per 1 januari 2005 is de (6^e) CAO voor de onderzoekinstellingen in werking getreden met een looptijd tot 1 oktober 2006.

In verband met de economische situatie waren de werkgevers genoodzaakt om, als gevolg van de gemaakte afspraken in november 2004 tussen kabinet en vakcentrales (het zogenaamde STAR-akkoord) bij de CAO-onderhandelingen soberheid te betrachten waarbij van werkgeverszijde feitelijk de zogenaamde "nullijn" moest worden aangehouden. Dit heeft het onderhandelproces bemoeilijkt. Evenwel en ondanks de beperkte financiële ruimte werd in het najaar over de nieuwe CAO overeenstemming bereikt. Overeenkomstig bovengenoemd akkoord is er voor het jaar 2005, ingaande 1 april, een gematigde loonstijging van 0,6% gegenereerd. Per 1 augustus zullen de salarissen in 2006 met 1,6% worden verhoogd. Deze verhoging is mede overeengekomen door de Goede Vrijdag in het vervolg aan te merken als werkdag.

Doorbetaling tijdens ziekte

Eveneens zijn er afspraken gemaakt over de loondoorbetaling tijdens ziekte. Gedurende het eerste jaar, voorheen gedurende het eerste anderhalf jaar, van arbeidsongeschiktheid wordt het loon volledig doorbetaald. In het tweede ziektejaar wordt de bezoldiging teruggebracht naar 70% met dien verstande dat gewerkte uren gericht op reïntegratie 100% worden uitbetaald. Werkt men in het tweede ziektejaar 50% of meer van de aanstellingsomvang, dan ontvangt de werknemer over de resterende ziekteverlofuren 85% van het salaris in plaats van 70%.

145

Basiszorgverzekering

In verband met de wijziging van het ziektekostenstelsel per 1 januari 2006 is er door het NIOZ in samenspraak met Assurantiën Intermediair MEEUS in het laatste kwartaal van 2005 een aantal offertes bestudeerd van zorgverzekeraars met het oog op het verlengen van het bestaande of het afsluiten van een nieuw collectief contract. De conclusie uit dit onderzoek was dat er geen substantiële verschillen bestonden tussen de benaderde zorgverzekeraars qua premie en verzekeringsvoorwaarden en dat er geen eensluidend advies kon worden gegeven ten aanzien van de keuze voor een bepaalde zorgverzekeraar, te meer om reden dat dit sterk afhankelijk is van de persoonlijke (gezins- en gezondheids)situatie.

De zogenaamde "interimvergoeding" (zkoi-regeling) komt door de inwerkingtreding van de Zorgverzekeringswet per 1 januari 2006 te vervallen. In overleg met de vakbonden zal in 2006 bezien worden op welke wijze er uit de resterende gelden van de zkoi-regeling een werkgeversbijdrage kan worden gerealiseerd.

Seniorenregeling

In afwachting van de definitieve levensloopregeling van de onderzoekinstellingen blijft de seniorenregeling van kracht.

Arbeidsvoorwaarden op maat

In 2005 is de belangstelling voor het gebruik van AVOM ten opzichte van 2004 iets gedaald. Dit is niet alleen toe te schrijven aan het niet meer via AVOM kunnen aanschaffen van een PC. Ook van andere "doelen" (aankoop fietsen – verkoop verlofuren) werd minder gebruik gemaakt. Mogelijk wordt dit veroorzaakt door de op zich plausibele aanname dat een medewerker niet elk jaar een nieuwe fiets aanschaft. De afname van verkoop van verlofuren zou verband kunnen houden met de reductie van het verlofstuwmeer.

Fietsen	20 medewerkers
Verkopen verlofuren	51 medewerkers
Kopen verlofuren	3 medewerkers
Studieregeling	1 medewerker

Opleiding en training

Om duidelijkheid te geven over hoe het Koninklijk NIOZ omgaat met opleidingen, cursussen en trainingen is er begin 2005 een notitie opgesteld welke door het managementteam is goedgekeurd. Hierin worden de procedure rondom het aanvragen van een opleiding, cursus of training en de regels bij deelname aan een cursus, opleiding of training weergegeven.

In 2005 zijn er 2 groepscursussen georganiseerd, te weten

**Writing English for publication:* De cursus bestond uit 10 bijeenkomsten van 2,5 uur die in-company werden gegeven. In totaal zijn 19 medewerkers begonnen aan de cursus en hebben 10 medewerkers een certificaat ontvangen na afloop van de cursus. De cursus richtte zich op het schrijven van wetenschappelijke teksten in het Engels. Onderwerpen die aan bod zijn gekomen:

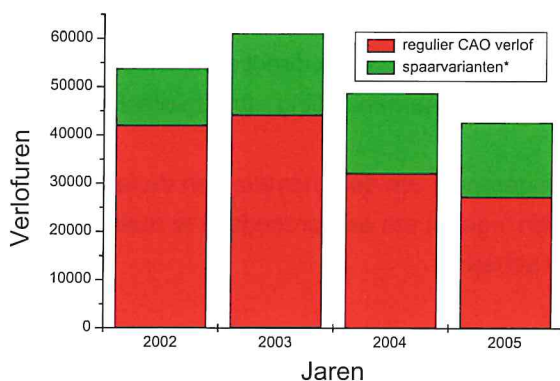
- functies van inleiding en conclusie van een wetenschappelijke tekst;
- onderzoeksdoelen aankondigen in het Engels;
- het schrijven van een goede Engelse alinea;
- aspecten van zinsbouw.

**Arcgis spatial analyst:* De cursus bestond uit een bijeenkomst van 2 dagen en werd in-company gegeven. In 2006 volgt nog een bijeenkomst van 3 dagen. In totaal hebben 10 medewerkers deelgenomen aan de cursus. De cursus richtte zich op het analyseren van ruimtelijke gegevens.

Naast de 2 in-company groepscursussen hebben 12 medewerkers op individuele basis een (externe) opleiding, cursus of training gevolgd. Deze staan los van wetenschappelijke bijeenkomsten/seminars, zijn functiegericht en aan de werkplek gerelateerd. Een aantal van deze opleidingen, cursussen of trainingen loopt door in 2006.

In het kader van de bedrijfshulpverlening hebben 5 medewerkers diverse cursussen gevolgd ten behoeve van de bedrijfsbrandweer en is er 2 keer een herhalingscursus EHBO in-company georganiseerd. Verder heeft de bedrijfsbrandweer 2 praktijkdagen gevolgd waarbij realistisch geoefend werd in een trainingscontainer.

Van de dienst vaartuigen en logistiek hebben 5 medewerkers in maart de training Medical First Aid gevolgd en een hofmeester van de Pelagia de cursus Sociale Hygiëne.



*spaarvarianten hebben betrekking op sabbatical leave, recreatief verlof en prépensioen; laatstgenoemde spaarvariant is inmiddels vervallen

Verlofstuwmeer

Op 31 december 2008 eindigt de overgangstermijn die in de CAO is opgenomen teneinde te bereiken dat op genoemde datum het verlofsaldo van een medewerker niet uitstijgt boven de 80 uur.

In navolging van voorgaande jaren worden leidinggevend en medewerkers met een verlofstuwmeer geadviseerd om met elkaar afspraken te maken teneinde het verlofstuwmeer te reduceren tot maximaal het niveau als hierboven aangegeven.

Tot en met het jaar 2003 was er nog sprake van een toename van het verlofstuwmeer (in 2003 ruim 13% ten opzichte van 2002). Door leidinggevend en medewerkers nadrukkelijk te informeren over de CAO-overgangstermijn en over de mogelijkheden die kunnen leiden tot een afname van het stuwmeer, betrof de reductie in 2004 ten opzichte van het vorige jaar 20% (in het jaarverslag van 2004 is een onjuist percentage vermeld omdat de reductie van het verlofstuwmeer door het gebruik maken van avon-doelen hierin niet was verdisconteerd). In 2005 bleek echter dat de afname relatief minder te zijn dan in 2004 (circa 12%).

147

Individueel Klachtrecht

Koninklijk NIOZ beschikt over een regeling Individueel Klachtrecht. Deze regeling biedt werknemers de mogelijkheid om klachten, over een gedraging door of vanwege de werkgever, bespreekbaar te maken en te doen onderzoeken. In 2005 zijn er bij de Klachtadviescommissie geen klachten ingediend.

In verband met het verstrijken van de zittingsduur is de samenstelling van de Klachtadviescommissie gewijzigd. Op voorspraak van de ondernemingsraad en de directie wordt de nieuwe samenstelling door het bestuur geformaliseerd.

Arbo- en Milieujaarverslag 2005

Inleiding

In dit verslag wordt gerapporteerd over de belangrijkste activiteiten op het terrein van Arbo en Milieu die in 2005 hebben plaatsgevonden.

Beleid

Binnen het kader van de ARBO-wet zijn er in het afgelopen jaar, vooruitlopend op bijvoorbeeld verbouwingen, risicoinventarisaties uitgevoerd. Met name de verbouw van de dienst elektronica en de laboratoria in blok E zijn hier beoordeeld.

Om de informatie aan de medewerkers te optimaliseren is de interne web-pagina van Arbo en Milieu aangevuld met nieuwe informatie zoals het voorkomen van RSI en gevaren van elektriciteit.

Arbo- en Milieucommissie

De Arbo- en Milieucommissie heeft een adviserende en signalerende taak naar de directie en ondernemingsraad op het gebied van veiligheid en milieu. De commissie is breed van samenstelling vanuit verschillende geledingen.

De commissie heeft zich het afgelopen jaar onder meer sterk gemaakt om de renovatie van de laboratoria te bewerkstelligen. Daarnaast hebben leden van de commissie zich ingezet om een procedure te realiseren voor het transport en het gebruik van chemicaliën aan boord van de schepen.

Ongevallen

In het afgelopen jaar zijn er slechts een paar kleine ongevallen voorgevallen. In geen geval is er personeel doorverwezen naar een huisarts of ziekenhuis. In het ernstigste geval betrof het licht oogletsel. In een ander geval betrof het een (bijna)ongeval zonder letsel met een basische vloeistof.

Veiligheids- en milieuzaken

De opslag van formaline en formalinehoudende producten binnen het gebouw is het afgelopen jaar gesaneerd en hiermee voldoet het instituut aan haar milieuvergunning. Voor een deel zijn de producten verplaatst naar de nieuwe opslag naast het formalinelab. Een overgroot deel is geneutraliseerd en afgevoerd.

Voor het lozen van afvalwater ten behoeve van laboratoriumopstellingen in de Waddenzee is de huidige wvo-vergunning uit 1999 bij Rijkswaterstaat vernieuwd. Het betreft met name de veranderde wijze van bemonstering van het afvalwater. Dit wordt in de nieuwe vergunning uitgevoerd conform de vigerende normen op aanwezigheid van kwik en extraheerbare organische gehalogeneerde verbindingen (EOX).

In verband met de vergunning voor het lozen van afvalwater heeft het laboratorium van Tauw Milieu in Deventer ieder kwartaal het geloosde afvalwater geanalyseerd. De gegevens zijn uiterlijk één maand na het beëindigen van ieder kwartaal toegezonden aan Rijkswaterstaat Directie Noord-Holland met afschrift aan het RIZA in Lelystad. Het NIOZ heeft het afgelopen jaar 66.130 m³ afvalwater geloosd.

Via de container van het afvalverwerkingsbedrijf SITA is weer het nodige klein chemisch afval afgevoerd. De belangrijkste af te voeren componenten waren oplosmiddelen, giftige chemicaliën, laboratoriumafval en batterijen.

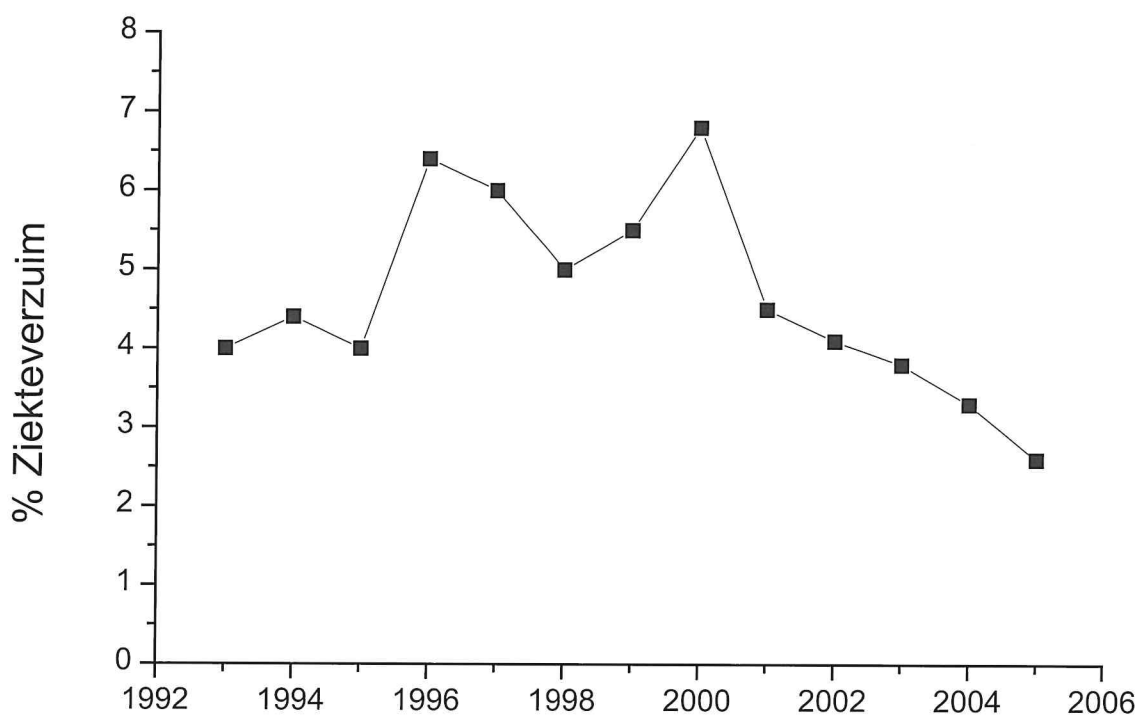
Bedrijfsgezondheidszorg

De opvarenden van de schepen en de leden van de bedrijfsbrandweer zijn dit jaar weer periodiek gekeurd en geschikt bevonden. Ook zijn er niet reguliere keuringen gedaan voor personeel dat voer op buitenlandse schepen of keuringen voor duikers.

Ziekteverzuim

De laatste jaren is er sprake van een verdergaande daling van het ziekteverzuim. Ten opzichte van 2004 is het ziekteverzuim in 2005 met ruim een half procent gedaald.

	WP	M	V	NWP	M	V	Overall%
2001	3.7	4.0	2.5	5.7	4.1	12.9	4.5
2002	3.5	3.5	3.4	5.0	3.1	13.9	4.1
2003	1.5	1.3	2.3	6.8	6.7	7.4	3.8
2004	2.5	1.8	4.6	4.3	4.2	4.9	3.3
2005	1.62	2.1	0.6	3.1	2.5	5.3	2.6



BHV organisatie

De vacatures binnen de bedrijfshulpverleningorganisatie zijn het afgelopen jaar ingevuld met twee Aspirant Manschappen. Hierdoor bestaat de bedrijfsbrandweer momenteel uit 13 manschappen. Voor de taak EHBO zijn er 10 leden beschikbaar.

Om de inzetbaarheid van de leden van de bedrijfsbrandweer en de EHBO te garanderen zijn de afgelopen jaar diverse trainingen en cursussen gevolgd. Vanwege de bereikbaarheid buiten diensttijd zijn nieuwe alarmontvangers aangekocht volgens het landelijke systeem P2000.

Verslag van de ondernemingsraad

Samenstelling van de or.

In het voorjaar traden drie leden af: Sven Ober, Ewout Adriaans en Ramona Grippeling verlieten de ondernemingsraad. In verband hiermee werden verkiezingen gehouden. Hierna zag de samenstelling van de or er per 1 mei als volgt uit:

Klaas Timmermans (voorzitter), Kees Veth (secretaris), Swier Oosterhuis (plv. voorzitter), Maarten Mulder (plv. secretaris), Ruud Witte, Klaas Kikkert en Piet van den Hout. Eén positie voor een vertegenwoordiger uit de categorie "Technische diensten, ondersteunende diensten en stafeenheden" bleef vacant.

Formeel en informeel overleg

De or en de directie hebben om de twee weken informeel overleg gevoerd. Dit overleg werd niet genotuleerd, waardoor een vrije uitwisseling van gegevens tussen directie en or mogelijk was. In dit informele overleg werd besluitvorming voorbereid. Formele overlegvergaderingen tussen or en directie vonden vier keer plaats (28 januari, 1 april, 3 juni, 6 oktober). Deze overlegvergaderingen werden genotuleerd en de notulen zijn gepubliceerd op de pagina "Overleg" van de or-website. De notulen geven een gedetailleerd overzicht van de onderwerpen die tussen or en directie aan de orde zijn geweest.

Er vonden vier overlegvergaderingen met het NIOZ-bestuur plaats, en wel op 27 mei, 15 juli, 23 september en 13 oktober.

Wat kwam in de or aan de orde?

Onderwerpen die aan de orde kwamen betroffen ARBO zaken (i.s.m. de ARBO-cie van het NIOZ), nieuwbouw van het onderzoeksvaartuig Nereis, problemen in de afdeling MCG, functiewaarderingen, toekomstplannen ("scenario 4"), renovatie oudbouw, nieuwbouw logeergebouw de Potvis en communicatie. Verder heeft nauw overleg plaatsgevonden over de financiën van het instituut, en het reilen en zeilen van het onderzoeksvaartuig Pelagia.

In mei heeft de or een achterban-raadpleging gehouden. Hierbij bleek onrust bij het personeel te heersen over de ernstige vertraging bij het vinden van een nieuwe directeur. Verder waren er kritische opmerkingen over het ontbreken van een spoorboekje/visie op de toekomst, communicatie binnen het instituut, de status van onderzoeksafdeling MCG en de onzekerheid onder de bemanning van het onderzoeksvaartuig Pelagia. Deze zaken werden direct aan het bestuur overgebracht.

In november en december waren er grote wijzigingen op het bestuurlijke vlak. Het NIOZ-bestuur trad af, waarna het Algemeen Bestuur van NWO een nieuw (kern-)bestuur benoemde en dhr Geerken (directeur planning en organisatie van NWO) werd aangesteld als zakelijk directeur (tot 1 juli 2006).

Afgeronde zaken

De or heeft in de loop van het jaar een drietal adviesaanvragen en twee instemmingsaanvragen ontvangen en afgehandeld. De adviesaanvragen betroffen (1) een voorgenomen besluit met betrekking tot tijdelijke detachering van de groep "de Baar" uit de afdeling MCG bij de afdeling BIO, (2) benoeming van de leden van een driehoofdig kernbestuur van het NIOZ en (3) benoeming van dr. ir. B.M. Geerken tot interim zakelijk directeur. De instemmingsaanvragen gingen om twee voorstellen tot wijziging van artikel 5 van de UR 'Bijzondere toelagen voor bemanning Pelagia en Navicula'.

Tot slot heeft de or met het NIOZ-bestuur gecommuniceerd over het "stappenplan" van het bestuur en vragen gesteld naar aanleiding van het peer review.

DE PERSONEELSVERENIGING

Het zittend bestuur is gebleven en heeft met veel plezier de activiteiten van 2005 georganiseerd. Dit was natuurlijk een bijzonder jaar, omdat 40 jaar geleden de PV is opgericht. En in het teken van onze verjaardag hebben we de volgende activiteiten georganiseerd.

Als bedrijfsuitje zijn we dit jaar bij SEWACO geweest. Dit bedrijf doet het technisch onderhoud, aanpassingen en vernieuwingen van de technische installaties aan boord van de marine vloot. We hebben hierbij de radar en vuurleiding afdeling bezocht en zijn onder de indruk geraakt van dit materieel en de techniek hier achter.

In de winter zijn we met 30 leden de skipiste opgegaan bij Snowplanet in Velsen-zuid waar we konden skiën of snowboarden. Met weinig andere mensen om ons heen, hadden we het rijk nagenoeg alleen. Aan degenen met weinig tot geen ervaring werden lessen gegeven. Na afloop kon iedereen, gezond en wel en zonder blijvende schade, onder de koffie+ zijn sterke verhaal kwijt.

Op 6 oktober werd de sportdag gehouden. Tijdens de lunch werden teams gevormd en gehuld in een nieuw PV-shirt. Om daarna naar de haven te vertrekken en zich te storten op de verschillende sportactiviteiten, zoals kano estafette, GPS speurtocht, VIPblik gooien, blok slingeren, bowlen, donutvaren. Hoewel ons de hele week mooi weer was beloofd, was deze donderdag uiteindelijk fris en grijs, maar gelukkig wel droog (Hoewel... een paar mensen zagen eruit alsof ze wel een zeer plaatselijke bui waren tegengekomen). De loods was ingericht als eetcafé waar iedereen op temperatuur kon komen. De sportdag werd beëindigd met een uitgebreide BBQ en swingende muziek van de band Poundcake.



Dit jaar niet met Sinterklaas, maar met kerst een presentje. Ook weer iets luxer om onze verjaardag te vieren. Alle leden hebben handgemaakte Texelse bonbons (zelfs een met PV-logo) gekregen en deze werden smul-lend ontvangen. Sommigen werden zelfs meteen lid bij het zien van al dit lekkers.

Het jaar is weer afgesloten met de (inmiddels) traditionele kerstborrel. Even zag het er naar uit dat er geen gerookte vis beschikbaar was, maar gelukkig kwam dit kort van te voren toch nog goed. Veel collega's waren diep in hun kledingkast gedoken en hadden zich geweldig verkleed voor het thema The 70-s. Hopelijk hebben we in 2006 net zo'n spetterend jaar!

