BELGIAN MARINE RESEARCH

an overview - 2015

Colophon

The Brochure 'Belgian Marine Research - an overview' is a derived product of the Compendium for Coast and Sea: An integrated knowledge document on the socio-economic, ecological and institutional aspects of the coast and sea in Flanders and Belgium. The Compendium is the result of a collaboration between numerous research groups, administrations, societal organisations and consultation platforms with regard to the coast and sea. This initiative is coordinated by the Flanders Marine Institute (VLIZ).

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

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VLIZ

COMPENDIUM
KUST & ZEE / COAST & SEA

Introduction

Readers guide

The Brochure 'Belgian marine research - an overview' is a publication which relates to Chapter 1 of the Compendium for Coast and Sea concerning 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 focus on marine, maritime, 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. Furthermore, it intends to improve the communication and collaboration between the MRGs.

The marine research groups mentioned in this brochure comply with the following 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 funding from the government which is anchored in management agreements, covenants or arranged on another legal basis;
(4) Groups which do not belong to a university association are included in 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. With regard to marine innovation in companies and industry, 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 university associations', the 'Flemish scientific institutes', the 'Universities and graduate schools of the Wallonia-Brussels Federation' and the 'Federal scientific institutes'. In this brochure, institutes and their affiliated research groups are discussed according to the type of institution. In addition to the description of individual MRGs, this publication also discloses interfaculty marine/maritime research clusters. These clusters are discussed prior to 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, 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 VLIZ Integrated Marine Information System (IMIS) (*www.vliz.be*). 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 end of the URL of the webpage (http://www.vliz.be/imis/imis.php?module=institute&insid=ID).

This publication is accessible in an interactive way on the VLIZ-website (*www.vliz.be*) and the website of the Compendium for Coast and Sea (*www.compendiumkustenzee.be*). An overview of the available marine research infrastructure within the MRGs is given in the Catalogue 'Marine Research Infrastructure' (Pirlet et al., 2015).

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), covering 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 are active in the research domain of natural sciences (58%), followed by engineering and technology (20%), agricultural and veterinary sciences (8%), social sciences (7%), humanities (4%) and finally medical and health sciences (3%). On the level of research disciplines, 32% of the MRGs focus on biological sciences and 20% on earth sciences, followed by civil engineering (8%), chemical sciences (5%) and fisheries and aquaculture sciences (5%) (figure 2).

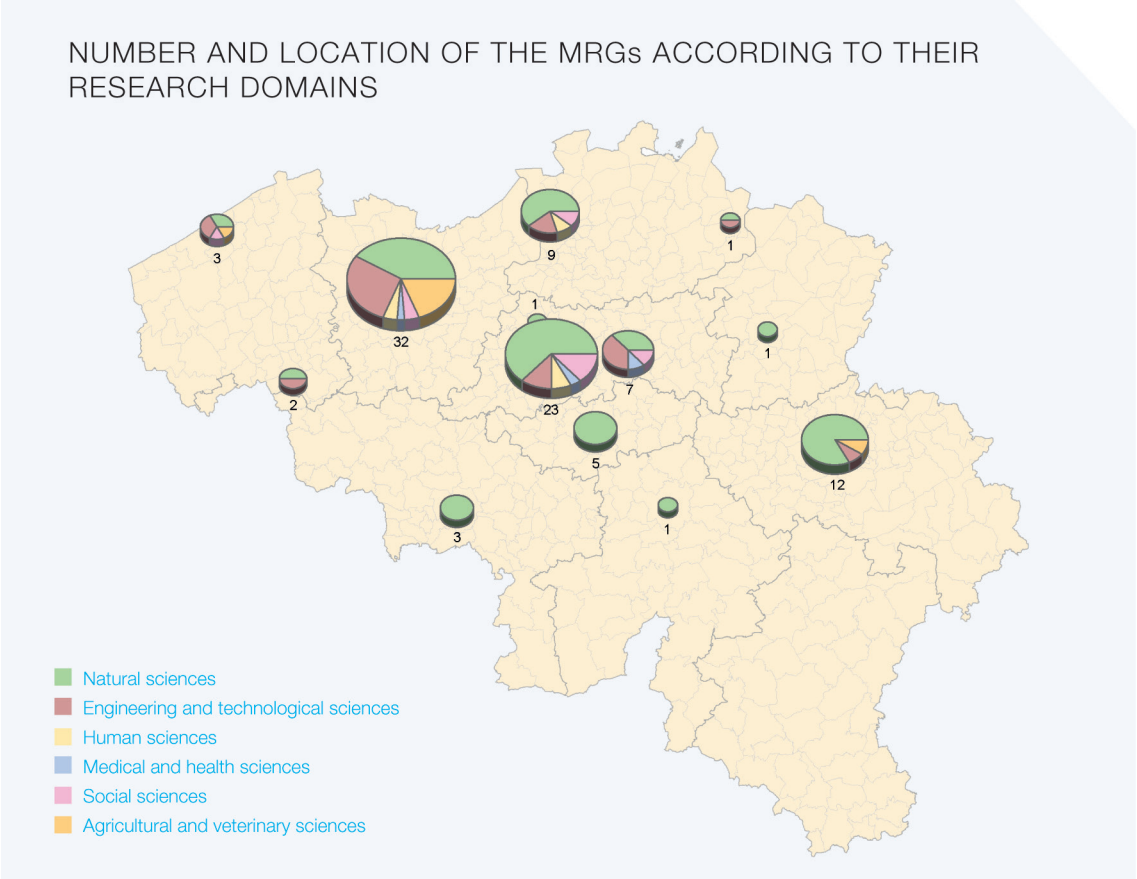


Figure 1. Number and location of the MRGs according to their research domains. * *Institutes can be located at several places and institutes can belong to multiple research fields.* **Source: Compendium for Coast and Sea (2015), Chapter 1.**

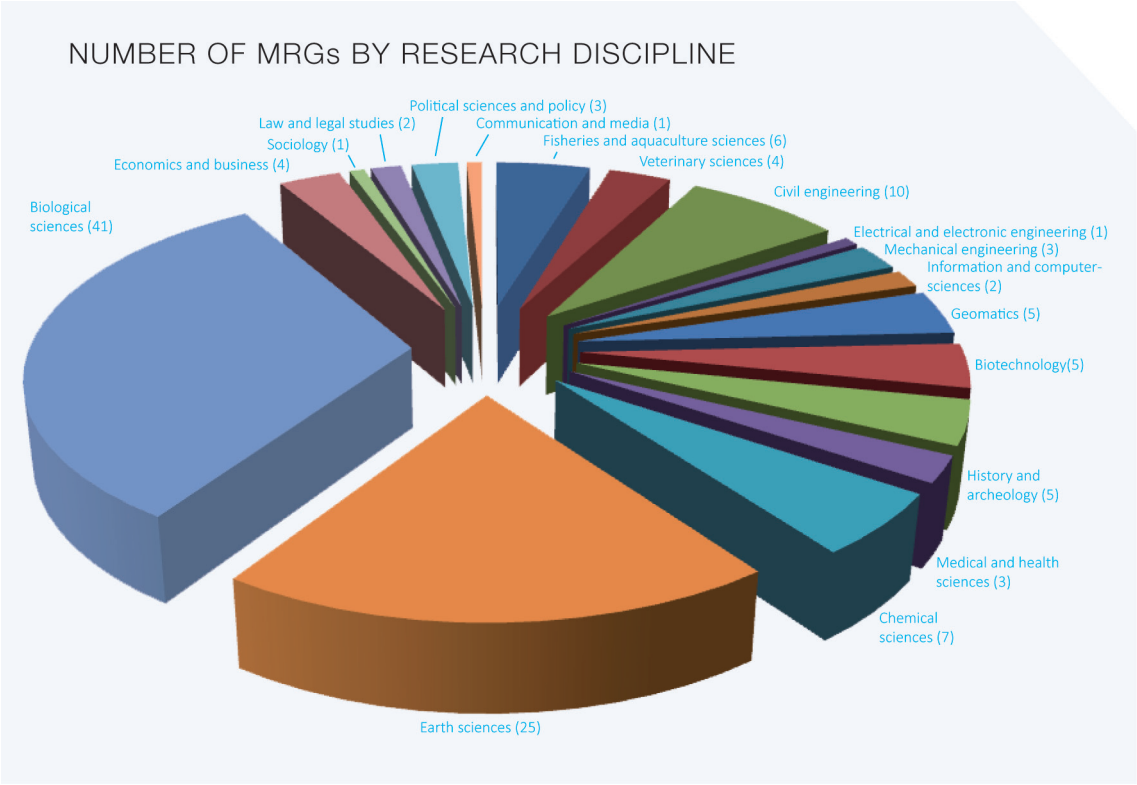


Figure 2. Number of MRGs by research discipline on 13 July 2015. * *Institutes can belong to multiple research disciplines.* **Source: Compendium for Coast and Sea (2015), Chapter 1.**

Antwerp University Association

KU Leuven University

Ghent University

- Natural sciences
- Engineering and technological sciences
- Human sciences
- Medical and health sciences
- Social sciences
- Agricultural and veterinary sciences

Hasselt University

Vrije Universiteit Brussel

Flemish Scientific Institutes

Haute École Paul-Henri Spaak

Université Catholique de Louvain

Université Libre de Bruxelles

University of Liège

University of Mons

University of Namur

Federal Scientific Institutes

Flemish University Associations

// Antwerp University Association (AUHA)

// KU Leuven University (KU Leuven)

// Ghent University (UGent)

// Hasselt University (UHasselt)

// Vrije Universiteit Brussel (VUB)

Antwerp University Association

// Faculty of Pharmaceutical, Biomedical and Veterinary Sciences

- Toxicological Centre

// Faculty of Arts and Philosophy

- Centre for Urban History

// Faculty of Applied Economic Sciences

- Department of Transport and Regional Economics

// Faculty of Science

- Ecosystem Management research group
- Laboratory of Ethology
- Research group Functional Morphology
- Research group Systemic Physiological and Ecotoxicological Research

// Other

- Antwerp Maritime Academy

/ **Ecosystem Management** research group (UAntwerpen)

www.ua.ac.be/ecobe

// institutional hierarchy

Faculty of Science

Biology Department

// 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 interface 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)

/ Laboratory of **Ethology** (UAntwerpen)

www.uantwerpen.be/en/rg/etho

// institutional hierarchy

Faculty of Science

Biology Department

// head of the group

Prof. dr. Marcel Eens

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The main research interest of the laboratory of Ethology is the study of the causes and consequences of variation in behavioural traits among individuals. Most studies are carried out within an ethological framework, focusing on all four major aspects of animal behaviour: causation, development, function and evolution. An integrated and multidisciplinary approach is used to study reproduction and sexual selection in different animal groups, but primarily in birds.

With regard to marine research, penguins are studied.

** Content not validated by the respective research group*

Ethology

Universiteitsplein 1
Campus Drie Eiken
2640 Antwerp

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

www.ua.ac.be/funmorph

// institutional hierarchy

Faculty of Science

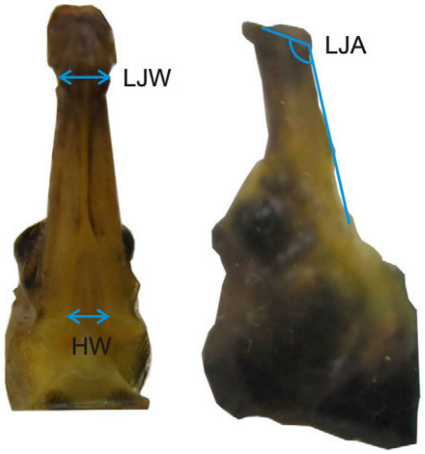
Biology Department

// 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 morphology and function of vertebrate musculoskeletal systems by combining comparative and experimental methods together with ecological and behavioural aspects. The group describes the shape of structural elements as well as their relationship (functional and mechanical) with each other and the environment.

In the marine field, the research group studies suction feeding in fishes.

Functional Morphology

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

/ Antwerp Maritime Academy (AUHA)

www.hzs.be

// institutional hierarchy
Antwerp Maritime Academy

// head of the group
Kapt. Patrick Blondé

// research domain and discipline
Engineering and technological sciences; Civil engineering

// abstract

The Antwerp Maritime Academy is the only academy in Belgium which provides education in Nautical Sciences and Marine Engineering. The courses are given both in Dutch and French.

The Nautical Sciences training consists of two cycles:

- At the end of the first three-year cycle, one can obtain a Bachelor's Degree in Nautical Sciences;
- At the end of the second cycle of one year, one can obtain a Master's Degree in Nautical Sciences.

The Marine Engineering training consists of a three-year cycle after which one obtains a Bachelor's Degree in Marine Engineering.

Education at the Antwerp Maritime Academy aims at two careers: one at sea as a Merchant Marine Officer, a long-distance Captain or a Chief Engineer; the other is an onshore career in a nautical-economic or nautical-technical function.

The courses taught at the Antwerp Maritime Academy meet stringent international and quality-standard requirements set by the IMO (International Maritime Organisation). Certificates from the Antwerp Maritime Academy are therefore fully compliant with IMO STCW-standards (Standards of Training, Certification and Watchkeeping). In Nautical Sciences, the STCW Operational Level is obtained at the completion of the bachelor cycle, while the STCW Management Level is a modular part of the master cycle. In Marine Engineering the STCW Management Level is already reached within the bachelor cycle.

Antwerp Maritime Academy

Noordkasteel Oost 6
2030 Antwerp

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

www.ua.ac.be/csg

// institutional hierarchy

Faculty of Arts and Philosophy

History Department

// head of the group

Prof. dr. Ilja Van Damme

Prof. dr. Tim Soens (marine researcher)

// research domain and discipline

Human sciences; History and archaeology

// abstract

The Centre for Urban History (CSG) of the University of Antwerp was founded in September 2004. CSG studies important aspects of the urban society, economy, ecology, culture and politics from the medieval period up until present time. 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 from 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 constitutes a prominent part of the research. Since 2013, the marine research is part of the research line 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 from 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** (UAntwerpen)

www.sphere.be

// institutional hierarchy

Faculty of Science

Biology Department

// 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 and was initially named laboratory of Biochemistry and General Zoology. SPHERE conducts research on important issues of environmental and adaptational biology. The research group focuses on how organisms respond to environmental changes with an 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 network of the research group includes both Belgian and international universities as well as Flemish scientific institutes such as the Institute for Agricultural and Fisheries Research (ILVO).

**** Based on input received in 2013***

SPHERE

Groenenborgerlaan 171/U7
B-2020 Antwerp

/ Toxicological Centre (UAntwerpen)

www.uantwerpen.be/en/rg/tox

// institutional hierarchy

Faculty of Pharmaceutical, Biomedical and Veterinary Sciences

Pharmaceutical Sciences Department

// 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 of two divisions, the Clinical Toxicology branch and the Environmental Research branch. The first branch performs clinical toxicological research, forensic research and routine analyses 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 of **Transport and Regional Economics** (UAntwerpen)

www.uAntwerp.be/en/rg/transport-and-regional-economics

// 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 of Transport and Regional Economics (TPR) of the University of Antwerp was founded in 1979 and performs research on the interface between general and business economics. The department focuses on freight transport, ports and the maritime sector, air transport, urban distribution, innovation in transport and logistics, the appraisal of infrastructure projects, strategic analyses 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 pipelines. 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 traditionally responds maximally to emerging challenges (related to society, industry as well as policy) 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.

The group studies the following maritime and port-related themes:

- Competition and cooperation in the maritime and port sector;
- Ports as junctions in the logistics chain;
- Productivity of terminals;
- Costs of maritime traffic;
- Ports policy;
- Strategic planning in ports;
- Traffic forecasting;
- Innovation in maritime transport and ports.

TPR is involved in various scientific networks such as TransportNET, the World Conference on Transport Research Society (WCTRS) and houses the Flemish Policy Research Centre of Commodity and Passenger Transport (MOBILO). Furthermore, researchers of this department hold leading 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 example the journal of 'Maritime Policy and Management'. Regarding education and research on maritime issues and port development, the group closely cooperates with the 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 of Technology and Vietnam Maritime University.

TPR

Prinsstraat 13
B-2000 Antwerp

KU Leuven University

// Biomedical Sciences Group

- Laboratory of Toxicology and Pharmacology

// Humanities and Social Sciences Group

- Public Governance Institute

// Science, Engineering and Technology Group

- Laboratory Aquatic Biology
- Laboratory of Biodiversity and Evolutionary Genomics
- Section Electrical Energy Computer Architectures
- Division of Geology
- Hydraulics laboratory
- Laboratory Food and Lipids

// Rega Institute

- Bioinformatics and (Eco-)systems Biology lab - Raes lab

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

www.kuleuven-kulak.be/biology

// institutional hierarchy

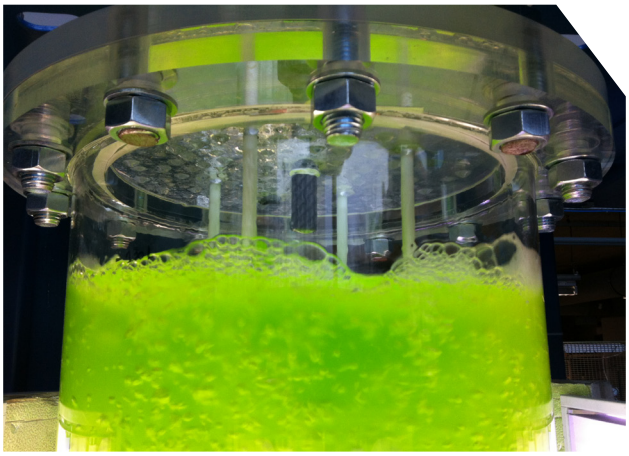
Science, Engineering and Technology Group (KULAK)

// head of the group

Prof. dr. Koenraad Muylaert

// research domain and discipline

Natural sciences; Biological sciences
Engineering and technological sciences; Biotechnology



// abstract

The laboratory Aquatic Biology of the KU Leuven University (branch Kortrijk, KULAK) was founded in 2008. The laboratory conducts fundamental and applied research with regard to aquatic microorganisms in both natural and artificial waters. The research focuses 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 feed. The main aim of the 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 studied 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. The group has to face several challenges, such as the cost-effective harvesting of microalgae, the development of techniques for the extraction and processing of omega-3 fatty acids from microalgae, the screening of microalgae for new antioxidants and the study of nutrient recuperation from waste streams by microalgae.

In the scope of the above-mentioned research, the laboratory collaborates intensively with the Agricultural University of Athens (Athens, Greece), IMDEA Energy (Madrid, Spain), National Renewable Energy Laboratories (Golden, USA), Sandia National Laboratories (Albuquerque, USA), Murdoch University (Murdoch, Australia), Universidade Federal de Rio Grande (Brazil) and the Instituto Tecnológico y de Estudios Superiores de Monterrey (Mexico).

Aquatic Biology

E. Sabbelaan 53
B-8500 Kortrijk

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

http://bio.kuleuven.be/eeb/lbeg

// 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 KU Leuven University, formerly known as the laboratory of Animal Diversity and Systematics, was founded in 1986. During its existence, the 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), bioarchaeology and fish systematics.

The laboratory participated in several research projects with a focus on the interface between ecology and evolution. Specific topics include the genetic structure of fish populations, connectivity, the co-evolution between fish hosts and parasites, the tracing and identification of fish, selection, the sustainable management of the North Sea and the impact of anthropogenic activities on fish populations. 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 parasitic flatworms;
- Archaeobiology of fish.

The laboratory aims to study the evolution of marine fish and their parasites based on the integration of the environment, phenotype and genotype, and archaeobiology. The group participates in a broad portfolio of European and national projects and cooperates closely 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
bus 2439
B-3000 Leuven

/ **Bioinformatics and (Eco-)system Biology** lab - **Raes** lab (KU Leuven)

www.raeslab.org

// institutional hierarchy

Rega Institute

Department of Microbiology and Immunology

// head of the group

Prof. dr. Jeroen Raes

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Raes lab combines large-scale, next-generation sequencing with novel computational approaches to investigate the functioning and variability of microbial communities. In addition, the lab focuses on the development of computational methods for the analysis of (next-generation) sequence data and the investigation of community properties from metagenomics, metatranscriptomics and meta-metabolomics data, which are applied in a wide range of environments (ocean, soil, etc.).

The marine research of the lab focuses on comparative metagenomics and metatranscriptomics of ocean plankton communities, from viruses to fish larvae. This research is also part of the Bioinformatics and (Eco-)systems Biology lab of VIB.

Raes lab

Campus Gasthuisberg
O&N I Herestraat 49, box 1028
3000 Leuven

/ Section **Electrical Energy Computer Architectures (ESAT-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 technological sciences; Electric and electronic engineering

// abstract

The research of the ESAT-ELECTA branch of the KU Leuven University covers a broad spectrum of electrical energy systems and the robust control of electrotechnical systems. More specifically, this group concentrates on the study of power systems, power quality, power electronics, information infrastructure and socio-economic issues. In this regard, the development of a future smart grid is a key objective.

The marine research component of this group concerns the techno-economic aspects of the energy production by offshore wind mills. In the future, ESAT-ELECTA will also focus on the following topics: expansion of offshore electricity networks, exploiting offshore electricity systems, coupling offshore networks to onshore networks and lastly, the storage of energy offshore.

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. The research group participates in several projects, including the Nemo Link project (electricity connection between Belgium and the United Kingdom).

** Based on input received in 2013*

ESAT - ELECTA

Kasteelpark Arenberg 10, bus 2445
B-3001 Heverlee

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

http://ees.kuleuven.be/geology

// institutional hierarchy

Science, Engineering and Technology Group

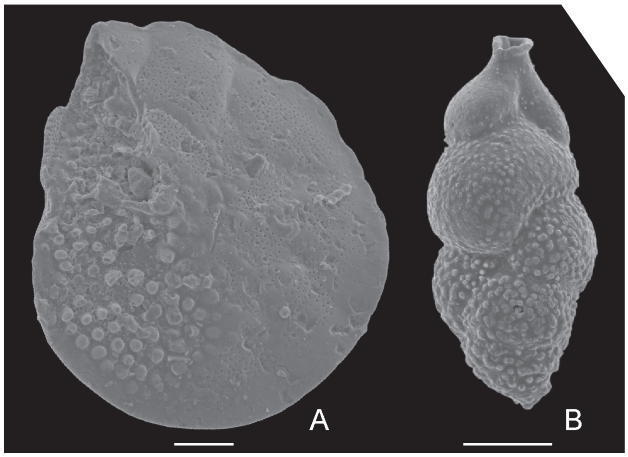
Department of Earth and Environmental Sciences

// head of the group

Prof. dr. Patrick Degryse

// research domain and discipline

Natural sciences; Earth sciences



// abstract

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

Geology

Celestijnenlaan 200E, bus 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 technological sciences; Civil engineering

// abstract

The Hydraulics laboratory of the KU Leuven University studies diverse marine topics. The laboratory conducts research on 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 modelling of tide and storm induced currents, modelling of erosion and transport of sediment, the modelling of the dynamic behaviour of cohesive sediment soils and morphological changes in estuaries and along coasts. Within this context, remote sensing observations play an important role.

Furthermore, 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,
bus 2448
B-3001 Heverlee

/ Public Governance Institute (KU Leuven)

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

// 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 Governance Institute of the KU Leuven University exists in its current form since 1998 and originated from the merger of two institutes: 'Vervolmakingscentrum voor Overheidsmanagement en Beleid' (founded after World War II) and 'Bestuur en Overheidsmanagement' (Political Sciences department). The institute provides a scientifically underpinned 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 fisheries policy.

** Content not validated by the respective research group*

Public Governance Institute

Parkstraat 45, bus 3609
B-3000 Leuven

/ Laboratory **Food and Lipids** (KU Leuven)

www.kuleuven-kulak.be/foodandlipids

// institutional hierarchy

Science, Engineering and Technology Group

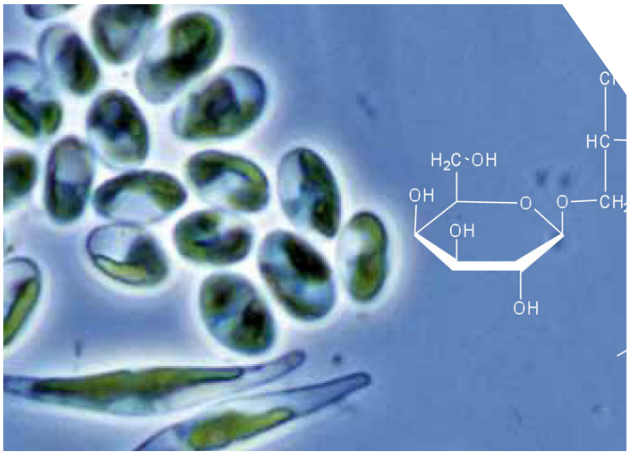
Department of Microbial and Molecular Systems

// head of the group

Prof. dr. Imogen Foubert

// research domain and discipline

Natural sciences; Biological sciences
Engineering and technological sciences; Biotechnology



// abstract

The laboratory Food and Lipids concentrates its research on the lipid (fat) fraction of foodstuffs. On the one hand, lipids are often under pressure from a health-conscious point of view but on the other hand they are essential for the sensory (e.g. taste), nutritional (e.g. essential fatty acids, fat soluble vitamins) and technological (e.g. spreadibility) properties of fat-rich food products. The mission of the laboratory is thus to conduct research facilitating the production of healthy/ier fat-rich food products without compromising the taste or the technological functionality.

The marine research of the laboratory is related to autotrophic microalgae as new sources of nutritionally-interesting lipids.The current focus is on the long-chain omega-3 fatty acids EPA and DHA, although work is also done on (phyto)sterols, carotenoids and other lipid-soluble antioxidants. The research investigates the possibilities of the microalgae (from a composition point of view) and how they can be applied in foodstuffs and nutraceuticals (downstream processing). Work is being done on drying, cell disruption, extraction and incorporation of biomass and oil in foodstuffs (e.g. in fruit and vegetable-based products and in eggs of laying hens feeded with microalgae).

Food and Lipids

Etienne Sabbelaan 53
8500 Kortrijk

/ Laboratory for **Toxicology and Pharmacology** (KU Leuven)

http://pharm.kuleuven.be/toxico/english/home.htm

// institutional hierarchy

Biomedical Sciences Group

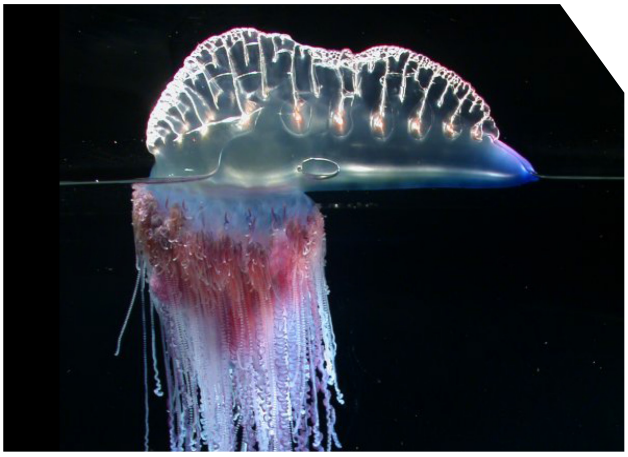
Department of Pharmaceutical and Pharmacological Sciences

// 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 Pharmacology of the KU Leuven University conducts research on substances foreign to the body (among which toxins) and studies the safety aspects and the composition of foodstuffs. At the request of the Belgian Court of Justice, the laboratory also performs forensic toxicological analyses and conducts research on biological samples (including post mortem) and confiscated products.

With regard to marine research, 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 Pharmacology also participated in the MAREX-project (2010-2014 - EU FP7) on exploring marine resources for bioactive compounds.

Toxicology and Pharmacology

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

Ghent University

// Marine@UGent consortium

// Faculty of Bioscience Engineering

- Research group Agro-food Marketing and Consumer Behavior
- 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
- Research group on Soil Spatial Inventory Techniques

// Faculty of Veterinary Medicine

- Laboratory for Chemical Analysis
- Department of Morphology
- Laboratory of Virology

// Faculty of Medicine and Health Sciences

- Department of Movement and Sport Sciences

// Faculty of Engineering and Architecture

- Hydraulics laboratory
- Magnel laboratory
- Maritime Technology division
- Center for Mobility and Spatial Planning
- Soete laboratory
- Department of Materials Science and Engineering
- Coastal Engineering, Bridges and Roads unit

// Faculty of Arts and Philosophy

- Department of Archaeology
- Research group Economy, Ecology and Demography

// Faculty of Law

- Maritime Institute

// Faculty of Sciences

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

/ Marine@UGent Consortium (UGent)

www.marineatugent.be

// point of contact

Prof. dr. Ann Vanreusel

// 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 founded the Marine Sciences Centre of Excellence, also known as 'Marine@UGent'.

This interfacultary consortium is composed of 30 research groups from six faculties (Bio-Engineering, Sciences, Engineering and Architecture, Law, Veterinary Medicine, and Medicine and Health Sciences) which conduct 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, seabed research, marine fossils, development of wave energy, coastal and marine spatial planning, maritime and coastal engineering, etc.

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

More information about Marine@UGent can be found on the following website (www.marineatugent.be).

** Content validated by the secretariat of the consortium in 2013*

// partners

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 unit
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. Laboratory for 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)*

/ Research group **Agro-food Marketing and Consumer Behavior** (UGent)

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

// institutional hierarchy

Faculty of Bioscience Engineering

Agricultural Economics Department

// 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 Agricultural Economics department (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 behaviour 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 labelling) on the opinions, perceptions, attitudes and choices of consumers.

The focus on consumer behaviour, 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 focused on the consumer perception of fish and fisheries products, the impact of communication and labelling, 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 labelling on the food choice;
- Perception of safety, health and sustainability of food and food production.

The research group participated 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.

** Based on input received in 2013*

Agro-food Marketing and Consumer Behavior

Coupure Links 653, block A
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. ir. Peter Bossier

// 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.

Aquaculture and ARC

Rozier 44
B-9000 Ghent

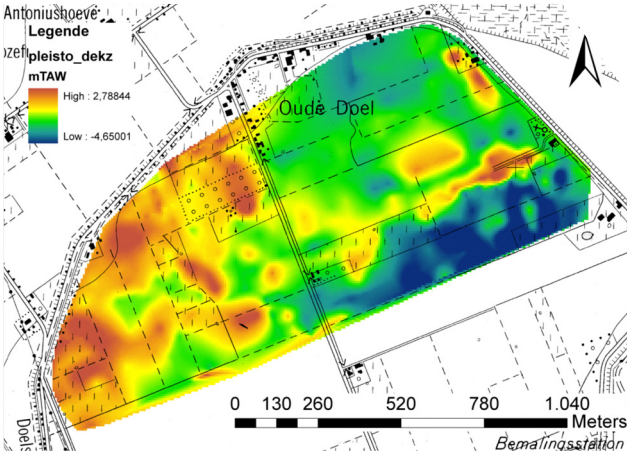
/ Department **Archaeology** (UGent)

www.archaeology.ugent.be/en

// institutional hierarchy
Faculty of Arts and Philosophy

// head of the group
Prof. dr. Philippe Crombé

// research domain and discipline
Human sciences; History and archaeology



// abstract

The department of Archaeology of Ghent University is composed out of five research units which perform archaeological research with a focus on different time periods.

For the prehistory and medieval historical periods, several research topics with a specific focus on the coastal area are studied. It concerns the following themes:

- An archaeological survey of the land-sea transition zone at Doelpolder Noord: impact of sea level rises on the palaeolandscape and human occupation from Prehistory to the Middle ages;
- Long distance raw material distribution in the Mesolithic of the southern North Sea basin;
- The late medieval and early post-medieval settlement of Middelburg (Flanders);
- Medieval Bruges and its associated ports. A landscape-archaeological approach to the Zwin-debate;
- A multidisciplinary investigation of the consumption of ceramics in the Zwin-Scheldt estuaries during the 15th - 18th centuries AD.

Archaeology

Sint-Pietersnieuwstraat 35 - Ufo
B-9000 Ghent

/ Department of **Movement and Sport Sciences** (UGent)

www.ugent.be/ge/bsw/en

// institutional hierarchy
Faculty of Medicine and Health Sciences

// head of the group
Prof. dr. Jan Bourgois

// research domain and discipline
Medical and health sciences; Medical and health sciences

// abstract

The department of Movement and Sport Sciences of Ghent University focuses on the following research lines: kinesiology, exercise physiology and training, sport management, physical activity, fitness and health and didactics of physical education.

The marine research (research group Exercise and Environmental Physiology) focuses on the physiology and epidemiology of injury in watersports such as rowing, sailing and kitesurfing, as well as on ocean environmental effects (cold water, waves, wind,…) on human physiology (thermoregulatory responses) and safety at sea and on the beach (drowning, resuscitation, lifeguarding).

Movement and Sport Sciences

Watersportlaan 2
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. ir. 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. LCA belongs to the department of Veterinary Public Health and Food Safety and has 35 years of experience in the detection of residues and contaminants in matrices of animal origin (BELAC accredited under ISO 17025). Based on this elaborate 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 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-MS^n, 2 LC-MS^n 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-(Q) Orbitrap-MS and U-HPLC-Q-q-ToF systems, which allow for multi-component screening, biomarker and metabolome studies. Furthermore, LCA participates in several national projects and collaborates intensively with the laboratory of Environmental Toxicology and Aquatic Ecology (UGent) and the Operational Directorate 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

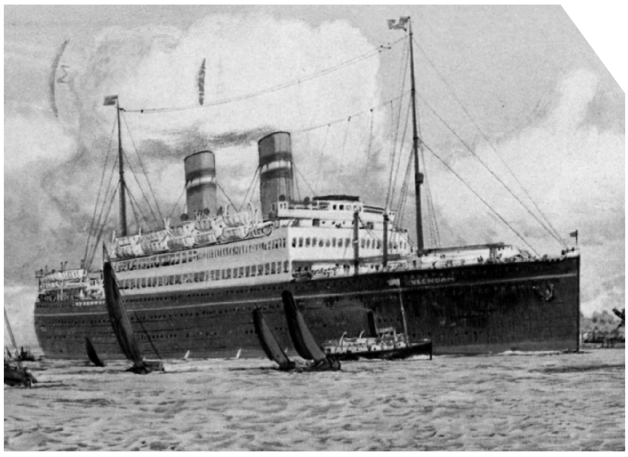
History Department

// head of the group

Prof. dr. Erik Thoen

// research domain and discipline

Human sciences; 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-economical 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 focuses on the following marine topics:

- 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-Leerstoel 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 (KU Leuven University), 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).

**** Based on input received in 2013***

EED

Sint-Pietersnieuwstraat 35
B-9000 Ghent

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

www.fun-morph.ugent.be

// institutional hierarchy

Faculty of Sciences

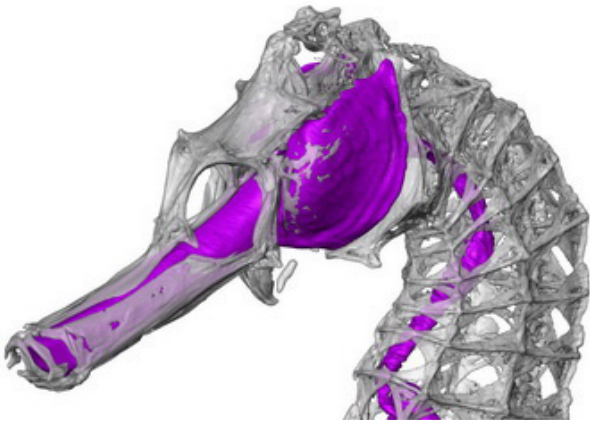
Department of Biology

// 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 marine (and other) fish, both from an evolutionary as applied (aquaculture) context. Projects on marine fish focus on syngnathid fish, European eel, seabass and gilthead sea bream. The group also performs research on the biomimetics and potential use of natural structures in industrial design (such as prehensile tail of seahorses). The group undertook three expeditions to Gabon (1999, 2000 and 2011) to collect fish species from lakes and rivers. They also 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 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 histology and 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 skeletal malformations in cultivated (aquaculture) fish and will contribute to the understanding of the role of phenotypic variation in head morphology of the European eel on its ecology and bio-accumulation of pollutants, as well as the elucidation of ontogenetic patterns of the feeding apparatus and performance in European and Japanese eel larvae.

The research group collaborates closely 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 is actively involved. The group is also member of the Marine@UGent consortium. Furthermore, the group collaborates intensively with the Centre for X-ray Tomography (UGent, UGCT) and the Institute for Nature and Forest Research (INBO).

Evolutionary Morphology of Vertebrates

K. L. Ledeganckstraat 35
B-9000 Ghent

/ Research group **Evolutionary Developmental Biology** (UGent)

www.evodevo.ugent.be

// institutional hierarchy

Faculty of Sciences

Department of Biology

// head of the group

Prof. dr. Ann Huysseune

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The research group Evolutionary Developmental Biology of the department of Biology at Ghent University focuses on the evolutionary developmental biology (evo-devo) of the vertebrate skeleton and dentition. With a tradition in morphology and histology, current research includes molecular, histochemical and cytochemical approaches to unravel the basic processes of vertebrate skeletal development. Naturally, the aim of the conducted research is to relate the features of selected skeletal or dental elements with specific biochemical and molecular events. Finally, the findings are placed in an evolutionary perspective.

The lab is specialised in the analysis of both cartilaginous and bony fish, including widely-used model organisms like the catshark (***Scyliorhinus canicula***), the bichir (***Polypterus senegalus***), the zebrafish (***Danio rerio***) and various species of cichlids (Cichlidae). Moreover, farmed species such as Atlantic salmon (***Salmo salar***) are studied as well. Other studies within the group extend to non-mammalian model organisms such as the clawed frog (***Xenopus***).

The lab has active collaborations and ongoing projects together with leading scientists and institutions in the United States, Canada, Singapore, France, Portugal and Norway.

Evolutionary Developmental Biology

K.L. Ledeganckstraat 35
B-9000 Ghent

/ **Phycology** research group (UGent)

www.phycology.ugent.be

// institutional hierarchy

Faculty of Sciences

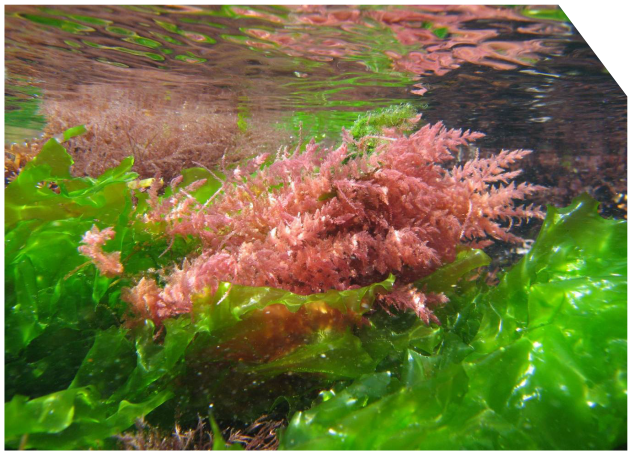
Department of Biology

// 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 90s 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: the study of 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 modelling, remote sensing of spatial and temporal changes in seaweed communities);
- Taxonomy and diversity: the group has extensive experience in this research domain and remains committed to this discipline, focusing on DNA research and statistical morphometrics;
- Invasive biology: the group uses correlative and mechanistic modelling techniques to predict the spread and eventual range of invasive marine macroalgae. The latter technique makes use of physiological data related to growth under different environmental conditions.

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 ensures the future of Algaebase. 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

/ Geomatics (UGent)

http://geoweb.ugent.be/cartogis

// institutional hierarchy

Faculty of Sciences

Department of Geography

// head of the group

Prof. dr. Philippe De Maeyer

// research domain and discipline

Engineering and technological sciences; Geomatics

// abstract

The Geomatics division 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 littoral and marine modelling 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).

** Based on input received in 2013*

Geomatics

Krijgslaan 281, building S8
B-9000 Ghent

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

www.earthweb.ugent.be/index.php?/public/en_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 research group Groundwater Modeling 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 coastal areas;
- Water quality in coastal areas;
- Water quality as a tracer in groundwater layers in coastal areas;
- Ground water extraction management in the Belgian coastal areas;
- 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 dune areas;
- Impact of climate change on the coastal hydrology.

The research group Groundwater Modeling participates in international projects including a project in Qatar regarding the environmental assessment and management options for the Abu Nakhla sewage pond.

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. ir. Tom De Mulder

// research domain and discipline

Engineering and technological sciences; 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 controlled inundation plains 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.

** Based on input received in 2013*

Hydraulics

Sint-Pietersnieuwstraat 41
B-9000 Ghent

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

www.foodscience.ugent.be/LFMFP

// institutional hierarchy

Faculty of Bioscience Engineering

Department of Food Safety and Food Quality

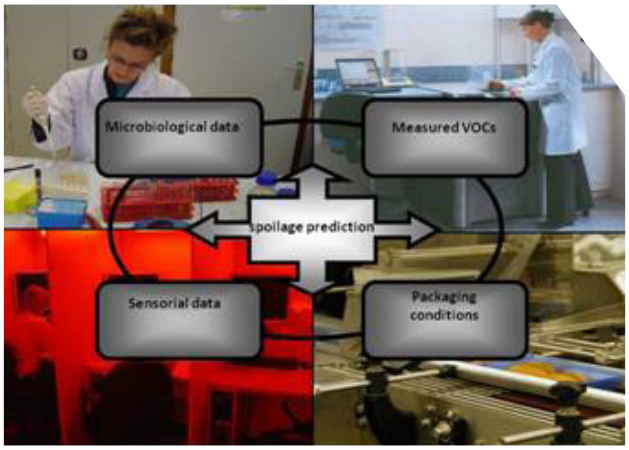
// head of the group

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 gradually expanded since its establishment due to an increasing awareness 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 behaviour 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 the preservation 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;
- Packaging of 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, etc.);
- Methods to assess the microbial risks in fish and fishery products;
- Viruses in ready-made food, such as shellfish;
- Pangasius processing.

In the future, the laboratory will focus on the further development of certain aspects regarding microbial food safety (detection of food pathogens and viruses), predictive microbiology (quantitative insights into the microbial behaviour of food products) and minimal preservation (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, block B
B-9000 Ghent

/ **Magnel** laboratory (UGent)

www.ugent.be/ea/structural-engineering/en/research/magnel

// institutional hierarchy

Faculty of Engineering and Architecture

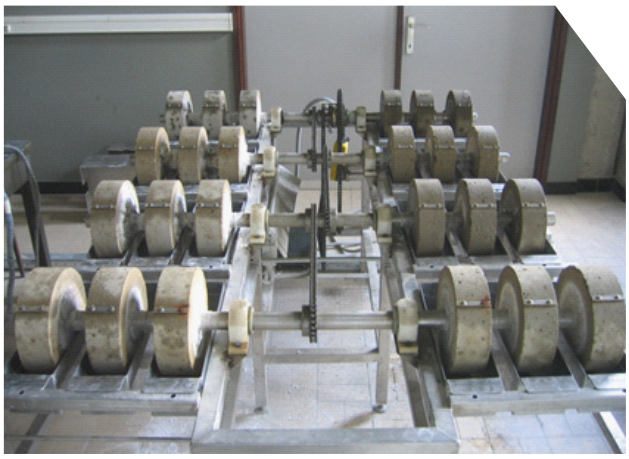
Department of Structural Engineering

// head of the group

Prof. dr. ir. Luc Taerwe

// research domain and discipline

Engineering and technological sciences; Civil engineering



// abstract

The Magnel laboratory was founded in 1926 and has a long-standing tradition in the study of a wide variety of aspects related to concrete and cementitious materials. The research focuses on the following topics:

- Structural behaviour of concrete;
- Concrete technology;
- Concrete and environment.

The marine research focuses on concrete durability in aggressive environments. The main topic in this field is the behaviour of concrete when exposed to chlorides and sulphates, mainly in a submerged marine environment. In order to study the marine degradation mechanisms more realistically, the combined attack of chlorides and sulphates is investigated. Furthermore, the influence of mechanical loading on the resistance against chloride penetration is also a research topic.

In addition, the influence of exposure to marine environments on the rebar corrosion process is investigated. A basic experimental characterisation of the concrete in terms of chloride and corrosion resistance should allow for an adequate service life prediction based on commonly-used models such as the one described in DuraCrete or fib Bulletin 34. In this context, specific attention is now being paid to self-healing concrete. Self-healing concrete is perceived as a possible solution to prevent early-age cracking and prolong the service life of concrete structures in marine environments (bridges, tunnels, port infrastructure, etc.).

Magnel

Technologiepark – Zwijnaarde 904
B-9052 Ghent

/ **Marine Biology** research group (UGent)

www.marinebiology.ugent.be

// institutional hierarchy

Faculty of Sciences

Department of Biology

// head of the group

Prof. dr. Ann Vanreusel

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Marine Biology research group (MARBIOL) of Ghent University was founded in the 70s. The group performs ecological and systematic research on marine ecosystems. Since its foundation, there has been a geographical expansion of the study areas, from the Belgian coast, North Sea and adjacent estuaries to a wider 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 fisheries, marine spatial planning and nature conservation constitute important elements in the valorisation of the 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 along continental margins, cold-water corals, seeps, hydrothermal vents, polymetallic nodule fields, abyssal plains and the impact of deep-sea mining activities;
- The study of polar offshore and coastal habitats;
- The study of temperate coastal ecosystems (e.g. North Sea and adjacent estuaries), including sandbanks, beaches, seagrass beds and tidal marshes (bioturbation, nursery function, etc.);
- The study of marine benthic webs and biogeochemical fluxes: the role of functional biodiversity in ecosystem services; approaches include stable isotopes, fatty acids, NGS-based diet analyses, etc.;
- Effects of environmental changes and stressors on behaviour and physiology of benthic invertebrates and fish, trophic interactions, functional responses traced by trophic biomarkers;
- Constructing biodiversity databases for ecological modelling and marine spatial planning;
- Taxonomic research and barcoding of marine organisms: a.o. Nematoda and Copepoda (harpacticoid copepods);
- Population genetics and habitat connectivity;
- Evolutionary ecology of marine nematodes and other key marine species;
- Fish migration behaviour and habitat use;
- Sustainable 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, etc.);
- Marine spatial planning and nature conservation;
- Invasive species;
- Ecological modelling / habitat mapping.

In the future, the group will further focus on the impact of disturbances (including global climate change) on coastal, deep-sea and polar ecosystems, the importance of biodiversity for marine ecosystem functioning, and ecosystem-based fisheries and its 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 numerous national, international and European marine research projects (e.g. FP6, FP7,H2020).

MARBIOL

Krijgslaan 281, building S8
B-9000 Ghent

/ Maritime Institute (UGent)

http://maritieminstituut.ugent.be

// institutional hierarchy

Faculty of Law

Department of European, Public and International Law

// head of the group

Prof. dr. Frank Maes

// 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 roots of the institute lie within the Faculty of Law. Its main research topics are: international law of the sea, international and European environmental law and biodiversity law, sustainable management of the North Sea, marine protected areas, 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, the law with regard to fresh-water bodies as well as climate change. The conducted research often has 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, extensive lecturing experience on a Master and Master after Master level in various faculties of Ghent University (law, political sciences, sciences, bioscience engineering) as well as in other Belgian universities (Vrije Universiteit Brussel and University of Antwerp). The Maritime Institute coordinates the Master in Maritime Sciences since 1986 and the Permanent Training in Port Management since 2001. In addition, the institute organises an annual thematic Maritime Symposium since 1996.

A key moment for the institute was winning the Award '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 drafting of the decree on integrated water policy 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 its effects on the sea, offshore renewable energy, international law of the sea, marine protected areas and protection of underwater culture heritage. The institute is internationally renowned for its participation in European and national projects, as well as for their cooperation with many European research institutes.

Maritime Institute

Universiteitstraat 4
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 technological sciences; Civil engineering

// abstract

In 1904, the research unit Naval Architecture (Ghent University) was founded, which can be considered as the precursor 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 the academic education regarding the design, construction, propulsion, functioning and maintenance of marine structures such as ships, but also offshore constructions. The second objective concerns the 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 maritime hydrodynamics, i.e. the behaviour of ships and other floating structures in the water. The emphasis lies on two main themes:

- Energy extraction from sea waves by using floating structures;
- The behaviour 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 a focus on manoeuvring simulations), influence of fluid mud layers on ship behaviour (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 estuarine 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. Furthermore, scientific advice is provided for the lock model and the 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 technological sciences; 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 the development of 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 is involved in several European and national marine research projects.

LabMET

Coupure Links 653
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 (including marine microbiology). The laboratory also holds the Belgian Coordinated 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;
- Identification and classification of new marine bacteria.

The group is active within national and international projects and collaborates intensively with laboratories within Ghent University, such as the Marine Biology research group, the Phycology research group, laboratory of Protistology and Aquatic Ecology and the laboratory of Microbial Ecology and Technology. The laboratory is a member of the Marine@UGent consortium and participates in the European Marine Biological Resource Centre (EMBRC).

Microbiology

K. L. Ledeganckstraat 35
B-9000 Ghent

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

www.ecotox.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 (GhEnToxLab) 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 GhEnToxLab focuses on both fundamental and applied aspects of aquatic ecotoxicology, stress ecology and ecological risk assessment.

Past and present research topics are:

- 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);
- Development and use of advanced (semi-)automated monitoring (e.g. video plankton recorder) and molecular techniques (e.g. eDNA and sequencing) for monitoring marine systems (biodiversity) and assessment of stress and/or impact;
- Study of the presence and ecological effects of existing and new chemical substances in the marine environment (endocrine disruptors, persistent substances, pharmaceutical substances, etc.) using new techniques (e.g. passive samplers);
- Occurrence, uptake and effects of marine litter with particular emphasis on the risks posed to humans and the environment with regard to microplastics;
- Study of ecological processes (e.g. competition and predation) on biodiversity, ecosystem functioning and structure of marine systems under stress;
- Development and validation of ecosystem models for the evaluation of indirect and direct effects of environmental contaminants and other stressors on the aquatic environment;
- Experimental and modelling approaches to understand and assess the occurrence and effects of Harmful Algal Blooms (HAB) toxins in marine environments. This research is part of the further development of the “Oceans and Human Health” research area at GhEnToxLab.

The current and future research strategy of GhEnToxLab is to further expand its marine research. Given the global concern regarding the health and use of our seas and oceans, GhEnToxLab will continue to focus on how emerging stressors (including HABs) as well as combinations of multiple stressors (including global change) affect marine systems, from the molecular level to the population and community level. The ultimate aim is to incorporate this knowledge in ecological risk management frameworks and environmental policy.

GhEnToxLab collaborates with both Belgian and foreign research institutes, participates in the UGent Aquaculture R&D consortium and the IOF consortium Aquaculture Ghent University. This lab is also the founder of the interfaculty research consortium Marine@UGent, and is/was the coordinator (or participant in) 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); INRAM (Integrated Risk Assessment and Monitoring of micropollutants in the Belgian coastal zone) and NEWSTHEPS (New strategies for monitoring and risk assessment of hazardous chemicals in the marine environment with passive samplers).

GhEnToxLab

Jozef Plateaustraat 22
B-9000 Ghent

/ Center for **Mobility and Spatial Planning** (UGent)

www.planning.ugent.be/en

// institutional hierarchy

Faculty of Engineering and Architecture

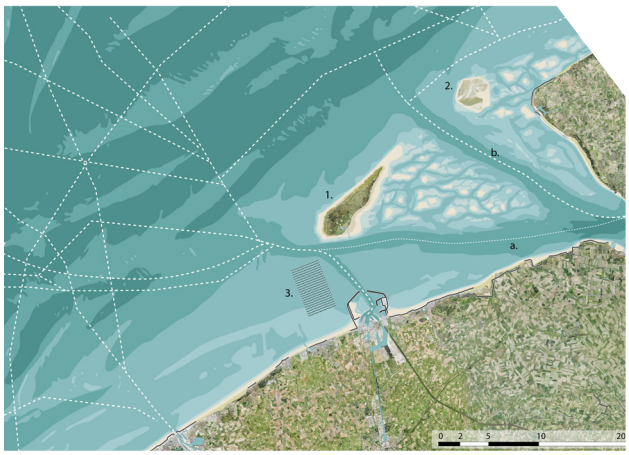
Department of Civil Engineering

// head of the group

Prof. dr. ir. Luuk Boelens

// research domain and discipline

Engineering and technological sciences; Civil engineering
Engineering and technological sciences; 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.

Mobility and Spatial Planning

Vrijdagmarkt 10/301
B-9000 Ghent

/ Department of **Morphology** (UGent)

www.morfologie.ugent.be

// institutional hierarchy

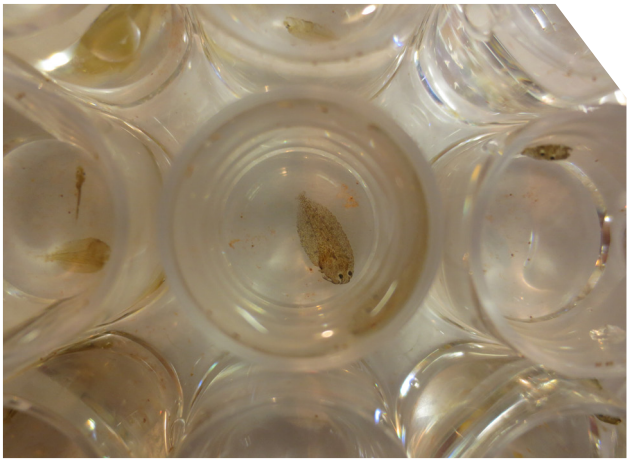
Faculty of Veterinary Medicine

// head of the group

Prof. dr. Paul Simoens

// research domain and discipline

Agriculture and fisheries sciences; Fisheries and aquaculture sciences
Agriculture and fisheries sciences; Veterinary sciences



// abstract

The department of Morphology of Ghent University studies the physique of animals, especially of pets, horses and 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 the circulatory system, mechanisms of angiogenesis during embryonic development and aquatic veterinary medicine.

Within the aquatic veterinary medicine branch, the 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 their activity in larvae is still unknown. Consequently, there is an increasing scientific and practical interest in unraveling the host-microbial interactions in early larval stages;
- 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 intends 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 the department of Pathology, Bacteriology and Poultry Diseases. The department of Morphology is also part of the UGent Aquaculture R&D consortium, the IOF consortium Aquaculture Ghent University and the Marine@UGent consortium.

The Morphology Museum is also part of this department. The museum manages a didactic and research collection in the comparative morphology of vertebrates. The emphasis lies on the museum objects of classic pets, horses and farm animals. The museum has extensive 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 and has established an intensive collaboration with the Operantional Directorate Natural Environment (RBINS) regarding this topic. The museum is furthermore involved in the recovery and conservation of stranded marine mammals along the Belgian coast.

Morphology

Salisburylaan 133
B-9820 Merelbeke

/ **Nematology** research unit (UGent)

www.ugent.be/we/biology/en/research/nematology

// institutional hierarchy

Faculty of Sciences

Department of Biology

// head of the group

Prof. dr. Wim Bert

// research domain and discipline

Natural sciences; Biological sciences

// abstract

Since the 1930s, the Nematology research unit has developed experience in nematological research, especially in taxonomy, morphology and phylogeny. Currently, the group focuses on the taxonomy, phylogeny, morphology and biology of nematodes from natural and agricultural ecosystems including free-living, plant-parasitic, virus-vector families and entomopathogenic nematodes.

Research is conducted on marine and brackish free-living nematode taxa with a focus on the taxonomy, phylogeny and morphology of Desmoscolecida, Epsilonematidae and Draconematidae.

Nematology

K.L. Ledeganckstraat 35
B-9000 Ghent

/ Research unit **Palaeontology** (UGent)

www.ugent.be/we/geologie/nl/onderzoek.htm/onderzoekseenheidpaleontologie

// institutional hierarchy

Faculty of Sciences

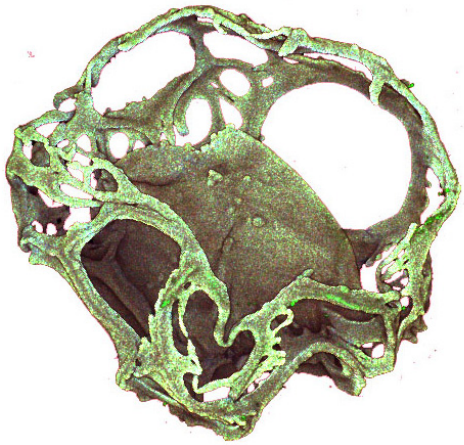
Department of Geology and Soil Science

// head of the group

Prof. dr. Stephen Louwye

// 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 Paleozoic Chitinozoa, Neogene freshwater molluscs and Paleogene 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 Paleozoic 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 Sciences

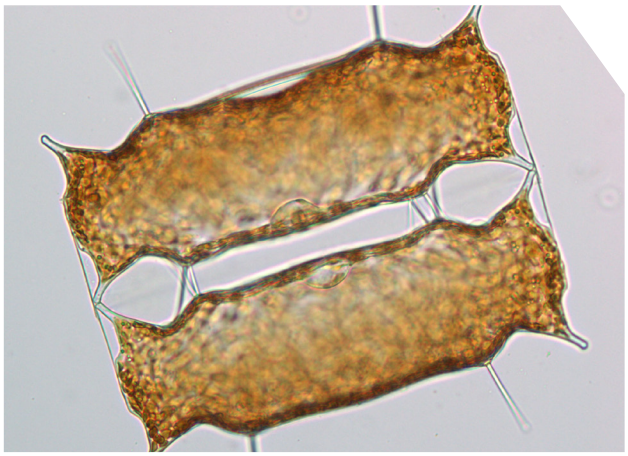
Department of Biology

// head of the group

Prof. dr. Wim Vyverman

// research domain and discipline

Natural sciences; Biological sciences
Engineering and technological sciences; Biotechnology



// abstract

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

- The role of dispersion and local adaptation for the genetic structure of microalgal populations and their spatial and temporal dynamics;
- Fundamental mechanisms of biotic interactions in microbial food webs, in particular chemical communication between microalgae and between microalgae and prokaryotes;
- Identification of endogene and exogene regulatory mechanisms of cell division and sexual reproduction among diatoms;
- Mechanisms and speed of speciation among diatoms;
- Ecophysiology of estuarine and marine plankton and benthos microalgae;
- (Meta-)omics of microbial (meta-)communities and species interactions;
- Dynamics of phytoplankton and microphytobenthos communities;
- The phenology and functional ecology of marine algal blooms;
- 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;
- Regulation of the metabolism of biotechnologically important microalgae.

The majority of the research projects take place in a multidisciplinary context in cooperation with Belgian and international research institutes. The laboratory manages an extensive collection of diatom cultures which is part of the BCCM consortium (Belgian Coordinated Collections of Microorganisms, http://bccm.belspo.be). The laboratory participates in the ESFRI European Marine Biological Resource Centre (EMBRC), ESFRI LifeWatch, UGent Marine Sciences Centre of Excellence (Marine@UGent) and the Aquaculture R&D consortium. The PAE-lab is also 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

/ Research group on **Soil Spatial Inventory Techniques** (UGent)

www.ugent.be/bw/soilmanagement/en/research/ResearchGroupSoilSpatialInventoryTechniques

// institutional hierarchy

Faculty of Bioscience Engineering

Department of Soil Management

// head of the group

Prof. dr. Marc Van Meirvenne

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The research group on Soil Spatial Inventory Techniques (ORBit) is responsible for the education, research and services related to the spatial inventory of soil properties in support of strongly differing applications. The expertise comprises:

- Mobile proximal soil sensor configurations for the investigation in a non-destructive way of soil properties;
- Geophysical prospection techniques for geoarchaeological and environmental applications;
- Geostatistical interpolation and simulation techniques;
- Sampling strategies for the characterisation of soil-related properties;
- GIS-techniques for the processing of sensor measurements.

The marine research is focused on the development of a geophysical methodology for soil inventory in the western Belgian coastal plain and a landscape-archaeological study of the Zwin area.

** Content not validated by the respective research group*

ORBit

Coupure links 653
Block B - 1th floor
B-9000 Ghent

/ Renard Centre of Marine Geology (UGent)

www.rcmg.ugent.be

// institutional hierarchy

Faculty of Sciences

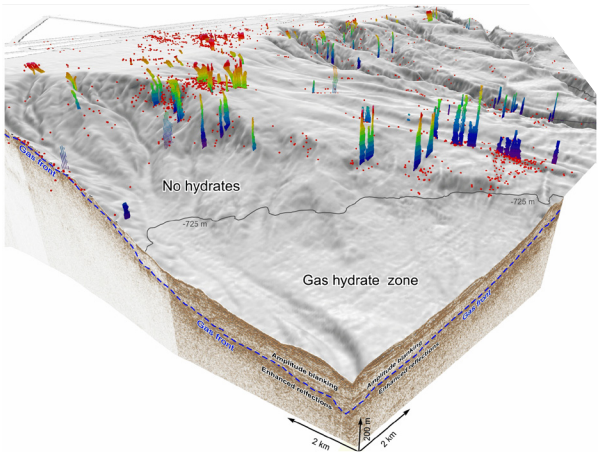
Department of Geology and Soil Science

// 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 international recognition 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. RCMG carries out research in numerous seas (Black Sea, Atlantic margin, Antarctic margin, Mediterranean Sea, etc.), 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 an emphasis on sedimentation processes, erosion, destabilisation, etc.);
- 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 an 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 geoarchaeological research.

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

RCMG

Krijgslaan 281, building S8
B-9000 Ghent

/ **Soete** laboratory (UGent)

www.soetelaboratory.ugent.be

// institutional hierarchy

Faculty of Engineering and Architecture

Department Mechanical Construction and Production

// head of the group

Prof. dr. ir. Patrick De Baets

// research domain and discipline

Engineering and technological sciences; Mechanical engineering

// abstract

The Soete laboratory (department of Mechanical Construction and Production) belongs to the Metal Structures Centre (MSC) and conducts basic research in the following fields:

- Strain-based design of flawed welds;
- Tribology and fatigue;
- Plasticity;
- Structure - property relations;
- Finite element modelling;
- Design of structures, components and products;
- Safety.

The marine research focuses on the assessment of abrasive wear of shackle chains of trawl nets, defective welds in offshore pipelines, fatigue analysis of steel used in offshore structures as well as the study of the mechanical behaviour of polymer composite used in marine applications.

In addition, the Soete laboratory offers services to industrial customers and partners in the fields of weld testing, fracture mechanics, failure analysis, tribology and fatigue.

** Content not validated by the respective research group*

Soete

Technologiepark Zwijnaarde 903
B-9052 Zwijnaarde

/ Terrestrial Ecology unit (UGent)

www.ecology.ugent.be/terec

// institutional hierarchy

Faculty of Sciences

Department of Biology

// head of the group

Prof. dr. Luc Lens

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Terrestrial Ecology unit (TEREC) originates from the 'laboratorium voor Ecologie der Dieren' (laboratory for Animal Ecology). TEREC 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 behaviour 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. Throughout the years, the research of the group has gradually evolved to terrestrial ecology with an 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);
- Year-round life history strategies of coastal breeding gulls;
- Distribution strategy of spiders as an indicator of the structure and dynamics of coastal tidal marshes;
- Plant - herbivore 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;
- Biological evaluation of Belgian beaches and the impact of sand suppletions;
- Spatial and nutritional ecology of coastal breeding gulls;
- Ecotoxicology of coastal breeding gulls with special focus on mercury pollution.

In the future, the Terrestrial Ecology unit intends to expand and advance the research on sea birds and the eco-evolutionary research of plant - herbivore interactions, both in an applied and fundamental way. This research includes 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 with regard to the research on marine birds are the Marine Biology research group (Ghent University), ISOFYS (Ghent University), the department of Biology (University of Antwerp), the Research Institute for Nature and Forest (INBO), the 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 University for the areal extension, the Royal Belgian Institute of Natural Sciences (RBINS; Entomology) and INBO for the European marram grass-associated research. In this context, the use of physiological markers (feather, CORT, immunobiology, stable isotopes) and GPS telemetry (study of movements) is increasing. The first pilot study is currently funded by the LifeWatch 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/en_research/ltgh

// institutional hierarchy

Faculty of Sciences

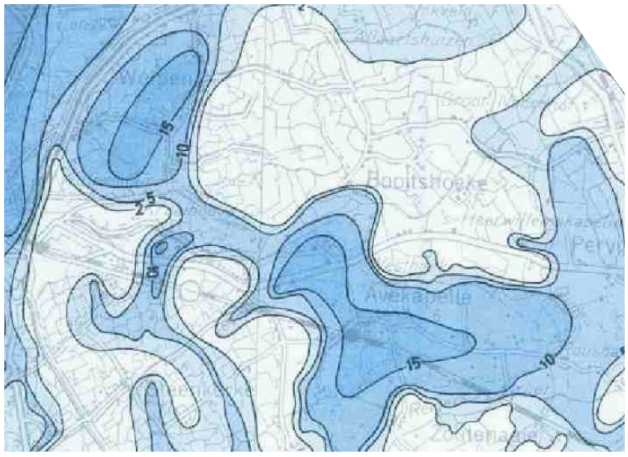
Department of Geology and Soil Science

// head of the group

Prof. dr. Kristine Walraevens

// research domain and discipline

Natural sciences; Earth sciences



// abstract

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

The following research topics are studied in the coastal area:

- 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.

Applied Geology and Hydrogeology

Krijgslaan 281, S8/WE13
B-9000 Ghent

/ Department of **Materials Science and Engineering** (UGent)

www.ugent.be/ea/dmse/en

// institutional hierarchy

Faculty of Engineering and Architecture

// head of the group

Prof. dr. Joris Degrieck

// research domain and discipline

Engineering and technological sciences; Mechanical engineering

// abstract

In the department of Materials Science and Engineering (DMSE) two main research programmes can be distinguished: Metals Science and Technology and Mechanics of Materials and Structures.

The marine research activities are situated in the Mechanics of Materials and Structures group and focus on composites for wave energy converters. Specifically, the impact of waves on the composite materials is studied. Furthermore, research is conducted on the behaviour of composites in sailing masts. Finally, new concepts of wave energy converters are studied.

DMSE

Technologiepark 903
B-9052 Zwijnaarde

/ Laboratory of **Virology** (UGent)

www.vetvirology.ugent.be

// institutional hierarchy

Faculty of Veterinary Medicine

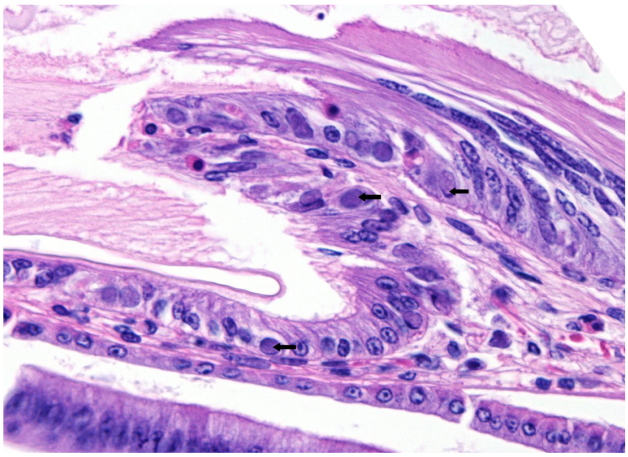
Department of Virology, Parasitology and Immunology

// head of the group

Prof. dr. Hans Nauwynck

// research domain and discipline

Agricultural and veterinary sciences; Veterinary sciences



// abstract

The laboratory of Virology studies a number of viruses (pseudorabies virus, porcine reproductive and respiratory syndrome virus, influenza virus, Equine herpesvirus 1, etc.) in different animals.

The marine research of this laboratory focuses on viral diseases in aquaculture such as the so-called white spot syndrome virus in shrimp farms.

** Content not validated by the respective research group*

Virology

Salisburylaan 133
B-9820 Merelbeke

/ Coastal Engineering, Bridges and Roads unit (UGent)

http://awww.ugent.be

// institutional hierarchy

Faculty of Engineering and Architecture

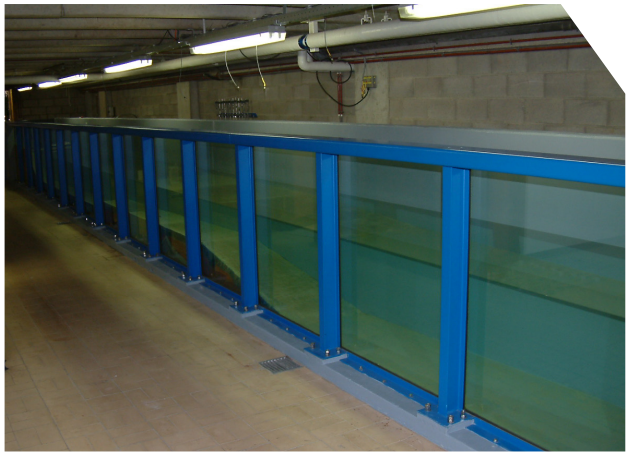
Department of Civil Engineering

// head of the group

Prof. dr. ir. Peter Troch

// research domain and discipline

Engineering and technological sciences; Civil engineering



// abstract

The Coastal Engineering, Bridges and Roads unit of the department of Civil Engineering of Ghent University comprises two different research groups: 'Coastal Engineering' and 'Bridges and Roads'. The Coastal Engineering group focuses on the design and construction of coastal structures (mainly breakwaters and sea dikes), coastal defense (protecting the hinterland from flooding by waves and sea level rise) and the structural response of these structures to wave loading (such as armour layer stability, wave overtopping and overflow, porous flow and the development of pore pressures in the core of the breakwater). Research studies also focus on the interactions between the water motions (waves and tides) including the associated sediment transport and the coastal structures (which may cause local erosion of the seafloor). 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 with regard to interaction effects within parks of wave energy convertors. The group also has extensive experience in the development and use of instruments for field measurements of currents and waves in oceans, estuaries and rivers. Finally, the research group is very active in the experimental and numerical modelling of wave propagation and the interaction with coastal structures.

The research methodology is 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 keep its focus mainly on topics such as coastal defense (particularly coastal structures) and renewable energy. The group was involved in both national and European (e.g. FP6, FP7) research projects on coastal structures and offshore energy production and is a member of several consortia (Marine@UGent consortium, WECAN consortium, Coastlab network).

Coastal Engineering, Bridges and Roads

Technologiepark 904
B-9052 Ghent

Hasselt University

// Faculty of Sciences

- Research group Zoology: Biodiversity and Toxicology

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

http://www.uhasselt.be/UH/research/Research-Hasselt-University/Research-groups-per-discipline-group/Details-research-group-.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. The group conducts research on invertebrate animals, and in particular on free-living flatworms (Platyhelminthes). 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 on several biological aspects of turbellarians: regeneration and stem cell dynamics, life history parameters, morphology, etc.;
- Molecular and cellular effects of pollution.

The marine research topics concern the biodiversity, phylogeny and biogeography of marine invertebrates, in particular of free-living flatworms. The toxicologal part of the research focuses on the stem cell-oriented coping capacity of regenerative animals towards carcinogenic and neurotoxic compounds and on the role of the redox balance in the process of regeneration, using marine and freshwater turbellarians as model systems.

CMKDK

Campus Diepenbeek
Agoralaan, building D
B-3590 Diepenbeek

Vrije Universiteit Brussel

// Faculty of Economic and Social Sciences & Solvay Business school

- Management and Strategy Cluster (MAST)

// Faculty of Engineering

- Acoustics and Vibration research group
- 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, Environmental and Geochemistry
- COSMOPOLIS Centre for Urban Research
- Research group Physical Geography
- Research group Marine Biology

/ **Acoustics and Vibration** research group (VUB)

mech.vub.ac.be/avrg

// institutional hierarchy

Faculty of Engineering

Department of Mechanical Engineering

// head of the group

Prof. dr. ir. Patrick Guillaume

// research domain and discipline

Engineering and technological sciences; Mechanical engineering

// abstract

The central goal of the Acoustics and Vibration research group of the Vrije Universiteit Brussel is to conduct fundamental and applied research in the broad field of acoustics and vibration, with a special emphasis on experimental and operational model analysis, frequency-domain maximum likelihood identification of multivariable systems, damage assessment and sound quality.

The research group has an extensive expertise in the field of offshore wind energy and is involved in the initiatives BruWind (Brussels Wind Energy Research Institute) and OWI-Lab (for efficient and reliable offshore wind energy).

** Content not validated by the respective research group*

AVRG

Pleinlaan 2
B-1050 Brussels

/ 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 Plant Biology and Nature Management laboratory (APNA) of the Vrije Universiteit Brussel focuses on seven research themes: (1) limnology (ecological quality), (2) mangroves, (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 constitutes the first marine component of the research. Besides studying the mangrove vegetation as an ecosystem and a vegetation type, the physiological functioning of the mangrove tree is part of APNA's research focus. 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 (Tervuren). The micro-CT-scan equipment (at APNA, open for collaboration), combined with CT-scan, MRI and NMR (each through external collaborative links) allow for high-resolution tissue research and real-time plant physiological behaviour. Biogeography, climate relations and the dispersal mechanistic process are investigated in the field, with ex situ experimentation and by means of modelling. Validation as well as input data for mangrove ranges are sought in the mangrove genetic population structure (mostly Western Indian Ocean and East Atlantic).

Seagrasses are studied for their population genetic structure, dispersal and distributional patterns across coastal lagoons and wetland areas. Molecular markers are designed using the most recent technologies. Isolation-by-distance is tested by means of different models at various spatial scales, from continent-wide phylogeography approaches up to fine-scaled spatial analyses of clones and their resilience within a lagoon.

An emerging coastal and marine field in the group addresses the connectivity of (as for now) European and North African wetlands, mostly coastal, in the Palaearctic migratory route of waders / seabirds. This research is based on fieldwork and on connectivity modelling. It has an explicit relation to EU nature legislation.

An overarching theme within APNA is the interest and research concerning the sustainable use and management of coastal resources, particularly in East Africa and with a focus on mangrove ecosystems and their goods and services. This research is policy-relevant, which translates into studies regarding international (coastal) policies and governance.

APNA

Pleinlaan 2
B-1050 Brussels

/ Research group **Analytical, Environmental and Geochemistry** (VUB)

www.vub.ac.be/AMGC

// institutional hierarchy

Faculty of Science and Bio-engineering Sciences

Department of Chemistry

// head of the group

Prof. dr. Philippe Claeys

// research domain and discipline

Natural sciences; Chemical sciences

// abstract

The research group Analytical, Environmental and Geochemistry (AMGC) of the Vrije Universiteit Brussel results from the merge of the research units 'Isotope Geology' and 'Analytical Chemistry' in 2013. The group is involved in several topics regarding environmental and marine research. The group focuses 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 in (palaeo)oceanography, both of nutrients and pollutants. Within the field of analytical and environmental 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 hydrogen, oxygen, carbon and nitrogen using IRMS (stable isotope mass spectrometry); high resolution 2D 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). Moreover, the group also uses µX-ray fluorescence for the determination of major and trace elements. The research related to marine ecosystems focuses on the quantification of the productivity and export production in open oceans; palaeoceanography; 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 behaviour. The research group 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).

AMGC

Pleinlaan 2
B-1050 Brussels

/ COSMOPOLIS Centre for Urban Research (VUB)

www.cosmopolis.be

// institutional hierarchy

Faculty of Sciences

Department of Geography

// head of the group

Prof. dr. Bas Van Heur

// research domain and discipline

Social sciences; Economics and business
Social sciences; Sociology

// abstract

COSMOPOLIS of the Vrije Universiteit Brussel (VUB) is an interdisciplinary research team focusing on the contemporary 'urban question'. It explores the processes of 'glocalisation' (globalisation and localisation) and the relationship between urbanity, society and culture. COSMOPOLIS looks at cities from both a research- and a design-perspective.

The marine research focuses on solutions for environmental contrasts in coastal areas and analyses of conflicts of uses of coastal resources amongst users and sectors.

** Content not validated by the respective research group*

COSMOPOLIS

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 original research, concentrated 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 modelling of the continental cryosphere (Antarctica, Greenland and Quaternary ice sheet), regional Antarctic ice sheet dynamics (modelling, field work, remote sensing) and research on glaciers in the Alps and the Himalaya (modelling, mass balance, radar sounding and GPS measurements).

Within the field of volcanology, the research topics concern the geomorphology and spatial distribution of volcanoes, the characterisation of instability processes and on the monitoring of eruptive processes on African volcanoes.

Within the marine domain, the group studies ice sheet and glacier dynamics and their impact on global sea level changes. The research group Physical Geography is also strongly involved in the IPCC reports regarding the themes 'cryosphere', 'sea level' and 'polar ice sheets'.

FARD

Pleinlaan 2
B-1050 Brussels

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

www.vub.ac.be/hydr

// institutional hierarchy

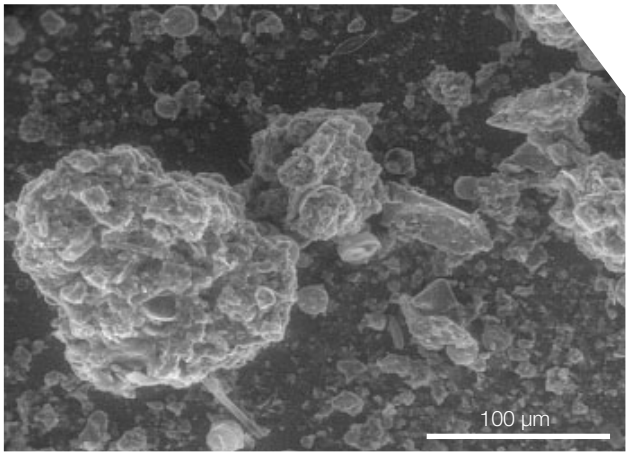
Faculty of Engineering

// head of the group

Prof. dr. Willy Bauwens

// research domain and discipline

Engineering and technological sciences; Geomatics
Engineering and technological sciences; Civil engineering



// abstract

The department of Hydrology and Hydraulic Engineering of the Vrije Universiteit Brussel was founded in 1976. Since its establishment, this department specialises in numerical simulation techniques and computer applications which resulted in expertise in the use and development of hydrological modelling techniques. GIS and remote sensing are employed 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 research projects funded by Flemish, Belgian or European scientific programmes, 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/welcomeintren.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 International Law department, and originates from the merge of 3 former institutes (90s): 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 constitutes, 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) international regional 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 practices of the Belgian State are followed closely.

** Based on input received in 2013*

International Law

Pleinlaan 2
B-1050 Brussels

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

www.vub.ac.be/SKAR/onderzoek/research.html

// institutional hierarchy

Faculty of Arts and Philosophy

// onderzoeker

Prof. dr. Dries Tys

// research domain and discipline

Human sciences; History and archaeology

// abstract

Maritime and coastal archaeology and landscape research are a core theme of the research of the department of Art Sciences and Archaeology (VUB). The following topics are studied:

- Archaeological and historical research of coastal embankments;
- Archaeological and historical research of coastal settlements (terp settlements, fishing villages);
- Archaeological and historical research of coastal material culture and identity;
- Archaeological and historical research of coastal trade and exchange (and trade settlements);
- Archaeological and historical research of the early medieval coastal plain.

SKAR

Pleinlaan 2
B-1050 Brussels

/ Management and Strategy Cluster (VUB)

http://research.vub.ac.be/business/mast-management-and-strategy

// institutional hierarchy

Faculty of Economic and Social Sciences & Solvay Business School

Department of Business

// head of the group

Prof. dr. Elvira Haezendonck

// research domain and discipline

Social sciences; Economics and business

// abstract

The Management and Strategy (MAST) Cluster of the Vrije Universiteit Brussel (VUB) conducts research and advisory work in three domains:

- Stakeholder management, with a special focus on complex investment evaluations. Unique research and advisory expertise has been developed in the optimal design of public - private partnerships (PPSs), triple bottom-line (TBL) measurement tools for projects with high external effects, and corporate social responsibility (CSR) policies;
- Sustainable mobility and infrastructure management, focused on assessing large-scale infrastructure projects such as port terminals, intermodal transport hubs, brownfield rejuvenation investments for mixed usage and greenfield development sites. The cluster builds upon more than 25 years of leading research and leadership in this area;
- International strategic management, with a focus on the governance and expansion strategies of large multinational enterprises and their subsidiaries. The cluster has achieved a world-class status in this field with numerous publications in leading scholarly journals.

The marine-related research of MAST focuses on themes such as port authority and port cluster strategic management, port performance management, interaction of ports with other transport modes and integrated evaluation of port projects.

MAST

Pleinlaan 2
B-1050 Brussels

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

http://we.vub.ac.be/nl/environment-biodiversity-and-ecosystems

// 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 seagrass beds. The group focuses on molecular ecology (assessment of population connectivity based on genetic methods), molecular phylogenetics (phylogeography, molecular systematics, DNA barcoding for species identification), marine biotechnology (development of DNA microarrays for species identification), marine ecology (multivariate analyses of community structures related to environmental parameters).

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)

// Botanic Garden Meise

// Flemish Institute for Technological Research (VITO)

// Flanders Marine Institute (VLIZ)

// Flanders Hydraulics Research

/ Flanders Heritage Agency

www.onroerenderfgoed.be

// institutional hierarchy

Flemish Government

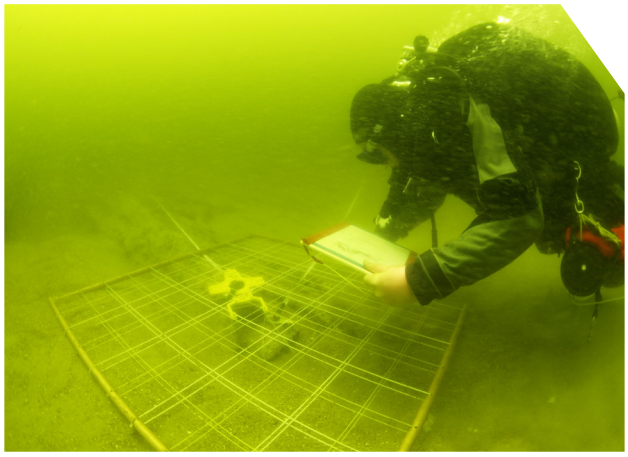
Policy area Town and Country Planning, Housing Policy and Immovable Heritage

// head of the group

Sonja Vanblaere

// research domain and discipline

Human sciences; History and archaeology



// abstract

The Flanders Heritage Agency is operational since July 2011, and results from a fusion between the 'Heritage' division of the agency for Space and Heritage ('Ruimte en Erfgoed') and the Flemish Institute for Immovable Heritage ('VIOE'). Flanders Heritage Agency deals with built, archaeological and landscape heritage but also with heraldic heritage and the historical fleet (varend erfgoed). The agency realises inventories, studies and protects valuable buildings, landscapes, archaeological sites and sailing heritage. The agency also supports the immovable heritage management and performs research that supports policy and management. From 2003 onwards, there were a variable number of researchers active within the Flanders Heritage Agency and its predecessors (Institute for the Archaeological Heritage (IAP), Flemish Institute for Immovable Heritage (VIOE)) who perform policy-oriented research on topics related to maritime and/or underwater heritage. In the present structure of the agency, there is no research group dedicated to marine topics or underwater heritage, but marine researchers are spread over different units of the agency. The marine or maritime research expertise within the agency is related to the following topics:

- Late medieval fishing settlements in the southern North Sea coastal areas;
- The medieval cogs of Doel;
- Maritime conservation: this topic gradually became more important since the start 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 the period 600-1600 AD;
- Archaeological heritage in the Belgian part of the North Sea and the adjacent intertidal zone (developing 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 at sea and an increase of the support for underwater heritage;
- Support for the conservation policy of the historical fleet (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 maritime heritage when appropriate.

Key events of the maritime group 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 multidisciplinary study-project 'De Kogge' in the period 2009-2014, the approval and realisation of the IWT/SBO-project 'Archaeological heritage in the North Sea' (2013-2016) and the ratification by Belgium of the UNESCO-Convention for the protection of underwater cultural heritage in 2013.

There is also a close collaboration with both national and international institutes and participation in various international research projects.

Flanders Heritage Agency

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

/ Institute for Agricultural and Fisheries Research (ILVO)

www.ilvo.vlaanderen.be

// institutional hierarchy

Flemish Government

Agriculture and Fisheries Policy Area

// head of the group

Ir. Joris Relaes

// 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 Decree 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 constitute 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

When striving for a sustainable exploitation of marine resources, it is very important to have a well-supported evaluation of the environmental quality as well as the quality of the biological marine products. ILVO uses an integrated approach for evaluation. By means of biological, toxicological and chemical tests, ILVO studies the human effect on the marine environment (sand and gravel extraction, dumping of dredged material, building of offshore wind turbines, fisheries, introduction of (invasive) alien species) and different types of pollution (pollutants, garbage) on marine life. Furthermore, research is conducted on the genetic and (bio)chemical quality, freshness and authenticity by developing analyses and applying them to fish and shellfish. This research includes ongoing, long-term monitoring as well as specific research projects.

Fisheries and Aquatic Production

Modern fisheries management is based on accurate information about the fish stocks and their place in the ecosystem, thorough understanding of the efficiency and the effects of fishing methods and insight into the socio-economic aspects of the fisheries industry. ILVO provides science bodies and the government with this information. A multidisciplinary team with an extensive network is supported by a technical team that does the field work on land as well as at sea. In addition to the marine fisheries research, ILVO also has a team investigating how to build sustainable aquaculture systems. ILVO also provides services to support businesses, government agencies and other scientific institutions in their scientific research.

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 institute participates in numerous national and international research projects and collaborates with many Belgian and foreign institutes.

ILVO

Burgemeester Van Gansberghelaan 96, bus 1
B-9820 Merelbeke

/ Research Institute for Nature and Forest (INBO)

www.inbo.be

// institutional hierarchy

Flemish Government

Environment, Nature and Energy Policy Area

// 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 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 and other interested stakeholders. Furthermore, the institute provides information for international reports and to local authorities. In addition, INBO also support organisations with regard to nature management, forestry, agriculture, hunting and fisheries.

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

The research group Species Diversity of the Biodiversity and Natural Environment department focuses on the study of the evolution, feeding ecology, habitat use and migration patterns of coastal breeding gulls and terns, counting birds on the Belgian part of the North Sea, coupling of the pelagic component and top predators in the food web, studying nature values in the polder area 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), the Operational Directorate Natural Environment of RBINS, IMARES (the Netherlands), Bureau Waardenburg (the Netherlands), the Terrestrial Ecology unit (Ghent University) and the Marine Biology research group (Ghent University) concerning monitoring projects in the Belgian part of the North Sea (WAKO I and II, WESTBANKS, TROPHOS, BWZEE, SPEEK) and the monitoring of the compensation measures for the extension of the port of Rotterdam. The study of nature values in the coastal polders is conducted in close cooperation with the Mobility and Public Works department (afdeling Maritieme Toegang), the Flemish Land Agency (VLM) and Natuurpunt.

The estuarine research of the research group Aquatic, Wetland and Estuarine Ecosystem Diversity of the Biodiversity and Natural Environment department is mainly working in the framework of the long-term vision for the Scheldt estuary, the updated Sigmaplan, the Water Framework directive and the Birds and Habitats directives. The integrated monitoring system of the macrobenthos, water birds, vegetation and habitats or ecotopes provides information for the evaluation of the state and trends of the environment and the licensing policy in order to set objectives and metrics for European directives, the ecological recovery strategy for the Scheldt estuary and the design, planning and evaluation of the associated measures. The research contributes to the research and monitoring (O&M) effort of the Flemish-Dutch Scheldt Commission (VNSC) in the framework of the long-term vision for the Scheldt estuary and is performed 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 Management and Sustainable Use department performs ichthyologic research in estuaries: monitoring and evaluation of estuarine fish stocks; the development of indicators for the Water Framework directive; research on habitat use and recovery; migration and migration bottlenecks; effects of pumping stations and hydropower; the preparation of species recovery and species management plans (e.g. eel management plan).

The research group Ecosystem Management of the Management and Sustainable Use department focuses on the landscape dynamics in the coastal dunes, the inventory and mapping of vegetation and focal species along the Flemish coast, and providing scientific support for conservation management and restoration.

INBO

Kliniekstraat 25
B-1070 Brussels

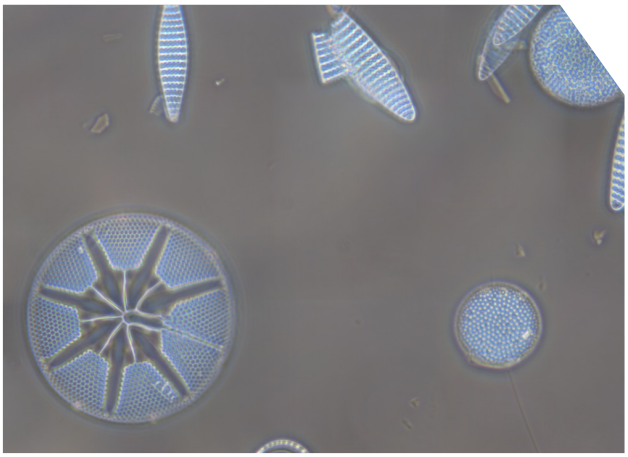
/ Botanic Garden Meise

www.plantentuinmeise.be

// institutional hierarchy
Flemish Government

// head of the group
Dr. Steven Dessein

// research domain and discipline
Natural sciences; Biological sciences



// abstract

On 1 January 2014, the National Botanic Garden of Belgium became the Botanic Garden of Meise which is part of the Flemish government.

Classical herbarium studies are the main research area of this institute: plant systematics and related fields such as floristics, phytogeography, phylogeny, comparative morphology, pollen and spores and vegetation studies. With its systematic investigation, the Garden contributes to the development of the global inventory of biodiversity. Related disciplines such as floristics and plant geography are also studied.

The Botanic Garden concentrates on temperate Europe (especially Belgium), the palaeotropics (especially Central Africa) and the polar regions (mainly Antarctica). All plant groups are studied: algae, bryophytes, fungi (including lichens) and vascular plants.

In the temperate regions, the systematic knowledge of plants is already quite well-known, nevertheless important work remains to be done. An updated floristic inventory and the follow-up of the spread of species are a priority for nature conservation. Also, alien plant species are studied to monitor if they evolve into an invasive threat to our indigenous flora.

In contrast to that of temperate regions, the tropics have a less well-known flora. The Garden already works on the flora of Central Africa for more than 100 year. On a regular base, new species are described.

The marine research of the Garden focuses on algae and fungi. Although mainly freshwater algae are studied, marine, coastal and brackish water (African inland saline) species are also part of the research scope (in this context the term coastal refers to the shorelines of the (great) lakes). An international reputation was built with the study of algae from arid and semi-arid regions in northern and sub-saharian Africa. Furthermore, diatoms of the polar regions (mostly Antarctica and sub-Antarctic islands) are an important research domain as well.

The Garden studies fungi associated to halobiont and/or halotolerant Arthropoda (mainly Coleoptera) from coastal and estuarine environments (incl. saltmarshes from the Scheldt and the Zwin). The nature of the brackish environment and the composition of its fungus-infected entomofauna is used as a model for explaining the mechanisms behind specificity, speciation, inter- and intraspecific transmission of these fungi (Laboulbeniales). Taxonomical and ecological contributions have been published regularly (1988-2014).

Botanic Garden Meise

Nieuwelaan 38
B-1860 Meise

/ Flemish Institute for Technological Research (VITO)

www.vito.be

// institutional hierarchy

Flemish Government

Economy, Science and Innovation Policy Area

// head of the group

Ir. Dirk Fransaer

// research domain and discipline

Natural sciences; Earth sciences
Engineering and technological sciences; Geomatics

// abstract

The Flemish Institute for Technological Research (VITO) is an independent research and consulting center that focuses on innovative technologies and scientific knowledge with applications 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 modelling'. VITO focuses on 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.

In the framework of environmental modelling research, VITO develops a service concerning hydrological models, water quality modelling, in situ measurements of water quality and quantity, water management and flood risks, social cost-benefit analyses and the determination of ecosystem goods and services. Cooperation agreements were established regarding the planning and implementation of the Sigmaplan, the social cost-benefit analyses 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

Economy, Science and Innovation Policy Area

// head of the group

Prof. dr. Jan Mees

// research domain and discipline

Engineering and technological sciences; Information and computer sciences
Social sciences; Communication and media
Social sciences; Political sciences and policy

// 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, is a node for marine and coastal research and acts as an international contact point.

The tasks of VLIZ can be summarised as follows:

- Coordination and management of research infrastructure: coordination of ship time on the RV Simon Stevin and the management of common research equipment and infrastructure;
- Management of the VLIZ 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;
- The VLIZ library with marine scientific and coastal literature and multimedia;
- A platform to promote a network of marine scientists and stakeholders, to advance the expertise in Flanders and to provide information to Belgian and foreign stakeholders;
- Supporting a sustainable and scientifically underpinned policy for the 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 (communication and education) providing scientifically underpinned information to the general public, professionals, policy makers, teachers, etc.

VLIZ participates in numerous national and international marine research projects, has around 30 cooperation agreements with national academic institutes, administrations and foreign institutes. Furthermore, the organisation is a member of numerous national and international networks in the marine scientific field.

VLIZ

Wandelaarkaai 7
B-8400 Oostende

/ Flanders Hydraulics Research

www.flandershydraulicsresearch.be

// institutional hierarchy

Flemish Government

Mobility and Public Works Policy Area

Department of Mobility and Public Works

// head of the group

Prof. dr. Frank Mostaert

// research domain and discipline

Natural sciences; Earth sciences
Engineering and technological sciences; 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, this entity was integrated 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 three 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 hydrodynamic regime of important non-tidal rivers and canals is also studied, and the laboratory also performs studies which are highly relevant for the management of waterways. The laboratory manages the hydrological monitoring network, is charged with flood risk warning in Flanders, carries out assignments for the agency for Maritime and Coastal Services and performs similar assignments for other Belgian and foreign governmental services as well as for private companies.

Flanders Hydraulics Research disposes of 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 an emphasis on cross-border collaboration regarding the Scheldt estuary.

WatLab

Berchemlei 115
B-2140 Borgerhout (Antwerp)

Universities and Graduate Schools of the Wallonia-Brussels Federation

// Haute École Paul-Henri Spaak

// Université Catholique de Louvain (UCL)

// Université Libre de Bruxelles (ULB)

// University of Liège (ULg)

// University of Mons (UMons)

// University of Namur (UNamur)

Haute École Paul-Henri Spaak

// Paramedical department

- Environmental, Occupational Physiology (Integrative) laboratory

/ Environmental, Occupational Physiology (Integrative) laboratory

www.he-spaak.be/he-spaak/recherche/unites.html

// institutional hierarchy

Paramedical department

// head of the group

Prof. dr. Costantino Balestra

// research domain and discipline

Medical and health sciences; Medical and health sciences

// abstract

The Environmental and Occupational Physiology laboratory is part of the paramedical department of the Haute École Paul-Henri Spaak. This group conducts research on the physiology in certain environments such as space, confined environments, high-altitude environments, remote areas, hyperbaric environments, etc.

The marine research of this group focuses on the study of the physiology during diving activities. Furthermore, the group is also interested in remote area medicine and wellness as well as preconditioning or training activities. This research field can be applied to seafarers or sailors, submariners, etc.

Environmental, Occupational Physiology

Avenue Charles Schaller 91
B-1160 Oudergem (Brussels)

Université Catholique de Louvain

// Science and Technology Sector

- Marine Biology laboratory
- Applied Mechanics unit
- Institute of Life Sciences
- Research pole Environmental Sciences (Earth and Life institute)
- Lemaître Centre for Earth and Climate Research

/ **Marine Biology** laboratory (UCL)

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

// institutional hierarchy

Science and Technology Sector

Earth and Life Institute

Biodiversity pole

// 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 Victoria Museum and the Sydney and Perth Universities (Australia), the University of Bergen (Norway), Goteborg and Lund Universities (Sweden), Otago University (New Zealand), University of California - Santa Barbara Campus (USA), Ryukyus University and the Arago laboratory (Japan) and the 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;
- Bioluminescence in sharks;
- The control mechanisms, functions and evolution of bioluminescence;
- Origin of marine luminous compounds;
- Bioluminescence on the pelagic ringworm *Tomopteris*.

BMAR

Place Croix du Sud 3
B-1348 Louvain-la-Neuve

/ Applied Mechanics unit (UCL)

www.uclouvain.be/en-mema.html

// institutional hierarchy

Science and Technology Sector

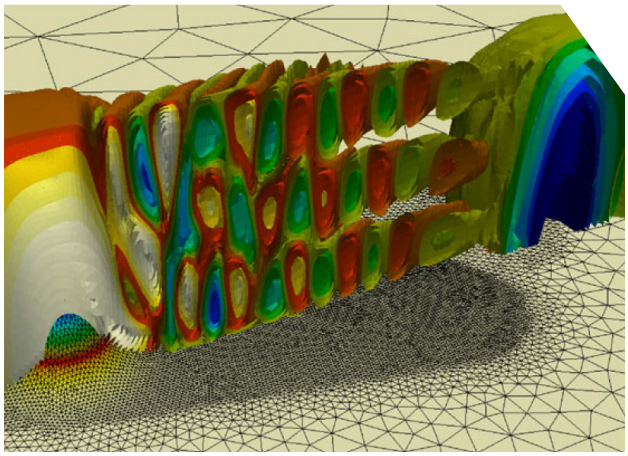
Institute of Mechanics, Materials and Civil Engineering

// 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 behaviour 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 performs modelling of ocean circulations, sea level variations and ice dynamics by means of various models (e.g. SLIM and CART). The SLIM-model is inter alia applied on the Scheldt river - estuary - sea continuum.

** 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. Jean-Francois Rees

// 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 on biomolecules. Within the research group Biology of Nutrition and Environmental Toxicology, marine related research is conducted on the following topics:

- The influence of pollutants such as PCBs 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;
- Effects of multiple stress (nutrition and pollution) in aquatic organisms, from molecular to ecosystem approach.

Institute of Life Sciences

Place Croix du Sud 2
B-1348 Louvain-la-Neuve

/ Branch **Environmental Sciences (Earth and Life Institute)** (UCL)

www.uclouvain.be/en-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 Environmental Sciences branch 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 (Institute of Mechanics, Materials and Civil Engineering (IMMC)). The research conducted by this group ranges from fundamental to applied research which relates to numerous 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 means of models (e.g. the SLIM model);
- The biogeochemical cycle of iron in the ocean.

In the future this group foresees a landward shift in their research in order to develop a multi-scale model of the land - sea continuum. The intention is to model the water cycle and the dynamics of biogeochemical tracers from land towards the sea. Such a model will allow to explicitly model the impact of land-based human activities on marine ecosystems.

** Based on input received in 2013*

Environmental Sciences

Place Croix du Sud 2
B-1348 Louvain-la-Neuve

/ Lemaître Centre for Earth and Climate Research (UCL)

www.uclouvain.be/en-teclim.html

// institutional hierarchy

Science and Technology Sector

Earth and Life Institute

// head of the group

Prof. dr. Bas van Wesemael

// 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 a focus on climate and the relationship between human activities and the natural environment. The four main research themes of the centre involve past climate, the current state of the earth and solar system, human-environment interactions and modelling.

The marine-related research of TECLIM concerns climate, sea-ice and ocean models (e.g. LIM, SLIM and CART). These models are applied on various systems such as the Scheldt estuary and the Great Barrier Reef.

** Content not validated by the respective research group*

TECLIM

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

Université Libre de Bruxelles

// Faculty of Science

- Biogeochemistry and Earth System Modelling group
- Marine Biology unit
- Laboratory of Systems Ecology and Resource Management
- Unit of Social Ecology
- Glaciologie unit
- Laboratory 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 Hydroacoustics laboratory (ULB)

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

// institutional hierarchy

Faculty of Applied Sciences / Polytechnic School

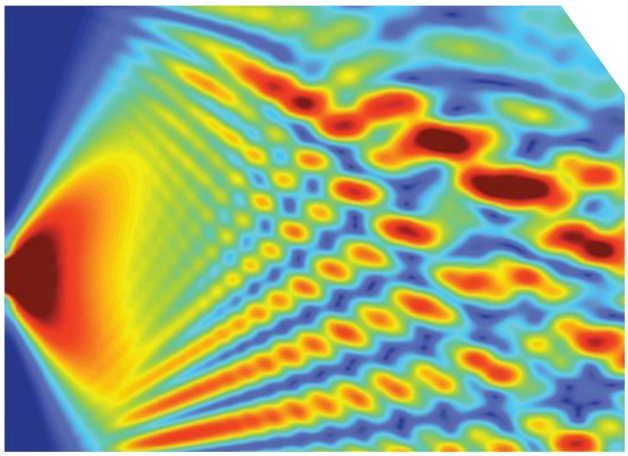
Laboratories of Image, Signal and Acoustics

// head of the group

Prof. dr. Jean-Pierre Hermand

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The laboratory carries out fundamental and applied research on the characterisation of marine/aquatic environments and ecosystems primarily by remote, active and passive acoustic sensing, but also by optical sensing. Since its creation, the lab has been participating in international interdisciplinary projects, primarily on global environmental issues, and has been conducting field experiments at sea on a regular basis in different parts of the world.

Current research includes the following topics:

- Use of acoustics to improve our understanding of pelagic and benthic ecosystems;
- Development of acoustic systems for the characterisation of surface sediment and subsurface layers;
- Non-invasive acoustic investigation of fluid mud dynamics and associated processes in estuarine and coastal environments (e.g. Amazon River mouth);
- Design and field testing of submersible digital holographic microscopy for in situ observation of plankton and particles in fisheries surveys (West Africa);
- Integrated acoustic monitoring of marine habitats to assess primary production and biodiversity (seagrass meadows off Tyrrhenian Sea islands; kelp forests off Southeast Australia);
- Passive acoustic sensing of sediment transport in lagoons and coastal environments (e.g. Venice, North Sea beach);
- Acoustic exploration of submarine archaeological sites and geoacoustic characterisation of cultural layers;
- Feature-based acoustic tomography of shelf and coastal ocean processes (Ushant tidal front, Northwest France; deep thermal front, Southeast Brazil);
- Comprehensive assessment of marine sediments by combining hydrographic surveying and geoacoustic inversion (e.g. Caribbean, Mediterranean).

As part of research projects, the group develops methods and algorithms to solve a variety of data assimilation and inverse problems, pioneering the application of optimal control theory and Bayes statistics. Modelling acoustic propagation and scattering to support offshore experiments including the development of approaches for complex media and multiphase materials are core activities of the lab. For some materials, e.g. flint and biological tissue, ultrasonic measurement techniques are developed to determine intrinsic acoustic properties on samples from expeditions. Sedimentological and lithostratigraphic analyses of short sediment cores are carried out in partnership with STEP, ULB and foreign labs. The lab has a well-developed expertice in applying advanced signal processing to sound propagation measurement, soundscape recording, e.g. ship-radiated noise and biological sound production, raw backscatter data from scientific single or multibeam echosounders. Through extensive offshore experimentation, the lab has consolidated expertise in the development of acoustic and oceanographic sensor packages specifically conceived to fulfill efficiently each project's scientific objectives. The staff and partners of the lab are specialised in acoustics, geophysics, marine biology and ecology, 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 Modelling (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 modelling 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 the following topics:

- Modelling of 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'-interface (i.e. fungi and bacteria);
- 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;
- Water and fossil fuels resources.

** Content not validated by the respective research group*

BGéoSys

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

/ Marine Biology unit (ULB)

http://biomar.ulb.ac.be

// institutional hierarchy

Faculty of Science

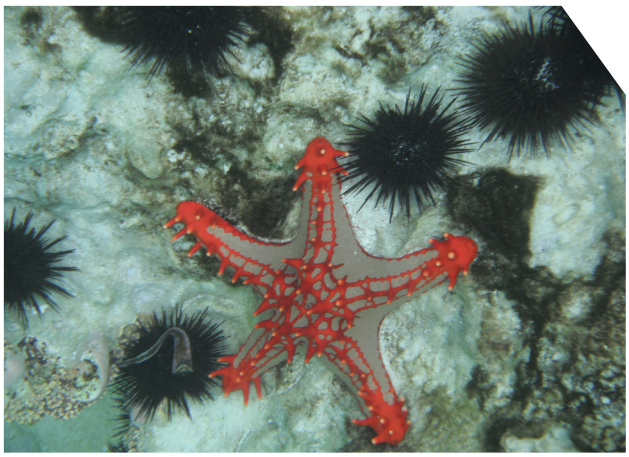
Department of Biology of Organisms

// head of the group

Prof. dr. Philippe Dubois

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The Marine Biology unit (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, biogeography, biomineralisation, development, ecotoxicology, ecophysiology (including energetics), general biology, nutrition, reproduction and symbioses. The research group is a partner in the Interuniversity Center for Marine Biology (CIBIM).

BIOMAR

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

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

http://esa.ulb.ac.be

// institutional hierarchy

Interfacultary School of Bio-Engineering

// head of the group

Prof. dr. Pierre Servais

// 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 modelling 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 experiments are combined. ESA participates in federal and European marine research projects on advanced modelling and research on eutrophication and has expertise in the 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 laboratory of Systems Ecology and Resource Management 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 what the effects are on their ecosystem functions, goods and services. The main focus is 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 its research in renowned journals such as 'Science' and 'Current Biology'.

In the marine domain, the group focuses on mangroves, with links to neighbouring ecosystems such as coral reefs. The laboratory adopts a retrospective approach, using relevant methods from different disciplines (tropical botany, very high resolution remote sensing and ground truthing, socio-ecological survey research, historic archive research, etc.) and integrative analyses (using GIS, multivariate and multicriteria analyses, etc.), 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 is also interested in changes in biodiversity and in climate, and on ecological and ethological plant - animal and man - ecosystem interactions. Research is conducted on variable spatial scales from local casestudies in several American, African and Asian countries to global macroecological scales.

Systems Ecology and Resource Management

Av. F. D. Roosevelt 50, CPI 264/1
B-1050 Brussels

/ Unit of **Social Ecology** (ULB)

www.ulb.ac.be/sciences/use

// institutional hierarchy

Faculty of Science

Department of Biology of Organisms

// head of the group

Prof. dr. Jean-Louis Deneubourg

Prof. dr. Clair Detrain

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The unit of Social Ecology of the Université Libre de Bruxelles (ULB) is interested in the organisation of animal societies, in the underlying physiological and ethological mechanisms as well as in the adaptive value of collective patterns which are put in an ecological perspective.

With regard to marine research, there is specific expertise with regard to certain tuna species.

** Content not validated by the respective research group*

USE

Boulevard du Triomphe, CP 231
B-1050 Brusselss

/ Glaciology unit (ULB)

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

// institutional hierarchy

Faculty of Science

Department of Geography

// head of the group

Prof. dr. Frank Pattyn

// research domain and discipline

Natural sciences; Earth sciences

// abstract

The Glaciology unit 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 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 multiparametric study of ice rich in solid or liquid impurities.

The marine component of the research is related to the study of the dynamics of calving ice caps and the contribution of their melting to the sea level rise. Furthermore, the unit also investigates 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** (ULB)

http://gtime.ulb.ac.be

// institutional hierarchy

Faculty of Science

Department of Earth Science and Environment

// head of the group

Prof. dr. Alain Bernard

Dr. Nadine Mattielli

// research domain and discipline

Natural sciences; Earth sciences
Natural sciences; Chemical sciences

// abstract

The laboratory G-Time (Geochemistry: Tracing with Isotopes, Minerals and Elements) 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 metal biogeochemical cycles, igneous and sedimentary petrology, palaeoenvironmental reconstruction, and 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 metal fluxes in the Belgian North Sea, based on inputs from estuaries 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 also develops expertise in planetology and early Earth environments (early crust, interactions between different planetary reservoirs through time and early life on Earth).

G-Time

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

University of Liège

// Applied and Fundamental Fish Research Center (AFFISH)

// 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
- Laboratory of Animal Physiology
- Geohydrodynamics and Environment Research group
- 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

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

/ Applied and Fundamental Fish Research Center (AFFISH) (ULg)

www.affish.ulg.ac.be

// point of contact

Prof. dr. Pascal Poncin (president)

Prof. dr. Eric Parmentier (vice-president)

Dr. Carole Rougeot (secretariat)

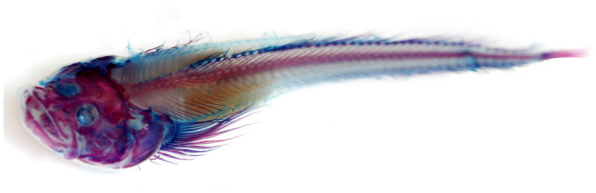
// number of members

10

// abstract

Research at the University of Liège on fish and the aquatic environment dates back to the middle of the 19th century. The public Aquarium was established at the beginning of the 1960s followed by the establishment of the STARESO Marine Research Station (Corsica) and the Aquaculture Research and Training Center aiming to stimulate fundamental and applied research in a variety of domains belonging to ichthyology and marine biology: eco-ethology, morphology, biochemistry, physiology, embryology, eco-toxicology, virology and genetic.

In an attempt to integrate this expertise around the internationally recognised Tihange research and educational station and one of the most representative showcases – the Zoology Institute's Aquarium-Museum – fish laboratories have joined in a single official operational structure. In this context, the board of governors of the ULg have approved the creation of a thematic fundamental and applied research entitiy on fish (AFFISH-RC) in December 2012.



// partners

The partners of the AFFISH cluster are:

1. Aquarium-Museum*
2. Behavioral Biology unit*
3. Functional and Evolutionary Morphology laboratory
4. Hydrology and Fluvial Geomorphology laboratory*
5. Laboratory of Immunology-Vaccinology*
6. Laboratory of Molecular Biology and Genetic Engineering*
7. Oceanographic Research Station (STARESO)**
8. Laboratory of Oceanology
9. Group for Research and Applications in Statistical Physics (GRASP)*
10. Research and Education Center in Aquaculture (CEFRA)*

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

*** not considered as a research group in this publication*

/ 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 (secretariat)

// number of members

26

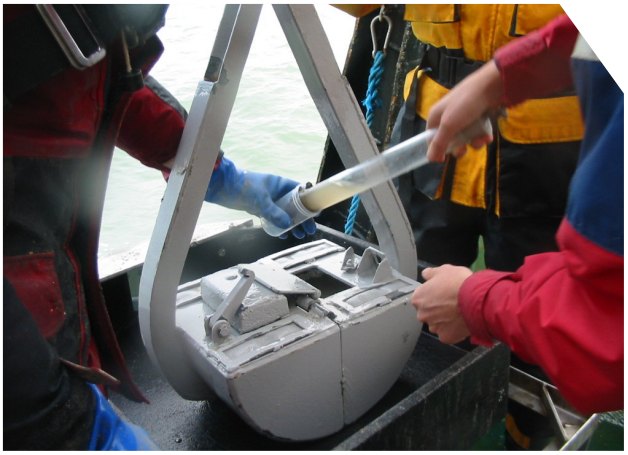
MARE
INTERFACULTARY CENTER FOR MARINE RESEARCH - LIEGE UNIVERSITY

// abstract

The research discipline 'oceanology' has steadily grown over 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 multidisciplinary field work (data aquisition), lab analyses, interpretation and mathematical modelling makes oceanology in essence a multidisciplinary research domain. The scope of oceanology has extended over the last decennia in the framework 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.

Hence, this scientific environment resulted in the foundation of the interfaculty research centre 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 as for field work and modelling;
- To accompany the broadening of these activities to new disciplines 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 extensive 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 international conferences and colloquia (the International Liège Colloquium on Ocean Dynamics and associated symposia). The latter allows valorisation at local, European and international level of research related to the fundamental problems that mankind 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)*

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

www.anast.ulg.ac.be

// institutional hierarchy

Faculty of Applied Sciences

Department of Architecture, Geology, Environment and Construction

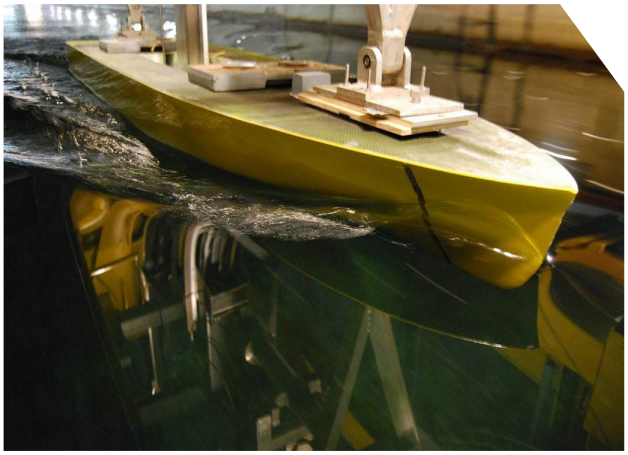
Structural Engineering Division

// head of the group

Prof. dr. Philippe Rigo

// research domain and discipline

Engineering and technological sciences; 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. The research activities of this group concentrate on shipbuilding; maritime transport; modelling 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-economic comparative analyses on transport modes (incl. intermodality); the development of a transport plan, mathematical modelling of future traffic flow; testing techniques after optimisation in the towing tank; naval hydrodynamics and production simulation (space, flow).

The marine topics studied by this research unit are:

- Shipbuilding and the development of an integrated application software (CAD-CAE) for ship building;
- Development and optimisation of offshore wind turbines (WindSteel, EOL-OS, etc.);
- 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

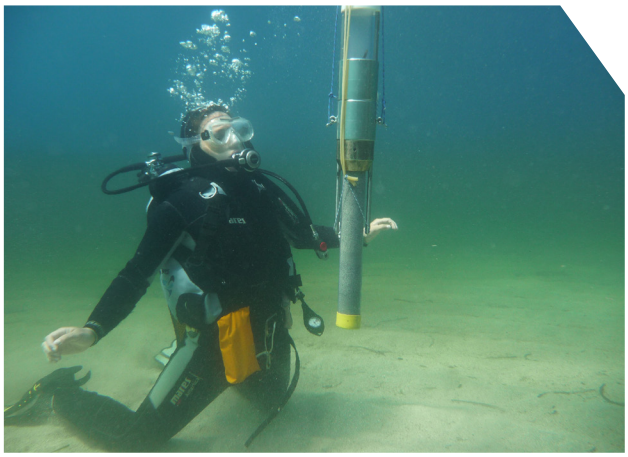
Department of Geology

// 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 University of Liège (ULg) studies Quaternary sedimentary records, with a particular focus on the minerogenic component, in order to reconstruct palaeoenvironmental and/or palaeoceanographical conditions. A multidisciplinary approach, coupling sedimentology, mineralogy (especially clays) and geochemistry, is used to determine the origin and provenance of detrital materials, to identify the main transport agent and to quantify the sedimentary fluxes.

Within the marine field, AGEs has specific expertise in mineralogy and geochemistry of late Quaternary marine sediments from various oceanic basins (North Atlantic, Arctic, Indian Ocean, Japan Sea). For instance, the research group reconstructs deep-sea circulation patterns of the North Atlantic and Arctic Ocean using mineralogy and isotope analyses of sediments in order to better understand the relationships between ocean circulation changes and climate variability. Recent research also involves palaeoenvironmental reconstructions in coastal and swamp settings (Mediterranean coast from Tunisia and Corsica).

AGEs

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

/ Animal Ecology and Ecotoxicology laboratory (ULg)

www.leae.ulg.ac.be

// institutional hierarchy

Faculty of Sciences

Department of Biology, Ecology and Evolution

// head of the group

Prof. dr. Jean-Pierre Thomé

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Animal Ecology and Ecotoxicology laboratory (LEAE) of the University of Liège was founded in 1967 under its former name 'laboratoire de Morphologie, Systématique et Ecologie Animales'. The laboratory studies freshwater ecology, marine ecology and ecotoxicology. The former research 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. Furthermore, a central ecotoxicological research theme concerns the study of the endocrine disruption in freshwater invertebrates with molluscs, rotifers and crustaceans as model organisms and based on proteomic and genomic approaches. The experiments and analyses were performed in the laboratory, as well as in natural ecosystems. LEAE is also specialised in the analyses of organic micropollutants in environmental matrices (water, sediments, organisms). In addition, the group is involved in epidemiological studies in order to evaluate the impact of several xenobiotics on human health in the French Antilles (chlordecone and POPs).

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 behaviour of red weeds caused by (human-induced) changes in their environment;
- Coral ecology: the study of the contribution of bacteria and an increasing temperature in the coral bleaching process as well as the study of marine microbacterial 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 conducted in order to predict how the marine system will respond to future changes.

LEAE

Sart-Tilman, B6C
Allée du 6 Août 11
B-4000 Liège

/ Laboratory of **Animal Physiology** (ULg)

www2.ulg.ac.be/physioan/index.htm#top

// institutional hierarchy

Faculty of Sciences

Department of Biology, Ecology and Evolution

// head of the group

Prof. dr. Jean-Christophe Plumier

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The marine research of the laboratory of Animal Physiology of the University of Liège focuses on histological reponses of sea anemones to bleaching-inducing stresses.

** Content not validated by the respective research group*

Animal Physiology

Sart Tilman
Boulevard du Rectorat 27 (P70)
B-4000 Liège

/ Geohydrodynamics and Environmental Research group (ULg)

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

// institutional hierarchy

Faculty of Sciences

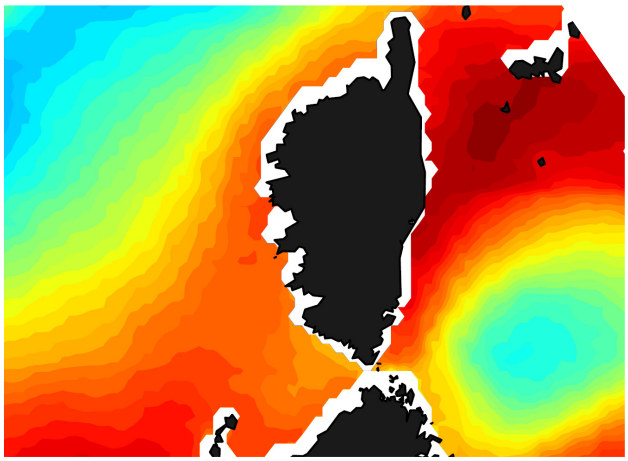
Department of Astrophysics, Geophysics and Oceanography

// head of the group

Prof. dr. Jean-Marie Beckers

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The Geohydrodynamics and Environmental Research group (GHER) of the University of Liège was formerly known as 'unité d'Océanographie Physique'. The group focuses on marine and environmental studies and modelling.

In the 70s, 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. Current research activities focus on the merging of statistical data analyses and modelling 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, resulting in the Mediterranean 3D primitive equation hydrodynamic models, and MERMAIDS, MODB, MEDAR and SeaDataNet (in which the oceanographic data base and data analysis tools were elaborated). 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)

www.mmm.ulg.be

// institutional hierarchy

Faculty of Applied Sciences

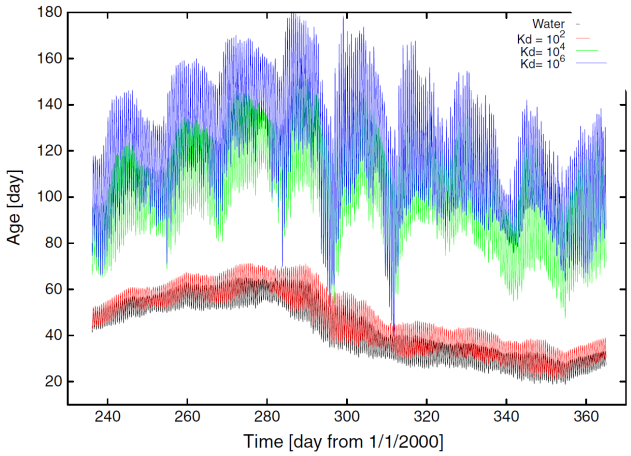
Department of Aerospace and Mechanics

// head of the group

Prof. dr. ir. 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 originates from the research group Geohydrodynamics and Environmental 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 modelling of ocean hydrodynamics;
- Mathematical modelling of hydrodynamic and biogeochemical processes of the ocean, sediment dynamics and transport of heavy metals.

MMM

Sart-Tilman, B37
Quartier POLYTECH 1
Allée de la Découverte 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, microorganism identification and animal health. Since 1991, more than 1,500 necropsies have been performed on marine mammals stranded on the Belgian, Northern France and Dutch coastlines, which include more than 20 large cetaceans such as sperm whales ***Physeter macrocephalus***, humpback whales ***Megaptera novaeangliae***, fin whales ***Balænoptera physalus*** and minke whales ***Balænoptera acutorostrata***.

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

- The quality of life of populations of harbour porpoises 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 include the creation of new partnerships from which to obtain animal samples, the expansion of the Belgian Marine Mammal Biobank to a European level, the improvement of microorganism identification methodologies, the European standardisation of post-mortem investigations and the diagnosis of animal diseases.

The department participates in several national and international programmes and collaborations focusing on stranded 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
B-4000 Liège

/ Functional and Evolutionary Morphology laboratory (ULg)

www2.ulg.ac.be/morfonct

// institutional hierarchy

Faculty of Sciences

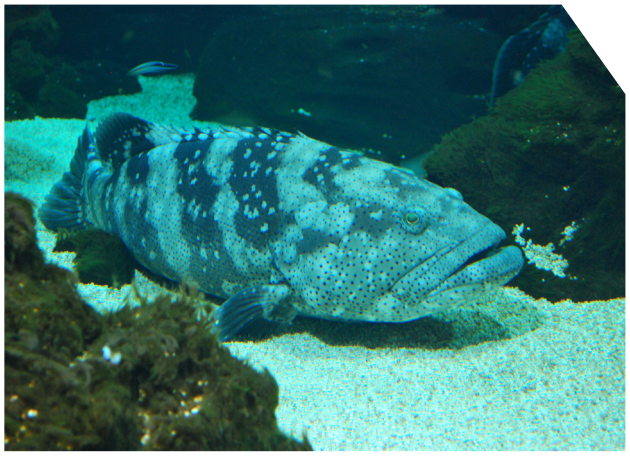
Department of Biology, Ecology and Evolution

// head of the group

Prof. dr. Eric Parmentier

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The complexity of biodiversity is so high that its understanding requires a multidisciplinary approach and a variety of techniques in the fields of biology, mathematics and physics. By combining comparative and experimental methods, studies in the laboratory and in the field, the Functional and Evolutionary Morphology laboratory aims to tackle different kinds of biological questions using morphology as a common basis. The laboratory has a long-standing tradition in the study of fish musculo-skeletal systems in Teleosts and in arthropod skeletal structures. Different projects are currently in development:

- The biodiversity of sound production mechanisms, the related behaviours, the meaning of the calls and hearing abilities in teleost fishes;
- The mechanisms and the dynamics of evolutionary diversification in different fish taxa;
- The biology of deep sea arthropods.

From a practical point of view, the current research includes the following marine topics:

- Understanding of the relationships between Carapidae fish (Ophidiiformes) and their invertebrate hosts (sea cucumber, sea star, bivalve, etc.);
- Study of the different factors explaining the biodiversity of Pomacentridae;
- The acoustic communication and mechanisms in different teleost taxa;
- Use of sound communication in aquaculture;
- Coral reef monitoring using passive acoustics.

The research unit cooperates closely with several universities and scientific institutes on a national and an international level.

Functional and Evolutionary Morphology

Sart-Tilman, B6c
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 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 greenhouse gases 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 on the first synthesis of CO_2 fluxes in coastal environments (Borges, 2005 - Estuaries), a publication on 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, Iberian coastal upwelling systems, the Mediterranean Sea, 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 greenhouse gases 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, KU Leuven University, Université Libre de Bruxelles (Belgium), Bordeaux-I (France), the Royal Netherlands Institute for Sea Research (NIOZ) 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 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. Sylvie Gobert

// 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, understanding of short- and long-term plankton variability, ecohydrodynamics, modelling of marine ecosystems, stable isotopes and food webs.

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

- Seagrass ecology;
- The use of stable carbon and nitrogen isotopes to assess plant and animal ecology;
- Long-term study of Mediterranean phyto- and zooplankton, including jellyfishes;
- Impact of climate variation and anthropogenic pressure on plankton dynamics and biodiversity;
- Development of phyto- and zooplankton, seagrass, ecosystem indicators of water quality;
- The ecotoxicology of marine vertebrates encompasses the study of the impact of pollution on different marine vertebrate species;
- The modelling of marine ecosystems (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 ecology.

In the future, the group will continue its ongoing research, but will also expand its focus towards the study of emerging pollutants, stable isotopes and discrimination of the pollution sources, microplastics, intercomparison of Mediterranean plankton time series, development of water quality indexes and modelling of marine fish.

The laboratory participates in national and international projects dealing with oceans such as the European (FP7) project SESAME (assessing and modelling 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 du 6 Août 15
B-4000 Liège

/ Palaeobiogeology, Palaeobotany and Palaeopalynology laboratory (ULg)

http://palaeobiogeo.weebly.com

// institutional hierarchy

Faculty of Sciences

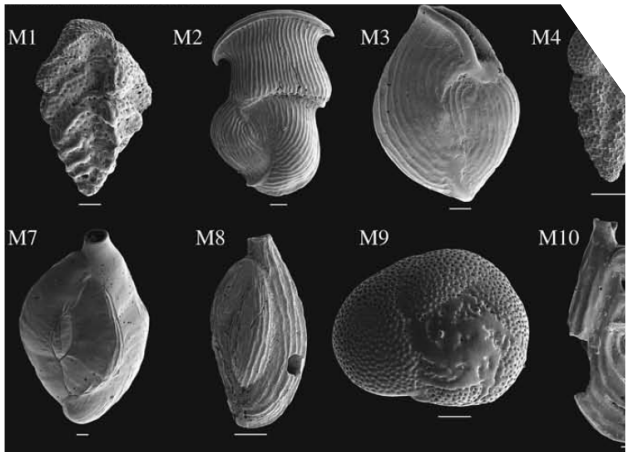
Department of Geology

// head of the group

Prof. dr. Emmanuelle Javaux

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The Palaeobiogeology, Palaeobotany and Palaeopalynology laboratory (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 traces and 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).

PPP studies the following marine topics:

- Evolution of the Precambrian biosphere (4 to 0.5 billion years ago) in relation with environmental changes (redox conditions, glaciations, tectonics, nutrient availability, etc.);
- Origin, evolution, palaeobiology and palaeoecology of early eukaryotes, and diversification of prokaryotes, in particular cyanobacteria;
- Macro- to nano-scale analyses (microscopy, microchemistry) 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.

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 littoral 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 sediments 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).

Pétrologie Sédimentaire

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

University of Mons

// Faculty of Sciences

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

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

http://hosting.umons.ac.be/php/biomarine

// institutional hierarchy

Faculty of Sciences and UMons Research Institute for Biosciences (IBS)

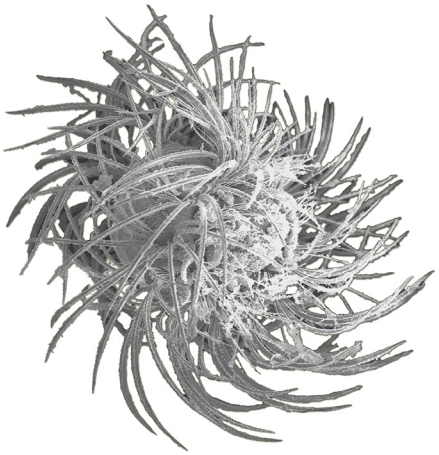
Department of Biology

// head of the group

Prof. dr. Igor Eeckhaut

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The research carried out within the laboratory of Biology of Marine Organisms and Biomimetics focuses on three main axes: (1) socio-ecological aquaculture, (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 - of which certain stages can be managed by poor coastal communities. Historically, the group experienced great success with the development of sea cucumber aquaculture and most of their aquaculture-related publications deal with this subject. Particular interest has been paid to the development of a method to allow cultivation of sea cucumbers in locally managed farms all year round. This method is patented since 2002, which led to the development of Madagascar Holothurie SA in 2008, 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 performs research on parasitic, commensal or mutualist relations of marine organisms. The life cycle, etiology 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. A variety of analytic methodes are used 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. 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 and Aquatic Systems group (UMons)

http://econum.umons.ac.be

// institutional hierarchy

Faculty of Sciences and UMons Research Institute for Biosciences (IBS)

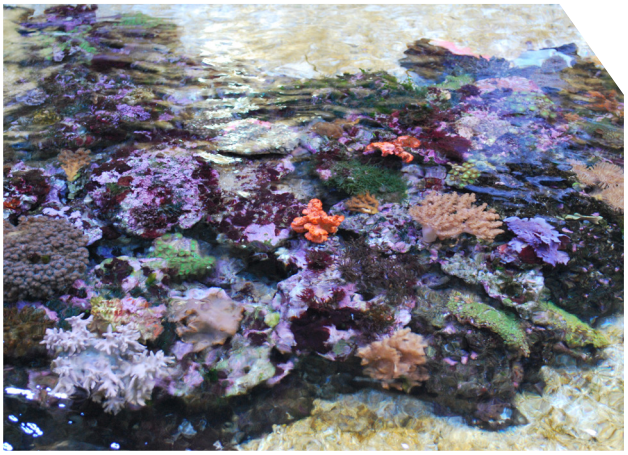
Department of Biology

// head of the group

Prof. 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. The research focus is 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).

Numerical Ecology of Aquatic Systems

Avenue du Champ de Mars 6
B-7000 Mons

/ Proteomic and Microbiology unit (UMons)

http://portail.umons.ac.be/en2/universite/facultes/fs/services/institut_bio/proteomique_microbiologie/pages/default.aspx

// institutional hierarchy

Faculty of Sciences and UMons Research Institute for Biosciences (IBS)

Department of Biology

// head of the group

Prof. dr. Ruddy Wattiez

// research domain and discipline

Natural sciences; Biological sciences

// abstract

The Proteomic and Microbiology unit of the University of Mons performs genetic and metabolic analyses on different types of organisms. This includes molecular studies, proteomic characterisations, functional analyses, etc.

In the marine field, the groups studies topics such as:

- Identification and quantification of carbonylated proteins in the UVB-resistant marine bacterium *Photobacterium angustum* S14;
- Links between bacterial communities in marine sediments and trace metal geochemistry;
- Characterisation of the carbohydrate fraction of the temporary adhesive secreted by the tube feet of the sea star *Asterias rubens*;
- LAS degradability by marine biofilms derived from seawater in Spain and Sweden;
- Metaproteogenomic insights of contaminated microbial communities in marine and freshwater environments;
- Efflux of metals from contaminated marine sediments due to bacterial remineralisation of phytodetritus.

** Content not validated by the respective research group*

Proteomic and Microbiology

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

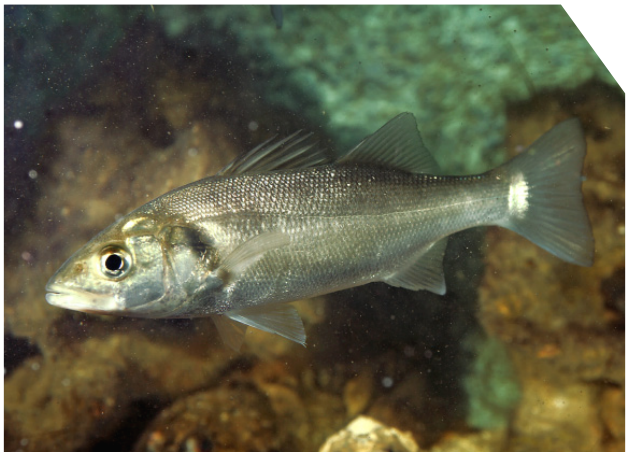
Department of Biology

// 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 studies aquatic organisms and environments (both marine and fresh water), at all integration levels, from molecules to ecosystems. Rather than focusing on specific molecular and cellular approaches of life, URBE investigates the biochemistry, physiology, evolution and ecology of living organisms.

The main research topics include the analyses of physiological, biochemical and molecular responses of organisms to environmental disturbances (pollutions, climate warming, etc.), to molecular ecology and evolutionary genetics, as well as to the ecology of microbial, plant and animal communities in lakes and rivers. Fundamental and applied research is also carried out in the field of aquaculture and on the management of aquatic environments in temperate and tropical regions.

** 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 Directorate **Earth and History of Life** (RBINS)

www.naturalsciences.be/en/science/do/94

// 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 Operational Directorate 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). The Directorate conducts fundamental and applied research in the fields of geology, palaeontology, bioarchaeology and human evolution. Three multidisciplinary research programmes can be distinguished:

- Researchers from the Geological Survey of Belgium study the evolution of the lithosphere, the geological component of our environment and its mineral and energy resources. This group also provides scientific expertise within EuroGeoSurveys;
- The Palaeobiosphere Evolution programme conducts research with regard to the evolution of the biosphere and its interactions with the geosphere: the biodiversity and evolution of fossil flora and fauna, the reconstruction of fossil environments and palaeoclimatology;
- Researchers on the Quartenary Man and Environments programme study the physical and cultural aspects of human evolution, as well as the interactions between humans and their physical and biotic environment in the past. Funded by the regions, the group also provides expertise in the field of archaeosciences.

In each of these research programmes marine themes are covered:

- In the Geological Survey of Belgium research is conducted on the dynamics of sedimentary basins, studying inter alia the stratigraphy and sedimentology of marine records. The Geological Survey also focuses on the reconstruction of the geological history of natural hazards (tsunamis) and the reconstruction of the oceanic geochemical fluctuations and biotic turnovers;
- The research programme Paleobiosphere Evolution studies the evolution and dynamics of marine palaeoecosystems during critical periods in the history of life on earth, through the integration of palaeobiological, geophysical and geochemical information. Furthermore, research is conducted on the origin and early diversification of cetaceans during the Eocene;
- The Quaternary Environments and Humans unit focuses on the reconstruction of the changing environments of low-lying coastal plains during the Pleistocene and Holocene. Finally, the evolution of fish exploitation and trade are studied.

** Based on input received in 2013*

Earth and History of Life

Vautierstraat 29
B-1000 Brussels

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

http://odnature.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 technological sciences; Information and computer sciences
Engineering and technological sciences; Geomatics

// abstract

The Operational Directorate Natural Environment (OD Nature) resulted from the merger of the former Management Unit of the North Sea Mathematical Models and the Scheldt Estuary (MUMM) with the Fresh Water Biology and Biological Evaluation departments, the Belgian Biodiversity Platform and the National Focal Point concerning the Convention on Biological Diversity.

OD Nature studies both biotic and abiotic components of the natural environment as well as the interactions of underlying systems. For the marine environment, the research follows a system-oriented approach, often underpinned by modelling studies and with an important physical component. This research extends far beyond the Belgian boundaries.

The Directorate is competent to perform research in certain domains. The group ensures a permanent monitoring programme of the North Sea and reports to the official services. It also coordinates a programme 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 several bodies and instruments. In certain cases, it concerns legally-bounded commitments. OD Nature also manages several databases (Belgian Marine Datacenter, marine mammals, bird ringing, archiving of satellite images, etc.) which are available for scientists as well as for the broader public.

Specifically for the marine environment, OD Nature is working on:

- Modelling: studying the ecosystems of the North Sea using mathematical modelling techniques with a view to understand how they function and to provide certain forecasting capacities;
- 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, OD Nature represents Belgium in diverse intergovernmental conventions dealing with the protection of the marine environment. Furthermore, MUMM elaborates the Belgian position on certain matters which fall under the authority of the minister responsible for for the marine environmental policy.

OD Nature also coordinates and manages the RV Belgica and is responsible for the Belgian North Sea Aerial Survey program tracing marine pollution. The Directorate 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 Freshwater Biology division 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 division 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.

This division collaborates with several foreign institutes and participates in research projects including the AntaBIF project, aimed to build an Antarctic Biodiversity Information Facility. This will result in the Belgian federal contribution to LifeWatch.

Natural Environment

Vautierstraat 29
B-1000 Brussels

/ Operational Directorate **Taxonomy and Phylogeny** (RBINS)

www.naturalsciences.be/en/science/do/97

// institutional hierarchy

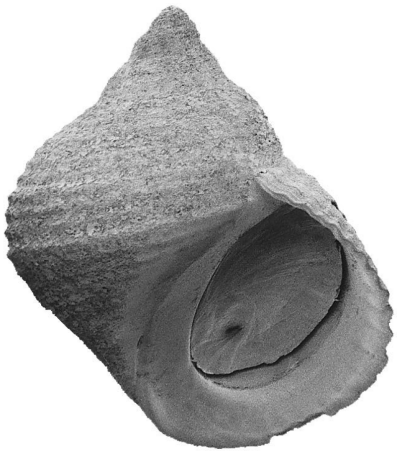
Royal Belgian Institute of Natural Sciences (RBINS)

// head of the group

Prof. dr. Thierry Backeljau

// research domain and discipline

Natural sciences; Biological sciences



// abstract

The Operational Directorate 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). This Directorate conducts research on animal biodiversity and evolution, and more specifically, speciation, adaptation, biotic interactions and integrative taxonomy. Particular attention is paid to the identification of new taxa (primarily via DNA barcoding), the impact of invasive species, the importance of chemical communication in insects, the effects of habitat disruption, the reconstruction of phylogenetic relations and the creationism versus evolution debate.

A number of marine themes are studied in this group. It concerns taxonomic research on fish, echinoderms (Echinodermata), crustaceans (Crustacea), molluscs (Mollusca), annelids (partim: Oligochaeta), roundworms (Nematoda) and sponges (Porifera). The Directorate performs field work in various parts of the world. Especially the work in Antarctica and the Southern Ocean has a marine focus. The research group is for example involved in SCAR-MarBIN 'the Antarctic Marine Biodiversity Information Network'.

** Based on input received in 2013*

Taxonomy and Phylogeny

Vautierstraat 29
B-1000 Brussels

/ Earth Sciences department (RMCA)

http://www.africamuseum.be/research/earth-sciences/index_html/?searchterm=aardwetenschappen

// institutional hierarchy

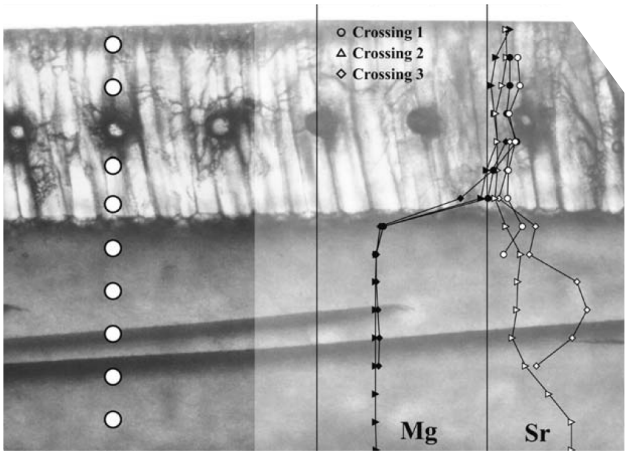
Royal Museum for Central Africa (RMCA)

// head of the group

Prof. dr. Luc André

// research domain and discipline

Natural sciences; Earth sciences



// abstract

The Earth Sciences department of the Royal Museum for Central Africa (RMCA) carries out diverse geological and environmental research in a number of African countries. The research inter alia comprises general geology, cartography, geochemistry, isotope geology and geomorphology.

The Mineralogy and Petrography section is part of this department and focuses on geochemistry applied to questions regarding global changes (in the distribution of chemical elements in different spheres of the environment). The marine research activities include the study of biogeochemical cycles in seas and oceans. In this context, the section is involved in the BIGSOUTH-project in the Southern Ocean.

** Content not validated by the respective research group*

Earth Sciences

Leuvensesteenweg 13
B-3080 Tervuren

/ Biology department (RMCA)

www.africamuseum.be/research/biology

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

// head of the group
Prof. dr. Marc De Meyer

// research domain and discipline
Natural sciences; Biological sciences

// abstract

The Biology department of the Royal Museum for Central Africa (RMCA) manages an extensive collection of Afrotropical organisms. Furthermore, the department conducts research at an international level both on collection specimens and on species in their natural environment in order to attain a better understanding of African biodiversity.

The department consists of four divisions

- Wood Biology;
- Biological collection and data management;
- Invertebrates;
- Vertebrates.

The marine research is situated in the Vertebrates and Invertebrates divisions.

- The Vertebrates division conducts research in the field of ichtyology and more specifically on the systematics and ecology of African fish species. This group is involved in FishBase: the largest worldwide fish encyclopedia and scientific data source on fish. The RMCA is responsible for the African brackish and freshwater fish (www.FishBaseForAfrica.org);
- In the Invertebrates division, the taxonomy of sea cucumbers is studied.

** Based on input received in 2013*

Biology

Leuvensesteenweg 13
B-3080 Tervuren