BELGIAN MARINE RESEARCH

an overview

Colofon

The brochure 'Belgian Marine Research - an overview' is a publication linked to the 'Compendium for Coast and Sea 2013: integrating knowledge on the socio-economic, environmental and institutional aspects of the Coast and Sea in Flanders and Belgium'. The Compendium results from a collaboration between multiple academic groups, governmental authorities, civil society organisations and discussion platforms dealing with coastal and marine issues and was coordinated by the Flanders Marine Institute (VLIZ).

The Compendium for Coast and Sea can be consulted online: *www.compendiumcoastandsea.be*

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Citation:
Mees, J, Verleye, T., Pirlet, H., Lescrauwaet, A.K., Janssen, C., Herman, R. (Eds.), 2013. Belgian Marine Research - an overview. Flanders Marine Institute (VLIZ), Oostende, Belgium, 127 pp.
ISBN: 978-90-820731-4-0

Responsible publisher:
Jan Mees (Flanders Marine Institute, VLIZ)
Wandelaarkaai 7
8400 Oostende
Belgium

Photography:
Photographs are provided by the respective marine research groups, except for the photos on the pages 11 (Alpha Ventus/DOTI 2009); 15 (Van Ginderdeuren Karl); 19, 22 (VLIZ); 23 (Roos et al. 2009); 24, 25 (Van Ginderdeuren Karl); 27 (Covaci et al. 2008); 29, 33, 36 (VLIZ); 41 (Den Haag Lankhout); 44 (Vandenbohede et al. 2010); 52 (Bodnar Wanda); 55 (VLIZ); 60 (De Breuck et al. 1974); 66 (VLIZ); 71 (Deckers Pieterjan); 72 (VLIZ); 75 (VLIZ); 79 (BMM/MUMM); 80, 81 (VLIZ); 83 (Misjel Decleer); 86, 87 (VLIZ); 88 (Blaise et al. 2010); 89, 90 (Van Ginderdeuren Karl); 93 (van der Zee & Chou 2005); 94, 96, 101,104 (VLIZ); 105 (Beckers et al. 2006); 106 (Delhez & Wolk 2012); 107 (Verkempynck Marc); 108 (VLIZ); 110 (Van Ginderdeuren Karl); 111 (van Hengstum et al. 2009); 112 (Boulvain et al. 2009); 115 (VLIZ); 118 (Decleer Misjel); 121 (VLIZ); 123 (De Wolf et al. 1997); 125 (Lazareth et al. 2003).

VLIZ

Introduction

Reading guide

The brochure 'Belgian marine research' is a publication linked to Chapter 1 of the Compendium for Coast and Sea, dealing with mapping the marine scientific landscape. Therefore, we refer to this chapter for more information regarding the methodology. This brochure aims to disclose the Belgian research groups that conduct research on marine, coastal and/or estuarine research topics (subsequently referred to as 'marine' research). The publication maps the marine expertise on the level of individual marine research groups (MRGs) and aims to actively promote the expertise both in Belgium and abroad, as well as to improve the communication and collaboration between the MRGs.

The marine research groups mentioned in this brochure meet the following four criteria:

(1) Located in Belgium;
(2) A marine research focus. In case of doubt, the output of the group is decisive (more than one peer-reviewed publication in the past 5 years with a first author affiliated to the research group);
(3) The research group receives regular operating funds or subsidies from the government which are anchored in management agreements, covenants or arranged on another legal basis;
(4) Non-university groups belong to the list of recognised institutes for scientific research as included in article 5 of the *Royal Decree of 22 August 2006* tot wijziging van het KB/WIB 92 op het stuk van de aangifte in de bedrijfsvoorheffing and subsequent amendments).

The criteria mentioned above imply that institutes such as administrations, museums, organisations with educational purposes, companies, etc., which may also conduct marine research, are not included in this brochure. For the disclosure of the latter, we refer to *Flanders' Maritime Cluster*, a network organisation for the marine and maritime industry in Flanders. If your institute meets the aforementioned criteria but is not included in the brochure, please contact the secretariat of the Compendium for Coast and Sea (*compendium@vliz.be*).

The MRGs can be classified into four types of institutions: the Flemish universities, the Flemish scientific research institutes, the universities of the Federation Wallonia-Brussels and the Federal scientific institutes. In this brochure, institutes and their affiliated research groups are discussed by type of institution and in alphabetical order. MRGs can also be thematically classified according to research field or research discipline, a classification which is adopted in modified form from the 2007 Frascati Revised Field of Science and Technology (FOS) classification (see tables 1 to 6). In addition to the description of individual MRGs, this publication also discloses interfaculty marine/maritime research clusters. These interfaculty clusters are discussed before the description of the individual MRGs belonging to the respective university.

The publication presents the following information for each MRG: name of the research group or scientific institute, IMIS-ID (see below), website, institutional hierarchy, head of the group, research field and discipline, abstract and address. The MRGs are also disclosed online in the IMIS-database (Integrated Marine Information System) of the Flanders Marine Institute (VLIZ). In this database more detailed information about the research group can be consulted, such as the current staff, an overview of the publications affiliated to the respective group, projects in which the group participated and datasets (if relevant). The IMIS-ID of each MRG is visualised in the upper right corner of every MRG-sheet. It is a numeric code referring to the webpage of the MRG within IMIS and corresponds with the digits at the back of the URL of the webpage (http://www.vliz.be/imis/imis.php?module=institute&insid=ID).

Expertise of the marine research groups

The Belgian MRGs study a wide range of marine/maritime research topics (see Compendium for Coast and Sea, Chapter 1 for more details) over various research fields and disciplines. The geographical visualisation of the MRGs according to research field emphasises the fragmented nature of the current marine research landscape in Belgium (figure 1).

The majority of the MRGs conduct marine scientific research belonging to the research domain of natural sciences (61%), followed by engineering and technology (16%), agricultural and veterinary sciences (9%), social sciences (7%), humanities (4%) and finally medical and health sciences (2%). On the level of research disciplines, 33% of the MRGs focus on biological sciences and 24% on earth sciences, followed by chemical sciences (8%), civil engineering (7%) and fisheries and aquaculture sciences (6%) (figure 2).

Tables 1 to 6 visualise which MRGs conduct research in what research domain, to which type of organisation or institute they belong and in which research discipline the group specialises.

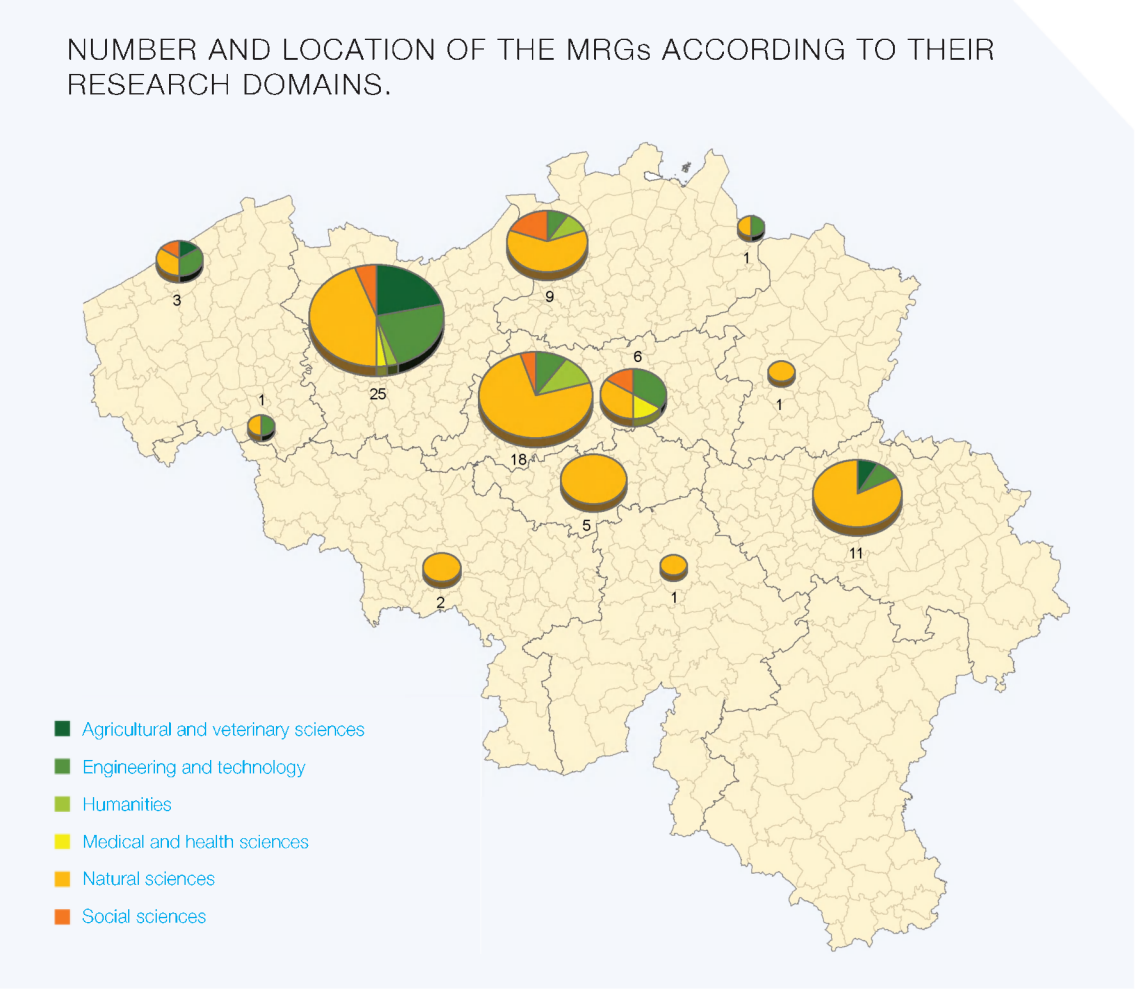


Figure 1. Number and location of the MRGs according to their research domains. * *Institutes can be located at several places and institutes can belong to multiple research fields.*

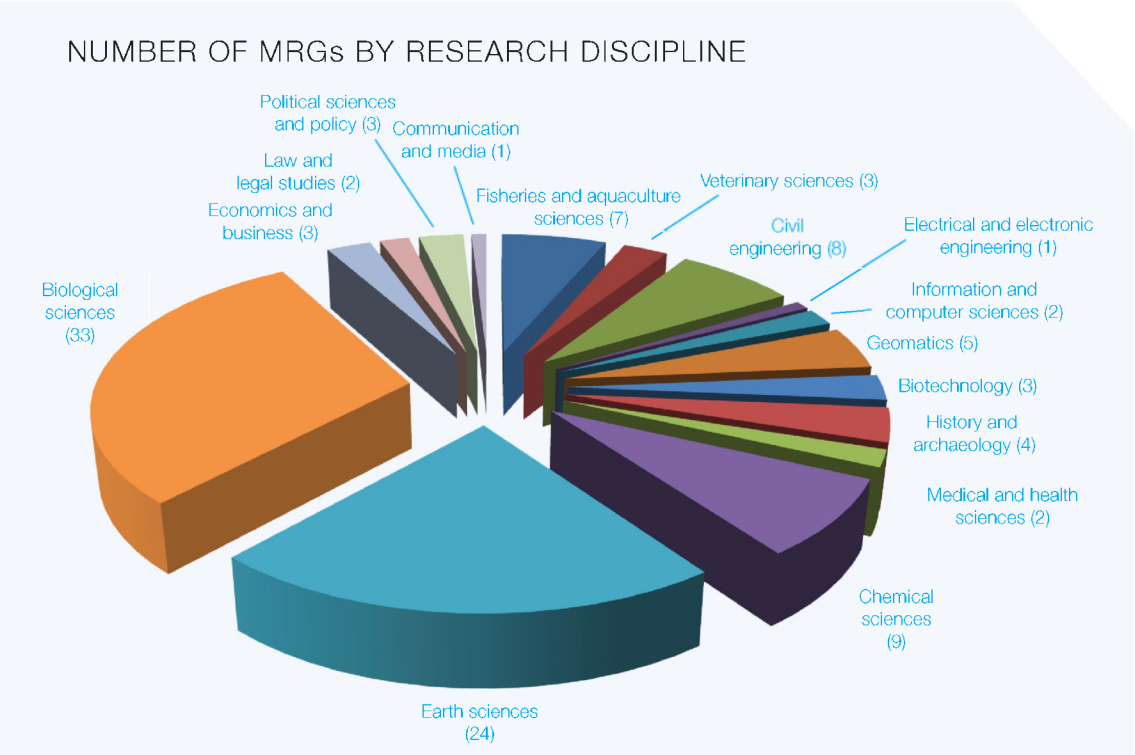


Figure 2. Number of MRGs by research discipline on 19 July 2013. MRGs (and the associated staff) can be allocated to several research domains and disciplines (Source: VLIZ survey 2012-2013).

Table 1. Overview of the marine research groups conducting scientific research in the research field of **Natural sciences**. This research domain includes the following research disciplines: mathematics, physical sciences, chemical sciences, earth sciences and biological sciences.

Marine research groups	University	Math	Physical sci.	Chemcal sci.	Earth sci.	Biological sci.
Flemish Universities						
Laboratory Aquatic Biology	KU Leuven					x
Laboratory of Biodiversity and Evolutionary Genomics	KU Leuven					x
Division of Geology	KU Leuven				x	
Ecosystem Management research group	UA					x
Research group Functional Morphology	UA					x
Micro- and Trace Analysis Centre; Research group Environmental Analysis	UA			x		
Research group Systemic Physiological and Ecotoxicological Research	UA					x
Toxicological Centre	UA			x		
Phycology research group	UGent					x
Laboratory of Analytical Chemistry and Applied Ecochemistry	UGent			x		x
Laboratory for Chemical Analysis	UGent			x		
Research group Evolutionary Morphology of Vertebrates	UGent					x
Research unit Groundwater Modeling	UGent				x	
Laboratory for Food Microbiology and Food Preservation	UGent					x
Marine Biology Research group	UGent					x
Laboratory for Microbial Ecology and Technology	UGent					x
Laboratory of Microbiology	UGent					x
Laboratory of Environmental Toxicology and Aquatic Ecology	UGent					x
Renard Centre of Marine Geology	UGent				x	
Research unit Palaeontology	UGent				x	
Laboratory of Protistology and Aquatic Ecology	UGent					x
Terrestrial Ecology Research group	UGent					x
Laboratory for Applied Geology and Hydrogeology	UGent				x	
Research group Zoology: Biodiversity and Toxicology	UHasselt					x
Plant Biology and Nature Management Laboratory	VUB					x
Research group Analytical and Environmental Chemistry	VUB			x		
Research group Physical Geography	VUB				x	
Research group Marine Biology	VUB					x
Flemish scientific institutes						
Institute for Agricultural and Fisheries Research (ILVO)				x		x
Research Institute for Nature and Forest (INBO)						x
Flemish Institute for Technological Research (VITO)					x	
Flanders Hydraulics Research					x	
Universities of the Wallonia-Brussels Federation						
Marine Biology Laboratory	UCL					x
Lemaître Centre for Earth and Climate Research	UCL				x	
Research pole Environmental Sciences	UCL				x	
Institute of Life Sciences	UCL					x
Applied Mechanics Unit	UCL				x	
Acoustics and Environmental Hydroacoustic Lab	ULB				x	
Biogeochemistry and Earth System Modelling group	ULB			x	x	
Research group Marine Biology	ULB					x
Laboratory of Ecology of Aquatic System	ULB				x	x
Laboratory of Systems Ecology and Resource Management	ULB					x
Laboratoire de Glaciologie	ULB				x	
G-Time	ULB			x	x	
Research unit Clays, Sedimentary Geochemistry and Environments	ULg				x	
Animal Ecology and Ecotoxicology Laboratory; Marine Ecology Unit	ULg					x
GeoHydrodynamics and Environment Research	ULg				x	
Mathematical Modelling and Methods	ULg				x	
Functional and Evolutionary Morphology Laboratory	ULg					x
Chemical Oceanography Unit	ULg				x	
Laboratory of Oceanology	ULg				x	x
Palaeobiogeology, Palaeobotany and Palaeopalynology Laboratory	ULg				x	
Sedimentary Petrology Laboratory	ULg				x	
Laboratory of Biology of Marine Organisms and Biomimetics	UMons					x
Numerical Ecology of Aquatic Systems group	UMons					x
Research unit in Environmental and Evolutionary Biology	UNamur					x
Federal scientific institutes						
Royal Belgian Institute of Natural Sciences (RBINS)				x	x	x
Royal Museum for Central Africa (RMCA)					x	x

Table 2. Overview of the marine research groups conducting scientific research in the research field of **Engineering and technology.** This research domain includes the following research disciplines: civil engineering, elektrical and electronic engineering, mechanical engineering, information and computer sciences, geomatics, biotechnology and other engineering and technology disciplines.

Marine research groups	University	Civil eng.	Elektr. eng.	Mechan.	Inf.- and comp.	Geomatics	Biotech.	Other
Flemish Universities								
Laboratory Aquatic Biology	KU Leuven						x	
Hydraulics Laboratory	KU Leuven	x						
Section ESAT - ELECTA	KU Leuven		x					
Geomatics	UGent					x		
Maritime Technology Division	UGent	x						
Center for Mobility and Spatial Planning	UGent	x				x		
Coastal Engineering, Bridges and Roads; Coastal Engineering Research group	UGent	x						
Laboratory for Microbial Ecology and Technology	UGent						x	
Hydraulics Laboratory	UGent	x						
Laboratory of Protistology and Aquatic Ecology	UGent						x	
Department of Hydrology and Hydraulic Engineering	VUB	x				x		
Flemish scientific institutes								
Flemish Institute for Technological Research (VITO)						x		
Flanders Marine Institute (VLIZ)					x			
Flanders Hydraulics Research		x						
Universities of the Wallonia-Brussels Federation								
Naval Architecture (ANAST)	ULg	x						
Federal scientific institutes								
Royal Belgian Institute of Natural Sciences (RBINS)					x	x		

Table 3. Overview of the marine research groups conducting scientific research in the research field of **Agricultural and veterinary sciences.** This research domain includes the following research disciplines: fisheries and aquaculture sciences, veterinary sciences and other agricultural and veterinary sciences.

Marine research groups	University	Fisheries and aquaculture sciences	Veterinary sciences	Other
Flemish Universities				
Laboratory of Aquaculture and Artemia Reference Center	UGent	x		
Agro-food Marketing and Consumer Behavior	UGent	x		
Laboratory for Chemical Analysis	UGent		x	
Laboratory for Food Microbiology and Food Preservation	UGent	x		
Laboratory for Microbial Ecology and Technology	UGent	x		
Department of Morphology	UGent	x	x	
Research group Nutrition and Food Safety	UGent	x		
Flemish scientific institutes				
Institute for Agricultural and Fisheries Research (ILVO)		x		
Universities of the Wallonia-Brussels Federation				
Department of Morphology and Pathology	ULg		x	

Table 4. Overview of the marine research groups conducting scientific research in the research field of **Social sciences.** This research domain includes the following research disciplines: economics and business, sociology, law and legal studies, political sciences and policy, communication and media and other social sciences.

Marine research groups	University	Economics and business	Sociology	Law and legal studies	Political sciences and policy	Communication and media	Other
Flemish Universities							
Public Management Institute	KU Leuven				x		
Department Transport and Regional Economy	UA	x					
Institute of Transport and Maritime Management	UA	x					
Maritime Institute	UGent			x			
Center for Mobility and Spatial Planning	UGent	x			x		
Centre for International Law	VUB			x			
Flemish scientific institutes							
Flanders Marine Institute (VLIZ)					x	x	

Table 5. Overview of the marine research groups conducting scientific research in the research field of **Humanities**. This research domain includes the following research disciplines: history and archaeology and other humanities.

Marine research groups	University	History and archaeology	Other
Flemish Universities			
Centre for Urban History	UA	x	
Research group Economy, Ecology and Demography	UGent	x	
Department of Art Sciences and Archaeology	VUB	x	
Flemish scientific institutes			
Flanders Heritage Agency		x	

Table 6. Overview of the marine research groups conducting scientific research in the research field of **Medical and health sciences**. This research domain includes the following research discipline: medical and health sciences.

Marine research groups	University	Medical and health sciences
Flemish Universities		
Laboratory for Toxicology and Food Chemistry	KU Leuven	x
Research group Nutrition and Food Safety	UGent	x

Flemish Universities

// Katholieke Universiteit Leuven

// University of Antwerp

// Ghent University

// Hasselt University

// Vrije Universiteit Brussel

Katholieke Universiteit Leuven

// Biomedical Sciences Group

- Laboratory for Toxicology and Food Chemistry

// Humanities and Social Sciences Group

- Public Management Institute

// Science, Engineering and Technology Group

- Laboratory Aquatic Biology
- Laboratory of Biodiversity and Evolutionary Genomics
- Section ESAT - ELECTA
- Division of Geology
- Hydraulics Laboratory

/ Laboratory **Aquatic Biology (KU Leuven - KULAK)**

www.kuleuven-kulak.be/biology

// institutional hierarchy

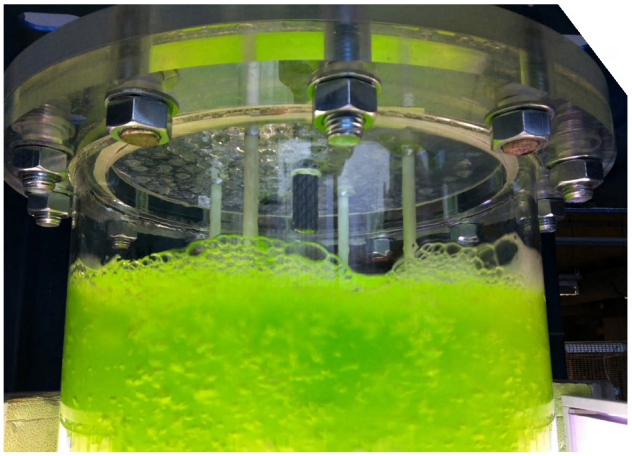
Faculty of Science and Technology (KULAK)

// head of the group

Prof. dr. Koenraad Muylaert

// research domain and discipline

Natural sciences; Biological sciences
Engineering and technology; Biotechnology



// abstract

The laboratory Aquatic Biology of the Katholieke Universiteit Leuven (branch Courtray, KULAK) was founded in 2008. The laboratory carries out fundamental and applied research into aquatic microorganisms in both natural and artificial waters. The research is centered on three main topics: (1) the causes and solutions for eutrophication and algal blooms, both in freshwater and marine ecosystems; (2) the development of applications of microalgae, such as in waste water treatment, biofuel production or food and animal food. The main aim of marine microalgae research is to discover particular species that are a source of omega 3 fatty acids and new antioxidants; (3) fundamental research regarding the evolutionary interaction between parasites and their hosts, using the water flea *Daphnia* as an animal model.

The marine topics researched by this group can be summarised as follows:

- Study of the variations in phytoplankton diversity and density in the Scheldt estuary;
- Research on marine microalgae cultures.

In the near future, the group will further focus on the use of marine microalgae in sustainable technologies such as replacing fish oil by algae and microalgae as a source of new natural products. Challenges the group has to face concerning the cost-effective harvesting of microalgae, the development of techniques for extraction and processing of omega 3 fatty acids from microalgae, the screening of microalgae for new antioxidants and performing studies regarding nutrient recuperation out of waste streams by the use of microalgae.

In the scope of the above-mentioned research, the laboratory collaborates intensively with the Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico) and the Institut Universitaire Mer et Littoral (Nantes, France).

Aquatic Biology

E. Sabbelaan 53
B-8500 Courtray

/ Laboratory of **Biodiversity and Evolutionary Genomics (KU Leuven)**

http://bio.kuleuven.be/de/dev/

// institutional hierarchy

Science, Engineering and Technology Group

Department of Biology

Ecology, Evolution and Biodiversity Conservation Section

// head of the group

Prof. dr. Filip Volckaert

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The laboratory of Biodiversity and Evolutionary Genomics of the Katholieke Universiteit Leuven, formerly known under the name laboratory of Animal Diversity and Systematics, was founded in 1986. During its existence, its research focus has shifted from taxonomy and systematics of vertebrates towards the study of biodiversity and evolution of vertebrates. Currently, the laboratory studies the evolution of fish and parasites (population genetics, genomics, ecology and evolution), bioarcheology and fish systematics.

The laboratory participated in several research projects focusing on the sustainable management of the North Sea, the impact of anthropogenic activities on fish populations, the genetic structure of fish, the co-evolution between host and parasite, tracing and identification of fish, etc. Geographically, the above research is performed in the North Sea, the Northeast Atlantic Ocean, the Mediterranean Sea and the Southern Ocean.

The marine topics studied by the laboratory are:

- Phylogeography and historical genetics;
- Dispersion ecology of marine fish;
- Naturally and human-induced adaptation of marine fish;
- Population genomics;
- Host-parasite co-evolution, with focus on the parasitic Monogenea;
- Archaeobiology of fish.

In the future, the laboratory will cover topics such as the evolution of marine fish and their parasites based on the integration of the environment, phenotype and genotype, and the archaeobiology of fish. The challenges involved are the expansion of the multidisciplinary cooperation and the integration of new methods. Additionally, the group participates within a variety of European and national projects and maintains a close cooperation with the University of Padova, University of Santiago de Compostella, DTU-Aqua, Max Planck Institute for Evolutionary Biology, IMARES and Ifremer.

LBEG

Charles Deberiotstraat 32,
box 2439
B-3000 Leuven

/ Section **ESAT - Electrical Energy and Computer Architecture (ELECTA) (KU Leuven)**

www.esat.kuleuven.be/electa/

// institutional hierarchy

Science, Engineering and Technology Group

Department of Electrical Engineering (ESAT)

// head of the group

Prof. dr. Ronnie Belmans

// research domain and discipline

Engineering and technology (applied sciences); Electrical engineering and electronic engineering

// abstract

The research of the branch ESAT-ELECTA of the Katholieke Universiteit Leuven covers the broad spectrum of electrical energy systems and the robust control of electro-technical systems. More specifically, this group concentrates on the study of power systems, power quality, power electronics, information infrastructure and socio-economic issues. The development of the future smart grid is their key objective.

The marine component of this group's research focuses on techno-economic aspects of the energy production by offshore wind mills. In the future, the research of this branch will include studies on the following topics: expansion of electricity networks in the sea, exploiting electricity systems in the sea, coupling offshore networks to onshore networks and lastly, the energy storage in the sea.

Furthermore, together with the Flemish Institute for Technological Research (VITO) and the Interuniversity Microelectronics Centre (IMEC), ELECTA is a co-founder of EnergyVille, a knowledge center which carries out research regarding renewable energy. Presently, this research group participates in several projects, including the NEMO project (electricity connection between Belgium and the United Kingdom).

ESAT - ELECTA

Kasteelpark Arenberg 10, box 2445
B-3001 Heverlee

/ Division of **Geology (KU Leuven)**

http://aow.kuleuven.be/geologie/

// institutional hierarchy

Science, Engineering and Technology Group

Department of Earth and Environmental Sciences

// head of the group

Prof. dr. Patrick Degryse

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The department Geology of the Katholieke Universiteit Leuven studies a wide range of earth science topics such as archaeometry and geoarchaeology, continental tectonics, hydrogeology and applied geology, biogeology, geodynamics and geofluids and applied mineralogy. Within the context of marine research, the group has expertise in marine microfossils and marine carbonates.

** Content not validated by the respective research group*

Geology

Celestijnenlaan 200E, box 2408
B-3001 Heverlee

/ Hydraulics Laboratory (KU Leuven)

www.kuleuven.be/hydr/

// institutional hierarchy

Science, Engineering and Technology Group

Department of Civil Engineering

// head of the group

Prof. dr. Jaak Monbaliu

// research domain and discipline

Engineering and technology, Civil engineering

// abstract

The Hydraulics Laboratory of the Katholieke Universiteit Leuven studies diverse marine topics. On the one hand, the laboratory researches the interaction between turbulence and concentration of (fine) sediments, as well as the interaction between waves, currents and sediment transport. Other important research topics include modeling of tide and storm induced currents, modeling of erosion and transport of sediment, modeling of the dynamic behavior of cohesive sediment soils and morphological changes in estuaries and along coasts. Within this context, observations made using remote sensing play an important role.

On the other hand, the researchers focus on the possible effects of climate change on the various functions of coasts and estuarine areas. The emphasis lies on changes in the border conditions (wave and storm surge) and the possible consequences (for instance inundations).

The laboratory is actively involved in national and international research projects and participates in the nautical bottom research of the Maritime Access division and the Flanders Hydraulics Research.

Hydraulics

Kasteelpark Arenberg 40,
box 2448
B-3001 Heverlee

/ Public Management Institute (KU Leuven)

http://soc.kuleuven.be/io/eng/

// institutional hierarchy

Humanities and Social Sciences Group

Faculty of Social Sciences

// head of the group

Prof. dr. Annie Hondeghem

// research domain and discipline

Social sciences; Political sciences and policy

// abstract

The Public Management Institute of the Katholieke Universiteit Leuven exists since 1998 under its current form, and arose from the merging of the 'Vervolmakingscentrum voor Overheidsmanagement en Beleid' (founded after World War II) and the branch 'Bestuur en Overheidsmanagement' (department Political Sciences). The Institute provides a scientifically substantiated contribution to the management and policy of both national public authorities of different administrative levels (local, regional, federal) and international public authorities, taking into account the core tasks of a university (research, education, training and service).

The activities of the institute can be grouped into five clusters: (1) Citizen and policy, (2) Governance and organisation, (3) Electronic government, (4) Personnel and change, and (5) Finance, quality and performance. Within the marine domain, the institute contributes to the fishery policies.

Public Management Institute

Parkstraat 45, box 3609
B-3000 Leuven

/ Laboratory for **Toxicology and Food Chemistry (KU Leuven)**

www.toxicologie.be

// institutional hierarchy

Biomedical Sciences Group

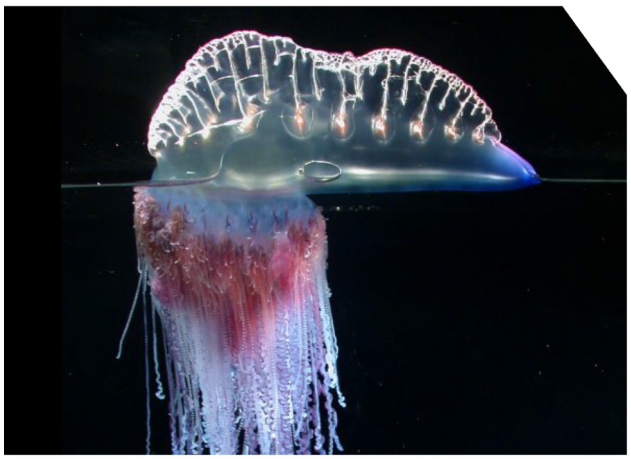
Department of Pharmaceutical and Pharmacological Sciences

// head of the group

Prof. dr. Jan Tytgat

// research domain and discipline

Medical and health sciences; Medical and health sciences



// abstract

The laboratory for Toxicology and Food Chemistry of the Katholieke Universiteit Leuven conducts research on substances foreign to the body (toxins) and studies the safety aspects and the composition of foodstuffs. At the request of the Belgian Courts of Justice, the laboratory also performs forensic toxicological analysis and research on biological samples (including post mortem) and confiscated products.

In relation to marine biology, the laboratory focuses on the discovery and characterisation of toxins (peptides and small organic molecules) present in poison glands or organs of marine species such as jellyfish, sea anemones and Conus snails. The research group aims to further concentrate on this topic in the future. Within this context, the main challenge is to combine state-of-the-art analytical techniques (for example chromatography, mass spectrometry and sequencing) in order to link proteomics with transcriptomics and functional studies.

The laboratory for Toxicology and Food Chemistry also participates within the MAREX-project (2010-2014), which is a Seventh Framework (EU FP7) project with the aim of exploring marine resources for bioactive compounds.

Toxicology and Food Chemistry

O&N II Herestraat 49, box 922
B-3000 Leuven

University of Antwerp

// Faculty of Pharmaceutical, Biomedical and Veterinary Sciences

- Toxicological Centre

// Faculty of Arts and Philosophy

- Centre for Urban History

// Faculty of Applied Economic Sciences

- Department Transport and Regional Economy

// Faculty of Science

- Ecosystem Management research group
- Research group Functional Morphology
- Micro- and Trace Analysis Centre - research group Environmental Analysis
- Systemic Physiological and Ecotoxicological Research

// Other

- Institute of Transport and Maritime Management Antwerp

/ Ecosystem Management research group (UA)

www.ua.ac.be/ecobe

// institutional hierarchy

Faculty of Science

Departement Biology

// head of the group

Prof. dr. Patrick Meire

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Ecosystem Management research group (ECOBE) of the University of Antwerp studies the ecology of aquatic ecosystems and wetlands, as well as the processes occurring at the land-water transition along the river continuum and the river-coast-sea interaction. Study areas include small streams (with narrow banks) and large rivers, floodplains and estuaries. The studies are used to assess the impact of different management options on ecosystem functioning and biodiversity.

** Content not validated by the respective research group*

ECOBE

Universiteitsplein 1
Campus Drie Eiken
B-2610 Wilrijk (Antwerp)

/ Research group **Functional Morphology (UA)**

www.ua.ac.be/funmorph

// institutional hierarchy

Faculty of Science

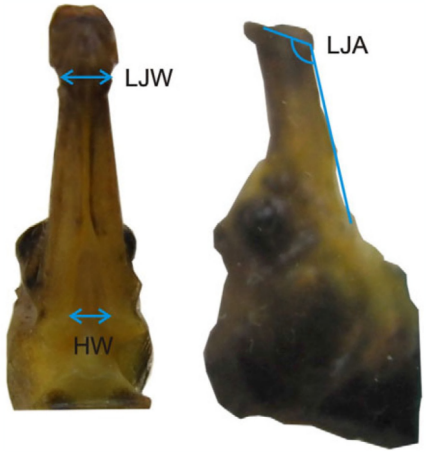
Departement Biology

// head of the group

Prof. dr. Peter Aerts

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The research group Functional Morphology of the University of Antwerp studies the evolution of the form and function of vertebrate musculoskeletal systems by combining comparative and experimental methods together with ecological and behavioral aspects. Through the aid of their research findings, the group describes the shape of structural elements as well as their relationship (functional and mechanical) with each other and the environment.

The research group studies the following marine topics:

- The biomechanics (and hydrodynamics) of the interaction between Syngnathus fish (such as pipefish and seahorses) and their aquatic environment while feeding;
- The (evolution of the) hydrodynamic consequences of variations in the shape of the carapax of bone fish (Teleostei: Ostraciidae).

Functional Morphology

Universiteitsplein 1
Campus Drie Eiken
B-2610 Wilrijk (Antwerp)

/ Institute of Transport and Maritime Management (UA)

www.itmma.ua.ac.be/

// institutional hierarchy
University of Antwerp

// head of the group
Prof. dr. Theo Notteboom

// research domain and discipline
Social sciences; Economics and business

// abstract

The Institute of Transport and Maritime Management (ITMMA) of the University of Antwerp is one of the first institutes in the world to offer highly specialised academic and practice-oriented maritime and logistics education and research. Aside from research, they offer MSc and PhD programs, and manage short-term courses, events and conferences.

The research activities of ITMMA cover various areas in the fields of transport, maritime economics and management. Research is performed on topics such as port and maritime transport, market organisation, (hinterland) transportation and the integration of transport and logistics. ITMMA develops quantitative techniques and management tools for strategic market analysis, policy formulation and logistic network optimisation.

The maritime research performed by ITMMA focuses on port and maritime economy and management with emphasis on port competitiveness, strategic port planning, maritime traffic forecasting, shipping networks, etc.

ITMMA

ITMMA House, Kipdorp 59
B-2000 Antwerp

/ Micro- and Trace Analysis Centre – Research group Environmental Analysis (UA)

http://webh01.ua.ac.be/mitac1/

// institutional hierarchy

Faculty of Science

Departement Chemistry

// head of the group

Prof. dr. René Van Grieken

// research domain and discipline

Natural sciences; Chemical sciences

// abstract

The Micro- and Trace Analysis Centre (MiTAC) of the University of Antwerp was founded in 1980. The MiTAC's Environmental Analysis group performs both fundamental and methodological research related to micro- and trace analysis with applications in the environment, cultural heritage conservation and material science. The main topics are: the atmospheric deposition of nutrients and heavy metals in the North Sea (e.g. air pollution from ships); aerosols in remote areas; the damage to historical buildings and medieval glass windows by sea salt and polluted air; aerosols in museums and most importantly churches; the relationship between aerosol concentration and health problems, etc. The group is also involved in projects regarding the development and testing of new analytical instruments and techniques for micro trace analysis and surface analysis.

** Content not validated by the respective research group*

MiTAC - Environmental analysis

Universiteitsplein 1
Campus Drie Eiken
B-2610 Wilrijk (Antwerp)

/ Centre for **Urban History (UA)**

www.ua.ac.be/csg

// institutional hierarchy

Faculty of Arts and Philosophy

Departement History

// head of the group

Prof. dr. Ilja Van Damme

Prof. dr. Tim Soens (marine researcher)

// research domain and discipline

Humanities; History and archaeology

// abstract

The Centre for Urban History (CSG) of the University of Antwerp was founded in September 2004. The CSG studies important aspects of the urban society, economy, ecology, culture and politics from the medieval period up until present. Cities are emphatically categorised into their spatial and chronological context, in relation to each other, but also in relation to the non-urban and non-human environment. Research priorities include the urban material culture, civil society, urban identity, knowledge networks, economic growth and social inequality, migration and urban ecology.

Since a few years, the group increasingly focuses on studying the relationship between cities and their natural environment in a historical perspective. Given the geographical research focus on the North Sea area and the role of rivers and estuaries in urban development in this part of Europe, the historical relationship between cities and water forms a prominent part of the research. From the summer of 2013 onwards, the marine research will fall under a new research theme called ENVIRHUS: 'Environmental and Rural History of Urbanized Societies', coordinated by Prof. dr. Tim Soens.

Within the marine and coastal domain, the research focuses on five topics:

- The study of the causes, impact and perception of historical flood disasters;
- The historical study of polders and water-meadows in the North Sea area (as a bottom-up organisation for coast and river water management);
- Broader research on coastal development during the last millennium (mainly the interaction between natural and human dynamics);
- The study of peat development and excavation;
- The study of heritage aspects of coastal and river landscapes (focusing on the integration of natural values and cultural historical values).

The CSG intensively collaborates with research groups of the University of Antwerp (Ecosystem Management research group) and Ghent University (research group Economy, Ecology and Demography and the Renard Centre of Marine Geology).

CSG

Prinsstraat 13
B-2000 Antwerp

/ Research group **Systemic Physiological and Ecotoxicological Research (UA)**

www.sphere.be

// institutional hierarchy

Faculty of Science

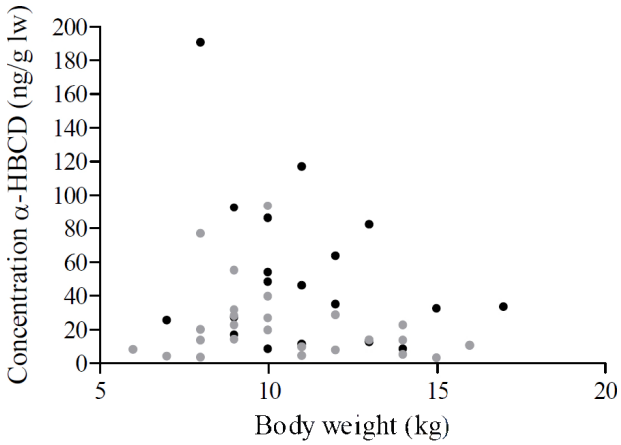
Departement Biology

// head of the group

Prof. dr. Ronny Blust

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The research group Systemic Physiological and Ecotoxicological Research (SPHERE) of the University of Antwerp holds this name since 2012, and was formerly known as Ecophysiology, Biochemistry and Toxicology (EB&T). The group was founded in 1973 when it was initially named laboratory of Biochemistry and General Zoology. SPHERE performs research regarding important issues of environmental and adaptational biology. The research group focuses on how organisms respond to environmental changes with emphasis on the different levels of biological organisation: from the molecular level (including genomics, proteomics and metabolomics), to the broader response of populations in real field situations.

Within the marine domain, SPHERE studies the following topics:

- The combined effects of temperature, hypoxia, carbon dioxide and nitrogen on the ion regulation of fish, in particular the effect on the energy budget and hormones;
- Trophic transfer and bioaccumulation of contaminants in food webs in the Scheldt estuary;
- The intake and toxicity of metals in the European sea bass – The development of a biotic ligand model (BLM) for the metals copper (Cu) and cadmium (Cd) in marine and estuarine areas for key species such as the European sea bass (*Dicentrarchus labrax L.*);
- Study of the presence of heavy metals in spiny dogfish (*Squalus acanthias*);
- Study of vegetable protein sources that can be used as food for fish and shellfish.

SPHERE participates within several marine projects dealing with topics such as the effects of pollutants on populations and benthic communities in the North Sea, and the influence and recovery of anthropogenic interventions on fish populations. The research group maintains networks with both Belgian and international universities, as well as Flemish scientific institutes such as the Institute for Agricultural and Fisheries Research (ILVO).

SPHERE

Groenenbrogerlaan 171/U7
B-2020 Antwerp

/ Toxicological Centre (UA)

www.ua.ac.be/toxicologie

// institutional hierarchy

Faculty of Pharmaceutical, Biomedical and Veterinary Sciences

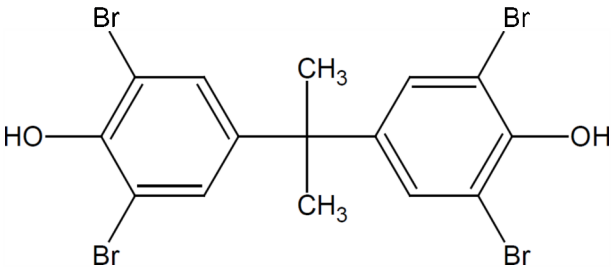
Department Pharmaceutical Sciences

// head of the group

Prof. dr. Hugo Neels

// research domain and discipline

Natural sciences; Chemical sciences



// abstract

The Toxicological Centre of the University of Antwerp consists out of two divisions, the Clinical Toxicology branch and the Environmental Research branch. The former performs clinical toxicological research, forensic research and routine analysis for the Belgian Ministry of Justice. The Environmental Research branch primarily focuses on persistent organic pollutants (POPs) and on the development of new analytical procedures to analyse these chemicals. Within the marine field, the Toxicological Centre conducts research on the presence of POPs in fish, eels and marine mammals.

** Content not validated by the respective research group*

Toxicological Centre

Universiteitsplein 1
Campus Drie Eiken
B-2610 Wilrijk (Antwerp)

/ Department **Transport and Regional Economy (UA)**

www.ua.ac.be/tpr

// institutional hierarchy

Faculty of Applied Economic Sciences

// head of the group

Prof. dr. Ann Verhetsel

// research domain and discipline

Social sciences; Economics and business

// abstract

The department Transport and Regional Economy of the University of Antwerp was founded in 1979 and performs research on the interface between general and business economy. The department focuses on goods trafficking, harbours and the maritime sector, air transport, innovation in transport and logistics, the appraisal of infrastructure projects, strategic analysis and policy recommendations, the interaction between transport and regional dimension, urban economics, and the interaction between mobility and the economy. During its existence the department has expanded its field of interest to the study of issues related to air transport and pipe lines. In the future, the above mentioned topics will be further examined, taking into account future developments (regarding market and policy) and innovative topics. This department has the tradition to respond maximally to arising challenges (being society, company or policy related) and to translate these into research questions which are tackled using existing or newly developed techniques, often in an international partnership. Big challenges that arise (and have a large impact on transport) include climate change, varying energy costs and sources, labour, geographical market shifts and internationalisation.

Within the framework of harbour and maritime related research, the group studies the following themes:

- Competition and cooperation in the maritime and harbour sector;
- Harbours as junctions in the logistic chain;
- Productivity of terminals;
- Costs of maritime traffic;
- Harbour policy;
- Strategic planning in harbours;
- Traffic prognosis;
- Innovation in maritime transport and harbours.

The department of Transport and Regional Economy is involved in various scientific networks such as TransportNET, World Conference on Transport Research Society (WCTRS) and houses the Flemish Policy Research Centre of Commodity and Passenger Transport (MOBILO). Further, researchers of this department hold leadership positions in academic associations such as the WCTRS and the European COST-action for Public-Private Partnerships in Transport (TU1001). They are also members of several journal editorial boards including for the journal of 'Maritime Policy and Management'. Regarding education and research on maritime issues and harbour development, the group closely cooperates with Delft University of Technology, Technical University of Lisbon, University of Genova, University of the Aegean, University of South-California, Massachusetts Institute of Technology, National University of Singapore, Singapore Nanyang University and Vietnam Maritime University.

TPR

Prinsstraat 13
B-2000 Antwerp

Ghent University

// Marine@UGent consortium

// IOF consortium Aquaculture Ghent University

// Faculty of Bioscience Engineering

- Agro-food Marketing and Consumer Behavior
- Laboratory of Analytical Chemistry and Applied Ecochemistry
- Laboratory of Aquaculture and Artemia Reference Center
- Laboratory of Food Microbiology and Food Preservation
- Laboratory for Microbial Ecology and Technology
- Laboratory of Environmental Toxicology and Aquatic Ecology

// Faculty of Veterinary Medicine

- Laboratory for Chemical Analysis
- Department of Morphology

// Faculty of Medicine and Health Sciences

- Research group Nutrition and Food Safety

// Faculty of Engineering and Architecture

- Hydraulics Laboratory
- Maritime Technology Division
- Center for Mobility and Spatial Planning
- Coastal Engineering, Bridges and Roads; Coastal Engineering Research group

// Faculty of Arts and Philosophy

- Research group Economy, Ecology and Demography

// Faculty of Law

- Maritime Institute

// Faculty of Sciences

- Phycology Research group
- Evolutionary Morphology of Vertebrates
- Geomatics
- Research unit Groundwater modeling
- Marine Biology Research group
- Laboratory of Microbiology
- Research unit Palaeontology
- Laboratory of Protistology and Aquatic Ecology
- Renard Centre of Marine Geology
- Terrestrial Ecology Research group
- Laboratory for Applied Geology and Hydrogeology

/ Marine@UGent Consortium

www.marineatugent.be

// point of contact

Prof. dr. Colin Janssen

// number of members

30

// abstract

Ghent University has internationally recognised expertise in fundamental and applied research in the field of marine science and technology. To strengthen its reputation, Ghent University recently founded the Marine Sciences Center of Excellence, also known as 'Marine@UGent'.

This interfaculty consortium which is composed of 30 research units, associated with six faculties (Bio-Engineering, Sciences, Engineering & Architecture, Law, Veterinary Medicine, and Medicine and Health Sciences), performs research on various marine/maritime topics and disciplines: e.g. fish behaviour and anatomy, marine food, maritime law, biodiversity of oceans and coasts and the human impact on it, marine pollution and ecotoxicology, aquaculture, cartography, microbiology, the study of the seabed, marine fossils, development of wave energy, spatial planning on the coast and at sea, maritime engineering, coastal engineering, etc.

The Marine@UGent center aims to promote and facilitate the collaboration between these research groups and with Flanders Marine Institute (VLIZ). This cooperation will result in innovative results and boost marine science and technological innovation in Belgium.

You can read more about Marine@UGent on the website (www.marineatugent.be), on Facebook (https://www.facebook.com/MarineartGhentUniversity) and you can follow this consortium on Twitter (https://twitter.com/MarineAtUGent) to read more about the research performed by the members.

// members

The partners of the Marine@UGent consortium are:

1. Research group Agro-food Marketing and Consumer Behaviour
2. Phycology Research group
3. Laboratory of Analytical Chemistry and Applied Ecochemistry
4. Laboratory of Aquaculture and Artemia Reference Center
5. Laboratory of Chemical Analysis
6. Research group Evolutionary Morphology of Vertebrates
7. Geomatics
8. Groundwater Modeling
9. Research group Food Chemistry and Human Nutrition*
10. Laboratory of Food Microbiology and Food Preservation
11. Marine Biology Research group
12. Maritime Institute
13. Maritime Technology Division
14. Laboratory of Microbial Ecology and Technology
15. Laboratory of Microbiology
16. Laboratory of Environmental Toxicology and Aquatic Ecology
17. Center of Mobility and Spatial Planning
18. Department of Morphology
19. Nematology Research group*
20. Research unit Nutrition and Food Safety
21. Environmental Organic Chemistry and Technology Research group*
22. Research unit Palaeontology
23. Department of Pathology, Bacteriology and Poultry diseases*
24. Protistology and Aquatic Ecology Laboratory
25. Renard Centre of Marine Geology
26. Research unit Sedimentary and Engineering Geology*
27. Terrestrial Ecology Unit
28. Applied Geology and Hydrogeology
29. Department of Virology, Parasitology and Immunology*
30. Coastal Engineering, Bridges and Roads; Coastal Engineering Research group

** currently do not meet the definition of a marine research group (see reading guide)*

/ IOF consortium Aquaculture Ghent University

// point of contact

Prof. dr. Patrick Sorgeloos

Prof. dr. Peter Bossier

Dr. ir. Margriet Drouillon (contact)

// number of members

6

// abstract

Aquaculture Ghent University groups top scientists of Ghent University that are active in different aspects of sustainable aquaculture and the blue economy. In 2012, the consortium Aquaculture Ghent University generated a turnover related to Research and Development (R&D) activities of over 5 Million EUR, mainly obtained through external research grants and research with private companies.

Vision

Aquaculture Ghent University wants to become the preferred Centre of Excellence for Sustainable Aquaculture in Europe, within an international, collaborative context, providing multidisciplinary expertise and innovation in the areas of hatchery management, microbial management and genomics and breeding.

Mission

- Aquaculture Ghent University functions as a direct interface between its members and the industry, governments and social organisations;
- The consortium Aquaculture Ghent University identifies and initiates multidisciplinary research projects that can benefit the industry and/or society;
- Aquaculture Ghent University actively monitors new research findings for their benefit to the entire value chain of the aquaculture industry;
- Aquaculture Ghent University provides interdisciplinary scientific and technological expertise, innovations, training and advice to our partners.

// members

The partners of the IOF consortium Aquaculture Ghent University are:

1. Laboratory of Aquaculture and Artemia Reference Centre
2. Research group Evolutionary Morphology of Vertebrates
3. Marine Biology Research group
4. Laboratory of Microbial Ecology and Technology
5. Laboratory for Environmental Toxicology and Aquatic Ecology
6. Laboratory of Morphology
7. Research group Environmental Organic Chemistry and Technology*
8. Department Plant Systems Biology*
9. Laboratory of Virology*

** currently do not meet the definition of a marine research group (see reading guide)*

/ Agro-food Marketing and Consumer Behavior (UGent)

http://www.ugent.be/bw/agricultural-economics/en/research

// institutional hierarchy

Faculty of Bioscience Engineering

Department of Agricultural Economics

// head of the group

Prof. dr. Wim Verbeke

// research domain and discipline

Agricultural and veterinary sciences; Fisheries and aquaculture sciences

// abstract

The research group Agro-food Marketing and Consumer Behavior of the department Agricultural Economics (Ghent University) was founded in 2001 and focuses on the marketing challenges associated with agriculture production and its resulting agricultural and food products in Belgium, Europe and abroad. Within this context, consumer behavior is always the starting point. Furthermore, the laboratory deals with research questions regarding the role and impact of personal, product and environmental factors (such as communication and labeling) on the opinions, perceptions, attitudes and choices that consumers make.

The focus on consumer behavior, with respect to fish and fishery products, is a result of the cooperation within the EU Sixth Framework (FP6) Project SEAFOODplus (2004-2008). Subsequently, the research group focuses on the consumer perception of fish and fisheries products, the impact of communication and labeling, and the balance between health, safety, sustainability and price from the consumers' point of view. The research topics can be summarised as follows:

- Consumer acceptance of technological innovation in the food chain;
- Trends and changes in food choices;
- Impact of ethical and sustainability considerations of consumers and citizens;
- Impact of communication and labeling on the choosing of food;
- Perception of safety, health and sustainability of food and food production.

The research group participates in several European research consortia (FP6 and FP7) dealing with consumer behaviour with respect to food, and collaborates intensively with Norwegian (NOFIMA and University of Tromsø) and Danish (Aarhus University and DTU) institutes.

Agro-food Marketing and Consumer Behavior

Coupure Links 653, building A
B-9000 Ghent

/ Phycology research group (UGent)

www.phycology.ugent.be

// institutional hierarchy

Faculty of Sciences

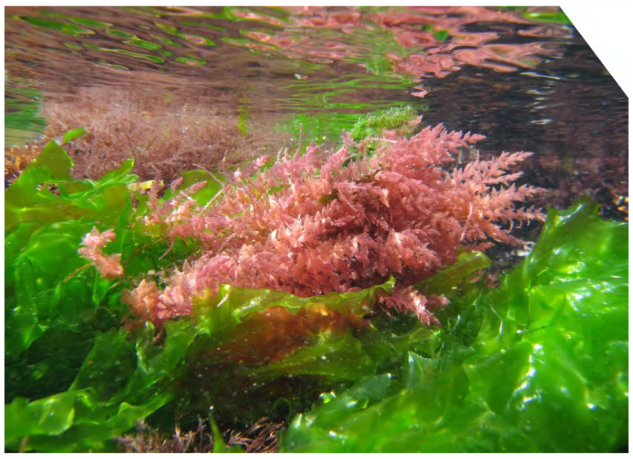
Department of Biology

// head of the group

Prof. dr. Olivier De Clerck

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The Phycology research group was founded at the end of the 90's under its former name 'laboratory of Morphology, Ecology and Plant Systematics'. The research undertaken by the laboratory has gradually evolved from floristics and descriptive taxonomy towards diversity, biogeography, diversification and developmental biology of marine macroalgae (seaweed). More specifically, the following themes are studied:

- Sexual reproduction and speciation: the mechanisms and genetics of sexual reproduction of brown algae by studying the genes and proteins important for a successful sexual propagation;
- Evolutionary dynamics and biogeography: the macroevolutionary studies aim at answering the question regarding the bloom or decline of algal groups. This includes studying the relevant biological, environmental and geological data in a phylogenetic context;
- Bacteria-algae interactions: studying the identity and the role of prokaryote symbionts of siphonous green algae, in collaboration with the laboratory of Microbiology (Ghent University);
- Spatial and temporal analysis of communities and the variation of species: the acquisition and integration of spatial data in relation to the marine environment and the application to ecological, biogeographical and evolutionary questions (ecological niche modeling, remote sensing of spatial and temporal changes in seaweed communities);
- Taxonomy and diversity: this research group has a lot of experience in this research domain and remains committed to this discipline, focusing on DNA research, statistical morphometrics.

In the future, the group will invest in the expansion of the research domain 'invasive species' (and niche modeling of invasive species), improve the integration of ecophysiology and local adaptation in evolutionary research and further integrate next generation sequencing (NGS) data in ongoing research. Regarding their future services, the group would like to play a leading role in the management of biodiversity information and taxonomy of seaweeds by constructing a model that promises Algaebase a lasting future. Furthermore, the Phycology research group participates in both Belgian and international research projects and collaborates with several research groups worldwide.

Phycology

Krijgslaan 281, building S8
B-9000 Ghent

/ Laboratory of **Analytical Chemistry and Applied Ecochemistry (UGent)**

www.ecochem.ugent.be

// institutional hierarchy

Faculty of Bioscience Engineering

Applied Analytical and Physical Chemistry

// head of the group

Prof. dr. Filip Tack

// research domain and discipline

Natural sciences; Biological sciences
Natural sciences; Chemical sciences

// abstract

The laboratory of Analytical Chemistry and Applied Ecochemistry (ECOCHEM) of Ghent University studies the chemical and biological behavior of nutrients and toxic elements in natural ecosystems and agriculture. Its research activities focus on trace elements, particularly heavy metals. The laboratory's research covers several research domains, such as analytical environmental chemistry, biogeochemistry and environmental technology.

The research group studies, and will continue to study the biogeochemical behavior of heavy metals in river sediments, intertidal zones and floodplains of the Scheldt estuary. The bioavailability is examined as a link between the concentration and speciation of heavy metals in organisms and plants to the content and speciation of these metals in the sediments. Special attention is paid to the effects of changing redox potential, organic material and salinity on the mobility and availability of metals, as well as to the form in which trace elements are present (speciation analysis). Particular focus lies on micropollutants that will become more important in the future, such as metallic nanoparticles.

The laboratory collaborates intensively with several national and international universities and research institutes. ECOCHEM also organises series of international conferences on the behavior and management of pollutants in wetlands (WETPOL).

ECOCHEM

Coupure Links 653, building B
B-9000 Ghent

/ Laboratory of **Aquaculture and Artemia Reference Center (UGent)**

www.aquaculture.ugent.be

// institutional hierarchy

Faculty of Bioscience Engineering

Department of Animal Production

// head of the group

Prof. dr. Patrick Sorgeloos

// research domain and discipline

Agricultural and veterinary sciences; Fisheries and aquaculture sciences

// abstract

The laboratory of Aquaculture and Artemia Reference Center, so called since 1989, was founded in 1978 under its former name Artemia Reference Center (ARC). Since its establishment, the laboratory has been involved in research on larviculture of fish and shellfish species of aquaculture interest. Initially, the research mainly focused on the universally used brine shrimp *Artemia* as a vital food source for fish and shellfish larvae. Research topics encompass: brine shrimp culturing biology, natural occurrences, production techniques, strain characterisation as well as nutritional value and enrichment. Gradually, research activities extended to other live food organisms, such as microalgae and rotifers, i.e. particularly their production and nutritional manipulation, with emphasis on lipids and vitamins C and E. Meanwhile, the worldwide industrialisation of larviculture increased the demand for thorough research on the zootechnical, microbiological and immunological aspects of larviculture. Therefore, the ARC engaged in a multidisciplinary collaboration effort with specialists from different research institutes, local and foreign, in the framework of nationally and internationally funded Research and Development (R&D) projects. The laboratory is the coordinator of the UGent Aquaculture R&D consortium and the IOF consortium Aquaculture Ghent University.

ARC

Rozier 44
B-9000 Ghent

/ Laboratory for **Chemical Analysis (UGent)**

www.vvv.ugent.be

// institutional hierarchy

Faculty of Veterinary Medicine

Department of Veterinary Public Health and Food Safety

// head of the group

Prof. dr. Lynn Vanhaecke

// research domain and discipline

Natural sciences; Biological sciences
Agricultural and veterinary sciences; Veterinary sciences

// abstract

The laboratory of Chemical Analysis (LCA) of Ghent University was founded in 1992. The LCA belongs to the department of Veterinary Public Health and Food Safety and has ca. 35 years of experience (BELAC accredited under ISO 17025) in the detection of residues and contaminants in matrices of animal origin. From all this experience, LCA aims to use the most recent, accurate and sensitive analytical methodology to detect, quantify or identify known and unknown residues, contaminants including micropollutants or food components as well as derivatives or metabolites hereof, within a variety of matrices of animal (or vegetable) origin to ensure food safety and quality. This vision is also reflected in the current and future ongoing research projects.

Part of the scientific research performed by LCA is related to the marine or estuarine environment:

- Analysis of micropollutants in the Belgian coastal zone;
- Food safety of fish and seafood;
- The determination of endocrine disruption in the Scheldt estuary;
- Metabolism and transfer of marine algal toxins to molluscs and the environment.

In the future, the group will continue to develop methods for multi-residue and multi-contaminant analysis of water and biota monsters, using high resolution mass spectrometry (MS). This analysis will include emerging pollutants such as pharmaceuticals, phthalates, PFCs, phenols, etc. LCA will also elaborate on the analytical aspects associated with research on marine toxins. The metabolomics approach, which is already used in several other research areas within the lab, will also serve as a basis for innovative research.

Taking into account the low concentrations of the components to be analysed (ppt or ppb) and the complexity of the matrices, high-tech equipment is required. For this purpose, the laboratory uses 1 GC-MSn, 2 LC-MSn and 1 U-HPLC-QqQ-MS/MS which enable the identification and quantification of components and their residues and/or metabolites in complex matrices. Besides that, LCA also has high-resolution U-HPLC-Orbitrap-MS and U-HPLC-Q-q-ToF systems, which also allows for multi-component screening, biomarker and metabolome studies. The LCA participates in several national projects and collaborates intensively with the laboratory of Environmental Toxicology and Aquatic Ecology (Ghent University) and the Direction Natural Environment of the Royal Belgian Institute of Natural Sciences (RBINS).

LCA

Salisburylaan 133
B-9820 Merelbeke

/ Research group **Economy, Ecology and Demography (UGent)**

www.eed.ugent.be

// institutional hierarchy

Faculty of Arts and Philosophy

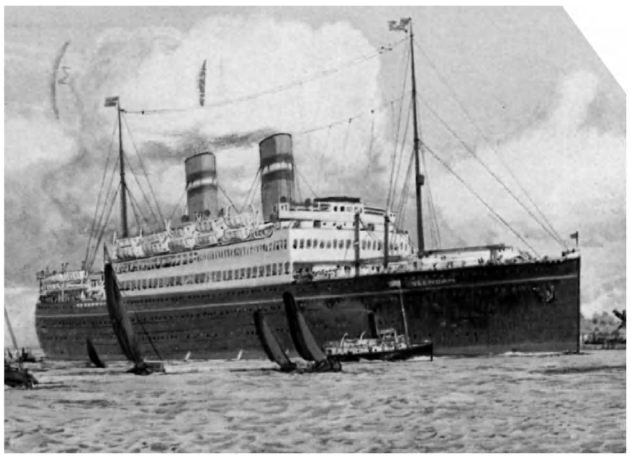
Department of History

// head of the group

Prof. dr. Erik Thoen

// research domain and discipline

Humanities; History and archaeology



// abstract

The research group Economy, Ecology and Demography (EED) of Ghent University was founded in 1995. The group studies a large number of different aspects relating to economic, ecological and demographic history. Starting with a socio-economic approach, this research unit covers sub-areas closely linked to the study of demographic structures, material culture, agrarian technologies and changes in ecology and landscape.

The group studies the following topics within the marine field:

- Historic geography of coastal landscapes;
- History of the social environment in coastal landscapes of Belgium and The Netherlands;
- Demographic history in coastal areas (such as malaria in the Flemish coastal area);
- History of maritime relationships in the development of a global economy;
- The study of maritime migration during the period 1882-1938.

From now on, the group will focus even more than before on the historic landscape and environment of the coastal area and the hinterland, in which social factors play an important role.

In the academic year 2011-2012, the Francqui-Chair was assigned to Prof. dr. Erik Thoen. EED is part of the international interuniversity research group CORN (Comparative Rural History of the North Sea Area) and collaborates intensively with the Interfaculty Centre for Agrarian History (Katholieke Universiteit Leuven), the Centre for Urban History (University of Antwerp), the Research Institute for History and Culture (University of Utrecht) and the Institute of Early Modern History (Ghent University).

EED

Sint-Pietersnieuwstraat 35
B-9000 Ghent

/ Research group **Evolutionary Morphology of Vertebrates (UGent)**

www.fun-morph.ugent.be

// institutional hierarchy

Faculty of Sciences

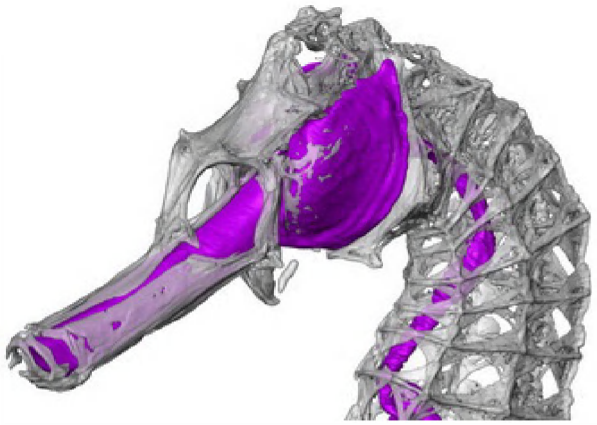
Department of Biology

// head of the group

Prof. dr. Dominique Adriaens

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The research group Evolutionary Morphology of Vertebrates of Ghent University originates from the laboratory of Zoology, and was founded in 2001. This research group studies the evolutionary morphology of vertebrates, including marine fish. The research topics focus on ontogeny and (abnormal) morphology of cultivated (aquaculture) fish and endangered fish species such as eel, sea breams and sea bass. The group also performs research on the potential use of natural kinetic structures in industrial design (for example the tail of seahorses). Regarding this research, the group undertook three expeditions to Gabon (1999, 2000 and 2011) to collect fish from lakes and rivers. Also, they participated in an expedition to Guyana in 2007 to study the Essequibo and Amazon basin and they organised an expedition to Peru in order to study the fish fauna in high lying Andes rivers. The marine research topics studied by this group are:

- Phylogeny and the evolution of the muscles and skeleton of cranial systems in Anguilliformes;
- Effect of physical and nutritional parameters on the development of ***Dicentrarchus labrax*** larvae in axenic and gnotobiotic environments;
- The application of geometric morphometry in the early detection of opercular malformations in cultivated sea breams (*Sparus aurata*);
- The phenotypical variation in the cranial morphology of the European eel in relation to feeding ecology and pollution;
- PRO-EEL – The propagation of the European eel – towards a self-maintaining aquaculture;
- The evolution and design of the feeding apparatus of seahorses and pipefish (Syngnathidae);
- The study of the seahorse skeleton and its potential use in industrial designs.

In the future, the group will study, among others, the morphological aspects of malformations in cultivated (aquaculture) fish and will contribute to the optimisation of feeding and raising of eels in order to make aquaculture possible, by obtaining insight into the construction, development and feeding requirements of larvae stadia.

The research group closely collaborates with the laboratory of Aquaculture and Artemia Reference Center, which is the coordinator of the UGent Aquaculture R&D Consortium and the IOF consortium Aquaculture Ghent University, in which the research group Evolutionary Morphology of Vertebrates actively participates. This group also collaborates intensively with the Centre for X-ray Tomography (Ghent University, UGCT) and the Ichthyology branch of the Royal Museum of Central Africa (RMCA).

Evolutionary Morphology of Vertebrates

K. L. Ledeganckstraat 35
B-9000 Ghent

/ Geomatics (UGent)

http://geoweb.ugent.be/cartogis
http://www.geoweb.ugent.be/data-acquisition-3d

// institutional hierarchy

Faculty of Sciences

Department of Geography

// head of the group

Prof. dr. Philippe De Maeyer

// research domain and discipline

Engineering and technology; Geomatics

// abstract

The Geomatics branch of Ghent University is a cooperation of the research groups 'Cartography and GIS' and '3D data acquisition'. The Cartography and GIS research group performs both fundamental and applied research on several aspects of cartography and geographical information sciences, applied to marine and coastal research. The emphasis lies on flood risk and effect calculations and the development of cross-domain data models. The 3D data acquisition research group owns a broad range of acquisition tools for the measurement of beaches and shallow waters. The group is actively involved in 3D litoral and marine modeling and the development of specific problem-solving algorithms.

The Geomatics branch participates in national and European research projects and collaborates intensively with Flanders Hydraulics Research, Antwerp Maritime Academy, ENSTA (Brest) and HafenCity Hamburg (HCU).

Geomatics

Krijgslaan 281, building S8
B-9000 Ghent

/ Research unit **Groundwater Modeling (UGent)**

www.earthweb.ugent.be/index.php?/public/nl_research/ltgh

// institutional hierarchy

Faculty of Sciences

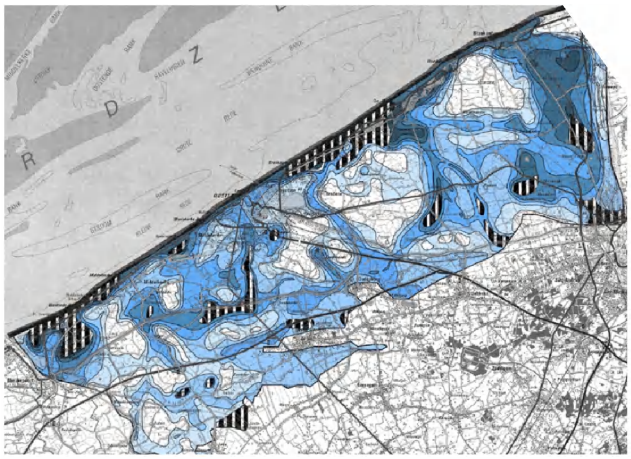
Department of Geology and Soil Science

// head of the group

Prof. dr. Luc Lebbe

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The laboratory of Applied Geology and Hydrogeology of Ghent University studies the movement and quality of groundwater, as well as the interaction of groundwater with the rock. Within this framework the group performs research on the flow of groundwater, the amount of groundwater that can be extracted from a layer, the composition of groundwater, chemical reactions and pollution due to human activities, etc. The group tackles the following topics within the field of coastal hydrology:

- Circulation of salt groundwater;
- The propagation of tides;
- Fresh-salt water distribution in the Belgian coastal zone;
- Water quality in the Belgian coastal zone;
- Water quality as a tracer in groundwater layers in the Belgian coastal zone;
- Ground water extraction management in the Belgian coastal zone;
- The influence of artificial inlets;
- Management options for dunes;
- Heat transport beneath the dunes, beach and sea;
- Impact of the artificial infiltration of an aquifer in the dunes;
- Artificial replenishment of groundwater in the Belgian dune areas;
- Impact of climate change on the coastal hydrology.

The laboratory of Applied Geology and Hydrogeology participates in international projects including a project in Qatar regarding the artificial replenishment of purified wastewater effluent into sand dunes to enable sustainable groundwater management for water reuse.

Groundwater Modeling

Krijgslaan 281, building S8
B-9000 Ghent

/ Hydraulics Laboratory (UGent)

www.hydraulics.ugent.be

// institutional hierarchy

Faculty of Engineering and Architecture

Department of Civil Engineering

// head of the group

Prof. dr. Tom De Mulder

// research domain and discipline

Engineering and technology; Civil engineering

// abstract

The Hydraulics laboratory of Ghent University was founded in 1935. The research activities of the laboratory concern the broad field of hydraulics within the civil engineering domain. The group has a special interest for hydraulic structures, eco-hydraulics, and hydro- and morphodynamics of rivers and estuaries. Field and laboratory measurements are intensively used as a basis for the validation of mathematical models. Regarding coast and estuary related hydraulics, research is performed on the following topics:

- Geomorphological evolution of tidal marshes;
- Evolution of tidal inlets;
- Tidal hydrodynamics;
- Hydro- and morphodynamics of estuaries and rivers;
- Hydraulic design of locks and weirs;
- Hydraulic design of flood control areas and areas with reduced tide.

In the future, the laboratory will continue to study the same topics, including hydraulic structures and hydro- and morphodynamics of tidal and non-tidal estuaries and rivers. The laboratory also collaborates intensively with Belgian and foreign universities.

Hydraulics

Sint-Pietersnieuwstraat 41
B-9000 Ghent

/ Laboratory for **Food Microbiology and Food Preservation (UGent)**

www.foodscience.ugent.be/LFMFP

// institutional hierarchy

Faculty of Bioscience Engineering

Department of Food Safety and Food Quality

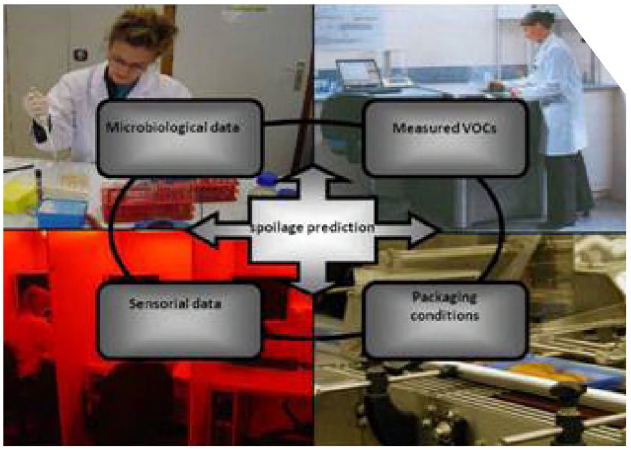
// head of the group

Prof. dr. ir. Frank Devlieghere

Prof. dr. ir. Mieke Uyttendaele

// research domain and discipline

Agricultural and veterinary sciences; Fisheries and aquaculture sciences
Natural sciences; Biological sciences



// abstract

The laboratory of Food Microbiology and Food Preservation (LFMFP) of Ghent University was founded around 1980. The expertise of the laboratory has constantly expanded since its establishment due to an increasing knowledge of the research discipline. The food crises in Belgium and Europe increased the awareness and appreciation of food safety.

The laboratory focuses on studying microbial behavior in food products during harvesting/slaughtering, fabrication, storage, distribution and preparation. Two essential areas of research are predictive microbiology and microbial analysis. The group also performs research on mild preservation and decontamination techniques in order to prolong preservability and to increase the microbial safety of food products. Microbial food safety is a key research theme of the laboratory, with an emphasis on viruses, in for example fish and fishery products. Quality assurance systems are implemented and analysed to ensure microbial food safety and quantitative data are collected for exposure assessment to enable more accurate microbial risk evaluation.

As a consequence of the economic interests, special attention is paid to the mechanisms of microbial decay of food products, such as fish and fishery products.

The marine research of this group focuses on:

- Development of preservation strategies for fish and fishery products;
- Development of intelligent packaging for the indication of decay of packed fish and fishery products;
- Microbial ecology of fishery products (shrimps, cod, …);
- Methods to assess the microbial risks in fish and fishery products;
- Viruses in ready-made food, such as shellfish.

In the future, the laboratory will focus on further developing aspects regarding microbial food safety (detection of food pathogens and viruses), predictive microbiology (quantitative insights into the microbial behavior of food products) and minimal conservation (new decontamination methods and microbial aspects of food packaging). The group maintains an intense collaboration with the food industry and politics due to the integration of an accredited laboratory (with up to date infrastructure) into the laboratory of Food Microbiology and Food Preservation. The laboratory is active within several consortia, such as Food2know, Pack4food and the UGent Aquaculture R&D Consortium.

LFMFP

Coupure Link 653, building B
B-9000 Ghent

/ Marine Biology Research group (UGent)

www.marinebiology.ugent.be

// institutional hierarchy

Faculty of Sciences

Department of Biology

// head of the group

Prof. dr. Magda Vincx

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Marine Biology research group (MARBIOL) of Ghent University was founded in the 70's, at the same time as the establishment of 'Project Sea' (1970-1976). The group performs ecological and systematical research on marine ecosystems. Since its foundation, there has been an expansion of the geographical research locations studied, from the Belgian coast, North Sea and adjacent estuaries towards a wide variety of marine habitats, from the tropics to polar systems, including deep-sea ecosystems such as cold water corals, and chemo-synthetic-based ecosystems. At the same time, there has been a significant shift from the initial morphological taxonomic and ecological studies based on field observations, towards process-oriented and functional studies with an experimental, biochemical and molecular approach. The policy-oriented questions regarding sustainable fishing, marine spatial planning and nature conservation form important elements in the valorisation of the main fundamental research conducted by the group. The research mainly focuses on the following topics:

- The study of ecosystems in the deep sea such as submarine canyons at continental margins, cold water corals, communities around seeps, etc.;
- The study of polar sea and coastal habitats;
- The study of coastal ecosystems (e.g. North Sea and adjacent estuaries);
- The study of ecosystems such as sandbanks, beaches and tidal marshes (bioturbation, nursery function, …);
- The study of marine food webs: the role of functional biodiversity (primary producers, biomass, predators, key species, species diversity, food relationships, …), for instance by using molecular markers (isotopes, fatty acids);
- Constructing biodiversity databases for use in ecological modeling and marine spatial planning;
- Taxonomic research of marine organisms: taxa such as Nematoda (nematodes) and Copepoda (copepods);
- Population genetics and evolutionary ecology of marine nematods and other key marine species;
- The study of macrobenthos: the specific functional role of macrobenthos species, the interaction between the benthos and the biogeochemistry of sediments;
- Human use of the coast and sea: marine protected areas, human impact on nature and environment (e.g. beach suppletion, aggregate extraction, contaminants, offshore wind farms, fisheries, …);
- Marine spatial planning;
- Nature conservation;
- Invasive species;
- Ecological modeling / Habitat mapping.

In the future, the group will further focus on the impact of disturbances (including global climate change) on deep-sea and polar ecosystems, the importance of biodiversity for marine ecosystem functioning and ecosystem based fisheries and their impact on benthic communities.

The MARBIOL yearly trains dozens of master and PhD students in marine sciences (cf. EMBC, MARES educational networks). The six main topics are (1) Future oceans: temperature changes – hypoxia – acidification; (2) Understanding biodiversity effects on the functioning of marine ecosystems; (3) Biological invasions; (4) Natural resources : overexploitation, fishing and aquaculture; (5) Noise pollution in oceans; (6) Habitat loss, urban development, coastal infrastructures and marine spatial planning. The MARBIOL participates in many national, international and European marine research projects (e.g. FP6, FP7) and consortia (e.g. Marine@UGent consortium, UGent Aquaculture R&D Consortium and IOF consortium Aquaculture Ghent University).

MARBIOL

Krijgslaan 281, building S8
B-9000 Ghent

/ Maritime Institute (UGent)

http://maritieminstituut.ugent.be

// institutional hierarchy

Faculty of Law

Department of Public International Law

// head of the group

Prof. dr. Eduard Somers

// research domain and discipline

Social sciences; Law and legal studies

// abstract

The Maritime Institute of Ghent University was founded in 1986 under the name 'Study and Documentation Centre for Port and Maritime Sciences'. The Maritime Institute is a research group with its roots in the Faculty of Law. Its main research focuses are: international law of the sea, international and European environmental law and biodiversity law, sustainable management of the North Sea, protected marine areas, and marine spatial planning and integrated coastal zone management. Within the scope of environmental law particular attention is paid to the pollution from ships, marine nature protection, fresh water law and climate change law. Research is often of a multidisciplinary nature due to the collaboration with other research groups of Ghent University (marine biologists, bio-engineers, marine geographers, environmental economists) or other European research groups. The Maritime Institute is also a partner in the Centre for Environmental and Energy Law of Ghent University.

The members of the Maritime Institute have, within their field of expertise, a lot of lecturing experience at Master and at Master after Master level in various faculties of Ghent University (law, political sciences, sciences, bioscience engineering) and at other Belgian Universities (Vrije Universiteit Brussel and University of Antwerp). The Maritime Institute is organiser of the Master in Maritime Sciences since 1986 and the Permanent Training in Port Management since 2001. Additionally, since 1996 the institute yearly organises a thematic Maritime Symposium.

A key moment for the institute was winning the Prize of Rudi Verheyen in 2004. The research team, led by Prof. Maes and Prof. Lavrysen, won the price thanks to their preliminary research that led to the preparation of the draft 'Decreet Integraal Waterbeleid' and the accompanying Explanatory Memorandum.

In the future, the Maritime Institute will further focus on topics such as marine biodiversity, marine spatial planning, climate change law and effects on the sea, offshore renewable energy, international law of the sea, marine protected areas and protection of natural marine heritage and underwater heritage. The institute is internationally known for its participation in European, but also national projects as well as for their cooperation with many European research institutes.

Maritime Institute

Universiteitstraat 6
B-9000 Ghent

/ Maritime Technology Division (UGent)

www.maritiem.ugent.be

// institutional hierarchy

Faculty of Engineering and Architecture

Department of Civil Engineering

// head of the group

Prof. dr. ir. Marc Vantorre

// research domain and discipline

Engineering and technology; Civil engineering

// abstract

In 1904, the research unit Naval Architecture (Ghent University) was founded and can be considered the forerunner of the current Maritime Technology division. This division was initially known as the 'laboratory for Naval Architecture' and later on as the 'service for Naval Architecture'.

The mission of the Maritime Technology division is threefold. Its primary aim is to ameliorate academic education regarding the design, construction, propulsion, functioning and maintenance of marine structures such as ships, but also offshore constructions. The second objective concerns carrying out fundamental and applied scientific research in the maritime field, especially regarding the hydrodynamics of vessels and other floating structures. The third purpose is to carry out scientific studies for and in collaboration with enterprises and public services in the maritime field.

The research undertaken by this division mainly focuses on the maritime hydrodynamics, i.e. the behavior of ships and other floating structures in the water. The emphasis lies on two distinct main themes:

- Energy extraction from sea waves by using floating structures;
- The behavior of ships in shallow and confined waters.

Research on the latter theme includes aspects such as model research, manoeuvring of ships in shallow water (with an eye on manoeuvring simulations), influence of sludge layers on ship behavior (nautical bottom), ship-bank interaction, ship-ship interactions, moored ships, arrival and departure arrangements for deep-draft vessels, probabilistic admission policy, vertical ship movements caused by the squat effect and waves, sailing in and out of locks, inland and estuary shipping (risk analysis), fairway design and equivalent bottom. In the context of the Knowledge Centre 'Manoeuvring in Shallow and Confined Water', which was founded in 2008, there is a structural collaboration with Flanders Hydraulics Research. With the same laboratory there is a collaboration for the towing tank for manoeuvres in shallow and confined waters and scientific advice is provided for the lock model and simulators for ship manoeuvres.

Maritime Technology

Technologiepark 904
B-9052 Ghent

/ Laboratory for **Microbial Ecology and Technology (UGent)**

www.labmet.ugent.be

// institutional hierarchy

Faculty of Bioscience Engineering

Department of Biochemical and Microbial Technology

// head of the group

Prof. dr. ir. Nico Boon

// research domain and discipline

Natural sciences; Biological sciences
Engineering and technology; Biotechnology
Agricultural and veterinary sciences; Fisheries and aquaculture sciences

// abstract

The laboratory of Microbial Ecology and Technology (LabMET) was founded in 1978 and specialises in the study and application of mixed microbial cultures and communities. LabMET focuses on the optimal management of these microbial resources (Microbial Resource Management, MRM) enabling them to develop novel products and processes to improve the environment and human health in the most sustainable way. More specifically, LabMET applies this approach in the fields of applied microbial ecology, functional feed, medical microbial ecology, risk assessment, biomaterials and nanotechnology, water treatment, aquaculture, bio-energy, and soils and sediments.

LabMET conducts research on the following marine topics:

- Microbial diversity and activity in deep marine sediment ecosystems;
- Simulation of the deep-sea biosphere using a continuous high-pressure bioreactor;
- Bioremediation of marine ecosystems.

The laboratory collaborates intensively with several foreign institutes (e.g. Shanghai JiaoTong University, University of Milan, Technical University of Crete and University of Bologna) and participates in the UGent Aquaculture R&D consortium and the IOF consortium Aquaculture Ghent University. Furthermore, the group participates in several European and national marine research projects.

LabMET

Coupure Links 653, building A
B-9000 Ghent

/ Laboratory of **Microbiology (UGent)**

http://lmg.ugent.be

// institutional hierarchy

Faculty of Sciences

Department of Biochemistry and Microbiology

// head of the group

Prof. dr. Paul De Vos

Prof. dr. Peter Vandamme

Prof. dr. Anne Willems

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The laboratory of Microbiology of Ghent University (LM-UGent) was founded in 1959. The research topics of the laboratory are: microbial diversity, taxonomy, ecology, and diagnosis in different sectors including the medical sector, food sector and environmental microbiology (which includes marine microbiology). The laboratory also holds the Belgian Co-ordinated Collections of Microorganisms/Laboratory of Microbiology, Ghent University (BCCM/LMG) Bacteria Collection which contains more than 27,000 strains, belonging to over 500 genera and 3,000 species. The BCCM/LMG Bacteria Collection was established in 1982, funded by Belspo. This ensured the future of the bacteria collection which has steadily grown since the establishment of the laboratory.

The marine research of this group concentrates on the following topics:

- Biodiversity effects on the functioning of marine benthic ecosystems focusing on the role (and diversity) of bacteria, in particular in the Paulinapolder in the Scheldt-estuary and the Belgian part of the North Sea. Special attention goes to the nitrogen and carbon cycles, intertidal benthic biofilms and interactions between diatoms, bacteria and copepods;
- Study of marine methanotrophs;
- Study of the biodiversity, specificity and function of endosymbiotic bacteria in coenocytic green algae, in particular the genus Bryopsis;
- Identification and classification of new marine bacteria.

The laboratory of Microbiology has an internationally appreciated tradition of culture-based diversity-research of bacteria. In the future, the group will attempt to culture bacteria of functional interest which are even rarer or more difficult to grow. This will include numerous marine microorganisms which will be made available through the BCCM/LMG Bacteria Collection. This collection can be the fundamental base for further research on the biotechnological potential of those organisms. The group is also active within national and international projects and collaborates intensively with the Marine Biology, Algology, and Protistology and Aquatic Ecology research groups of Ghent University.

Microbiology

K. L. Ledeganckstraat 35
B-9000 Ghent

/ Laboratory of **Environmental Toxicology and Aquatic Ecology (UGent)**

www.milieutox.ugent.be

// institutional hierarchy

Faculty of Bioscience Engineering

Department of Applied Ecology and Environmental Biology

// head of the group

Prof. dr. Colin Janssen

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The laboratory of Environmental Toxicology and Aquatic Ecology (LMAE) of Ghent University was founded at the end of the 60s and was formerly known as the laboratory for Biological Research of Aquatic Pollution. The research of LMAE focuses on both fundamental and applied aspects of aquatic ecotoxicology and ecological risk assessment. The main research topics include the effects (on all levels of biological organisation and in both marine and fresh water environments) and the presence and availability of environmental contaminants in general, and in particular of metals, endocrine disrupters, natural toxins and persistent chemical substances.

There are different sub-groups in the laboratory which study the following topics:

- The bioavailability and effects of metals in freshwater and marine ecosystems (sediments and water);
- Acclimatisation (epigenetics), adaptation and micro-evolutionary consequences of stressors on aquatic organisms (both anthropogenic contaminants as well as global change stressors such as toxic algae);
- Study of the presence and ecological effects of existing and new chemical substances in the marine environment (endocrine disruptors, persistent substances, pharmaceutical substances, …) using new techniques (e.g. passive samplers);
- Development and validation of ecosystem models for the evaluation of indirect and direct effects of environmental contaminants and other stressors on the aquatic environment.

Although this research is conducted in both marine and in freshwater environments, the future research strategy of the laboratory aims at expanding its marine focus. Given the global concern regarding the health and the use of our seas and oceans, LMAE will focus more on the effects (on all levels of biological organisation) and interactions of environmental contaminants and the changing natural stressors in the marine environment (cf. global change).

The laboratory collaborates with both Belgian and foreign research institutes, participates in the UGent Aquaculture R&D Consortium and the IOF consortium Aquaculture Ghent University, is the founder of the interfaculty research consortium Marine@UGent, and is the coordinator of several multidisciplinary marine research projects such as AS-MADE (Assessment of Marine Debris on the Belgian Continental Shelf: occurrence and effects), ENDIS-RISKS (Endocrine disruption in the Scheldt Estuary: distribution, exposure and effects) and INRAM (Integrated Risk Assessment and Monitoring of micropollutants in the Belgian coastal zone).

LMAE

Jozef Plateaustraat 22
B-9000 Ghent

/ Center for Mobility and Spatial Planning (UGent)

www.planning.ugent.be

// institutional hierarchy

Faculty of engineering and Architecture

Department of Civil Engineering

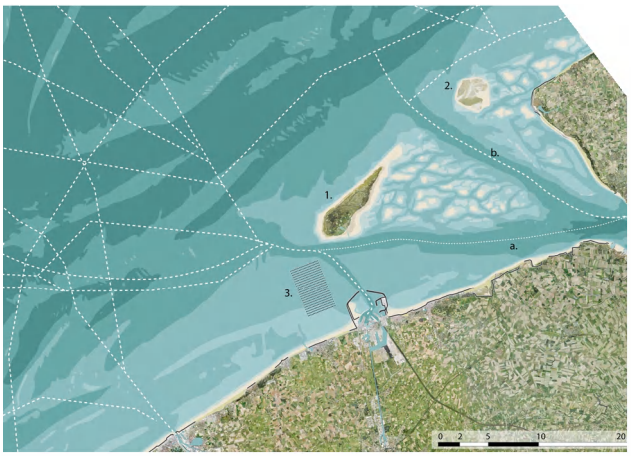
// head of the group

Prof. dr. Georges Allaert (until 10 October 2013)

Prof. ir. Luuk Boelens (from 10 October 2013 onwards)

// research domain and discipline

Engineering and technology; Civil Engineering
Engineering and technology; Geomatics
Social sciences; Economics and business
Social sciences; Political sciences and policy



// abstract

The Center for Mobility and Spatial Planning (AMRP) was founded in 1990 and originates from the Seminar for Survey and Spatial Planning (1972-1990). The scientific domains on which AMRP concentrates are: spatial economy and spatial management, spatial planning and spatial design, environmental management, sustainable mobility and integrated water management. Within this framework, AMRP participates in several national and European research projects and collaborates intensively with several Belgian and Dutch institutes and consultancy offices. The marine research of this group is associated with the following projects:

- CcASPAR: climate change and changes in spatial structures;
- Climate Proof Areas (CPA): how to deal with climate change;
- Climar: Evaluation of the impact of global climate change and adaptation measures for marine activities;
- WaterCap: climate change and its effects on the hydrological cycle.

In the future, AMRP will further develop the spatial design research as a commercial tool to mobilise stakeholders to participate in a positive marine/maritime story.

AMRP

Vrijdagmarkt 10/301
B-9000 Ghent

/ Department of **Morphology (UGent)**

www.morfologie.ugent.be

// institutional hierarchy

Faculty of Medicine and Health

// head of the group

Prof. dr. Paul Simoens

// research domain and discipline

Agricultural and veterinary sciences; Fisheries and aquaculture sciences
Agricultural and veterinary sciences; Veterinary sciences

// abstract

The department of Morphology of Ghent University studies the physique of animals, especially of pets or farm animals kept for food production (including aquaculture) and of marine animals such as marine fish and invertebrates. The department's scientific expertise is made available to the public by organising numerous courses and by the provision of advice services to veterinarians, clinicians, and educational and research institutes in Belgium and abroad.

The department is subdivided into three units: Anatomy, Histology and Embryology. The research projects of the department of Morphology focus on the following disciplines: tonsillar immunomorphology, anatomy of pets, mechanisms of angiogenesis during embryonic development and aquatic veterinary medicine.

Within the aquatic veterinary medicine branch, following marine topics are studied:

- The gastrointestinal development of fish larvae, with special attention for the microbial flora;
- The interactions between microorganisms with probiotic effects/prebiotics on the one hand and the host (larvae of marine fish species (sea bass (*Dicentrarchus labrax*)/sole (*Solea solea*)) and nauplii of the fairy shrimp) on the other hand. The use of pro- and prebiotics still gains popularity in aquaculture practices despite the fact that the process among larvae is still unknown. Consequently, there is an increasing scientific and practical interest in unraveling the host-microbial interactions in early larval stadia;
- Research on electric pulse fishing as an environmentally friendly fishing method in the North Sea, with emphasis on studying the effects of pulses on a representative group of marine organisms over the different life stages (eggs, larvae, juveniles, adults).

For the first two research topics, the department of Morphology collaborates with the Artemia Reference Center (Faculty of Bioscience Engineering, UGent) and the department of Pathology, Bacteriology and Poultry Diseases (Faculty Veterinary Medicine, UGent). For the third research discipline this department collaborates with the Institute for Agricultural and Fisheries Research (ILVO) and the department of Pathology, Bacteriology and Poultry Diseases. In the future, the department also aims to focus on the wellbeing of fish (e.g. identification and impact of chronic stress), alternative fishing methods and veterinary medical support in marine research projects. The group also aspires to study health indicators of wild-caught marine organisms using microbial and microscopic techniques in cooperation with ILVO and department of Pathology, Bacteriology and Poultry Diseases. The department of Morphology is also part of the UGent Aquaculture R&D consortium and the IOF consortium Aquaculture Ghent University.

The Morphology Museum is also part of this department. The museum manages a didactic and research collection in the comparative morphology of the vertebrates. The emphasis lies on the museum objects of classic pets. The museum has a lot of expertise in conservation techniques of organic specimens. Worldwide, there is a need for unambiguous protocols regarding conservations techniques for mammalian skeletons in natural historical collections, therefore, the museum also focuses on this research domain. For the latter, the museum collaborates intensively with the Operational Direction Natural Environment (RBINS) and participates to the recovery and conservations of stranded marine mammals along the Belgian coast.

Morphology

Salisburylaan 133
B-9820 Merelbeke

/ Research group **Nutrition and Food Safety (UGent)**

www.publichealth.ugent.be

// institutional hierarchy

Faculty of Medicine and Health Sciences

Department of Public Health

// head of the group

Prof. dr. Stefaan De Henauw

// research domain and discipline

Medical and health sciences; Medical and health sciences
Agricultural and veterinary sciences; Fisheries and aquaculture sciences

// abstract

The research unit Nutrition and Food Safety of Ghent University was founded in 1998. The research performed by this group can be subdivided into three main research topics. The first concerns the nutritional research on various food related issues (nutrients, feeding pattern, body composition, influence of social and ecological aspects such as stress) and their impact on public health. The second area includes research on food safety, with the emphasis on chemical food safety in relation to environmental problems and food-technological phenomena (for instance the use of additives and pigments). The third research topic concerns methodological research that is used to support food research and research on food safety, including nutrition assessment, measuring body composition and probabilistic techniques used to evaluate exposure.

Within the marine domain, the group performs research on the following topics:

- Fish and sea food as a dietary source of omega-3 fatty acids;
- Toxicological risks associated with the consumption of fish.

A noteworthy moment for this group was winning the Prof. Dr. G. Verdonk prize for dietetics presented by the Belgian Royal Academy for Medicine (period 2003-2006) for the work 'Evaluation of benefits and risks related to seafood consumption'. The research group participates in the European FP7 project ECSAFESEAFOOD and collaborates intensively with the Department of Food Safety and Food Quality and the research group Agro-food Marketing and Consumer Behavior, both of Ghent University.

Nutrition and Food Safety

De Pintelaan 185, building A
B-9000 Ghent

/ Research unit **Palaeontology (UGent)**

www.paleo.ugent.be

// institutional hierarchy

Faculty of Sciences

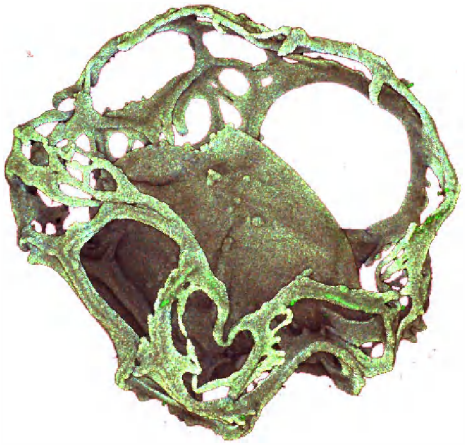
Department of Geology and Soil Science

// head of the group

Prof. dr. Jacques Verniers

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The research unit Palaeontology of Ghent University was founded in 1960. The group studies the biogeography, biostratigraphy, palaeoecology and evolution of a broad range of fossil organisms such as Neogene and Quaternary dinoflagellate cysts, Lower Palaeozoic Chitinozoa, Neogene fresh water molluscs and Palaeogene mammals. Besides these fossil organisms, Neogene and Quaternary pollen are studied. In addition, the group focuses on structural geology, stratigraphy and geological mapping (of Brabant Massif and Condroz-inlier), as well as on prehistoric settlements and land use systems in sandy north Flanders.

Two marine research topics can be distinguished within this research group. The first topic concerns the global and regional biostratigraphy of Ordovician and Silurian rocks using Chitinozoa (marine microfossils), as well as using Chitinozoa as a tool for the stratigraphy and geological mapping of the Lower Palaeozoic Brabant Massif and Condroz-inlier (Belgium). The second research topic deals with the study of organic walled phytoplankton and pollen in Neogene and Quaternary marine deposits of the North Sea Basin, the Atlantic and Pacific Ocean. A distinction can be made between:

- Biostratigraphical studies using Neogene dinoflagellate cysts;
- Palaeoecology of Neogene and Quaternary dinoflagellate cysts;
- The use of dinoflagellate cysts as a proxy for palaeoenvironmental changes;
- The development and validation of climate proxies based on Neogene and Quaternary dinoflagellate cysts;
- The use of pollen as a proxy for vegetation and palaeoenvironmental reconstructions.

In the future, the group will further focus on the palaeoecology of Phanerozoic marine environments using integrated palynological and biogeochemical research.

Palaeontology

Krijgslaan 281, building S8
B-9000 Ghent

/ Laboratory of **Protistology and Aquatic Ecology (UGent)**

www.pae.ugent.be

// institutional hierarchy

Faculty of Science

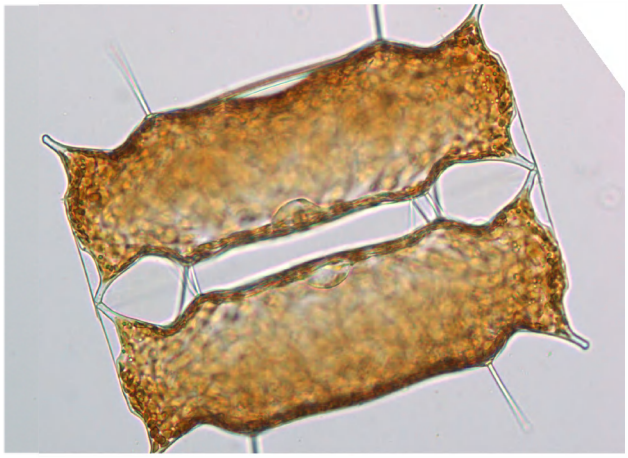
Department of Biology

// head of the group

Prof. dr. Wim Vyverman

// research domain and discipline

Natural sciences; Biological sciences
Engineering and technology; Biotechnology



// abstract

The laboratory of Protistology and Aquatic Ecology (PAE) from Ghent University was founded in 1996. The research of the group include three main topics: (1) biology and evolution of unicellular eukaryotes, (2) short and long term dynamics of fresh water and marine ecosystems and (3) biotechnology of micro algae. Current marine research topics include:

- The role of dispersion and local adaptation for the genetic structure of micro algae populations and their spatial and temporal dynamics;
- Fundamental mechanisms of biotic interactions in microbial food webs, in particular chemical communication between micro algae and between micro algae and prokaryotes;
- Identification of endogene and exogene regulation mechanisms of cell division and sexual reproduction among diatoms;
- Mechanisms and speed of speciation among diatoms;
- Dynamics of estuarine and marine microplankton and microbenthos communities;
- The role of intraspecific and species diversity for the stability and functioning of microbial food webs;
- The response of polar microbial metacommunities to environmental and climate variability;
- The late Quaternary evolution of Antarctic coastal environments;
- The phenology and functional ecology of marine algal blooms;
- Regulation of the metabolism of biotechnologically important micro algae.

The majority of the research projects take place in a multidisciplinary context in cooperation with Belgian and foreign research institutes. The laboratory manages an extended collection of diatom cultures which is part of the BCCM consortium (Belgian Co-ordinated Collections of Microorganisms, http://bccm.belspo.be/). The laboratory participates in the UGent Aquaculture R&D Consortium, is the coordinator of the Flemish Algae Platform (which focuses on the implementation of algae cultivation for industrial purposes), and is actively involved in international networks dealing with the molecular biology of microalgae.

PAE

Krijgslaan 281, building S8
B-9000 Ghent

/ Renard Centre of Marine Geology (UGent)

www.rcmg.ugent.be

// institutional hierarchy

Faculty of Science

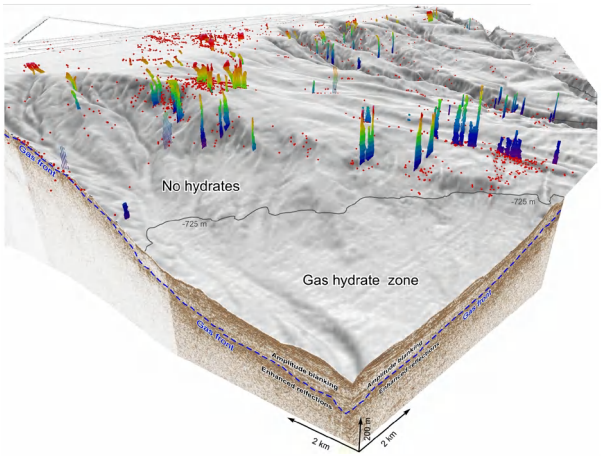
Deparment of Geology and Soil Science

// head of the group

Prof. dr. Marc De Batist

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The Renard Centre of Marine Geology (RCMG) of Ghent University performs research in the field of marine and lacustrine geology. The research group was founded in 1986 and acquired fame by studying clay tectonics of the North Sea (1991) and by the discovery of cold water coral mounds 'Belgica mounds' in the Porcupine Seabight (Ireland) in 1997, which were drilled into during the IODP Expedition 307 in 2005. The RCMG carries out research in most seas (Black Sea, Atlantic margin, Antarctic margin, Mediterranean Sea,…), participates in several international research projects and collaborates with renowned foreign marine research groups such as IFREMER, NOC Southampton, Center for Marine Environmental Sciences (Marum) Bremen and Royal Netherlands Institute for Sea Research (NIOZ). The current marine research topics of RCMG are:

- Geology of continental margins (geodynamics, sequence stratigraphy and palaeoceanography of continental margins with emphasis on sedimentation processes, erosion, destabilisation, …);
- Methane hydrates (occurrences and stabilisation conditions), cold seeps and mud volcanos (processes of seepage, methane fluxes and budgets);
- Cold water coral and carbonate mounds: the study of the habitats on continental margins of the North Atlantic Ocean, the Mediterranean Sea and the Pacific Ocean with emphasis on the study of carbonate mounds and deep water coral habitats;
- Mapping of marine habitats: Integrated method of marine mapping - multibeam, side-scan sonar imaging and acoustic characterisation of the seabed. The development of habitat models based on geophysical and hydrographical data;
- Applied marine research: sediment and morphodynamics, sustainable management of natural resources, the evaluation of landfills and marine geoarcheological research.

In the future, the RCMG will further focus on palaeoseismology, marine geoarcheology, palaeoceanography (seismic oceanography) and deep water circulation.

RCMG

Krijgslaan 281, building S8
B-9000 Ghent

/ Terrestrial Ecology Research group (UGent)

www.ecology.ugent.be/terec

// institutional hierarchy

Faculty of Science

Department of Biology

// head of the group

Prof. dr. Luc Lens

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The research group Terrestrial Ecology originates from the 'laboratorium voor Ecologie der Dieren' (laboratory for Animal Ecology). This group studies the patterns and processes on which the functioning of terrestrial ecosystems is based. This includes research on population and vegetation dynamics, biotic interactions between plants, herbivores, pollinators and predators, variation in behavior and life cycle properties, and phenotypical (development) plasticity and bio-indicators of invertebrate and vertebrate species. Four main research topics can be distinguished within the research of this group: population and community ecology; evolutionary ecology; plant-animal interactions and applied ecology. Through the years, the research of the group has gradually become more focused on terrestrial ecology with the emphasis on the ecology of dunes, tidal marshes and sea birds. Key moments for the group include: the introduction of new research topics (such as the study of arthropods in dunes (1973)) and eco-evolutionary research in tidal marshes (1981).

Specific coastal research topics concern:

- Ecology and functioning of dune systems (e.g. research on the blue grasshopper, spiders, Marram grass and plant-herbivore interactions)
- The natural variation in life cycle characteristics and the corresponding consideration between breeding and migration behavior of European Herring Gulls and Lesser Black-backed Gulls breeding on roofs and on the ground;
- Distribution strategy of spiders as an indicator of the structure and dynamics of coastal tidal marshes;
- Herbivore-plant interactions and mechanisms of succession as determining factors for the vegetation structure;
- Seed dispersion by large mammals in dune areas;
- Population biology of higher plants in a fragmented dune landscape.

In the future, the Terrestrial Ecology group wishes to expand on and advance in research of sea birds and the eco-evolutionary research of plant-herbivore interactions, both in an applied and fundamental way. This research includes both the study of European marram grass-associated biodiversity and the impact on ecosystem functioning as well as the impact of climate change and areal extension on evolution and life history characteristics. The most important national partners of marine bird associated research are Marine Biology (Ghent University), ISOFYS (Ghent University), Department of Biology (University of Antwerp), Research Institute for Nature and Forest (INBO), Institute for Agricultural and Fisheries Research (ILVO) and Flanders Marine Institute (VLIZ). Concerning the study of plant-herbivore interactions, the most important national partners are KU Leuven for the areal extension, the Royal Belgian Institute of Natural Sciences (RBINS; Entomology) and INBO (Sam Provoost) for the European marram grass-associated research. Regarding this type of research, the use of physiological markers (feather, CORT, immunobiology, stable isotopes) and GPS telemetry (study of movements) is increasing. The first pilot study is being financed by the Life-Watch project 'zendernetwerk meeuwen en bruine kiekendieven'.

TEREC

K. L. Ledeganckstraat 35
B-9000 Ghent

/ Laboratory for **Applied Geology and Hydrogeology (UGent)**

www.earthweb.ugent.be/index.php?/public/nl_research/ltgh

// institutional hierarchy

Faculty of Sciences

Department of Geology and Soil Science

// head of the group

Prof. dr. Kristine Walraevens

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The laboratory of Applied Geology and Hydrogeology of Ghent University was founded in 1970 and was formerly known as 'Leerstoel Toegepaste Geologie' (Chair Applied Geology). This laboratory studies the movement and quality of groundwater, as well as the interaction of groundwater with rocks. This includes the study of the flow of groundwater, the amount of groundwater available for extraction from particular aquifers, chemical reactions and pollution due by human activities. Between 1960-1989 this group was responsible for the construction of salinisation maps, mapping out the depth of the interface between fresh and salt groundwater in the Belgian coastal zone.

The following research topics are studied in the coastal zone:

- Groundwater quality and the hydrogeochemical processes in coastal aquifers;
- Groundwater quality and the hydrogeochemical processes in marine aquifers;
- Exploitation of coastal aquifers;
- Groundwater regimes in dunes in relation to the ecosystem;
- Geophysical research in coastal areas (mainly geo-electrical and electromagnetic);
- Mapping of the depth of the interface between fresh and salt groundwater;
- Sustainable groundwater extraction in coastal areas.

The future research will continue to focus on the above mentioned themes.

Applied Geology and Hydrogeology

Krijgslaan 281, building S8
B-9000 Ghent

/ Coastal Engineering, Bridges and Roads - Coastal Engineering Research group (UGent)

www.awww.ugent.be

// institutional hierarchy

Faculty of Engineering and Architecture

Department of Civil Engineering

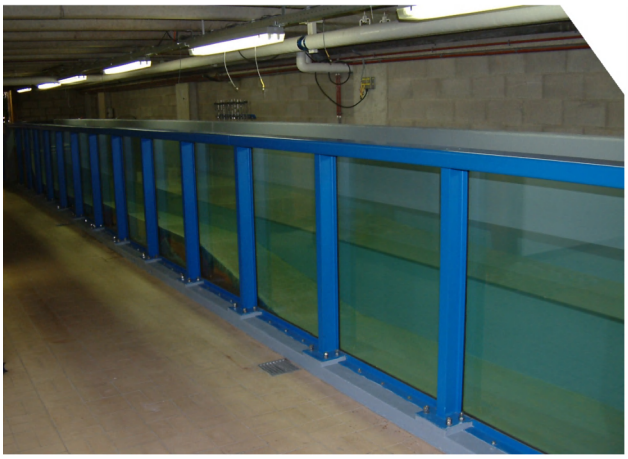
// head of the group

Prof. dr. ir. Julien De Rouck (until 1 October 2013)

Prof. dr. ir. Peter Troch (from 1 October 2013 onwards)

// research domain and discipline

Engineering and technology; Civil Engineering



// abstract

The department Coastal Engineering, Bridges and Roads of Ghent University performs research that falls under three different research groups: Coastal Engineering, Bridges and Roads. The former group deals with some marine topics focusing on the design and construction of coastal hydraulic constructions (such as breakwaters and dikes), coastal defense (protecting the hinterland from flooding by waves and sea level rise) and the structural response of these constructions to wave attacks (such as coating stability, wave overtopping and overflow, porous flow and the development of pore pressures in the core of the breakwater). Meanwhile, studies also focus on the interactions between the water movement (waves and tides) including the associated sediment transport and the coastal hydraulic constructions (which may cause local erosion of the sea floor). Another research theme deals with renewable wave and tidal energy. The research group is actively involved in the system development for exploiting wave energy and in the research toward interaction effects within parks of wave energy convertors. The group also has a lot of experience in the development of measurement tools for currents and waves in oceans, estuaries and rivers.

The research methodology is mainly based on the use and integration of physical models, numerical models and field measurements. Therefore the group has two physical wave flumes and multiple numerical models for the propagation of wind-generated waves (MILDwave, FLOW3D, OpenFOAM) and tidal currents (COHERENS).

In the future, this group will focus on topics such as coastal defense (mainly constructions) and renewable energy. The group participates in both national and European (e.g. FP6, FP7) research projects on coastal hydraulic constructions and offshore energy production and is a member of several consortia (Marine@UGent consortium, WECAN consortium, Coastlab).

Coastal Engineering

Technologiepark 904
B-9052 Ghent

Hasselt University

// Faculty of Sciences

- Research group Zoology: Biodiversity and Toxicology

/ Research group **Zoology: Biodiversity and Toxicology (UH)**

www.uhasselt.be/UH/nl/Onderzoek/OndUH/Onderzoeksgroepen/DetOndgr.html?oid=52

// institutional hierarchy

Faculty of Sciences

Discipline group Biology – Geology

Centre for Environmental Sciences

// head of the group

Prof. dr. Tom Artois

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The research group Zoology: Biodiversity and Toxicology of Hasselt University was founded in 1976 and was formerly known as the research group Biodiversity, Phylogeny and Population Studies and the research group Zoology. Their research focuses on the study of invertebrate animals, and in particular on free-living flatworms (Platyhelminthes). Furthermore, the main focus lies on the following research topics:

- Biodiversity, including cryptic biodiversity;
- Phylogeny and phylogeography, based on molecular markers and morphological characteristics;
- Effect of pollution (in particular heavy metals) on several biological aspects of Turbellaria: regeneration and stem cell dynamics, life history parameters, morphology, …;
- Molecular and cellular effects of pollution (in particular heavy metals).

The marine topics of focus are: the biodiversity, phylogeny and biogeography of marine invertebrates, in particular of free-living flatworms. Future research of the group will concentrate on the development of molecular tools for the identification of marine microturbellaria, which is presently still based on detailed morphological studies. Moreover, emphasis will lie on the biodiversity assessments of interstitial marine meiofauna, in particular flatworms, based on next generation sequencing (NGS) techniques (environmental sequencing).

The group will also continue to study the cryptic biodiversity and biogeographic patterns of selected flatworm species and future research will be expanded to symbiotic Turbellaria, including the study of co-evolution. The main challenge, in order to commence the above mentioned research, is fine-tuning of molecular protocols. Besides that, a dataset of marine flatworms on the Belgian coast must be developed with as many possible species-specific DNA sequences.

CMKDK

Campus Diepenbeek
Agoralaan, building D
B-3590 Diepenbeek

Vrije Universiteit Brussel

// Faculty of Engineering

- Department of Hydrology and Hydraulic Engineering

// Faculty of Arts and Philosophy

- Department of Art Sciences and Archaeology

// Faculty of Law and Criminology

- Centre for International Law

// Faculty of Science and Bio-engineering Sciences

- Plant Biology and Nature Management Laboratory
- Research group Analytical and Environmental Chemistry
- Research group Physical Geography
- Research group Marine Biology

/ Plant Biology and Nature Management Laboratory (VUB)

www.vub.ac.be/APNA

// institutional hierarchy

Faculty of Science and Bio-engineering Sciences

Department of Biology

// head of the group

Prof. dr. Nico Koedam

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The research group Plant Biology and Nature management (APNA) of the Vrije Universiteit Brussel focuses on seven research themes: (1) limnology (ecological quality), (2) mangroves and biocomplexity, (3) conservation genetics, (4) temperate forests and urban ecology, (5) sustainable development governance, (6) invasive exotic aquatic plants and (7) bird migration and wetlands.

The study of coastal vegetation and mangroves forms the marine component of the research. Next to studying the mangrove vegetation as a whole, the functioning of the mangrove trees themselves is part of APNA's research focus. The mangrove wood studies are carried out in close collaboration with the Kenya Marine and Fisheries Research Institute (KMFRI) and the wood laboratory of the Royal Museum for Central Africa (RMCA, Tervuren).

** Content not validated by the respective research group*

APNA

Pleinlaan 2
B-1050 Brussels

/ Research group **Analytical and Environmental Chemistry (VUB)**

www.vub.ac.be/ANCH

// institutional hierarchy

Faculty of Science and Bio-engineering Sciences

Department of Chemistry

// head of the group

Prof. dr. Willy Baeyens

// research domain and discipline

Natural sciences; Chemical sciences

// abstract

The research group Analytical and Environmental Chemistry (ANCH) of the Vrije Universiteit Brussel was founded in 1990, and originated from the research group Analytical Chemistry which in turn was founded in 1968. The group is involved in several topics regarding environmental research. The group focuses in particular on the development of analytical methods needed for the study of aquatic systems such as oceans, coastal ecosystems, estuaries, rivers and lakes, but also for the impact of the environment on human health or food quality.

In the marine field, the developments in analytical chemistry are closely connected to the study of biogeochemical processes, both of nutrients and pollutants. Within the field of analytical chemistry, the group focuses on the sampling of labile, bioavailable dissolved fractions of both nutritive and toxic trace elements; the determination of trace metals using HR-ICP-MS (high resolution inductive coupled plasma mass spectrometry); the determination of stable isotopes of carbon and nitrogen using IRMS (stable isotope mass spectrometry); high resolution 2-D visualisation of spore metals in sediments using laser technology coupled to ICP-MS; the determination of Th/U ratios in particles using a scintillation counter; and the measurement of persistent organic hydrocarbons (i.e. dioxins and PCBs) using genetically modified cell lines (CALUX). The research related to marine ecosystems focuses on the quantification of the productivity and export production in open oceans; the biogeochemical cycles of carbon, nitrogen and pollutants (inorganic and organic) in coastal ecosystems; metal fluxes and microbial diversity in contaminated marine sediments; and the accumulation of pollutants in marine organisms.

Future research will focus among others on the development of methods to refine export production fluxes, on the 3D visualisation of spore elements found in sediments and the development of 3D process models for the description of their behavior. The research group Analytical Chemistry participates in several national and international research projects and collaborates with renowned Belgian and foreign research institutes.

Some key events during the existence of this group are the publication of the first 2D tide and pollutant dispersion models of the Scheldt (1980), the development of a new analytical method to detect methylmercury in marine fish (1985) and a publication in the renowned journal Science describing the export production of carbon in the Southern Ocean, based on vertical Barium-profiles (1992).

ANCH

Pleinlaan 2
B-1050 Brussels

/ Research group **Physical Geography (VUB)**

www.vub.ac.be/DGGF/fard/fard.htm

// institutional hierarchy

Faculty of Science and Bio-engineering Sciences

Department of Geography

// head of the group

Prof. dr. Philippe Huybrechts

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The research group Physical Geography (FARD) of the Vrije Universiteit Brussel was founded in 1970. The research that focused on glaciology and quaternary geology (since 1985) shifted towards the research themes 'ice and climate' and 'volcanology' (from 2011 onwards). The first theme focuses on the dynamics of natural ice masses and their interaction with the climate system. The research group's emphasis lies on 3D modeling of the continental cryosphere (Antarctica, Greenland and Quaternary ice caps), the regional Antarctic ice cap dynamics (modeling, field work, remote sensing) and research on glaciers in the Alps and the Himalaya (modeling, balance, radar sounding and GPS measurements).

Within the field of volcanology, research focuses on the geomorphology and spatial distribution of volcanos, the characterisation of instability processes and on monitoring eruptive processes on African volcanos.

Within the marine domain, the group studies ice cap dynamics and their impact on the global sea level. Within this context, the group participates in the EU FP7 project Ice2sea. The research group Physical Geography is also strongly involved in the IPCC reports regarding the themes 'cryosphere' and 'polar ice caps'.

FARD

Pleinlaan 2
B-1050 Brussels

/ Department of **Hydrology and Hydraulic Engineering (VUB)**

www.vub.ac.be/hydr

// institutional hierarchy

Faculty of Engineering

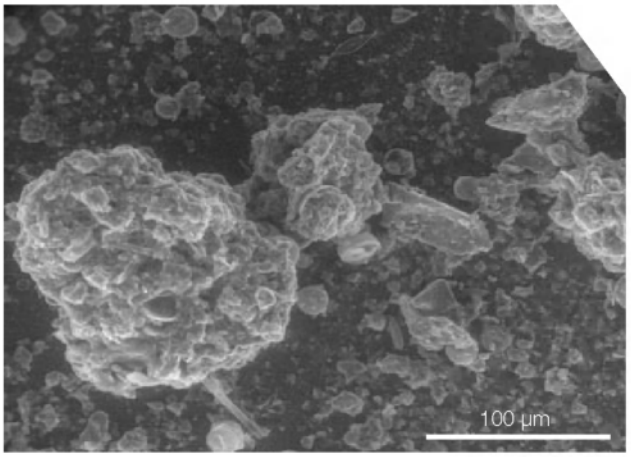
Department of Hydrology and Hydraulic Engineering

// head of the group

Prof. dr. Willy Bauwens

// research domain and discipline

Engineering and technology; Geomatics
Engineering and technology; Civil engineering



// abstract

The department of Hydrology and Hydraulic Engineering of the Vrije Universiteit Brussel was founded in 1976. Since its foundation, this department specialises in numerical simulation techniques and computer applications which is how it gained expertise in the use and development of hydrological modeling techniques. GIS and remote sensing are used during the development, use and visualisation of these models and their results.

In the marine and estuarine fields, the department studies hydrodynamics, sediment transport, particle and sediment flocculation and aggregation, geo-acoustic characteristics, lithological and geomorphological evolution of the Scheldt basin, the estuarine river floors and the coastal zone.

The department of Hydrology and Hydraulic Engineering participates in both Flemish, Belgian and European research projects, subsidised by Flemish, Belgian or European scientific programs, or directly by the industry. These projects conduct research on, among others, aspects concerning the Sigmaplan, Moneos (integrated monitoring of the Scheldt estuary) and the long term vision of the Scheldt estuary and the coastal zone.

Hydrology and Hydraulic Engineering

Pleinlaan 2
B-1050 Brussels

/ Centre for **International Law (VUB)**

www.vub.ac.be/IERE/welcomeintr.htm

// institutional hierarchy

Faculty of Law and Criminology

Department of International and European Law

// head of the group

Prof. dr. Erik Franckx

// research domain and discipline

Social sciences; Law and legal studies

// abstract

The Centre for International Law of the Vrije Universiteit Brussel is the successor of the department International Law, and originates from the fusion of 3 former institutes (90's): the Centre for the Study of the Law of the United Nations and the Specialized Agencies (REVN), the International Institutions Unit (INRI) and the Centre for the Study of East-European Socialist Legal Systems (Centrum OOST). Since 2003, this Centre forms, together with the Centre for European Law, the department of International and European Law (IERE).

The Centre mainly performs research on the following four areas: (1) law of the sea, (2) law of international organisations, (3) regional international law in Africa and (4) the East-European legal system.

The marine related research focuses on the international law of the sea in general. The main interests include marine pollution and the marine environment, the international and European fisheries law and maritime demarcation issues. On a regional level, the main focus lies on Arctica, the Baltic Sea and the South China Sea. Finally, the Belgian State practices are followed closely.

International Law

Pleinlaan 2
B-1050 Brussels

/ Department of **Art Sciences and Archaeology (VUB)**

www.vub.ac.be/SKAR

// institutional hierarchy

Faculty of Arts and Philosophy

Department of Art Sciences and Archaeology

// researcher

Prof. dr. Dries Tys

// research domain and discipline

Humanities; History and archaeology

// abstract

The research carried out within the department of Art Sciences and Archaeology (SKAR) aims at documenting the history of the arts and the material past in order to set the evidence within the broader context of European art history, culture history and archaeology.

Within the department some marine topics are studied, such as medieval coastal landscapes and the material culture of maritime communities, especially fishing villages.

** Content not validated by the respective research group*

SKAR

Pleinlaan 2
B-1050 Brussels

/ Research group **Marine Biology (VUB)**

http://dbio.vub.ac.be/onderzoek/onderzoek.html#marine

// institutional hierarchy

Faculty of Science and Bio-engineering Sciences

Department of Biology

// head of the group

Prof. dr. Marc Kochzius

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The research group Marine Biology of the Vrije Universiteit Brussel studies tropical marine ecosystems such as coral reefs, mangroves and sea grass beds. The group focuses on marine ecology (multivariate analysis of community structures in relation to environmental parameters), molecular ecology (assessment of population connectivity based on genetic methods), molecular phylogenetics (phylogeography, molecular systematics, DNA barcoding for species identification) and marine biotechnology (development of DNA micro arrays for species identification).

** Content not validated by the respective research group*

Marine Biology

Pleinlaan 2
B-1050 Brussels

Flemish Scientific Institutes

// Flanders Heritage Agency

// Institute for Agricultural and Fisheries Research (ILVO)

// Research Institute for Nature and Forest (INBO)

// Flemish Institute for Technological Research (VITO)

// Flanders Marine Institute (VLIZ)

// Flanders Hydraulics Research

/ Flanders Heritage Agency

www.onroerenderfgoed.be

// institutional hierarchy

Flemish Government

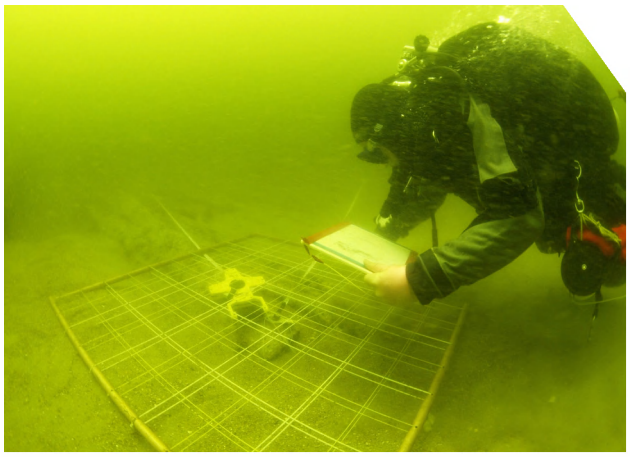
Policy area Town and Country Planning, Housing Policy and Immovable Heritage

// head of the group

Sonja Vanblaere

// research domain and discipline

Humanities; History and archaeology



// abstract

The Flanders Heritage Agency was founded in 2011, and results from a fusion between the 'Heritage' branch of the agency for Space and Heritage and the Flemish Institute for Architectural Heritage (VIOE). Immovable heritage includes architectural, archaeological, landscape but also heraldic and maritime heritage. The agency inventorises, studies and protects valuable buildings, landscapes, archaeological sites and sailing heritage. Also, the agency supports the immovable heritage management and performs research for policy and management issues. From 2003 onwards there are a variable number of researchers within the Flanders Heritage Agency and its precursors (Institute for the Archaeological Heritage (IAP), VIOE) who perform policy-oriented research on maritime and/or underwater heritage. In the present structure of the organisation, there is no research group specifically focusing on marine topics or underwater heritage, but marine researchers are spread over different departments of the agency. The marine research within the agency focuses on the following topics:

- Late medieval fishing settlements in the southern North Sea area (Walraversijde, from 1992 onwards);
- The medieval cogs of Doel;
- Maritime conservation: this topic became more studied after the onset of the project 'De Kogge' (2009-2014);
- The medieval origin and development of commercial fisheries in the North Sea, the Baltic Sea and the North Atlantic Ocean. This includes combining data from European archaeological research on fish remains from 600-1600 AD;
- Archaeological research in the Belgian part of the North Sea (drawing up inventories of old findings, research on new findings). This topic aims at achieving three scientific goals: (1) development of a reliable research methodology (using geophysical and remote sensing techniques); (2) developing proposals for a transparent and sustainable management policy and for the further development and implementation of a legal framework for underwater heritage and (3) practical guidance for actors on sea and an increase of the support for underwater heritage;
- Study of sailing heritage to support the conservation policy (inventories, documentation and history of ships and shipyards).

The challenge faced by the marine researchers is to create awareness among policy makers and maritime actors of the importance of marine heritage and to obtain the necessary resources to study and conserve this highly vulnerable marine heritage.

Key events of this agency and its precursors are the cooperation agreement (5 October 2004) between the federal government and the Flemish Region concerning maritime heritage, the realisation of the TV documentary 'Vergaan in de Noordzee' (Canvas; 2004), the realisation in 2006 of an online accessible database on maritime archaeology (www.maritieme-archeologie.be), the onset of the project 'De Kogge' in 2009 and the approval of the project 'Archeology in the North Sea' (IWT, 2012). There is also a close collaboration with both national and international institutes and participation in international research projects.

Flanders Heritage Agency

Koning Albert II-laan 19, box 5
B-1210 Brussels

/ Institute for Agricultural and Fisheries Research (ILVO)

www.ilvo.vlaanderen.be

// institutional hierarchy

Flemish Government

Policy area Agriculture and Fisheries

// head of the group

Prof. dr. ir. Erik Van Bockstaele

// research domain and discipline

Natural sciences; Chemical sciences
Natural sciences; Biological sciences
Agricultural and veterinary sciences; Fisheries and aquaculture sciences

// abstract

The Institute for Agricultural and Fisheries Research (ILVO) is an internal autonomous agency without legal personality and was founded by the Ministerial Order of 9 December 2005. ILVO is the result of the fusion between the former Agricultural Research Centre (CLO) and the scientific branch of the Centre for Agricultural Economics (CLE). The institute performs multidisciplinary, pioneering and independent research focusing on sustainable agriculture and fishery, in an economic, ecological and social perspective. Based on this research, ILVO gathers fundamental and applied knowledge necessary for the improvement of products and production methods, for the monitoring of the quality and safety of the end products and for the improvement of policy instruments which form the basis of the sector development and agricultural policies. The research entities 'Aquatic Environment and Quality' and 'Fisheries and Aquatic Production' specifically focus on marine research topics.

Aquatic Environment and Quality

In striving towards a sustainable exploitation of natural marine resources, a fully underpinned assessment of the quality of the environment and biological seafood is important. ILVO carried out this evaluation in an integrated manner. On the one hand, biological, toxicological and chemical effects of all kinds of human activities (sand/gravel extraction, dumping, wind farms, fishery, introduction of exotic species) and of different types of pollution (pollutants, waste) are studied. On the other hand, genetic and (bio)chemical quality, freshness and authenticity analyses are developed and applied to fish, shellfish and molluscs. This research includes continuous, long term monitoring and more specific targeted research projects.

Fishery and Aquaculture Production

The modern management of fisheries is based on sound information about fish stocks and their place in the ecosystem, thorough knowledge on the efficiency and effects of fishing techniques as well as insight into the socio-economic aspects of the fishery industry. ILVO provides this information to our government. Also, ILVO supports and advises the fishery industry and fishery trade in their pursuit towards sustainable fishing. A multidisciplinary scientific team, with an extensive network, is assisted by a technical team dealing with land- and sea-based fieldwork. Besides the research group focusing on marine fisheries, ILVO also has a research group dealing with the development of sustainable aquaculture systems. Simultaneously, a service is developed which supports companies, governments and other scientific institutes in their scientific work.

The ILVO has a number of analysis tools (ASE, GC-ECD, GC-MS (Ion trap), GC-MS (Quad), HPLC (UV+FL) and research laboratories. Furthermore, the ILVO participates in numerous national and international research projects and collaborates with many Belgian and foreign institutes.

ILVO

Burgemeester Van Gansberghelaan 96, box 1
B-9820 Merelbeke

/ Research Institute for Nature and Forest (INBO)

www.inbo.be

// institutional hierarchy

Flemish Government

Policy area Environment, Nature and Energy

// head of the group

Dr. Jurgen Tack

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Research Institute for Nature and Forest (INBO) was founded in 2006 and arose from the fusion of the former Institute of Nature Conservation and the Institute for Forestry and Game Management. INBO focuses on the sustainable management and the use of nature. INBO primarily works for the Flemish Government, but as a Flemish research and knowledge institute, INBO also performs research and provides knowledge to policy makers, to those implementing policies and other interested stakeholders. The institute also provides information for international reports and to local authorities. Besides that, INBO also supports organisations for nature management, forestry, agriculture, hunting and fishing organisations.

The marine research of INBO focuses on the impact of human activities on coastal breeding birds and sea bird populations; migration bottlenecks; habitat use and recovery for (diadrome) fish in estuaries; landscape dynamics in coastal dunes; and flora and fauna in coastal nature reserves for management evaluation, ecological objectives, recovery and state- and trend evaluation in estuaries.

The research group Species Diversity of the department Biodiversity and Natural Environment focuses on the study of the evolution of coastal breeding bird populations, counting birds on the Belgian part of the North Sea, the feeding ecology of terns, coupling of the pelagic component and top predators in the food web, and the impact of human activities on coastal breeding birds and seabird populations. Within this context, INBO concluded important cooperation agreements with other research institutes such as the Institute for Agricultural and Fisheries Research (ILVO), Management Unit of the North Sea Mathematical Models and the Scheldt estuary (now part of the Operational Direction Natural Environment - RBINS) and the Marine Biology research group (Ghent University) concerning monitoring projects on the Belgian part of the North Sea (WAKO I and II, WESTBANKS, TROPHOS, BWZEE, SPEEK).

The estuarine research of the research group Ecosystem Diversity of the department Biodiversity and Natural Environment is mainly working in the frame of the long-term vision for the Scheldt estuary, the actualised Sigmaplan, the Water Framework Directive and the Bird and Habitat Directives. The integrated system monitoring of the macrobenthos, water birds, vegetation and habitats or ecotopes provides information for the evaluation of the state and trends, the licensing policy, to set up objectives and metrics for European directives, the ecological recovery strategy for the Scheldt estuary and design, planning and evaluation of the associated measures. The research contributes to the research and monitoring (O&M) action of the Flemish-Dutch Scheldt Commission (VNSC) in the frame of the long-term vision for the Scheldt estuary, and is done in collaboration with the Agency for Maritime Transport, Waterwegen en Zeekanaal (W&Z), Flemish Environment Agency (VMM), University of Antwerp, Flanders Hydraulics Research, Deltares and IMARES. INBO is also responsible for the Flemish contribution with respect to the EU Water Framework Directive COAST group for the intercalibration.

The research group Aquatic Management of the department Management and Sustainable Use performs ichthyologic research in estuaries: monitoring and evaluation of estuarine fish stocks, set up indicators for the Water Framework Directive, research on habitat use and recovery, migration and migration bottlenecks, effects of pumping stations and hydropower, and preparing species recovery and species management plans (e.g. eel management plan).

The research group Ecosystem Management of the department Management and Sustainable Use focuses on the landscape dynamics in the coastal dunes, the inventorisation and mapping of focus species along the Flemish coast and in coastal and dune reserves, underpinning management plans, quantifying ecological effects of beach and sand suppletion and the development of measures for nature conservation and restoration.

INBO

Kliniekstraat 25
B-1070 Brussels

/ Flemish Institute for Technological Research (VITO)

www.vito.be

// institutional hierarchy

Flemish Government

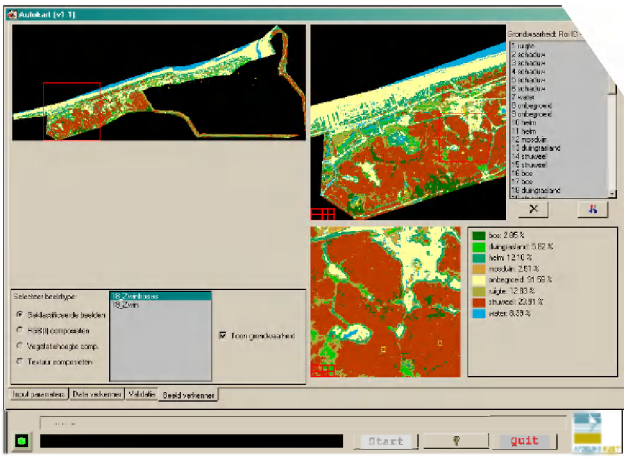
Policy area Economy, Science and Innovation

// head of the group

Ir. Dirk Fransaer

// research domain and discipline

Natural sciences; Earth sciences
Engineering and technology; Geomatics



// abstract

The Flemish Institute for Technological Research (VITO) is an independent research and consulting center, that makes innovative technologies and scientific knowledge practically applicable for governments and industry. VITO develops innovative technological solutions and provides scientifically underpinned advice and support to stimulate sustainable development and strengthen the economic and social environment in Flanders.

The Environmental Quality group performs marine research, concentrating on themes such as 'earth observation' (remote sensing) and 'environmental modeling'. VITO focuses research on the development and demonstration of image processing algorithms and related models, using (manned and unmanned) airplanes, water platforms as well as satellite observations (optical sensors). During the last 10 years, the Earth Observation department gained broad recognition on a national, European and global level. The research emphasis lies on monitoring and mapping of vegetation, sediment balance, water quality and oil pollution, effects of dredging activities, spatial extension of sediment plumes, etc., with the aim of ensuring better monitoring of environmental processes. Important applications within this research domain are the projects HYPERKART, HYECO, Belcolour I and II, and DIGIKART.

In the frame of environmental modeling research, VITO develops a service concerning hydrological models, water quality modeling, in-situ measurements of water quality and quantity, water management and flood risks, social cost-benefit analysis and the determination of ecosystem goods and services. Cooperation agreements were established regarding the planning and implementation of the Sigma plan, the social cost-benefit analysis in the Scheldt estuary and Flemish ports, coast lines and coastal protection. VITO has specialised research infrastructure for environmental research in coastal waters and estuaries.

VITO

Boeretang 200
B-2400 Mol

/ Flanders Marine Institute (VLIZ)

www.vliz.be

// institutional hierarchy

Flemish Government

Policy area Economy, Science and Innovation

// head of the group

Prof. dr. Jan Mees

// research domain and discipline

Engineering and technology; Information and computer sciences
Social sciences; Communication and media
Social sciences; Political sciences and policies

// abstract

Flanders Marine Institute (VLIZ) is an autonomous institute with the legal status of a non-profit organisation and was founded in 1999. VLIZ is the coordination and information platform for marine scientific research in Flanders, and is a node for marine and coastal research and acts as an international contact point. An important aspect is the fact that the VLIZ doesn't perform research but aims at supporting marine scientific research of existing research groups in the broadest sense. However, research projects may be initiated in collaboration with these research groups.

The tasks of VLIZ can be summarised as follow:

- Coordination and management of research infrastructure: coordination of ship time on the R/V Simon Stevin and the management of common research equipment and infrastructure;
- Management of the Flanders Marine Data and Information Centre (VMDC): integration in international networks and contribution to the development of international standards for the management and exchange of data and information;
- Marine library of marine scientific and coastal literature and multimedia;
- Platform to promote a network of marine scientists and stakeholders, and to advance the expertise in Flanders and provide the information to Belgian and foreign stakeholders;
- Supporting a sustainable and scientifically underpinned policy for coast and sea, by providing policy-relevant scientific information to coast-and-sea-professionals, scientists, policymakers and specific target groups;
- Management of an info desk. The info desk (communication and education) provides scientifically underpinned information to the general public, professionals, policy makers, teachers, …

VLIZ participates in numerous national and international marine research projects, concluded 18 cooperation agreements with national academic institutes and administrations, 5 cooperation agreements with foreign institutes, and is a member of 9 national and 27 international networks.

VLIZ

Wandelaarkaai 7
B-8400 Ostend

/ Flanders Hydraulics Research

www.watlab.be

// institutional hierarchy

Flemish Government

Policy area Mobility and Public Works

Department of Mobility and Public Works

// head of the group

Prof. dr. Frank Mostaert

// research domain and discipline

Natural sciences; Earth sciences
Engineering and technology; Civil engineering

// abstract

Flanders Hydraulics Research was founded in 1933, and was initially part of the Antwerpse Zeediensten until 1945. In this year the institute became a separate research department under the Ministry of Public Works, Administration Waterways and Marine Affairs. In 1989, integration took place in the Ministry of the Flemish Community, which included the merging of Flanders Hydraulics Research with the department of Hydrological Research. Since 2006, the laboratory is a division of the Technical Support Services of the department of Mobility and Public Works of the Flemish Government.

Flanders Hydraulics Research is active within four research fields:

- Coast and maritime access;
- Nautical research;
- Water management;
- Hydraulic constructions.

The research of the laboratory is targeted at 3 main topics:

- Safe and smooth manoeuvring of ships in Flemish ports and on Flemish inland waters;
- Optimisation of hydraulic constructions (ports, locks, dams, dikes, weirs);
- Developing efficient measures to control exceptional water levels in rivers.

More specifically, Flanders Hydraulics Research performs hydraulic and nautical studies for hydraulic constructions, harbours, rivers, the coast and the environment. The flow regime of important non-tidal rivers and canals is also studied, and the laboratory also performs studies of high importance for the management of waterways. The laboratory manages the hydrological monitoring network, warns flood risks in Flanders, carries out assignments for the Agency for Maritime and Coastal Services and performs analogue assignments for other Belgian and foreign governmental services as well as for private companies.

Flanders Hydraulics Research has a wide range of research infrastructure, from physical models (wave flume, wave basin, multifunctional test basin, towing tank, current flume, Scheldt and Zeebrugge model), ship simulators, a sediment laboratory to its own applied software. The laboratory also participates in several projects with both Belgian and foreign universities and institutes, with emphasis on cross-border collaboration regarding the Scheldt estuary.

** Content not validated by the respective research group*

WatLab

Berchemlei 115
B-2140 Borgerhout (Antwerp)

Universities of the Wallonia-Brussels Federation

// Université Catholique de Louvain

// Université Libre de Bruxelles

// University of Liège

// University of Mons

// University of Namur

Université Catholique de Louvain

// Science and Technology Sector

- Marine Biology Laboratory
- Lemaître Centre for Earth and Climate Research
- Applied Mechanics Unit
- Institute of Life Sciences
- Research pole Environmental Sciences

/ Marine Biology Laboratory (UCL)

http://sites.uclouvain.be/sc-bmar

// institutional hierarchy

Science and Technology Sector

Earth and Life Institute

Research pole: Biodiversity

// head of the group

Prof. dr. Jérôme Mallefet

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Marine Biology laboratory (BMAR) of the Université Catholique de Louvain mainly studies bioluminescence, but formerly also researched the marine biodiversity on ship wrecks on the Belgian continental shelf. This research unit frequently collaborates with other universities around the world, such as the University of Sydney (Australia), the University of Bergen (Norway), Goteborg University (Sweden), Victoria Museum (Australia), Otago University (New Zealand), University of California - Santa Barbara Campus (USA) and the Arago Laboratory and Observatoire de Roscoff (France). The group is also part of the Interuniversity Center for Marine Biology (CIBIM).

The laboratory conducts research on the following marine topics:

- Biodiversity of bioluminescence;
- The control mechanisms, function and evolution of bioluminescence in the class Ophiuroidea (echinoderms);
- The indicator function of bioluminescence during the regeneration process of echinoderms;
- Bioluminescence on the pelagic ringworm *Tomopteris*;
- Bioluminescence in sharks.

BMAR

Place Croix du Sud 3, box 4
B-1348 Louvain-la-Neuve

/ Lemaître Centre for Earth and Climate Research (UCL)

www.uclouvain.be/teclim.html

// institutional hierarchy

Science and Technology Sector

Earth and Life Institute

// head of the group

Prof. dr. Thierry Fichefet

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The Lemaître Centre for Earth and Climate Research (TECLIM) of the Université Catholique de Louvain aims to understand the functioning of the Earth system, with focus on climate and the relationship between human activities and the natural environment. The four main research themes of the centre involve past climatic changes, the current state of the earth and solar system as well as human-environment interactions and modeling.

The marine related research of TECLIM concerns climate, sea-ice and ocean models. The centre also models the anthropogenic effects on the Scheldt estuary and the North Sea.

** Content not validated by the respective research group*

TECLIM

Chemin du Cyclotron 2
B-1348 Louvain-la-Neuve

/ Applied Mechanics Unit (UCL)

www.uclouvain.be/mema.html

// institutional hierarchy

Science and Technology Sector

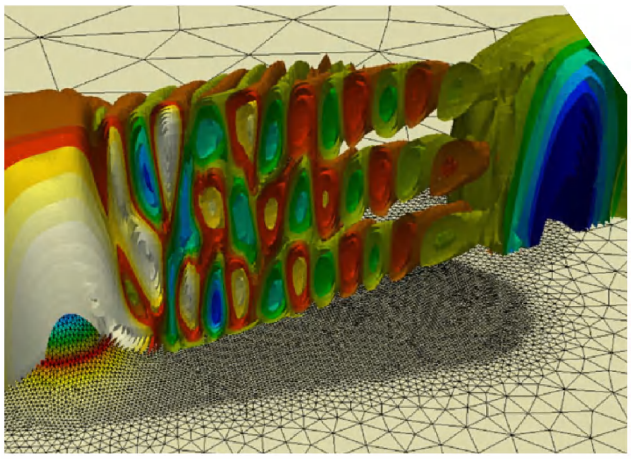
Institute of Mechanics, Materials and Civil Engineering

// head of the group

Prof. dr. Eric Deleersnijder

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The Applied Mechanics unit (MEMA) of the Université Catholique de Louvain studies the theoretical prediction of the behavior of solids and fluids using mathematical models and computer simulation techniques. Also, research is conducted regarding fluid mechanics, solid mechanics, simulation of industrial processes and numerical methods, as well as algorithms for scientific computations.

Within the marine field, the group investigates the modeling of anthropogenic effects on the Scheldt estuary and the North Sea (TIMOTHY) as well as the modeling of ocean circulations, sea level and sea ice through the use of various models (LIM, SLIM, CART).

** Content not validated by the respective research group*

MEMA

Avenue Georges Lemaître 4
B-1348 Louvain-la-Neuve

/ Institute of **Life Sciences (UCL)**

www.uclouvain.be/en-39083.html

// institutional hierarchy
Science and Technology Sector

// head of the group
Prof. dr. Bernard Knoops

// research domain and discipline
Natural sciences; Biological sciences

// abstract

The Institute of Life Sciences (ISV) of the Université Catholique de Louvain performs biological research using molecular and cellular methods. This research is applied on animals, plants, microorganisms as well as biomolecules. Within the research unit Animal Biology, marine related research is conducted on the following topics:

- The influence of pollutants such as PCB's on antioxidant enzymes in the muscles and liver of deep-sea fish;
- Antioxidant mechanisms of animals in the proximity of hydrothermal vents and other deep-sea fish;
- The toxicokinetics and physiological effects of organic contaminants on marine mammals, such as seals, sea lions, etc.

** Content not validated by the respective research group*

Institute of Life Sciences

Place Croix du Sud
B-1348 Louvain-la-Neuve

/ Research pole **Environmental Sciences (UCL)**

www.uclouvain.be/elie.html

// institutional hierarchy

Science and Technology Sector

Earth and Life Institute

// head of the group

Prof. dr. Emmanuel Hanert

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The branch Environmental Sciences of the Earth and Life Institute of the Université Catholique de Louvain was founded in 2008 and is strongly linked with and originates from the Applied Mechanics unit (MEMA) which is part of the same university but affiliated to a different institute (Institute of Mechanics, Materials and Civil Engineering (IMMC)). The research conducted by this group varies from fundamental to applied research which relates to many current societal concerns such as water and soil pollution, management of forests and nature reserves, functional ecology, soil erosion, land use, carbon and water cycle, the effect of climate change on biogeochemical cycles, etc. A key event during the existence of this group is the organisation of the '8th International Workshop on Unstructured Mesh Numerical Modeling of Coastal, Shelf and Ocean Flows', held in September 2009.

Marine topics studied by the Environmental Sciences group include:

- Ocean and sea currents by the aid of models (e.g. the SLIM model);
- The biogeochemical cycle of iron in the ocean.

The predicted vision of the branch Environmental Sciences is a landward shift in order to develop a multi-scale model of the land-sea continuum. They aim to model the water cycle and the dynamics of biogeochemical tracers from land towards the sea. Such a model should allow them to explicitly model the impact of land-based human activities on marine ecosystems.

Environmental Sciences

Place Croix du Sud
B-1348 Louvain-la-Neuve

Université Libre de Bruxelles

// Faculty of Science

- Biogeochemistry and Earth System Modelling group
- Research group Marine Biology
- Laboratory of Systems Ecology and Resource Management
- Laboratoire de Glaciologie
- G-Time

// Faculty of Applied Sciences / Polytechnic School

- Acoustics and Environmental Hydroacoustics lab

// Interfacultary School of Bio-Engineering

- Laboratory of Ecology of Aquatic System

/ Acoustics and Environmental Hydroacoustic Lab (ULB)

http://ehl.ulb.ac.be/index.htm

// institutional hierarchy

Faculty of Applied Sciences / Polytechnic School

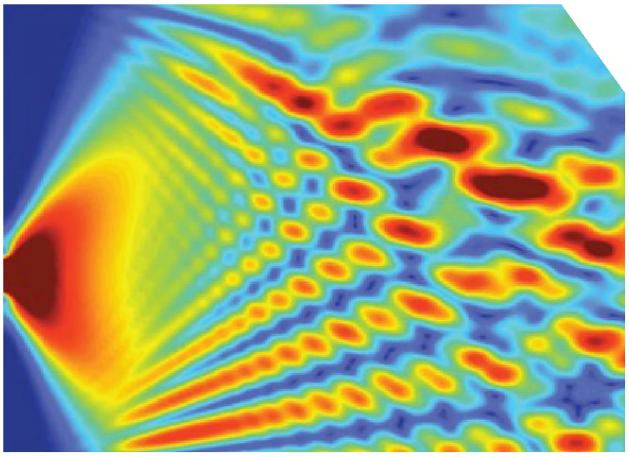
Laboratories of Image, Signal and Acoustics

// head of the group

Prof. dr. Jean-Pierre Hermand

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The Acoustics and Environmental Hydroacoustics laboratory (EHL) of the Université Libre de Bruxelles was founded in 2000. The laboratory specialises in the characterisation of marine and aquatic environments and ecosystems. This research is primarily conducted by acoustic means, covering a wide range of applications, e.g., geoacoustic characterisation of seafloor and near-surface sediment; acoustic tomography of coastal waters; monitoring of primary productivity in marine habitats; ultrasonic imaging of marine biological communities; subseafloor profiling at very high resolution; study of sediment dynamics in rivers and estuaries and the acoustics of Stone Age cultural sediment layers. Besides this, research on the physics of sound includes transdisciplinary collaborations in ultrasonic material characterisation and musical acoustics with Laborelec GDF Suez and the Museum of Musical Instruments (MIM). The laboratory has expertise and experience in the development and at-sea deployment of integrated systems of acoustic and oceanographic sensors, and in the subsequent data processing. The staff and partners of this laboratory are specialised in acoustics, geophysics, marine biology, applied mathematics, signal and image processing, and ocean engineering.

EHL

Av. F. D. Roosevelt 50, CP 165/57
B-1050 Brussels

/ Biogeochemistry and Earth System Modelling group (ULB)

www.biogeomod.net

// institutional hierarchy

Faculty of Science

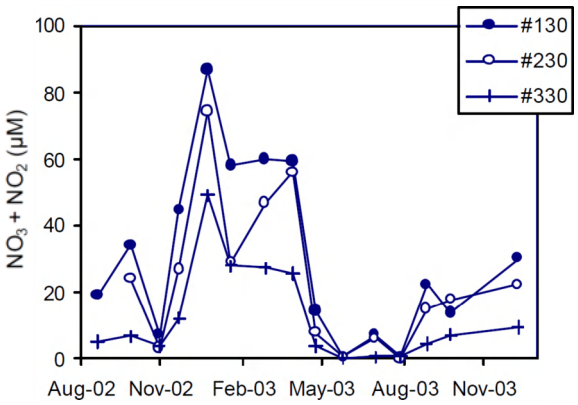
Department of Earth Science and Environment

// head of the group

Prof. dr. Lei Chou

// research domain and discipline

Natural sciences; Earth sciences
Natural sciences; Chemical sciences



// abstract

The Biogeochemistry and Earth System Modeling (BGéoSys) research group of the Université Libre de Bruxelles has expertise in a range of research fields, from the biogeochemistry of continental and marine systems, the kinetics of 'water – rock – microorganism' processes to the modeling of the Earth system. The group focuses mainly on the carbon and nutrient cycles and on their role in shaping the present and past climates on Earth.

More specifically, the research concentrates on:

- Modeling on the Earth system;
- Hydrological and biogeochemical cycles (C, N, P, Si, S, Fe): weathering, land – ocean – atmosphere exchange, marine (bio)geochemistry, early diagenesis and sedimentology;
- Geochemistry of contaminants (heavy metals, N, P) in aquatic and soil systems;
- Geomicrobial processes at the 'water – rock – microorganism' (i.e. fungi and bacteria)-interface;
- Carbon cycle, green-house gases (CO_2, CH_4, N_2O), ocean acidification, marine calcification and climate;
- Biogeochemical and geomicrobial dynamics in the sedimentary systems;
- Palaeoenvironments and palaeoclimate: archiving and tracing of processes in geological records.

The lab works in close collaboration with several renowned international universities and is involved in international projects regarding climate change (such as the CARBOOCEAN and EUR-OCEANS projects).

** Content not validated by the respective research group*

BGéoSys
Av. F. D. Roosevelt 50, CP 160/02
B-1050 Brussels

/ Research group **Marine Biology (ULB)**

www.ulb.ac.be/sciences/biomar

// institutional hierarchy

Faculty of Science

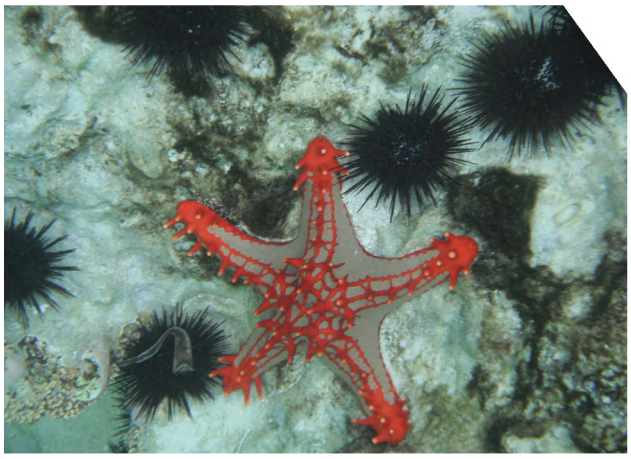
Department of Biology of Organisms

// head of the group

Prof. dr. Chantal De Ridder

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The research group Marine Biology (BIOMAR) of the Université Libre de Bruxelles focuses on the bio-ecology of marine benthic invertebrates, especially echinoderms. The following aspects are studied: aquaculture, biodiversity, biomineralisation, development, ecotoxicology, general biology, nutrition, reproduction and symbioses. The research group is a partner in the Interuniversity Center for Marine Biology (CIBIM).

** Content not validated by the respective research group*

BIOMAR

Av. F. D. Roosevelt 50, CP 160/15
B-1050 Brussels

/ Laboratory of **Ecology of Aquatic System (ULB)**

www.ulb.ac.be//assoc/esa

// institutional hierarchy

Interfacultary School of Bio-Engineering

// head of the group

Prof. dr. Christiane Lancelot

// research domain and discipline

Natural sciences; Biological sciences
Natural sciences; Earth sciences

// abstract

The laboratory of Ecology of Aquatic System (ESA) of the Université Libre de Bruxelles focuses on the study and modeling of the structure and functioning of aquatic systems and their response to natural and anthropogenic changes. For this study, field observations, process level studies under laboratory controlled conditions and numerical experimentation are combined. ESA participates in federal and European marine research projects on advanced modeling and research on eutrophication and has expertise in optical remote detection of substances in coastal waters.

Overall, ESA performs research on the role of oceans as a buffer in global climate change, aquatic microbial ecology, eutrophication of coastal waters and on toxic and harmful algal blooms, especially *Phaeocystis*.

ESA

Boulevard du Triomphe, CP 221
B-1050 Brussels

/ Laboratory of **Systems Ecology and Resource Management (ULB)**

www.ulb.ac.be/sciences/biocomplexity

// institutional hierarchy

Faculty of Science

Department of Biology of Organisms

// head of the group

Prof. dr. Farid Dahdouh-Guebas

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Systems Ecology and Resource Management laboratory of the Université Libre de Bruxelles was founded in 2007, and is the successor of the laboratory of Systematic Botany and Phytosociology and was initially called laboratory of Complexity and Dynamics of Tropical Systems. This research group seeks to understand and to predict how and why spatial and temporal dynamics in vegetation and landscape occur and mainly focuses on (sub) tropical vegetation and especially on mangrove-ecosystems. The lab works in close collaboration with the laboratory of Plant Biology and Nature Management of the Vrije Universiteit Brussel and is the general coordinator of the Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems. The group has already published their research in renowned journals such as Science and Current Biology.

In the marine domain, the group conducts research on mangroves, with links to neighbouring ecosystems such as coral reefs. The group adopts a retrospective approach, using relevant methods from different disciplines (botany, very high resolution remote sensing and ground truth, socio-ecologic survey research, historic archive research, ...) and integrative analysis (using GIS, multivariate and multicriteria analyses,...), in order to generate outputs relevant for a fundamental understanding of ecosystem functioning (status, resilience), for forecasting changes and for ecosystem management (preservation, restoration ecology). Within this framework the group also lays emphasis on ecological and ethological plant-animal and man-ecosystem interactions.

Systems Ecology and Resource Management

Av. F. D. Roosevelt 50, CP 169
B-1050 Brussels

/ Laboratoire de **Glaciologie (ULB)**

http://dev.ulb.ac.be/glaciol

// institutional hierarchy

Faculty of Science

Department of Earth Science and Environment

// head of the group

Prof. dr. Frank Pattyn

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The laboratoire de Glaciologie of the Université Libre de Bruxelles focuses on the study of glaciers and ice caps and their relationship with the climate system. The laboratory has expertise in the development of numerical ice cap models. Validation of these models is currently performed using land and airborne geophysics, including radio-echo sounding. The field work concentrates on polythermal glaciers and Antarctica. The group also focuses on properties of ice, such as the physicochemical properties of 'interface ice' (ice – bedrock; ice – ocean; ice – atmosphere). This expertise is based on polar expeditions and on the development of analytical techniques for the multi-parametric study of ice rich in solid or liquid impurities.

The marine component of the research performed by the group lies in the study of the dynamics of the calving of ice caps and in the contribution of their melting to rising sea level, and also in the study of biogeochemical cycles in sea ice and polar oceans (interaction with atmosphere).

The research group has several publications in the renowned journal Nature and is involved in several national and international marine projects such as the Ice2sea project (to assess the contribution of continental ice to the rising sea level) and the SIBClim project, which focuses on how ice in polar seas influences the Earth's climate.

Glaciology

Av. F. D. Roosevelt 50, CP 160-03
B-1050 Brussels

/ Laboratory **G-Time (Geochemistry: Tracing with Isotopes, Minerals and Elements) (ULB)**

http://gtime.ulb.ac.be

// institutional hierarchy

Faculty of Science

Department of Earth Science and Environment

// head of the group

Dr. Nadine Mattielli

// research domain and discipline

Natural sciences; Earth sciences
Natural sciences; Chemical sciences

// abstract

The G-Time (Geochemistry: Tracing with Isotopes, Minerals and Elements) laboratory of the Université Libre de Bruxelles (ULB) was founded in 2001 and was formerly known as the research unit IPE 'Isotopes: Petrology and Environment'. This group conducts research, by means of isotopic measurements, on biogeochemical cycles, igneous and sedimentary petrology, palaeoenvironmental reconstruction, and on inter-laboratory comparison and isotopic characterisation of standard reference material. Within this scope, the group is specialised in non-traditional stable isotopes such as Fe, Zn, Cu, Cd, etc.

The research group works in close collaboration with other laboratories of the ULB, Université Catholique de Louvain, University of Liège, Royal Museum for Central Africa and the Royal Belgium Institute of Natural Sciences. The group also collaborates with international institutes from France (Toulouse, Grenoble, Lille), The Netherlands (Royal Netherlands Institute for Sea Research), United Kingdom (Oxford), Canada (PCIGR), Portugal, etc.

In the marine field, the laboratory focuses on the following research topics:

- Contribution of Cu, Zn, Fe, Cd isotopes together with Pb isotopes to the study of Belgian North Sea metal fluxes, on the basis of estuary inputs and aerosol emissions from coastal industries;
- Marine biogeochemical cycle of Fe and other trace metals (and their isotopes) in the polar regions;
- Igneous and sedimentary petrology: research on the Kerguelen mantle plume (in the Indian Ocean), mantle plumes in the Atlantic Ocean and subduction zones.

In the future, G-Time will further focus on the study of biochemical cycles and on tracing the source of trace metals in the atmosphere, seawater, lithosphere and in old sediments. The research unit develops also expertise in planetology and early Earth environments (early crust, interactions between different planetary reservoirs through time, early life on Earth).

G-Time

Av. F. D. Roosevelt 50, CP 160/02
B-1050 Brussels

University of Liège

// Interfacultary Centre for Marine Research (MARE)

// Faculty of Veterinary Medicine

- Department of Morphology and Pathology

// Faculty of Sciences

- Research unit Clays, Sedimentary Geochemistry and Environments
- Animal Ecology and Ecotoxicology Laboratory; Marine Ecology Unit
- GeoHydrodynamics and Environment Research
- Mathematical Modelling and Methods
- Functional and Evolutionary Morphology Laboratory
- Chemical Oceanography Unit
- Laboratory of Oceanology
- Palaeobiogeology, Palaeobotany and Palaeopalynology Laboratory
- Sedimentary Petrology Laboratory

// Faculty of Applied Sciences

- Naval Architecture, Maritime Engineering, Inland and Sea Shipping and Transport System Analysis

/ Interfacultary Centre for Marine Research (MARE-ULg)

www2.ulg.ac.be/oceanbio/MARE

// point of contact

Prof. dr. Jean-Marie Beckers (director)

Prof. dr. Nathalie Fagel (president)

Prof. dr. Patrick Dauby (secretary)

// number of members

26

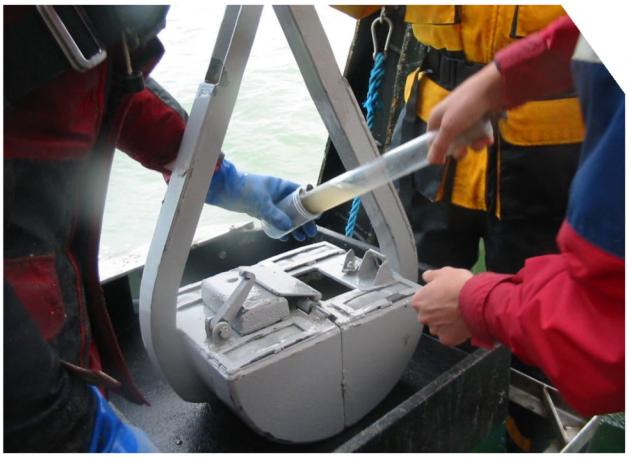
MARE
INTERFACULTARY CENTER FOR MARINE RESEARCH - LIEGE UNIVERSITY

// abstract

The research discipline 'oceanology' has grown during the last decennia together with the joint progresses in applied sciences (hydrography, marine hydrodynamics, coastal and offshore engineering) and fundamental sciences (marine chemistry, biology and geosciences). Integrating these complementary disciplines through pluridisciplinary field works (data aquisition), lab analyses, interpretation and mathematical modeling makes oceanology in essence a multidisciplinary research domain. The scope of oceanology extended during the last decennia in the frame of sustainable development, continent-ocean and atmosphere-ocean interactions and climate change. This discipline also includes socio-economic and legal aspects regarding the protection and exploitation of fish stocks in coastal areas and oceans. The consequences for public health caused by marine pollution and the overexploitation of marine resources, as well as the perspectives for discovering biochemical, medical or pharmaceutical substances in marine regions, have led to the integration of the discipline oceanology into biomedical and veterinary sciences.

This scientific environment has led to the foundation of the interfaculty research center MARE within the University of Liège. The main targets of MARE are:

- To coordinate interdisciplinary research at the different study sites throughout the world's oceans by providing a better integration between teams, as well for field works as for modeling;
- To accompany the broadening of these activities to new disciplines which should be associated to them in the framework of sustainable development programmes;
- To organise, within this scope, multidisciplinary cells of expertise and intervention, in order to respond to the community requests;
- To maintain, support and enlarge the extant set of second and third cycle teachings (Master in Oceanography, European DEA in Marine Environment Modeling) – unique in the French community of Belgium –, of a doctoral school, and of international conferences and colloquia (the International Liège Colloquium on Ocean Dynamics and associated symposia). The latter allow valorisation at local, European and international levels of research in the field of identification and knowledge of the fundamental problems that humankind will face in the future.



// partners

The partners of the MARE centre are:

1. Laboratory of Algology, Mycology and Experimental Systematics*
2. Laboratory of Animal Physiology*
3. Aquapôle*
4. Aquarium-Museum*
5. Naval Architecture, Maritime Engineering, Inland and Sea Shipping and Transport System Analysis
6. Research unit Clays, Sedimentary Geochemistry and Environments
7. Laboratory of Eco-Ethology and Zoogeography*
8. Animal Ecology and Ecotoxicology Laboratory
9. Economic and Social Geography*
10. Unit of Physical Geography and Quaternary*
11. GeoHydrodynamics and Environment Research
12. Geomatics unit*
13. Hydrogeology group*
14. Laboratory of Hydromechanics*
15. Centre for Protein Engineering*
16. Unit of International Economical Law*
17. Mathematical Modelling and Methods
18. Department of Morphology and Pathology
19. Functional and Evolutionary Morphology laboratory
20. Chemical Oceanography unit
21. Laboratory of Oceanology
22. Palaeobiogeology, Palaeobotany and Palaeopalynology laboratory
23. Petrology and Geochemistry unit*
24. Laboratory for Planetary and Atmospheric Physics*
25. Mass Spectrometry laboratory*
26. Laboratory of Systematics and Animal Diversity*

** currently do not meet the definition of a marine research group (see reading guide)*

/ Naval Architecture, Maritime Engineering, Inland and Sea Shipping and Transport System Analysis (ULg)

www-new.anast.ulg.ac.be

// institutional hierarchy

Faculty of Applied Sciences

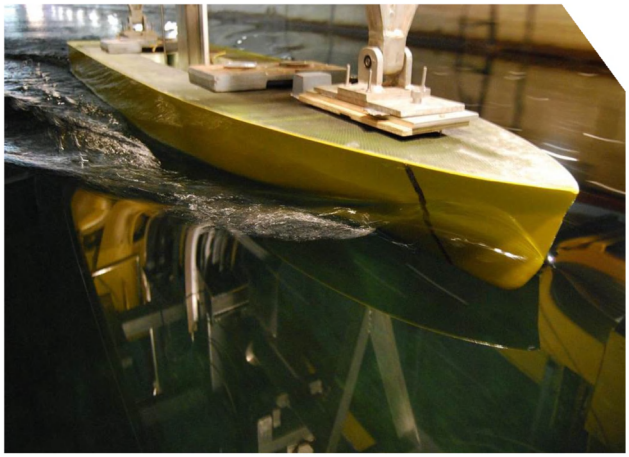
Department of Architecture, Geology, Environment and Constructions

// head of the group

Prof. dr. Philippe Rigo

// research domain and discipline

Engineering and technology; Civil engineering



// abstract

The research group Naval Architecture, Maritime Engineering, Inland and Sea Shipping and Transport System Analysis (ANAST) of the University of Liège studies multiple aspects of shipping. Their research activities concentrate on shipbuilding; sea transport; modeling of river-maritime and intermodal transport; telematics applied to the management of navigation material; the development of an integrated application software (CAD-CAE) for shipbuilding; optimisation of naval and floating structures; technical-economical comparative analysis on transport modes (+ intermodality); the development of a transport plan, mathematical modeling of future traffic flow; testing techniques after optimisation in towing tank; naval hydrodynamics and production simulation (space, flow).

The marine topics studied by this research unit are:

- Ship building and the development of an integrated application software (CAD-CAE) for ship building;
- Development and optimisation of high strength steel for offshore windmills (WindSteel);
- Development of a real-time and powerful asset integrity management system for offshore wind farms and an adaptive maintenance strategy (HLC-AIMS).

The research group collaborates with many institutes and universities worldwide and participates in several European and international research projects.

ANAST

Chemin des Chevreuils 1
B-4000 Liège

/ Research unit **Clays, Sedimentary Geochemistry and Environments (ULg)**

www.ages.ulg.be

// institutional hierarchy

Faculty of Sciences

Department of Geology

// head of the group

Prof. dr. Nathalie Fagel

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The research unit Clays, Sedimentary Geochemistry and Environments (AGEs) of the Geology department of University of Liège originates from the laboratoire de Géologie des Argiles et Sédimentologie des Silicoclastiques. This research group focuses on the study of Quaternary sediments, and in particular on their clay fractions, in order to apply this analysis to palaeoenvironmental and palaeoclimatological reconstructions. A multidisciplinary approach (sedimentology, mineralogy and geochemistry) is used to determine the origin and provenance of clay minerals.

Within the marine field, the research group reconstructs deep-sea circulation patterns of the North Atlantic Ocean using mineralogy and isotope analysis of sediments in order to better understand the relationships between ocean circulation changes and climate variability. Recent research involves palaeoenvironmental reconstructions in coastal and swamps settings.

AGEs

Sart-Tilman, B18
Allée du 6 Août
B-4000 Liège

/ Animal Ecology and Ecotoxicology Laboratory; Marine Ecology Unit (ULg)

www.leae.ulg.ac.be

// institutional hierarchy

Faculty of Sciences

Department of Biology, Ecology and Evolution

// head of the group

Dr. Mathieu Poulicek

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Animal Ecology and Ecotoxicology laboratory of the University of Liège was founded in 1967 under its former name laboratoire de Morphologie, Systématique et Ecologie Animales. The laboratory performs research regarding fresh water ecology, marine ecology and ecotoxicology. The former theme includes the study of the relationship between different plankton species and food selection by the rotifera ***Brachionus calyciflorus***. The ecotoxicological focus includes the study of the effect of pollution on an ecosystem and the impact of pollutants on organisms.

The Marine Ecology unit of the Animal Ecology and Ecotoxicology laboratory performs research on:

- Mediterranean ecosystems: the study of marine bacteria and the impact of ecological changes on those microorganisms, and the changing behavior of red weeds caused by (human-induced) changes in their environment;
- Coral ecology: study of the contribution of bacteria and an increasing temperature in the coral bleaching process as well as the study of marine micro-bacterial communities associated with corals;
- Malacology: systematics and ecology of molluscs.

The Marine Ecology unit collaborates with several French and Monégasque institutes in the BioCoB project, studying biomarkers for coral bleaching. The unit also participates within the research center STARESO (Station de Recherches Sous-marines et Océanographiques) on Corsica. Here, benthic and pelagic ecosystems are studied, as well as temporal changes (associated with climate change) in plankton and other organisms. This research is performed in order to predict how the marine system will respond to future changes.

LEAE - Marine Ecology

Sart-Tilman, B6C
Allée du 6 Août 15
B-4000 Liège

/ GeoHydrodynamics and Environment Research (ULg)

http://modb.oce.ulg.ac.be

// institutional hierarchy

Faculty of Sciences

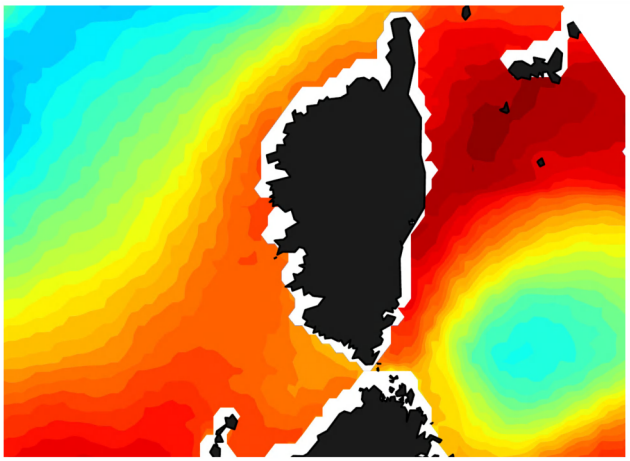
Department of Astrophysics, Geophysics and Oceanography

// head of the group

Prof. dr. Jean-Marie Beckers

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The research group GeoHydrodynamics and Environment Research (GHER) of the University of Liège was formerly known as unité d'Océanographie Physique. The group is devoted to marine and environmental studies and modeling.

In the seventies, in the framework of 'Project Sea', the GHER participated in the study of many different marine sites such as the North Sea, the Black Sea, the Aral Sea, the South China Sea, the Bering Sea, the Persian Gulf and the Mediterranean Sea. Present research activities focus on merging statistical data analysis with modeling into assimilated approaches, such as nested coastal models. Model verification using wavelets and other advanced statistical tools is another research focus, as well as cloud filling based on empirical orthogonal functions.

The research group participates in many European projects, such as EROS2000 and EUROMODEL, from which the Mediterranean 3D primitive equation hydrodynamic models resulted, and MERMAIDS, MODB, MEDAR and SeaDataNet (in which the oceanographic data base and data analysis tools were elaborated on). Furthermore, the GHER team is also responsible for the organisation of the International Liège Colloquium on Ocean Dynamics.

GHER

Sart-Tilman, B5
Allée du 6 Août 17
B-4000 Liège

/ Mathematical Modelling and Methods (ULg)

www2.ulg.ac.be/mathgen

// institutional hierarchy

Faculty of Applied Sciences

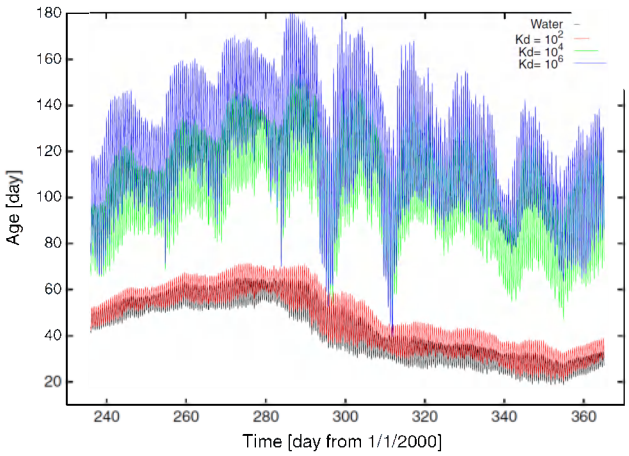
Department of Aerospatiale and Mechanics

// head of the group

Prof. dr. Eric J. M. Delhez

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The research group Mathematical Modelling and Methods of the University of Liège was founded in 1999, and stems from the research group GeoHydrodynamics and Environment Research (GHER), which still exists. The group mainly concentrates on the development of numerical and mathematical models. The marine research topics of this group include:

- The development of diagnostic instruments;
- Numerical modeling of ocean hydrodynamics;
- Mathematical modeling of hydrodynamic and biogeochemical processes of the ocean, sediment dynamics and transport of heavy metals.

In the near future, the research group will expand its research focus to the diagnosis of the transport of tracers and pollutants and their simulation with numerical models. The group participates in both national and international projects and collaborates with research groups inside and outside of Belgium.

Mathematical Modeling and Methods

Sart-Tilman, B37
Grande Traverse 12
B-4000 Liège

/ Department of **Morphology and Pathology (ULg)**

www.fmv.ulg.ac.be/cms/c_267191/fr/dept-de-morphologie-et-pathologie-dmp

// institutional hierarchy

Faculty of Veterinary Medicine

// head of the group

Prof. dr. Freddy Coignoul

// research domain and discipline

Agricultural and veterinary sciences; Veterinary sciences

// abstract

The marine research of the department of Morphology and Pathology of the University of Liège focuses on the pathology of seabirds and marine mammals, fish diseases, the diagnosis of animal diseases, micro-organism identification and animals' health. Since 1991, more than 1,500 necropsies have been performed on marine mammals stranded on the Belgian, Northern France and Dutch coastlines, which includes more than 20 large cetaceans such as sperm whales ***Physeter macrocephalus*** (Koksijde, 1994; Heist, 2012), a humpback whale ***Megaptera novaeangliae*** (Texel, The Netherlands, 2012), a fin whale ***Balænoptera physalus*** (Antwerp, 2009) and a minke whale ***Balænoptera acutorostrata*** (Nieuwpoort, 2012).

Within the marine domain, this group conducts research on the following topics:

- The quality of life of populations of harbour porpoise and harbour seals in the Northeast Atlantic (focusing on genetic and ecological aspects);
- The causes of death of marine mammals and the health of their populations;
- Diagnosis of animal diseases;
- The effect of pollutants on marine mammals.

The group will expand its focus on (1) zoonotic pathogens infecting animals (marine top predators) and humans, (2) the role of parasites and parasite intermediate hosts and (3) the impact of pollutants on marine mammal diseases. Some challenges faced by the group are creating new partnerships from which to obtain animal samples, the expansion of the Belgian Marine Mammal Biobank to a European level, the improvement of micro-organism identification methodologies, and the European standardisation of post-mortem investigations and the diagnosis of animal diseases.

This department participates in different national and international programs and collaborations focusing on washed up marine mammals in order to investigate their cause of death, examine the role of pathogens and pollutants and to improve their protection.

Morphology and Pathology

Sart-Tilman, B43a
Boulevard de Colonster 20
B-4000 Liège

/ Functional and Evolutionary Morphology Laboratory (ULg)

www2.ulg.ac.be/morfonct

// institutional hierarchy

Faculty of Sciences

Department of Biology, Ecology and Evolution

// head of the group

Prof. dr. Eric Parmentier

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Functional and Evolutionary Morphology laboratory of the University of Liège performs research on the relationships between the form of structures, developed functions and living conditions of (1) adult teleost fish and (2) arthropods in the course of their ontogeny.

The research includes the following marine topics:

- The relationships between Carapidae fish (Ophidiiformes) and their invertebrate hosts (sea cucumber, sea star, bivalve, etc.);
- The different factors explaining the biodiversity of Pomacentridae;
- The acoustic communication and mechanisms in different teleost taxa such as Pomacentridae and Ophidiiforms;
- The mechanism and role of the lateral line and inner ear of fish;
- Hearing in teleost fish.

In the near future, the group will also focus on the use of sound production to assess biodiversity. The research unit closely cooperates with several universities and scientific institutes on a national and an international level.

Functional and Evolutionary Morphology

Sart-Tilman, B6
Allée de la Chimie 3
B-4000 Liège

/ Chemical Oceanography Unit (ULg)

www.co2.ulg.ac.be

// institutional hierarchy

Faculty of Sciences

Department of Astrophysics, Geophysics and Oceanography

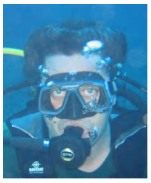


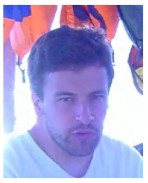

// head of the group

Dr. Alberto Vieira Borges

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The Chemical Oceanography unit of the University of Liège and originates from the Oceanology Laboratory and became an independent research unit within the department of Astrophysics, Geophysics and Oceanography in 1996. The research group studies biogeochemical cycles in oceans, coastal zones and estuaries, from tropical to polar environments, with an emphasis on gases that influence climate such as CO_2, CH_4, N_2O and dimethyl sulfide (DMS). Key events since the establishment of the group include a publication in the renowned journal Science about CO_2 emission from European estuaries (Frankignoulle et al., 1998 – Science), a publication of the first synthesis of CO_2 fluxes in coastal environments (Borges, 2005 – Estuaries), a publication of the first estimates of gas exchange between sea ice and the atmosphere (Delille et al., 2007 – Limnology and Oceanography) and the first measurements of CO_2 fluxes by eddy-covariance on Antarctic sea ice.

Within the marine and estuarine fields, this group performs research on the biogeochemistry of different systems, such as the Scheldt estuary, the Belgian coastal zone, the North Sea, the Bay of Biscay, coastal upwelling systems, mangrove ecosystems, tropical estuaries, sea ice (Arctic and Antarctic) and the Southern Ocean. Biogeochemistry studies are also performed on coccolithophores, ***Posidonia oceanica*** meadows and macrophyte coastal habitats. The group also studies the effects of ocean acidification on marine biogeochemistry, the global synthesis of CO_2 fluxes in continental shelves and the global synthesis of CO_2 and CH_4 fluxes in estuaries. In the future, the Chemical Oceanography unit will continue to study gases that influence climate, with a particular emphasis on establishing long-term time series.

The Chemical Oceanography unit collaborates with some renowned national and international universities and institutes such as the Vrije Universiteit Brussel (Belgium), Katholieke Universiteit Leuven (Belgium), Université Libre de Bruxelles (Belgium), the Bordeaux-I (France), Netherlands Institute of Ecology, Royal Netherlands Institute for Sea Research and the Dalhousie University (Canada). The research group also participates in several marine research projects, such as the European COCOS-project (to improve the exchange of datasets between different projects), CARBO-OCEAN (concerning an integrated assessment of marine carbon sources and sinks), PEACE (role of pelagic calcification and export of carbonate production in climate change) and the CANOPY-project (to assess the potential role of the Southern bight of the North Sea and the heavily polluted estuarine plumes, as sources or sinks of atmospheric carbon dioxide).

Chemical Oceanography

Sart-Tilman, B5
Allée de 6 Août 17
B-4000 Liège

/ Laboratory of **Oceanology (ULg)**

www2.ulg.ac.be/oceanbio

// institutional hierarchy

Faculty of Sciences

Department of Biology, Ecology and Evolution

// head of the group

Prof. dr. Jean-Marie Bouquegneau

// research domain and discipline

Natural sciences; Earth sciences
Natural sciences; Biological sciences

// abstract

The laboratory of Oceanology of the University of Liège studies a variety of topics such as seagrass ecology, marine ecotoxicology, the development of tools for the detection of pollution, coastal management, plankton and ecohydrodynamics, modeling of marine ecosystems, stable isotopes and food webs, and the accumulation of macrophytodetritus.

This research unit published studies related to the following marine topics:

- Sea grass ecology in the litoral zone of the Mediterranean Sea;
- The influence of stable carbon and nitrogen isotopes on marine animals and plants;
- The effect of climate variability and physical changes in the marine environment on phytoplankton, and the effect of variations in phytoplankton concentrations and diversity on the pelagic ecosystem;
- The ecotoxicology of marine vertebrates encompasses the study of the impact of pollution on different marine vertebrate species;
- The modeling of marine ecosystems: The research group makes mathematical models of various marine ecosystems, such as pelagic/benthic, oligotrophic/eutrophic and open water/coastal ecosystems. These models are used to study the ecosystem functioning in order to assess the influence of physical processes on ecosystem dynamics and to estimate the exchange of biogeochemical components between the coast, continental shelf and the deep sea;
- Accumulation of macrophytodetritus from macrophytes.

In the future, the group will continue its ongoing research, but will also expand its focus towards the study of emergent pollutants, stable isotopes and discrimination of the pollution sources, microplastics and modeling of marine fish. The laboratory participates in national and international projects dealing with oceans such as the European (FP7) project SESAME (assessing and modeling ecosystem changes of Mediterranean and Black Sea ecosystems), the Belgian project PEACE (to study the role of pelagic calcification and export of carbonate production in climate change) and the European MEDSEA project (dealing with Mediterranean Sea acidification due to the changing climate). The research group also collaborates with many institutes in and outside Europe.

Oceanology

Sart-Tilman, B6c
Allée de la Chimie 3
B-4000 Liège

/ Palaeobiogeology, Palaeobotany and Palaeopalynology Laboratory (ULg)

http://palaeobiogeo.weebly.com

// institutional hierarchy

Faculty of Sciences

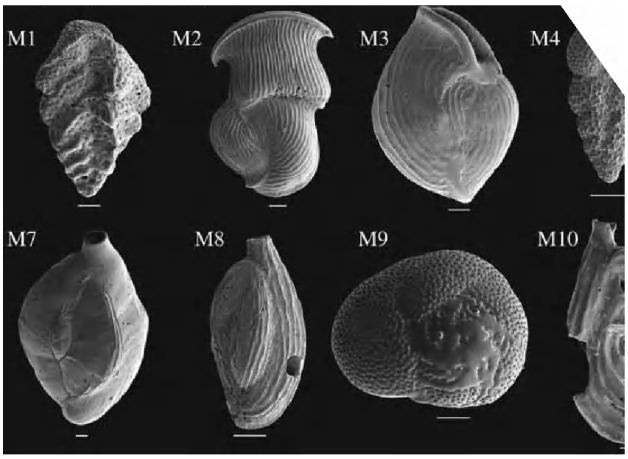
Department of Geology

// head of the group

Prof. dr. Emmanuelle Javaux

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The Palaeobiogeology, Palaeobotany and Palaeopalynology research unit (PPP) of Université de Liège exists under its present form and expertise since 2005. The group was formerly known as the Palaeobotany research unit (from the 1930s onwards) and the Palaeobotany-Palaeopalynology-Micropalaeontology research unit (from 1960s onwards), however, no marine topics were studied at that time. The research unit PPP performs research on the evolution of the early biosphere in marine and terrestrial environments, with emphasis on the topics palaeobiogeology (the study of the early evolution of life and the evolution of the interaction between the biosphere and the geosphere during the Precambrian), palaeobotany (the origin and evolution of land plants during the Mid Palaeozoic) and palaeopalynology (study of Palaeozoic fossilised spores).

The research unit studies the following marine topics:

- Evolution of the Precambrian biosphere (4 to 0.5 billion years ago) in relation with environmental changes;
- Origin, evolution, palaeobiology and palaeoecology of early eukaryotes, and diversification of prokaryotes, in particular cyanobacteria;
- Macro- to nano-scale analysis of fossilisation processes and determination of biological affinities of microfossils;
- Geobiology: microbial mats in siliciclastics from recent extreme environments (Antarctica) to the Precambrian (prokaryotes and protists) and preservation of biosignatures (diagenesis, metamorphosis);
- Characterisation of biosignatures for palaeobiology and astrobiology.

Future research will also focus on (1) traces of early life and their evolution, and implications for astrobiology, (2) the evolution of Precambrian eukaryotic plankton and benthos during changing redox and climate associated conditions of the Precambrian oceans and (3) the evolution and signatures of cyanobacteria. The challenges faced by the group include limited databases, and the taphonomy and incompleteness of fossil and rock records.

Key events since the establishment of the group are a publication in Nature (Javaux et al., 2010) and the Adolphe Wetrems Prize delivered to Prof. dr. Emmanuelle Javaux by the Royal Academy of Sciences, Fine Arts and Literature of Belgium, for her significant contribution to science. Further, PPP participates in various international projects such as the UNESCO IGCP project 'Changing Early Earth' and collaborates with both national and international research institutes.

PPP

Sart-Tilman, B18
Allée de 6 Août 17
B-4000 Liège

/ Sedimentary Petrology Laboratory (ULg)

www2.ulg.ac.be/geolsed

// institutional hierarchy

Faculty of Sciences

Department of Geology

// head of the group

Prof. dr. Frédéric Boulvain

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The Sedimentary Petrology laboratory of the University of Liège mainly studies Palaeozoic and Mesozoic carbonate-containing sediments. The research topics studied include reef and litoral sedimentation processes, basin dynamics, magnetic susceptibility, microbiological interference with sedimentation and diagenesis of carbonates.

Research topics related to the marine field are:

- Sedimentation processes and variations in magnetic susceptibility of sediment in order to reconstruct the palaeoenvironment. Changes in magnetic susceptibility are also used to detect sea level variations;
- Palaeozoic and Mesozoic coral reefs, mounds and atolls.

This group collaborates closely with the Royal Belgian Institute for Natural Sciences (RBINS).

Sedimentary Petrology

Sart-Tilman, B20
Boulevard du Rectorat 20
B-4000 Liège

University of Mons

// Faculty of Science

- Laboratory of Biology of Marine Organisms and Biomimetics
- Numerical Ecology of Aquatic Systems group

/ Laboratory of **Biology of Marine Organisms and Biomimetics (UMons)**

http://portail.umons.ac.be/FR/universite/facultes/fs/services/institut_bio/biologie_marine/Pages/default.aspx

// institutional hierarchy

Faculty of Science

Department of Biology

Research Institute for Biosciences

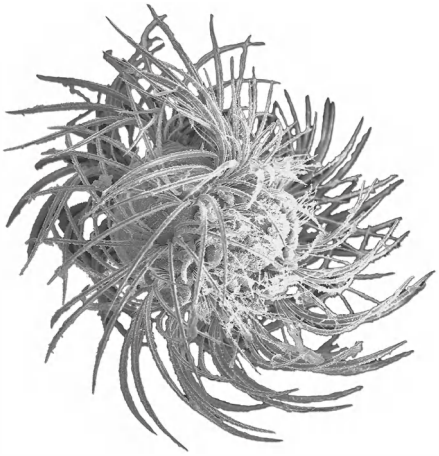
// head of the group

Prof. dr. Igor Eeckhaut

Prof. dr. Patrick Flammang

// research domain and discipline

Natural sciences; Biological sciences



// abstract

Research carried out within the laboratory of Biology of Marine Organisms and Biomimetics focus on three main axes: (1) socio-ecological aquacultures, (2) symbiosis and diseases and (3) biomimetics. The lab is part of the Interuniversity Center for Marine Biology (CIBIM).

'Socio-ecologic aquaculture' research addresses issues on aquacultures – particularly sea cucumber, algae and coral aquacultures – whose certain steps can be managed by poor coastal communities. Historically the group have had great success with the development of sea cucumber aquaculture and most of their published research for the aquaculture axis revolves around this subject. In particular we have been interested in the development of a method to allow the rearing of sea cucumbers in locally managed farms all year round. Since 2002 this method is patented, which led to the development in 2008 of Madagascar Holothurie SA, the first trade company based on sea cucumber aquaculture in Madagascar. In 2013, the group opened the Polyaquaculture Research Laboratory in Madagascar in collaboration with the Halieutic Institute and Marine Science of the University of Toliara.

The 'symbiosis and diseases' axis interests in marine organisms involved in parasitic, commensal or mutualist relation. The life cycle, ethiology and phylogeny of symbiotic prokaryonts and various symbiotic eukaryonts (e.g. ctenarians, flatworms, polychaetes, myzostomids, molluscs, echinoderms, fish) are studied in order to better understand the factors affecting or regulating the symbiotic interactions including those in diseases. Analytic methods used are varied and include electronic microscopy (TEM and SEM), DNA phylogeny and mass spectrometry.

The 'biomimetics' approach focuses on the different protein-based adhesion mechanisms developed by marine invertebrates. The aim of this research is to gain a detailed knowledge of biological adhesives in order to develop synthetic counterparts. All the adhesive systems of marine organisms differ by their mode of operation, their structure and the characteristics of their adhesive proteins. They are therefore complementary biological models for the study of bioadhesion in the marine environment.

BOMB

Avenue du champ de Mars 6
B-7000 Mons

/ Numerical Ecology of Aquatic Systems group (UMons)

http://econum.umons.ac.be/labo

// institutional hierarchy

Faculty of Science

Department of Biology

// head of the group

Prof. dr. Philippe Grosjean

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Numerical Ecology of Aquatic Systems group of the University of Mons studies hermatypic corals in artificial mesocosms. Focus lies on the adaptation potential of these animals to environmental changes (temperature, acidification and eutrophication). Furthermore, the research group also develops scientific software to automate the identification of plankton and for biostatistic purposes. The group is part of the Interuniversity Center for Marine Biology (CIBIM).

** Content not validated by the respective research group*

Numerical Ecology of Aquatic Systems

Avenue du Champ de Mars 6
B-7000 Mons

University of Namur

// Faculty of Sciences

- Research unit in Environmental and Evolutionary Biology

/ Research unit in **Environmental and Evolutionary Biology (UNamur)**

www.fundp.ac.be/sciences/biologie/urbe

// institutional hierarchy

Faculty of Sciences

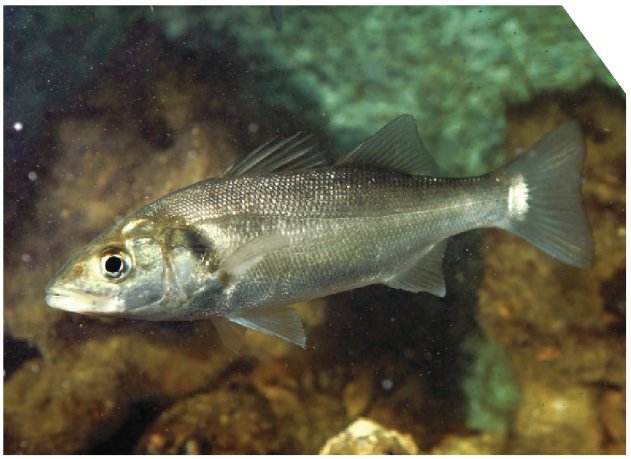
Department of Biology

// head of the group

Prof. dr. Patrick Kestemont

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The research unit in Environmental and Evolutionary Biology (URBE) of the University of Namur, formerly known as unité de recherche en Biologie des Organismes, studies living organisms (animals and plants), with a special focus on aquatic environments. The main research domains are the analysis of physiological and biochemical response towards environmental conditions and the ecology of freshwater ecosystems. The research topics range from the molecular and cellular mechanisms responsible for adaptations to changing environmental conditions, to the study of the functioning of aquatic ecosystems. Physiological and biochemical analysis is performed of the finless porpoise *Neophocaena phocaenoides*, the black tiger shrimp *Penaeus monodon* and the sea bass *Dicentrarchus labrax*.

** Content not validated by the respective research group*

URBE

Rue de Bruxelles 61
B-5000 Namur

Federal Scientific Institutes

// Royal Belgian Institute of Natural Sciences (RBINS)

// Royal Museum for Central Africa (RMCA)

/ Operational Direction **Earth and History of Life (RBINS)**

www.Natural sciences.be/

// institutional hierarchy

Royal Belgian Institute of Natural Sciences (RBINS)

// head of the group

Prof. dr. Pascal Godefroit

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The Direction Earth and History of Life is part of the Royal Belgian Institute of Natural Sciences (RBINS) which was founded in 1846 under its former name, the 'Koninklijk Natuurhistorisch Museum van België' (Royal Belgian Natural History Museum). This Direction includes the branches of the former departments Palaeontology (i.e. branches 'Micropalaeontology and palaeobotany', 'Fossil invertebrates', 'Fossil vertebrates' and 'Anthropology and prehistory') and the Geological Survey of Belgium (i.e. 'General Geology and Mineralogy' and 'Applied Geology and Geo-information').

The research activities of the former Palaeontology department are centered on five geological time spans: the Devonian, Carboniferous, Cretaceous, Tertiary and Quaternary periods. For the Devonian and Carboniferous periods, only marine fossils are studied, such as corals, brachiopods, ostracods and conodonts. While for the Cretaceous, Tertiary and Quaternary time spans, both marine (calcareous nannoplankton, phytoplankton, echinoids, brachiopods, molluscs, whales, otoliths of fish, and shark teeth) and continental fossils (xylography, reptiles, mammals, microfossils, anthracology and palynology, stratigraphy and sedimentology of loess deposits in the frame of archaeological and palaeontological research) are studied.

The former Geological Survey of Belgium (GSB) is founded in 1896, and functions as a department of the Royal Belgian Institute of Natural Sciences (RBINS) since 2002. The branches of the former GSB manage databases and collections about the Belgian geological substrate, validate and update datasets and make them available for research. In addition, the GSB fabricates cartographic material and initiates new geological research with emphasis on Belgian applications. Furthermore, the GSB has a tradition of carrying out public services and acts as the representative of the Belgian geological community. These activities are continued within the new structural framework.

Geological and geo-archaeological studies in the coastal zone focus on several subject areas including:

- Sedimentology of tidal deposits;
- Palaeogeographical reconstructions since the past 10 000 years;
- Geological sequence maps of Holocene deposits;
- Holocene sea level variations;
- Comparison of Eemian deposits in Belgium and UK;
- Sedimentology of marine Pleistocene deposits;
- Climate and environmental changes using geochemistry of Pleistocene bivalves (BiSpEem project).

In the near future the group will extend its focus on sea level variations during the past 2.000 years; the impact of human activities on coastal processes; the cause of coastal erosion since Roman times; the configuration of the southern North Sea during the Pleistocene and lastly, on comparing of the geochemistry of bivalves with other proxies such as speleothems which can provide an indication of the age of coastal deposits (BiSpEem project).

Moreover, the branches are involved in a number of marine projects and initiatives such as the European Marine Data and Observation Network (EMODNET-geology) and the European Marine Seismic Metadata and Information Centre (EUROSEISMIC). Also, the branches of the GSB collaborate intensively with the Direction Natural Environment (RBINS), Renard Centre of Marine Geology (RCMG, UGent) and the Union College Schenectady (Albany, USA).

OD Earth and History of Life

Vautierstraat 29
B-1000 Brussels

/ Operational Direction **Natural Environment (RBINS)**

www.Natural sciences.be/

// institutional hierarchy

Royal Belgian Institute of Natural Sciences (RBINS)

// head of the group

Dr. Patrick Roose

// research domain and discipline

Natural sciences; Biological sciences
Natural sciences; Earth sciences
Natural sciences; Chemical sciences
Engineering and technology; Information and computer sciences
Engineering and technology; Geomatics

// abstract

The Direction Natural Environment is part of the Royal Belgian Institute of Natural Sciences (RBINS) which was founded in 1846 under its former name, the 'Koninklijk Natuurhistorisch Museum van België' (Royal Belgian Natural History Museum). This Direction is a merger of the former Management Unit of the North Sea Mathematical Models and the Scheldt estuary (MUMM) with the departments Fresh Water Biology, Biological Evaluation and the services Belgian Biodiversity Platform and the National focal point to the Convention on biological diversity.

About ten researchers affiliated to the former MUMM are now working for the new scientific service MUMM, which continues the legal mandates of the former MUMM within the Direction Natural Environment. The Direction Natural Environment studies both biotic and abiotic components of the natural environment and of the interactions of underlying systems. For the marine environment, the research follows a system-oriented approach, often underpinned by modeling studies and with an important physical component. This research extends far beyond the Belgian boundaries.

The Direction performs scientific expertise in her competence domain. The Direction ensures a permanent monitoring programme of the North Sea and reports to the official services. It also coordinates a program to increase the knowledge about biodiversity in developing countries. It takes up an official role in several national bodies and represents or supports the State in diverse bodies and instruments. In certain cases it concerns legally bounded commitments. The Direction also manages several databases (Belgian Marine Datacenter, marine mammals, bird ringing, archiving of satellite images, …) which are available for scientists and the broader public.

Specifically for the marine environment, the Direction Natural Environment integrally took over the core tasks of the MUMM:

- Modeling: studying the ecosystems of the North Sea using mathematical modeling techniques, with a view to understand how they function and to providing certain forecasting capabilities;
- Monitoring: collecting marine information required to evaluate the state of the marine environment and to validate and adapt mathematical models;
- Management: via the scientific service MUMM, the Direction Natural Environment represents Belgium in diverse intergovernmental conventions dealing with the protection of the marine environment. Further, the MUMM elaborates the Belgian positions to be upheld and the implementation of decisions taken. This occurs under the authority of the Minister responsible for marine environmental policy.

The Direction Natural Environment also coordinates and manages the RV Belgica and is, through the scientific service MUMM, responsible for the Belgian North Sea Aerial Survey program tracing marine pollution. The Direction is also active in many national and international marine research projects such as MyOcean (Ocean monitoring and forecasting), EMODNET (European Marine Observation and Data Network) and SEAS-ERA.

The branch Freshwater Biology studies (1) the ecological strategies of freshwater organisms, (2) soil organisms in old lakes, (3) the taxonomy, phylogeny and ecology of certain taxa such as Ostracoda, Oligochaeta, Chironomidae and Rotifera and (4) genetic aspects in relation to the maintenance of biodiversity (for instance non-native amphibians).

Also, some research carried out by the Freshwater Biology branch overlaps with marine topics such as:

- Molecular phylogeny and phylogeography of Antarctic abyssal amphipods (Crustacea, Amphipoda, Gammaridea) and the relationship with abyssal species from oceans across the world;
- The biodiversity of freshwater and marine ecosystems.

OD Natural Environment

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/ Operational Direction **Natural Environment (RBINS)** *(continuation)*

// abstract (continuation)

This branch collaborates with several foreign institutes and participates in research projects including the AntaBIF project, aimed to build an Antarctic Biodiversity Information Facility. The AntaBIF project will proceed and will be a Belgian federal contribution to the European ESFRI project LIFEWATCH.

OD Natural Environment

Vautierstraat 29
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/ Operational Direction **Taxonomy and Phylogeny (RBINS)**

// institutional hierarchy

Royal Belgian Institute of Natural Sciences (RBINS)

// head of the group

Prof. dr. Thierry Backeljau

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Direction Taxonomy and Phylogeny is part of the Royal Belgian Institute of Natural Sciences (RBINS) which was founded in 1846 under its former name, the 'Koninklijk Natuurhistorisch Museum van België' (Royal Belgian Natural History Museum). The marine component of the Direction consists of the (partly) marine branches of the former departments Entomology (i.e. 'Insects' and 'Insects and Arachnomorphs') and Invertebrates (i.e. 'Malacology' and 'Recent Invertebrates').

The principle scientific research of the branches 'Insects' and 'Insects and Arachnomorphs' is centered around the study of the biological diversity of arachnids and insects. This includes research on taxonomy, phylogeny, ecology, population genetics, behavior, communication and chemical ecology. The department investigates certain coast-related aspects such as the use of ground beetles, spiders, ants, dagger flies and long-legged flies as bio-indicators in our coastal dunes: implications for conservation and evaluation of the impact of conservation measures on the fauna. This includes more specifically the study of the impact of sand suppletions on the ecosystem and the study of nature restoration and recolonisation on the beach.

The branches 'Malacology' and 'Recent Invertebrates' perform research regarding the taxonomy, phylogeny and population genetics and evolution of different invertebrate taxa such as Mollusca, Crustacea, Nematoda, Porifera, Cnidaria and Echinodermata. In addition, the department manages the collection of invertebrates (over 10 million specimens) including the famous mollusc collection of Dautzenberg. Lastly, the department is responsible for the development and maintenance of databases and it provides public services.

The former department 'Invertebrates' researches the following marine topics:

- Molecular systematics, taxonomy and population genetics of different animal groups (Mollusca in particular);
- Adaptive genetic divergence and ecological mechanisms of speciation in absence of geographical barriers: *Pogonus chalceus* (Coleoptera) from a historical salt extraction area as a test case;
- Revision and synopsis of Amphipoda in the Southern Ocean;
- SCAR-MarBIN "The Antarctic Marine Biodiversity Information Network";
- Biodiversity of free-living marine nematodes in Cuba;
- Morphological and systematic study of marine deep-sea nematodes from Campos Basin (Brazil);
- Taxonomy of Cyclopoida and Harpacticoida that originate from the North Atlantic deep-sea;
- The worldwide revision of Holothuriidae and Stichopodidae (Echinodermata, Holothuroidea, Aspidochirotida);
- Identification of sea cucumbers in the Indian Ocean;
- The taxonomy and biogeography of sponges from the Chilean fjords;
- The taxonomy, phylogeny and zoogeography of marine and brackish Ostracoda (worldwide);
- Distribution of exotic Crustacea in non-marine and estuarine waters in Belgium.

The Direction Taxonomy and Phylogeny features a DNA laboratory and an environmental scanning electron microscope (ESEM) and participates in several research projects.

OD Taxonomy and Phylogeny

Vautierstraat 29
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/ Department **African Zoology (RMCA)**

www.africamuseum.be

// institutional hierarchy
Royal Museum for Central Africa (RMCA)

// head of the group
Dr. Marc De Meyer

// research domain and discipline
Natural sciences; Biological sciences

// abstract

Within the Royal Museum for Central Africa (RMCA), founded in 1898, the department of African Zoology is divided into six branches, two of which comprise a marine or an estuarine component. These branches are: 'Non-insect invertebrates' and 'Vertebrates; research unit Ichthyology'. The former specialises in the systematics (classification) of diverse groups of animals which fall neither under vertebrates nor insects. This branch is mainly concerned with the study of spiders, mites, Diplopoda and certain marine organisms such as sea cucumbers. The scientists are specialised in the taxonomy, systematics and biogeography of African species. Their studies also focus on biodiversity, research of indicator species and the protection of terrestrial and aquatic fauna.

On the other hand, the branch 'Vertebrates; research unit Ichthyology' is among other things responsible for the database concerning African fresh water and brackish fish (FishBase for Africa).

In summary, research conducted on the marine and estuarine components by the department of African Zoology is related to the following topics:

- Taxonomic studies of sea cucumbers;
- FishBase: the largest worldwide fish-encyclopedia and scientific data source on fish. The RMCA is responsible for the African brackish and fresh water fish (www.FishBaseForAfrica.org).

In the future, the branch 'Non-insect invertebrates' will further delve into the taxonomic study of sea cucumbers. Also, this branch collaborates closely with the Royal Belgian Institute of Natural Sciences (RBINS), the Museum Victoria (Australia) and the University of Florida (USA).

African Zoology

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/ Department **Geology and Mineralogy** – Section **Mineralogy (RMCA)**

www.africamuseum.be

// institutional hierarchy

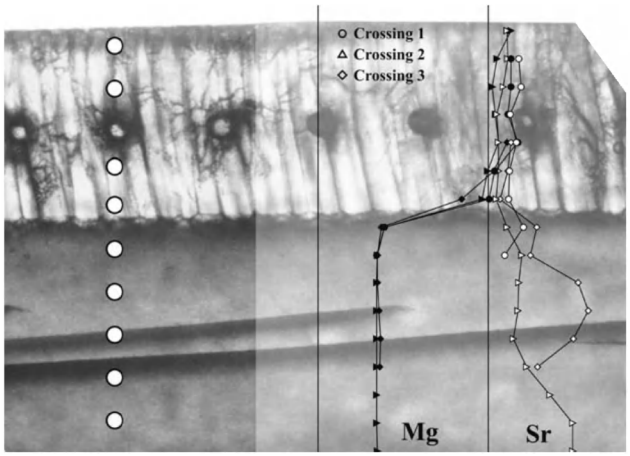
Royal Museum for Central Africa (RMCA)

// head of the group

Prof. dr. Luc André

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The branch Mineralogy falls under the Geology and Mineralogy department of the Royal Museum for Central Africa (RCMA) which was founded in 1898. The section is divided into three units: (1) Geochemistry of endogenous processes, petrology and mineralogy; (2) Bio- and hydrogeochemistry, environmental sciences and (3) Laboratory and analytical methodology. The research focuses on applied geochemistry, petrology and the distribution of chemical elements in different environments. The marine research activities include the study of biogeochemical cycles in seas and oceans. The group is also actively involved in several marine and estuarine research projects.

** Content not validated by the respective research group*

Geology and Mineralogy

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