Catalogue

Marine Research Infrastructure 2018

Flanders Marine Institute (VLIZ)

Colophon

The Catalogue Marine Research Infrastructure 2018 is part of the Compendium for Coast and Sea initiative: 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: *www.compendiumcoastandsea.be*.

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VLIZ

COMPENDIUM
KUST & ZEE / COAST & SEA

Readers guide

The Catalogue Marine Research Infrastructure 2018 discloses the research infrastructure (RI) that is available in the Belgian marine research groups (MRGs), affiliated to universities, graduate schools and scientific institutes. The goal of this publication is to demonstrate the (technical) expertise of the research groups, stimulate collaboration and optimise the use of the available RI. Furthermore, this publication can be used as an input for international, European and national marine science policy and mapping initiatives.

The MRGs are mapped in the framework of the Compendium for Coast and Sea, using a specific methodology where each group has to comply with a number of criteria (see *Pirlet et al. 2018*). For this catalogue, a first screening of the RI of the MRGs was performed by the secretariat of the Compendium for Coast and Sea. The draft information sheets were subsequently sent out to each of the research groups for validation. A number of MRGs that reported no RI are not included in this publication.

A framework with two levels of hierarchy was developed in order to report the available RI in a standardised way. This framework was developed in consultation with experts and taking into account relevant (European) initiatives such as:

- *European portal on research infrastructures' services*
- *Seasera-project* – work package 4: Infrastructures
- *MarinEra-project*
- Mapping of the European Research Infrastructure Landscape: *MERIL database*
- *Eurocean marine infrastructure database*
- *Expert group on marine RI (EC)*
- European Strategy Forum on Research Infrastructures (*ESFRI*)

For each first-level category, a symbol was developed in order to allow a quick screening of the available types of RI in the different MRGs (see table). For the category 'Experimental facilities and analysis capacity', additional symbols are used to create a more uniform terminology.

Whenever available, the website and contact person with regard to the RI are mentioned, as well as the user modalities for external parties. The user modalities are idicated by the number in superscript:

1. **Free**: RI is available for external parties free of charge
2. **Fee-based**: acces to RI is fee-based
3. **Co-authorship**: co-authorship on the publication based on the data generated by the RI
4. **Not available**: RI is not available for external parties

Furthermore, the IMIS-ID of the research groups is visualised in the upper right corner of every MRG-sheet. The IMIS-ID is a numeric code referring to the webpage of the MRG within the VLIZ Integrated Marine Information System (IMIS) and corresponds to the digits at the end of the URL of the webpage (*www.vliz.be/imis/imis.php?module=institute&insid=ID*). In the IMIS-database additional information about the MRG can be consulted, such as the current staff, an overview of the publications affiliated to the MRG, projects in which the group participated and datasets (where relevant).

Contributions, improvements and corrections with regard to this publication can be sent to the secretariat of the Compendium for Coast and Sea (*compendium@vliz.be*).

The catalogue is accessible in an interactive way on the VLIZ-website (*www.vliz.be*) and the website of the Compendium for Coast and Sea (*www.compendiumcoastandsea.be*).

Infrastructure categories				
Level 1 category		Level 2 category		
	Research Vessel			
	Marine and coastal stations			
	Sampling, observation and (sea-going) survey infrastructure	Underwater vehicles, drifters and floats		
		Ship-based instrumentation		
		Fixed platforms, moorings and landers		
		Field instrumentation		
	Satellites & (airborne) remote sensing capacity			
	Experimental facilities and analysis capacity	Overview		Particle size analysis
				X-ray diffractometer
				Analysis of genetic material
				Chromatography
				Mass spectrometers
				Microscopes
				Aquaculture experimental facilities
				Marine land-based facilities for engineering
		Type of laboratory / analyses		
		Class or accreditation of lab		
		Analysis equipment, services and techniques		
		Aquaculture experimental facilities		
		Marine land-based facilities for engineering		
		Other experimental facilities and analysis capacity		
	Data & information management and computing infrastructure	Numerical models, specialised software packages and computational infrastructures		
		Simulators		
		(Marine) libraries		
		Marine data centres		
		Collections		
	Logistics			

European Strategy Forum for Research Infrastructures

Semi-public bodies

Antwerp University Association

KU Leuven University Association

Ghent University Association

** Content based on the input provided in 2015 (not validated in 2018)*
*** Not validated*

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

Overview Marine Research Infrastructure

In the table below, an overview is given of the research infrastructure (RI) which is available in the marine research groups (MRGs). This overview is based on the information which was collected in fact sheets by the secretariat of the Compendium for Coast and Sea, and were validated by the respective research groups. For a few MRGs information about the RI was lacking while other MRGs do not have any RI, those groups are therefore not included in this overview.


Research Vessel


Marine & Coastal station


Sampling, observation & survey infrastructure


Satellites & (airborne) remote sensing capacity

Infrastructure Categories		Infrastructure
		• 2 regional vessels (35-55 m) • 4 RIBs • 3 smaller boats
		3 marine and coastal stations: at the Belgian coast, in Corsica and in Madagascar
	Underwater vehicles, drifters and floats	• 1 seaglider • 1 aquadrone (Mobile Sensor Platform) • 1 Unmanned Surface Vessel (USV) • 3 Remotely Operated Vehicles (ROVs) (1 micro ROV, 1 mini ROV and ROV Genesis) • Multiple wave-resisting drifters
	Ship-based instrumentation	13 MRGs indicate to dispose of ship-based instrumentation. It mostly concerns instruments to sample and analyse the water column, sediments, seafloor and marine organisms. Several groups have devices to measure the direction and strength of sea currents. Furthermore, 3 MRGs have acoustic devices to map and characterise the (sub-)seabed.
	Fixed platforms, moorings and landers	• 9 MRGs indicate to dispose of fixed platforms, moorings and landers • Multiple MRGs indicate to have frames (tripods) for mounting oceanographic instruments • Multiple buoys, mooring weights and cages • 1 sediment trap
	Field instrumentation	34 MRGs and 1 semi-public body indicate to dispose of field instrumentation. This covers a plethora of instruments ranging from devices to record shapes and topography, geophysiology, elemental analysis, light analysis, sample collections, waves and tides, abiotic conditions, video footage, animal detection devices, magnetism, acoustic receiver networks, structural testing, monitoring systems on wind farms, electric fishing nets, to meteorological stations.
		• 8 MRGs dispose of satellites and (airborne) remote sensing capacity • 1 airplane • Several remotely piloted aircraft systems (RPAS) (fixed wing cruiser and octocopters) • Several instruments (e.g. APEX and LiCrIS) and platforms for remote sensing (e.g. PROBA-V satellite) • 4 MRGs have the capacity to access and process satellite-imagery
	Overview	PSA XRD CHR MS
	Type of laboratory / analyses	65 MRGs indicate to dispose of a laboratory, analysis equipment or perform certain services and techniques (see also other section on analysis equipment, services and techniques).
	Class or accreditation of lab	14 MRGs indicate to dispose of laboratories with some kind of accreditation.

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Logistics

	Analysis equipment, services and techniques	The MRGs and semi-public bodies dispose of a plethora of analytical instruments and techniques. Some more specific numbers are given below: • At least 20 MRGs dispose of instruments and techniques for the analysis of genetic material • At least 25 MRGs dispose of microscopic instruments and techniques of which at least 11 conduct electron microscopy • At least 23 MRGs dispose of chromatography equipment and techniques • At least 25 MRGs dispose of spectrometry equipment and techniques • Several MRGs dispose of equipment to do structural testing • Several MRGs dispose of equipment to do zoological research above the molecular level
	Aquaculture experimental facilities and services	22 MRGs indicate to dispose of aquaculture experimental facilities. These facilities range from small tanks in temperature controlled cabinets, raceway ponds, photobioreactors, ocean acidification facilities, to tanks of several thousand liters with recirculation systems and extensive outdoor aquaculture facilities.
	Marine land-based facilities for engineering	13 MRGs indicate to dispose of marine land-based facilities for engineering, such as: • Multiple wave and current flumes • Multiple wave and test basins • At least 3 functional towing tanks • Multiple test rigs • Moving platform • 1 anechoic acoustic room • A physical model of the port of Zeebrugge • 2 wind tunnels
	Other experimental facilities and analysis capacity	15 MRGs indicated to dispose of other experimental facilities and analysis capacity not falling into former categories, including: • Deep Diving Pools (30-40 m) • A Controlled Reduced Tide area (Lippenbroek) • Desalinisation technologies • Raceway flumes and artificial rivers • Several climate rooms, greenhouses

	Num. models, spec. software and comp. IR	43 MRGs and 1 public body indicate to dispose of numerical models, specialised software packages and computational infrastructure.
	Simulators	4 MRGs indicate to dispose of (marine) simulators : • 2 simulators relate to shipping and maritime transport • 1 diving pool
	(Marine) libraries	21 MRGs indicate to dispose of a (partly marine) library.
	Marine data centres	20 MRGs and 1 public body indicate to dispose of a (partly) marine data center. It mainly concerns biological databases and data systems, although there are also databases with a focus on remote sensing, geological, chemical, historical, socio-economic and geographic data.
	Collections (e.g. for biological resources)	22 MRGs indicate to dispose of a collection which is of relevance for marine research. It mainly concerns biological collections (20 MRGs), followed by heritage collections (2 MRGs) and 1 collection related to geology.

	This section contains a wide range of items. It *inter alia* concerns: • Several cold rooms and freezers • Two sediment core repositories • Meeting facilities • Vans and four wheel drives • Diving equipment • Mechanic and electronic workshop

European Strategy Forum for Research Infrastructures

European Strategy Forum for Research Infrastructures (ESFRI)

The development of new or upgrading of existing supermassive research infrastructure of pan-European importance is one of the basic pillars of the current policy of the European Commission on the further development of the European Research and Innovation Area. It is research infrastructure that is considered to be crucial for further developments within a research field. To this end, a transparent and global vision of European needs has been developed in the form of a roadmap for research infrastructure in Europe for the next 10 to 20 years. The elaboration of this scientific roadmap has been entrusted to the 'European Strategy Forum on Research Infrastructures' (*ESFRI*). The first version of the ESFRI-roadmap has been published in 2006, followed by several updates. From 2010 onwards, several projects from this roadmap have moved from the preparation to the implementation phase.

The contribution of Flanders in a number of these pan-European research infrastructures is managed by the *FWO*. Currently, Flanders is participating in three ESFRI-infrastructures with a specific marine component: LifeWatch (biodiversity research), Integrated Carbon Observation System (ICOS) and European Marine Biological Resource Centre (EMBRC). Hence, the marine scientific community can use the services and facilities provided by these infrastructures. In the following pages, the services and facilities of LifeWatch, ICOS and EMBRC are elaborated.

European Marine Biological Resource Centre (EMBRC)


Research Vessel


Marine & Coastal station


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

// Abstract

EMBRC (*www.embrc.eu*) is a coordinating research infrastructure providing access to marine biological resources and consists of state-of-the-art research facilities and training at marine research stations throughout Europe. This includes marine biological species (models), biobanks, 'omics' platforms, structural facilities and imaging (microscopy, cytometry, etc.).

The Flemish contribution to EMBRC is coordinated by Ghent University in collaboration with the University of Hasselt and Flanders Marine Institute (VLIZ).

Infrastructure Categories		Infrastructure
		RV Simon Stevin will be deployed in the framework of EMBRC
		Marine Station Ostend (VLIZ) (*www.vliz.be/en/marine-station-ostend*)
	Underwater vehicles, drifters and floats	ROV Genesis (VLIZ)
	Ship-based instrumentation	Various sampling tools
	Overview	
	Type of laboratory / analyses	Technology platforms: • Aquarium and Culture platforms • Imaging and Microscopy platforms • Omics platforms
	Marine data centres	• The European Marine Training Portal (*www.marinetraining.eu*) • EMBRC aims to establish a common e-infrastructure for processing, curating, analysing and storing marine data
	Collections	Culture collections (*inter alia* available at Ghent University)

Integrated Carbon Observation System (ICOS)


Research Vessel


Sampling, observation & survey infrastructure

// Abstract

ICOS (*www.icos-infrastructure.eu*) is a European monitoring network consisting of a large number of observation systems for measuring greenhouse gases. The observation systems are spread across Europe and consist of three major components: an atmospheric component with high measurement towers, an ecosystem component with measurement towers that observe fluxes and a marine component with observation systems on ships and buoys. Through these observation systems, ICOS aims to provide long-term data required to better understand the current situation as well as the future behaviour of the global carbon cycle and greenhouse gas emissions. These data will also shed light on the factors that control the changing atmospheric composition in greenhouse gases.

In Belgium the ecosystem component is monitored by the University of Antwerp (Plant and Vegetation Ecology research group) and the Research Institute for Nature and Forest (INBO). Flanders Marine Institute (VLIZ) and the University of Liège (Unit of Biosystem Physics) take care of the marine component.

Infrastructure Categories		Infrastructure
		Deployment of RV Simon Stevin in the framework of ICOS.
	Ship-based instrumentation	• pCO_2 sensor • CTD has been expanded with sensors for measuring the acidity and photosynthetically active radiation
	Fixed platforms, moorings and landers	A buoy nearby the C-power wind park with *inter alia* a CTD for continuous measurement of the temperature and salinity supplemented with sensors for measuring the turbidity, the dissolved oxygen concentration, seawater pH, chlorophyll-a concentration, dissolved nutrients, currents and CO_2-concentration in air and seawater.

LifeWatch


Research Vessel


Sampling, observation & survey infrastructure


Satellites & (airborne) remote sensing capacity


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

// Abstract

LifeWatch (*www.lifewatch.be* (regional portal) / *www.lifewatch.eu* (central portal)) is a European infrastructure supporting biodiversity and ecosystem research. It is a virtual laboratory consisting of observation stations, databases, web services and modelling tools installed across Europe. This network facilitates the generation, processing, integration and analysis of biodiversity data.

The Flemish contributions to LifeWatch are coordinated by Flanders Marine Institute (VLIZ, marine part) and the Research Institute for Nature and Forest (INBO, freshwater and terrestrial part). This Flemish LifeWatch consortium is funded through FWO (Research Foundation Flanders). Furthermore, the Royal Belgian Institute of Natural Sciences (RBINS), the Belgian Biodiversity Platform, the Earth and Life Institute (UCL) and the Biosystems Engineering Department (ULg / Gembloux-ABT) are involved as Belgian partners.

Infrastructure Categories		Infrastructure
		Up to 17 stations in the BPNS are sampled with the research vessel Simon Stevin with regular frequency: nine stations close to shore are visited on a monthly basis and eight additional stations located further offshore on a seasonal basis.
	Ship-based instrumentation	• Flow cytometer • Video Plankton Recorder (VPR) • Underway system registering navigation (heading, time, latitude/longitude, speed, course over ground, navigation depth and draught), meteorological (air temperature and relative humidity, wind direction and speed) and oceanographic data (SST, salinity, chl-a, sound velocity).
	Field instrumentation	• Fish acoustic receiver network in the Belgian part of the North Sea • Cetacean passive acoustic network in the Belgian part of the North Sea • GPS tracking network for large birds (herring gulls, lesser black-backed gulls, marsh harriers) • Bat acoustic tracking network in the Belgian part of the North Sea • Groundwater monitoring network
		• Ecotopes and ecosystem descriptors based on space remote sensing sensors • Aerial remote sensing sensor Unmanned Aerial System (UAS)
	Analysis equipment, services and techniques	**Equipment** • Zooscan • Flowcam • Microscopes (regular, stereo, fluorescent and inverted) • qPCR • CTD sensor (Seabird 21+) • Secchi disks Measured parameters include zooplankton and phytoplankton counts and density, depth profile of the water column (temperature, salinity, turbidity, oxygen concentration, light scatter)
	Marine data centres	• The LifeWatch central taxonomic backbone that facilitates the standardisation of species information (WoRMS, Aphia, IRMNG, etc.) is a central part of the infrastructure. • Numerous databases (EurOBIS, EMODnet, Marine Regions, Broedvogel, Florabank, VIS, Vlinder, Watervogels, Wildbeheer, ETN) make a significant contribution to biodiversity research in Flanders. These databases are further completed and integrated in the central LifeWatch infrastructure. • Online web services, models and applications that disclose the available data (R-packages, Data explorer).
	Collections	Sample library: Physical collections of phytoplankton, zooplankton, macrobenthos, DNA and eDNA

Semi-public bodies

Flanders Maritime Laboratory (Greenbridge Research Campus)

// Website research infrastructure

www.greenbridge.be

// Contact research infrastructure

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Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Overview	
	Marine land-based facilities for engineering	• Coastal and Ocean Basin (under construction) • Towing tank

OWI-Lab

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Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	• Monitoring systems on C-Power offshore wind farm [3] • Monitoring systems on Nobelwind offshore wind farm [3]
	Overview	
	Analysis equipment, services and techniques	**Equipment** • Mobile dynamic measurement system [2] • Stand-alone dynamic measurement system with 3G capability [2] • Permanent monitoring system for dynamic monitoring [2] **Services** • Design verification [2] • Short-term dynamic assessment [2] • Permanent monitoring of dynamic system [2]
	Marine land-based facilities for engineering	• Climatic test facility - large climate chamber (extreme cold, icing, hot climate, humidity) [2] • Corrosion testing [2]
	Num. models, spec. software and comp. IR	• Data processing tools: matlab, python, etc. [2] • Finite Element Tools [2]
	Marine data centres	Data warehouse for storing monitoring data / large datasets [2]

OWI-Lab
(offices)

Gaston Geenslaan 8
3001 Heverlee

Flemish university associations

Antwerp University Association

// Faculty of Pharmaceutical, Biomedical and Veterinary Sciences

- Toxicological Centre

// Faculty of Arts and Philosophy

- Centre for Urban History

// Faculty of Applied Economics

- Department of Transport and Regional Economics

// Faculty of Sciences

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

// Other

- Antwerp Maritime Academy

Antwerp Maritime Academy

// Website research group

www.hzs.be


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Ship-based instrumentation	Development of a solar boat.
	Fixed platforms, moorings and landers	Fixed platform at the port of Ostend for corrosion and fouling studies.
	Field instrumentation	Portable instruments to analyse painted surfaces: • Surface temperature, surface profile, film and plate thickness • Bresle set test kit, adhesion test kit, comparators for shot and grit Portable sensors for water analysis Sensors for air and gas analysis: • Temperature, humidity, pressure, CO_2 concentration, O_2, UV, PM, NO_x Data loggers: • LabQuest 1, LabQuest Stream
	Overview	
	Analysis equipment, services and techniques	**Equipment** Paint analysis lab: • Paint spray cabin • Salt nebula cupboard (LABOMAT Brouillard Salin SSP 600 litres) • Corrosion pilot plant Bio lab: • Protein electrophoresis Protean ii xi met powercell. For SDS-PAGE and native PAGE • Laminar flow cabinet for bacterial cultures Starlab 48” • Eppendorf centrifuge 5430R, plus two rotors • Aquarium for culture of marine invertebrates Basic lab equipment: pH, spectrophotometer, thermal bath
	Num. models, spec. software and comp. IR	• Marine Sofware system - octopus program • Labview development systems 12 • ALPAC, AUTOCAD, SIMATEC STEP 7, Collision Avoidance, Dokmar ship stability • Navichart, CP master, Openfoam, Unitest, eNavigator
	Simulators	• Full Mission Bridge Simulator (Kongsberg Polaris 7.4.1 with 44 own ships, several target ships and 20 areas) with 3 cubicles and 1 desktop • 3 desktops with Kongsberg K-POSDP software including 6 own ships for dynamic positioning exercises • 17 desktops with Kongsberg liquid cargo with 2 ship model (i.e., a product tanker and a VLCC) • 15 desktops with Kongsberg propulsion plant trainer PPT2000 DE-II • Global Maritime Distress and Safety System (GMDSS) • 16 desktops with L3 Communications Company ‘liquid cargo handling simulator’ soft-ware for liquid gas/chemicals cargo including on 4 ship models
	(Marine) libraries	HZS library (*www.hzs.be/en/student-facilities/library*)

AMA

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B-2030 Antwerp

Ecosystem Management research group

// Website research group

www.uantwerpen.be/en/rg/ecobe

// Contact research infrastructure

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Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Type of laboratory / analyses	• Water quality lab [2] • C14 primary production lab (benthic / pelagic) [2]
	Analysis equipment, services and techniques	**Equipment** Mesodrome: large flume facility in green house for experiments with vegetation or other biota in different hydrological regimes [3]
	Other experimental facilities and analyses capacity	Pilot site 'Lippenbroek' with a controlled reduced tide. In this site continous water levels, in- and outgoing tidal volumes are recorded. A network of monitoring stations with data on e.g. topography, sedimentation and erosion, soil properties, vegetation, benthos is available. [3]

ECOBE

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B-2610 Wilrijk (Antwerp)

Research group **Functional Morphology**

// Website research infrastructure

www.ua.ac.be/main.aspx?c=.FUNMORPH&n=70331

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Field instrumentation	Field portable equipment (race-track, high-speed camera, force plate, bite force transducers, etc.) [2,3]
	Type of laboratory / analyses	The research group investigates the evolution of functional systems, for which it uses a wide range of equipment to quantify motion and function in animals. [2,3]
	Analysis equipment, services and techniques	• Vicon infrared system (automated motion capture system) [2,3] • High-speed cineradiography system [2,3] • Electromyography (emg)-system (study of muscle activity patterns) [2,3] • Force plate to measure ground-reaction forces in a wide array of animals [2,3] • Treadmill to measure lizard locomotor endurance [2,3] • Integrated zoo set-up to study the kinesiology of ape locomotion [2,3] • 3D laser scanner and 3D coordinate measurement system [2,3] • A portable spectrometer (Avaspec-2048-USB2-UA-50, Avantes) to quantify colours [2,3]

Modalities are usually discussed. If it is only about making equipment available (which usually implies that someone is also responsible for operation, technical support, etc.), a price is calculated depending on the duration and scope of the required deployment. If the collaboration can take the form of effective scientific collaboration, co-authorship is evident in itself and the cost is limited to operating costs.

Functional Morphology

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Research group **Systemic Physiological and Ecotoxicological Research**

// Website research infrastructure

www.uantwerpen.be/en/research-groups/sphere/technology

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	A range of analytical techniques: full transcriptomics, proteomics and metabolomics platforms, flow cytometry, enzymology, a broad range of organic and inorganic chemical analyses. [2,3]
	Analysis equipment, services and techniques	• Stratagene Q RT PCR (Real-Time PCR) [2,3] • Microbeta Tri Lux (multi-detector instrument for liquid scintillation or luminescence detection of samples) [2,3] • Coulter Counter [2,3] • Lightcycler [2,3] • High Resolution Inductively Coupled Plasma Mass Spectrometry (HR-ICP-MS) [2,3] • Biohazard Flow Bench [2,3] • Array Spotter [2,3] • Microwave destruction [2,3] • Gamma Counter [2,3] • Biacore System [2,3] • Inductively Coupled Plasma Mass Spectrometry (ICP-MS) [2,3] • Agilent Tof Mass Spectrometer (MS) O [2,3] • Total Organic Carbon [2,3] • Potentiometer [2,3] • Flow Cytometer [2,3] • ZebTEC stand-alone racks [2,3] • Fully controlled climate rooms [2,3] • Cel Potentiometer [2,3] • Laser Ablation Microscope [2,3] • Blood gas analysers [2,3] • ZebraCube and ZebraBox automated behavior analysis [2,3] • Swimming flumes for small and large fish [2,3] • Respirometry for small and large fish [2,3] • Respirometry for invertebrates [2,3] • Transcriptomics [2,3] • Proteomics [2,3] • Metabolomics [2,3]
	Aquaculture experimental facilities	• There are model systems for a range of organisms including tilapia, juvenile carp, zebra fish, green algae, *Daphnia*, *Escherichia coli*, harbour porpoises, etc. [2,3] • Aquaculture tanks [2,3]
	Other experimental facilities and analyses capacity	• Mesocosms for fresh and marine water [2,3] • Artificial rivers [2,3] • Raceways-swimming flumes for large fish [2,3]

	Num. models, spec. software and comp. IR	Speciation modelling [2,3]

SPHERE

Campus Groenenborger
Groenenbrogerlaan 171 build. U
B-2020 Antwerp

Toxicological Centre

// Website research infrastructure

www.uantwerpen.be/en/rg/tox/facilities-and-collaboration/analytical-service

Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Type of laboratory / analyses	Forensic Toxicology and Environmental Toxicology
	Analysis equipment, services and techniques	With regard to marine research the following analytical services are of particular relevance: • POPs and BFRs in human, environmental (dust, sediment, soil) and biological matrices (tissues, eggs, food) • Organophosphate flame retardants in abiotic (sediment and dust) and fish oil samples

Toxicological Centre

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Department of **Transport and Regional Economics**

// Website research group

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// Contact research infrastructure

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Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Num. models, spec. software and comp. IR	• Maritime chain cost simulation model [2] • Maritime Business Game [2]
	(Marine) libraries	*www.uantwerpen.be/en/library*
	Marine data centres	*www.uantwerpen.be/en/research-groups/transport-and-regional-economics*

TPR

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Centre for **Urban History**

// Website research group

www.uantwerpen.be/en/projects/gistorical-antwerp

// Contact research infrastructure

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Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Marine data centres	GISTorical Antwerp: GIS-infrastructure linking urban history to the history of the natural environment (including the Scheldt Estuary).

SCG

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B-2000 Antwerp

KU Leuven University Association

// Biomedical Sciences Group

- Laboratory of Toxicology and Pharmacology

// Science and Technology Group

- Laboratory of Biodiversity and Evolutionary Genomics
- Department of Civil Engineering
- Division of Geology
- Section Process Engineering for Sustainable Systems

// Science, Engineering and Technology Group, Kulak Kortrijk Campus

- Laboratory Aquatic Biology
- Laboratory Food and Lipids

// Rega Institute

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

Laboratory **Aquatic Biology**

// Website research infrastructure

www.kuleuven-kulak.be/en/research/research-at-kulak/aquatische-biologie/FacilitiesenServices

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	CHR
	Type of laboratory / analyses	Analyses of algal biomass [2,3]
	Analysis equipment, services and techniques	• Carotenoid and chlorophyll content (spectrophotometer) [2,3] • Carotenoid and chlorophyll profiling by HPLC, including esterified carotenoids such as astaxanthin [2,3] • Phycocyanin content in *Spirulina* [2,3] • Total lipid content according to Ryckebosch et al. (2011) [2,3] • Separation of lipid classes (neutral, phospho- and glycolipids) [2,3] • Fatty acid analysis of total lipids and lipid classes using GC (range from 8:0 to 24:1) [2,3] • Free fatty acid content [2,3] • Degree of lipid oxidation [2,3] • Protein content and amino acid profiling [2,3] • Phytosterol and cholesterol analysis [2,3] • Antioxidant activity, using TEAC, FRAP, AIOLA and square wave voltammetry [2,3] • Carbohydrate content and composition [2,3] • Polyphenol and flavonoid content [2,3] • Ash content and analysis of major minerals [2,3]
	Aquaculture experimental facilities	**Experimental services** • Batch, fed-batch and continuous production of microalgae in lab (1-2 L) and pilot scale photobioreactors (30-120 L) or raceway ponds (30 L) [2,3] • Experiments with economically relevant microalgal model species (*Chlorella, Phaeodactylum, Nannochloropsis, Spirulina / Arhtrospira, Oscillatoria, Isochrysis, Scenedesmus, Microcystis, Pavlova, Tetraselmis, Haematococcus, Botryococcus*) [2,3] • Flocculation of microalgae: pH-induced auto-flocculation, electro-flocculation, flocculation using metal salts or biopolymers [2,3] • Harvesting by cross-flow membrane filtration, centrifugation, and freeze-drying facilities [2,3] • Lab-scale extraction and biorefinery [2,3] • Microalgal growth assays in wastewater, including nutrient removal efficiency [2,3] • Pulse Amplitude Modulated fluorescence (PAM) measurements for algae viability evaluation [2,3]

Aquatic Biology

Etienne Sabbelaan 53
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Laboratory of **Biodiversity and Evolutionary Genomics**

// Website research infrastructure

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

// Contact research infrastructure

Bart Hellemans (bart.hellemans@bio.kuleuven.be or info@biogenomics.eu)

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	• Microscope unit for sample sorting and identification [3] • Medium throughput molecular DNA lab [2,3] • Integration with the Genomics Core platform [2]
	Analysis equipment, services and techniques	**Equipment** • qPCR unit (Applied Biosystems ABI 7000) [2,3] • Gradient PCR unit (Biometra Tgradient) [2,3] • 3 96-well PCR units (Biometra T1, Applied Biosystems Gene Amp 2700, Bio-Rad My Cycler) [2,3] • Attune flow cytometer (LifeTechnologies) [2,3] **Services** • Genetic marker discovery (neutral and gene linked SSRs and SNPs) [2,3] • Sequencing (Low and Medium (ABI 3130) throughput sequencing, Next generation sequencing (Illumina HiSeq/MiSeq through Genomics Core – KU Leuven)) [2,3] • Genotyping (from low to high throughput SSRs, AFLPs and SNPs genotyping) [2,3] • Molecular species identification (DNA barcoding) [2,3] • Traceability (populations and pedigrees) [2,3] • Selective breeding 'broodstock management, QTL analysis and Marker Assisted Selection) [2,3] • Health Management and Molecular Parasitology (identification and quantification of pathogens in aquatic organisms and problem solving in fish health management) [2,3] • Development of biomarkers (characterisation and evaluation of molecular biomarkers as sentinel for organic and inorganic pollutions (e.g. PAH, PCB, heavy metals and pesticides)) [2,3] • Tool Development and Training in Bioinformatics [2,3] **Techniques** • Sequencing (Low and Medium throughput sequencing, Next generation sequencing (Illumina HiSeq/MiSeq through Genomics Core – KU Leuven)) [2,3] • Genotyping (from low to high throughput SSRs, AFLPs and SNPs genotyping) [2,3]
	Aquaculture experimental facilities	50 tanks in temperature controlled room for selective breeding of small sized freshwater fish.

	Num. models, spec. software and comp. IR	• Software for the bioinformatic analysis of next generation sequencing output [2,3] • Species distribution models [2,3]
	Collections	Collection of population samples of some 10 species for the purpose of genotyping and molecular studies.

LBEG

Charles Deberiotstraat 32
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B-3000 Leuven

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

// Website research group

www.raeslab.org

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	-omics/bioinformatics lab • Functional and taxonomic analysis of microbial communities investigated using metagenomics and metatranscriptomics data • Discovery of species interactions in microbial communities and the impact of environment in community structure
	Num. models, spec. software and comp. IR	• Supercomputing: 14 * 12 cores and 32G of RAM and 2 * 64 cores and 500G of RAM / 40 Terabytes of storage • CoNet: a tool that detects significant non-random patterns of co-occurrence (copresence and mutual exclusion) in incidence and abundance data • LotuS: a simple demultiplexer, complete 16S amplicon pipeline and quality filtering of sequences

Raes lab

Herestraat 49 box 1030
B-3000 Leuven

Department of **Civil Engineering**

// Website research group

https://bwk.kuleuven.be

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	
	Marine land-based facilities for engineering	• An autonomous water circulation system • A number of test facilities including 2 flumes: 1 general purpose flume (W x H x L = 0.5 m x 0.6 m x 12 m) and 1 erosion flume (W x H x L = 0.4 m x 0.4 m x 8 m) • Associated measuring equipment: ultrasonic level gauges, acoustic doppler velocity meters, flow meters, turbidity meters • Flume (W x H x L = 0.8 m x 0.6 m x 8 m)
	Other experimental facilities and analysis capacity	1 cool temperature controlled room

Civil Engineering

Kasteelpark Arenberg 40
box 2448
B-3001 Heverlee (Leuven)

Laboratory **Food and Lipids**

// Website research group

www.kuleuven-kulak.be/foodandlipids

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	CHR
	Type of laboratory / analyses	Chemical lab
	Analysis equipment, services and techniques	• Gas Chromatography (determination of fatty acids) • High-performance liquid chromatography (HPLC) (determination of carotenoids) • Lipid content

Food and Lipids

Etienne Sabbelaan 53
B-8500 Kortrijk

Division of **Geology**

// Website research group

http://ees.kuleuven.be/geology/index.html

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	XRD
	Type of laboratory / analyses	Sedimentology lab, geochemistry labs, micropaleontology lab, mineralogy (X-ray) lab, computed tomography, microprobe analysis [2,3]
	(Marine) libraries	Ellis and Messina Catalogue on *foraminifera* [1]
	Collections	Foraminifera collections (NW Europe, Mediterranean region), mostly Cenozoic [1]

Geology

Celestijnenlaan 200E
B-3001 Heverlee

Section **Process Engineering for Sustainable Systems**

// Website research group

https://cit.kuleuven.be/process

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	CHR MS
	Analysis equipment, services and techniques	• Inductively Coupled Plasma Mass Spectrometer (ICP-MS) [2] • Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) [2] • Ion Chromatography for determination of ions [2]
	Other experimental facilities and analysis capacity	• Electrodriven membrane processes (technology for desalinisation) [1,2,3] • Reverse osmosis (technology for desalinisation) [1,2,3]

ProcESS

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Laboratory for **Toxicology and Pharmacology**

// Website research group

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

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Toxicological and pharmacological laboratory [2,3]
	Analysis equipment, services and techniques	• Liquid chromatography–mass spectrometry (LC-MS) [2,3] • High-Performance Liquid Chromatography (HPLC) with UV, DAD, refraction, fluorescence, and electrochemical detection [2,3] • Miniaturised HPLC with UV detection and automated fraction collection [2,3] • Fast protein liquid chromatography (FPLC) with UV detection, preparative columns and automated fraction collection [2,3] • Capillary Gas Chromatography (GC) with split/splitless, on column, purge and trap injection, coupled to MS, ECD, FID and NPD detection [2,3] • Thin-layer chromatography (TLC) with scanning device [2,3] • Immunoassays : RIA, FPIA and EMIT [2,3] • Beta and gamma (scintillation) counters [2,3] • UV spectrophotometry [2,3] • Atomic Absorption (AAS) spectrometry [2,3] • Differential Pulse Polarography [2,3] • Extractions: Liquid-Liquid, Solid phase, Headspace Solid Phase Microextraction (HSPME) [2,3] • Lyophilisator [2,3] • Speed-vac concentrator [2,3] • Low temperature asher [2,3] • Gel electrophoresis for nucleic acids and peptides [2,3] • Patch and voltage clamp setup [2,3] • Micro-injector (mRNA) [2,3] • *Xenopus laevis* oocyte expression system [2,3] • Library of 60 cDNAs encoding a diverse array of voltage-gated ion channels and receptors (Nav, Kv, Cav, TRP, CB, nAChR, MOR, etc.) [2,3]

Toxicology and Pharmacology
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Ghent University Association

// Faculty of Bioscience Engineering

- Laboratory of Aquaculture and Artemia Reference Center
- Laboratory of Food Microbiology and Food Preservation
- Center for Microbial Ecology and Technology
- Laboratory of Environmental Toxicology and Aquatic Ecology
- Environmental Organic Chemistry and Technology
- Particle and Interfacial Technology group
- Research group Soil Spatial Inventory Techniques
- Research group Thermochemical Conversion of Biomass

// Faculty of Veterinary Medicine

- Laboratory of Chemical Analysis
- Department of Morphology
- Department Pathology, Bacteriology and Poultry Diseases

// Faculty of Medicine and Health Sciences

- Department of Movement and Sport Sciences

// Faculty of Engineering and Architecture

- Hydraulics laboratory
- Magnel laboratory for Concrete Research
- Maritime Technology division
- Department of Materials, Textiles and Chemical Engineering
- Center for Mobility and Spatial Planning
- Soete Laboratory
- Coastal Engineering, Bridges and Roads unit

// Faculty of Arts and Philosophy

- Department of Archaeology

// Faculty of Sciences

- Atomic and Mass Spectrometry research group
- Cartography and GIS - 3D Data Acquisition research group
- Research group Evolutionary Developmental Biology
- Research group Evolutionary Morphology of Vertebrates
- Phycology research group
- Marine Biology research group
- Laboratory of Microbiology
- Nematology research unit
- Research unit Palaeontology and Palaeo-environment
- Department of Plant Systems Biology
- Laboratory of Protistology and Aquatic Ecology
- Renard Centre of Marine Geology
- Laboratory for Applied Geology and Hydrogeology

Laboratory for **Applied Geology and Hydrogeology**

// Website research group

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

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	• Hydrogeological field infrastructure (groundwater level measurements, pumping tests, groundwater sampling) [4] • Geophysical field infrastructure: geo-electrical prospection (1D VES and profiling; 2D tomography); geophysical borehole measurements; frequency-domain electromagnetic, Ground-Penetrating Radar [4]
	Type of laboratory / analyses	Laboratory for chemical water analyses [4]
	Num. models, spec. software and comp. IR	• Groundwater modelling software [4] • Interpretation and inversion of geo-electrical data with commercial software [4] (res2dinvres3dinv) and research codes (CRTomo)

User modalities only applicable in case of project collaboration.

Applied Geology and Hydrogeology
Campus Sterre
Krijgslaan 281, S8
B-9000 Ghent

Laboratory of **Aquaculture and Artemia Reference Center**

// Website research group

www.aquaculture.ugent.be/index.htm

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	 
	Class or accreditation	All wetlabs are safety level L2
	Analysis equipment, services and techniques	**Equipment** • Agilent 7890B gaschromatograph with 5977B MS detector [2,3] • Iatroscan MK-5 TLC-FID lipid class analyzer [2,3] • Agilent 1100/1200 series HPLC with quaternary pump and DAD, ELSD and fluorescence detectors [2,3] • Bio-Rad Chemidoc MP imaging system [2,3] • Applied Biosystems StepOne RT-PCR system [2,3] • Applied Biosystems 2720 thermal cycler [2,3] • Tecan infinite M200 microplate reader (fluorescence & absorbance) [2,3] **Services** • Fatty acid analyses via GC-FID [2,3] • Lipid class analyses via Iatroscan [2,3] • Lipid extractions via Folch [2,3] • Protein analyses via Kjeldahl [2,3] • Various DNA & molecular work (PCR, RFLP, etc.) [2,3]
	Aquaculture experimental facilities	• 3 poly wetlabs (temperature range 15-30 °C, programmable light regime) [2,3] • 1 wetlab to work under axenic conditions (temperature range 15-30 °C, programmable light regime) [2,3] • 1 wetlab for rotifer experiments [2,3] • 1 wetlab for experiments with *artemia* [2,3] • 1 wetlab for broodstock *Penaeid* shrimps (temperature range 15-30 °C, programmable light regime) [4] • 1 wetlab for freshwater experiments *Macrobrachium* (temperature range 15-30 °C, programmable light regime) [4] • 1 lab for artemia quality control [2,3] • 1 lab for artemia strains [2,3] • 1 poly wetlabs (temperature range 12-30 °C, programmable light regime) [2,3] • 2 Challenge rooms L2/A2 (temperature range 15-30 °C) [2,3]

ARC

Coupure Links 653, build. F
B-9000 Ghent

Department of **Archaeology**

// Website research group

www.archaeology.ugent.be/en


Sampling, observation & survey infrastructure


Satellites & (airborne) remote sensing capacity


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	GPS Trimble R10 [4]
		Drone DJI Phantom II [4]
	Overview	
	Type of laboratory / analyses	Laboratory for standard analysis of archaeological finds [2,3]
	Analysis equipment, services and techniques	Microscopes [2,3]
	(Marine) libraries	Archaeology library (*www.archaeology.ugent.be/library*) [1]
	Collections	Archaeological museum (*www.archaeology.ugent.be/archaeologicalcollection*) [1]

Archaeology

Universiteitsforum (Ufo)
Sint-Pietersnieuwstraat 35
B-9000 Ghent

Atomic and Mass Spectrometry research group

// Website research group

www.analchem.ugent.be/A&MS/index.php

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	MS CHR
	Analysis equipment, services and techniques	**Equipment** • Single-collector ICP-MS instrumentation [2,3] • Multi-collectior ICP-MS instrumentation [2,3] • Laser ablation units for coupling with ICP-MS [2,3] • HPLC for coupling with ICP-MS [2,3] **Services** • (Ultra-)trace elemental analysis [2,3] • High-precision isotopic analysis of metals & metalloids [2,3] • Bio-imaging (quantitative visualisation of element distributions) [2,3]

Modalities to be discussed, depending on the application.

A&MS

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Cartography and GIS - 3D Data Acquisition
research group

// Website research group
http://geoweb.ugent.be


Sampling, observation & survey infrastructure


Satellites & (airborne) remote sensing capacity


Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Field instrumentation	A range of topographical and photogrammetrical instruments (leveling instruments, robotic total stations, digital cameras for terrestrial photogrammetry, different GNSS receivers, terrestrial laser scanners, mobile mapping, IMU, INS, etc.) [1,2,3]
		Processing of satellite images and aerial recordings from different types of moving platforms [1,3]
	Type of laboratory / analyses	Laboratory for lens calibrations and calibrations of total stations
	Analysis equipment, services and techniques	• Collimator • Laser interferometer

CartoGIS - 3D Data Acquisition

Krijgslaan 281, S8/WE12
B-9000 Ghent

Laboratory of **Chemical Analysis**

// Website research infrastructure

https://www.ugent.be/di/vph/en/research/lca/services.htm

// Contact research infrastructure

Prof. Lynn Vanhaecke (Lynn.Vanhaecke@UGent.be)

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	CHR MS
	Type of laboratory / analyses	Chemical laboratory [2,3]
	Analysis equipment, services and techniques	**Equipment** • REIMS-Q-Tof [2,3] • Accela U-HPLC system coupled to HESI/APCI Q-Exactive Orbitrap-HRMS (high resolution accurate mass spectrometer) (U-HPLC-HRMS) [2,3] • Accela U-HPLC system coupled to HESI/APCI Exactive Orbitrap-HRMS (high resolution accurate mass spectrometer) (U-HPLC-HRMS) [2,3] • Accela U-HPLC system coupled to HESI/APCI TSQ Vantage (triple stage quadrupole mass spectrometer) (U-HPLC-MS/MS) [2,3] • Accela U-HPLC system coupled to HESI/APCI LTQ XL linear ion trap mass spectrometer (U-HPLC-MSn) [2,3] • Agilent 1100 series LC coupled to Evaporative Light Scattering Detector (ELSD 3300) [2,3] • Photodiode Array Detector (Accela PDA) [2,3] • Fluorescence Detector (Accella FLU) [2,3] • Centrifuges [2,3] • Vacuum dryers [2,3] • Nitrogen evaporators [2,3] • Shaker incubator [2,3] **Services** Analysis of water samples, including hormones, phthalates, phenols and antibiotics [2] **Techniques** • Dionex Accelerated Solvent Extraction (ASE350) [2,3] • Solid Phase Extraction (SPE) [2,3] • Liquid liquid extraction (LLE) [2,3] • High Pressure Liquid Chromatography (HPLC) -fractionationtraction (LLE) [2,3]
	Num. models, spec. software and comp. IR	• Metabolomics software (Sieve, SIMCA) [3] • Suspected analysis (ToxFinder ID) [3] • Untargeted analysis (Compound Discover™) [3] • In-house written R codes [3]
	(Marine) libraries	In-house database of 700 suspected compounds associated [3]

LCA

Salisburylaan 133
B-9820 Merelbeke (Ghent)

Coastal Engineering, Bridges and Roads unit

// Website research infrastructure

www.ugent.be/ea/civil-engineering/en/research/coastal-bridges-roads/coastal-engineering/infrastructure-services

// Contact research infrastructure

Prof. Peter Troch (peter.troch@ugent.be)

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	• A Valeport MIDAS WTR Wave and Tide Recorder for measurements on beaches and near shore environments (<20 m depth) [2] • Two Argus ASM-IV probes (high resolution measurements at the bottom of moving water) [2] • An acoustic doppler velocimeter ADV (Nortek Vectrino) (3D water velocity measurements) [2] • Valeport Electromagnetic Current Meter [2]
	Overview	
	Marine land-based facilities for engineering	• Small physical wave flume (Dimensions: 15.0 x 0.35 x 0.60 m (L x W x H). Design water depth: 0.30 m. Maximum wave height: 0.20 m) [2] • Large physical wave flume (Dimensions 30.0 x 1.0 x 1.2 (L x W x H). Design water depth: 0.80 m. Maximum wave height: 0.35 m) [2] • Wave-Flume 30 m x 1 m x 1.2 m (L x W x H) [2] • Wave Flume 15 m x 0.35 m x 0.6 m (L x W x H) [2] • 9 Resistive Wave Gauges (0.3 m) [2] • 9 Resistive Wave Gauges (0.5 m) [2] • Particle Image Velocimetry system [2] • Laser Profiler [2] • Faro Freestyle 3D Laser Scanner [2] • Loadcells (3 kg, 5 kg, 10 kg, 50 kg) [2]
	Num. models, spec. software and comp. IR	• MILDwave (in-house developed mild-slope wave propagation model) [2] • ANASYS – GENESYS (tools for wave generation, absorption and analysis in combination with physical wave flumes) [2] • WaveLab - Wave Analysis software [2] • AwaSys - 2nd Order Wave Generation software [2] • OpenFOAM (Navier-Stokes equations based numerical model for wave-structure interactions) [2] • DualSPHysics - Smoothed Particle Hydrodynamics model [2]

Coastal Engineering, Bridges and Roads

Technologiepark 904
B-9052 Zwijnaarde

Research group **Environmental Organic Chemistry and Technology**

// Website research infrastructure

www.ugent.be/bw/doct/en/research-groups/envoc

// Contact research infrastructure

Prof. Kristof Demeestere (kristof.demeestere@ugent.be)

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Field instrumentation	Passive sampling devices [2,3]
	Overview	CHR MS
	Type of laboratory analysis	Sampling and trace analysis of volatile organic compounds and emerging organic micropollutants (e.g. pharmaceuticals, personal care products, pesticides) + screening possibilities [2,3]
	Analysis, equipment, services and techniques	**Equipment** • Online SIFT-MS [2,3] • Online PTR-TOF-MS [2,3] • TD-GC-MS [2,3] • Q-Exactive LC-MS/HRMS [2,3] • Magnetic sector ion trap HRMS/MS [2,3] • GC, HPLC, IC [2,3] • Automated SPE, ASE, various sampling and sample preparation [2,3]

EnVOC

Coupure Links 653
B-9000 Ghent

Laboratory of **Environmental Toxicology and Aquatic Ecology**

// Website research infrastructure

www.milieutox.ugent.be/research-approaches-and-equipment

Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Overview	PSA  CHR MS
	Type of laboratory / analyses	State of the science ecotoxicological laboratory with various exposure rooms (single and multispecies assay facilities), culture rooms (different algal and invertebrate species) and analytical equipment.
	Analysis equipment, services and techniques	• X-ray fluorescence techniques (in collaboration with the X-ray Microspectroscopy and Imaging Group at UGent (*www.xmi.ugent.be*) • Passive samplers • Micro-array and qPCR (in collaboration with the University of Antwerp the Daphnia Genomics Consortium and the University of Indiana) • Micro CT scanning (in collaboration with UGCT of UGent) • Metal measurements (Thermo CE 3000 series Atomic Absorption spectrometer & Metrohm 797 VA Computrace Voltammeter) • Total Organic Carbon (TOC) analyser (Shimadzu TOC-5000 A) • Gas chromatography–mass spectrometry (GC-MS) (Thermo Quest Finnigan Trace DSQ coupled to a Thermo Quest Trace 2000 series GC) • Spectrophotometer (Thermo Multiskan Ascent plate-reader) • Coulter counter (Beckman Z-1000 Coulter Counter) • Standard cultures of several test species • Reverse osmosis system
	Other experimental facilities	Climate rooms

GhEnToxLab

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Research group **Evolutionary Developmental Biology**

// Website research group

www.evodevo.ugent.be

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	 
	Type of laboratory / analyses	• Histology lab • Molecular biology lab
	Analysis equipment, services and techniques	• High resolution light and fluorescence microscopes [4] • Access to transmission and scanning electron microscopes [4] • Confocal laser scanning microscope [4] • Equipment for conventional histology (incubators, microtomes, etc.) [2] • (Immuno)histochemistry [2] • In vitro organ culture [2] • In situ hybridisation [2]
	Aquaculture experimental facilities	Aquaria for freshwater fish [4]

Evolutionary Developmental Biology

K.L. Ledeganckstraat 35
B-9000 Ghent

Research group **Evolutionary Morphology of Vertebrates**

// Website research group

www.fun-morph.ugent.be/?q=node/46

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	• Clearing and staining [2,3] • Histology [2,3] • Graphical three dimensional reconstructions [2,3] • Morphometrics [2,3]
	Analysis equipment, services and techniques	• Rotational microtomes (e.g. MICROM HM360) [2] • Sliding microtome (e.g. POLYCUT Leica SM2500) [2] • Digital camera (Colorview 8, Soft Imaging System), mounted on a stereomicroscope (WILD M5) [2] • Ultimaker 2+ 3D printer [2] • Formlabs 2 3D printer [2] • Microscribe 3D digitiser [2] • Geoform grinding machine [2]
	Num. models, spec. software and comp. IR	• 3D reconstruction software (e.g. Amira and Rhinoceros software) [2,3] • Image processing software (Analysis Docu - Soft Imaging System GmbH, version 3.0) [2,3]
	Marine data centres	Catalogue of specimens in the collection of the Laboratory for Evolutionary Morphology of Vertebrates (*www.evomorph-specimens.ugent.be*). [1]

Evolutionary Morphology of Vertebrates

K.L. Ledeganckstraat 35
B-9000 Ghent

Laboratory of **Food Microbiology and Food Preservation**

// Website research infrastructure

www.foodscience.ugent.be/LFMFP/Equipment

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	CHR MS
	Type of laboratory / analyses	Microbial analysis of food
	Class or accreditation	Class 2
	Analysis equipment, services and techniques	• CheckMate 9900 O_2/CO_2 (PBI Dansensor, CheckMate 9900) [2] • CheckPoint O^2/CO_2 (PBI Dansensor, handheld analyser) [2] • Headspace Gas chromatography–mass spectrometry (GC-MS) (Agilent 7890A chromatograph and an Agilent 5975C-Inert XL Mass Selective Detector with CombiPAL autosampler) [2] • SYFT MS to analyse volatile metabolites [2] • High-Performance Liquid Chromatography (HPLC) [2] • Inverted epifluorescence microscope (Zeiss Axiovert 135 TV) coupled with a cooled camera [4] • OxySense® 210T (optical oxygen analyser) [2] • Gas packaging unit: MULTIVAC Packaging Machine (Modified Atmosphere Packaging), Traysealer [2] • Spectramax Gemini XS (a variety of fluorescent applications as well as some time-resolved fluorescent and luminescent assays) [2] • VERSAmax Microplate reader [2] • Anaerobic chamber [4] • Water activity measurements: Novasina, cryo [4] • Seahorse equipment of Bioscience [2] • Bio Safety Cabinet 1 (Holten, Bio Safe 1.2) [4] • Bio Safety Cabinet 2 (Scanlaf, Mars 1200) [4] • Bio Safety Cabinet 3 (Heraeus, Herasafe HS12) [4] • CO_2 incubator 9 (Binder, APT.line C150 (E2)) [4] • GeneDisc Cycler [4] • PCR system [4] • Vidas [4]

LFMFP

Coupure Links 653
B-9000 Ghent

Hydraulics laboratory

// Website research group

www.hydraulics.ugent.be

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	
	Marine land-based facilities for engineering	• The laboratory has a maximal pumping capacity of 0.5 m^3/s + 0.4 m^3/s (closed circuits) [2,3] • Head = 5-6 mWK [2,3] • Different current flumes and test tanks [2,3] • A calibration channel for speedometers [2,3] • Equipment for lab and field measurements: hydrometric propellers, EMC's, ADV's, sediment load samplers [2,3]

Modalities are discussed on a case by case basis. In general, use of infrastructure happens by payment but the group is open to other ways of collaboration.

Hydraulics

Sint-Pietersnieuwstraat 41
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Magnel laboratory for Concrete Research

// Website research infrastructure

www.ugent.be/ea/structural-engineering/en/service
www.concrete.ugent.be

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	• NDT testing (e.g.: Corrosion potential mapping, Concrete resistivity measurements, Rebar detection) [2] • Concrete core drilling [2] • Chloride content measurements (by means of RCT or potentiometric titration) [2]
	Overview	PSA
	Type of laboratory / analyses	The Magnel Laboratory for Concrete Research offers scientific services in various sectors of the construction industry (civil construction, industrial and domestic buildings, producers of construction materials, certification committees, public authorities, designers, contractors and owners). • Specialised laboratory tests [2] • In situ assessments [2] • Specialised calculations [2] • Valorisation [2]
	Class or accreditation	The Magnel Laboratory is certified according to EN ISO 17025 (accreditation certificates BELAC no 220-TEST and 220-CAL).
	Marine land-based facilities for engineering	With a large central testing hall of about 1,000 m² and numerous testing equipment, the Magnel Laboratory for Concrete Research is one of the biggest laboratories internationally (more information: *www.ugent.be/ea/structural-engineering/en/research/magnel/services/labotests*). [2] Instruments relevant for marine research: • Rapid Chloride Migration (RCM or CTH) [2] • Chloride resistance testing [2] • Chloride profiles (RCT, potentiometric titrations) [2] • Sulphate resistance testing [2] • Testing apparatus for accelerated degradation tests (TAP) [2] • Scanning Electron Microscopy (SEM) [2] • Optical microscopy and analysis of thin sections [2] • Water permeability setups [2]
	Other experimental facilities and analysis capacity	• A large number of hydraulic jacks for static and dynamic loading tests [2] • Special equipment for measurements and data acquisition [2] • Climate rooms (up to 50 °C, 30% - 95% RH – CO_2 concentration: 0 - 10 vol%), ovens (up to 1160 °C) and freeze chambers (up to -20 °C) [2] • Test configurations for durability tests: Carbonation (climate chamber) / Alkali-silica reaction (Oberholster test) / Frost-resistance (in combination with de-icing salts) / Acid resistance / Degradation by aggressive liquids / Roughness measurements (ALM) / etc. [2] • Concrete mixing and testing of fresh concrete properties (slump, flow, air content, etc.), equipment for monitoring of concrete setting and hardening (continuous ultrasound transmission, isothermal and (semi-)adiabatic calorimetry, traditional methods), equipment for porosity measurements (MIP, AirVoid, etc.), equipment for characterising cement (laser diffractometer, Blaine, etc), equipment for characterising aggregates (sieve analysis, water absorption, shape factor, density, etc.), gas permeability setups, etc. [2] • Numerous equipment for testing the characteristics of various building materials such as cement, aggregates, concrete, masonry, reinforcement, etc. [2]
	Num. models, spec. software and comp. IR	Specialised software in order to simulate the behaviour of concrete (more information: *www.ugent.be/ea/structural-engineering/en/research/magnel/services/calculation*): • COMREL, SYSREL and STATREL (RCP GmbH) (Risk Analysis Software which can be used for probabilistic service life assessment in marine environments in accordance with DuraCrete or fib Bulletin 34) • ATENA (Cervenka Consulting) (Nonlinear Finite Element Analysis of Concrete Structures) • FreET and SARA (Cervenka Consulting) (Risk Analysis Software) • Matlab (Technical Computing Software) • Numerous in-house developed software packages for specific purposes

Magnel

Technologiepark 904
B-9052 Zwijnaarde (Ghent)

Marine Biology research group

// Website research group

www.marinebiology.ugent.be

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Ship-based instrumentation	Reineck boxcorer, hyperbenthic sledge, Van Veen grabs [1]
	Field instrumentation	Acoustic receivers
	Overview	PSA CHR MS
	Type of laboratory / analyses	• Biological sorting lab [2,3] • Biological imaging lab [2,3] • Chemical lab [2,3] • Molecular lab [2,3] • Sedimentological lab [2,3]
	Analysis equipment, services and techniques	• Light microscopy including image analysis software (Nikon Elements & Leica Application Suite) [2,3] • Chemical lab (HPLC, GC-MS, GC-FID, Skalar nutrient chain, Victor multilabel reader, Beckman Coulter counter, etc.) [2,3] • Molecular Lab (PCR, qPCR, DGGE, Qubit & nanodrop, etc.) [2,3] • Sediment grain size analysis by laser diffraction, sediment organic matter analysis and characterisation [2,3] • Microrespiration equipment (polarographic electrodes, optodes, etc.) [2,3] • Fatty acid profiling [2,3]
	Aquaculture experimental facilities	• Aquaria and climate rooms, experimental rooms [2,3] • Ocean acidification facilities [2,3] • Microcosms facilities for rearing and experimental manipulation of benthic invertebrates [2,3]
	Marine data centres	A generic online species information system: NeMys (a digital platform, storing all kinds of information for biological taxa) [1]
	Colllections	• Nematode collections [1] • Monospecific, agnotobiotic nematode cultures [2,3]

MARBIOL

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Maritime Technology division

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Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Marine land-based facilities for engineering	Towing tank for Manoeuvres in Confined Water (in co-operation with Flanders Hydraulics Research, Antwerp): a shallow water towing tank, equipped with a planar motion carriage, a wave generator and an auxiliary carriage for ship-ship interaction tests (Total length: 88.0 m, Useful length: 67.0 m, Width: 7.0 m, Maximum water depth: 0.5 m, Ship model length: 3.5 - 4.5 m). Selected series of data can be freely used for validation purposes. [2,3]
		Under construction: Flanders Maritime Laboratory in Ostend (Towing Tank for Manoeuvres in Shallow Water: length 150 m, width 20 m, maximum depth 1.0 m, ship model length 7 m + Coastal and Ocean Basin). [2,3]
	Num. models, spec. software and comp. IR	**Specific maritime software packages** **Probabilistic and deterministic access policy** • ProToel (in co-operation with Flanders Hydraulics Research) [2] • RivSea (sea-keeping risk analysis tool for estuary vessels) [2] **Mooring ships behaviour** • Ropes [2] • Vlugmoor [2] • Optimoor [2] **Moored structures** • Moordyn [2] **Hydrostatics** • Delftship (complete design package for application in the marine industry) • ArchimedesMB • HeelMe • Wolfson Unit **Calculation in seaway** • Octopus Seaway • WAMIT • Software for risk analysis of estuarine vessels **Resistance and propulsion** • PSP Wageningen Propeller Series • Hydrocomp NavCad • Hydrocomp PropCad • Hydrocomp SwiftCraft **Ship Construction** • Bureau Veritas eRules
	Simulators	See Flanders Hydraulics Research (Watlab)
	(Marine) libraries	Library on ship/maritime technology and hydrodynamics

Maritime Technology

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Department of **Materials, Textiles and Chemical Engineering**

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www.composites.ugent.be/facilities.html

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Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure	
	Overview		
	Type of laboratory / analyses	Mechanical engineering laboratory - Mechanical testing of materials under static, fatigue, impact and vibration loads [2]	
	Analysis equipment, services and techniques	Test set-ups for static/impact/fatigue/vibration testing, 3 high-speed cameras, high-speed data-acquisition (see also Marine land-based facilities for engineering), full-field measurement software for displacements/strains/deformations (see also Numerical models, specialised software packages and computational infrastructures) [2]	
	Marine land-based facilities for engineering	**Impact** • Bird strike set-up for real birds and gelatine replicas [2] • Pneumatic launcher [2] • Two drop weight towers (3 m and 6 m) [2] • Pendulum impact test rig for glass windows [2] • Lab-scale set-up for slamming wave impact [2] • Three digital high speed cameras (up to 250,000 fps) [2] • High-end transient recorder/oscilloscope (up to 100 MHz sampling rate) [2] • Charpy impact tests (dynamic fracture) [2] • Dynamic load cells, accelerometers, displacement sensors [2] **Non-destructive testing (NDT) & evaluation (NDE)** • 2D and 3D Digital Image Correlation (static and high-speed) [2] • Optical fibre sensors and read-out equipment (up to 2 kHz) [2] • Ultrasound phased array (64 probes) [2] • Shadow and projection moire [2] • Ultrasound scanning facility for C-scans and polar scans [2] • Schlieren set-up for acousto-optics research [2] **Fatigue** • Two servohydraulic machines [2]	• Accessoiries for tension-compression and pure shear testing [2] • Devices for 3- and 4-point bending [2] • Two extensometers [2] • Electrical resistance measurement [2] **General mechanics of composite materials** • Electromechanical testing machine with temperature chamber (-150 °C to +350 °C) [2] • Electrodynamic shaker (up to 10 kHz) [2] • Laser vibrometer [2] • Set-up for measurement of modal frequencies and frequency-dependent modal damping [2] • Test set-ups for static and dynamic testing of racing bicycle frames [2] • Fracture mechanics tests for composites and polymers (DCB, ENF, ELS, TDCB, CT) [2] • Fracture mechanics tests for adhesives (dolly testing, DCB testing) [2] • Long-term experience with outdoor field testing without electrical grid connection (sailing yachts, wave energy devices, bicycle frames, etc.) [2] • Hand lay-up and vacuum assisted resin transfer moulding [2] • Infrared welding set-up [2] • Autoclave with cure monitoring [2] • Filament winding machine [2] • Measurement of fibre volume fraction of carbon and glass fibre composites [2]
	Num. models, spec. software and comp. IR	**Commercial software** • Implicit and explicit finite element suite ABAQUS [2] • Explicit finite element code LS-Dyna [2] • Open source finite element code Code_Aster [2] • HyperMesh and Gmsh high-performance finite-element pre-processors [2] • Composite draping software (Catia/CPD, Simulayt/Composite Modeler) [2] • Software for kinematics and multibody dynamics (Universal Mechanism) [2] • Optimisation software (iSight, evolutionary strategies) [2] • Numerical software (Mathcad, Matlab, Maple, Mathematica) [2] • CAD/CAE software (SolidWorks, Catia) [2] • Data acquisition software (LabVIEW) [2]	**In-house developments** • SERVE: Statistically Equivalent Representative Volume Element (RVE) software [2] • ORAS: Object-Oriented RVE Assembly Software [2] • Blade Mesher: meshing tools for large wind turbine blades [2] • Five workstations for intensive calculations[2] • Parallel computing infrastructure for finite element calculations (12000+ cores, 3.2 Terabyte RAM) [2] • Supernode with 720 GB RAM [2]

MaTCH

Technologiepark 903
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Center for **Microbial Ecology and Technology**

// Website research infrastructure

www.cmet.ugent.be/services

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labmet@ugent.be


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure	
	Field instrumentation	Flow cytometry [2,3]	
	Overview		
	Type of laboratory / analyses	CMET performs a wide array of analyses in the field of microbiology such as: • Microbial analyses: conventional and molecular methods [2,3] • Genetics (DNA & RNA extractions, PCR, cloning/sequencing, fluorescence in situ hybridisation (FISH), etc.) [2,3] • Bioassays and biodegradation assays [2,3] • Batch and continuous (high pressure) reactor technology [2,3]	
	Class or accreditation	Biosafety level 1 and 2 facilities	
	Analysis equipment, services and techniques	• Light microscopy [2,3] • Epifluorescence microscopy (Zeis & polyvar) [2,3] • Real-Time PCR (abi prism 7000 & StepOnePlus™ System) [2,3] • High Throughput Sequencing Illumina [2,3] • Flow cytometry (BD Accuri) [2,3] • Pippeting robot (Biorobot 3000) [2,3] • Various devices related with reactor technology such as high pressure reactor to simulate deep-sea conditions [2,3] • Gas chromatography (GC): - Varian GC FID (determination of chlorinated solvents, VOCs, hydrocarbons, alcohols, fatty acids) [2,3] - Varian GC ECD (determination of lindane and PCB's) [2,3] - Shimadsu GC 2014 FID + autosampler (determination of short chain VFAs) [2,3] - Shimadsu GC for biogas and Intersciene Compact GC (determination of CH_4, N_2, H_2, O_2, CO_2 & N_2O) [2,3] - High Pressure Liquid Chromatography (HPLC) (UV and Fluorescence detector) (Dionex) (analysis of pharmaceuticals, pesticides organic choride contaminations, sugars) [2,3]	• Ion chromatography for anions (761. Metrohm compact IC) (e.g. nitrate, nitrite, chloride, phosphate, sulphate, etc.) [2,3] • Ion chromatography for cations (e.g. ammonium, etc.), sugars (Dionex) [2,3] • UV-VIS Spectrophotometry for colorimetric determination of ammonium, phosphate, nitrite, nitrate, etc. [2,3] • Atom Absorption Spectrometry for analysis of Ag, Mn, Fe, Ni, Au, Pd, Co, Cu, Zn, etc. [2,3] • Biological oxygen demand (BOD) [2,3] • Chemical oxygen demand (COD)[2,3] • Furnaces and centrifuges for determination of total and volatile suspended solids (TSS & VSS) [2,3] • Steam distillation units and heating blocks for determination of ammonium, nitrite+nitrate, Kjeldahl nitrogen [2,3] • Galvanic, polarographic and luminescent probes for dissolved oxygen (DO) determination [2,3] • Probes for pH, conductivity and temperature measurements [2,3]
	Num. models, spec. software and comp. IR	R, mothur, Git, Linux, blast+, SparCC, Arb, Rstudio, Anvi'o, RaxML [2,3]	

CMET

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Laboratory of **Microbiology**

// Website research infrastructure

http://lmg.ugent.be/?q=all-infrastructure

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Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	CHR MS
	Type of laboratory / analyses	Microbial laboratory • Taxonomic characterisation of pure cultures [2,3] • Molecular analysis of natural ecosystems [2,3] • Culture-independent detection and enumeration of specific bacterial groups in complex sample matrices [2,3]
	Class or accreditation	Biosafety level 2 and 3
	Analysis equipment, services and techniques	**Equipment** • SpectraMax Plus384 Spectrophotometer[2,3] • 3130xl Genetic Analyzer [2,3] • High-Performance Liquid Chromatography (HPLC) [2,3] • Colony Picker K2 [2,3] • Compac GC for N and C-cycle research [2,3] • GC for FAME analysis [2,3] **Techniques** • Genotypic techniques (i.e., sequence analysis of various genes, a range of species- or strain-specific DNA fingerprinting methods, and DNA-DNA hybridisations) [2,3] • Chemotaxonomic methods (i.e. analysis of whole-cell fatty acids and polar lipids, and MALDI-TOF and electrospray mass spectrometry) [2,3] • Phenotypic characterisation [2,3] • Gradient Gel Electrophoresis (DGGE) [2,3] • MALDI-TOF and electrospray mass spectrometry [2,3] • Real-time PCR protocols [2,3] • Expertise in computerised data handling and database construction [2,3]
	Collections	• BCCM/LMG Bacteria Collection [2,3] • Research collection of bacteria [2,3]

Microbiology

K. L. Ledeganckstraat 35
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Center for **Mobility and Spatial Planning**

// Website research group

www.planning.ugent.be

Satellites & (airborne) remote sensing capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
		GIS
	Num. models, spec. software and comp. IR	GIS models/data
	(Marine) libraries	Library of AMRP with a collection focusing on spatial planning, economy and mobility

AMRP

Vrijdagmarkt 10 box 301
B-9000 Ghent

Department of **Morphology**

// Website research infrastructure

www.ugent.be/di/morfologie/nl/dienstverlening

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Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Morphological laboratory
	Analysis equipment, services and techniques	• Light and fluorescence microscopy (LM, FM) • Scanning Electron Microscopy (SEM) • Transmission Electron Microscopy (TEM) • Immunohistochemistry and immmunofluorescence labeling for LM/FM analysis • Immunogold labeling for TEM analysis • Stereology • 3D reconstrution based on histological sections
	Aquaculture experimental facilities	Fully segregated experimental challenge units (biotic (infectious agents) and abiotic challenges) for marine vertebrate and invertebrate species (larval stages, juveniles and adults) (in construction).
	Num. models, spec. software and comp. IR	3D reconstruction based on histological sections.

Morphology

Salisburylaan 133
B-9820 Merelbeke (Ghent)

Department of **Movement and Sport Sciences**

// Website research group

www.ugent.be/ge/bsw/en

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Type of laboratory / analyses	Complete biomechanical and physiology laboratory (new since December 2014, with climate chamber) for anthropometrical and body composition analysis of humans, human muscle biochemistry, and biomechanical and physiological analysis of exercise, physical activity and occupational activity. [2,3]

'Payment' with potential co-authorship is the general principle. To be discussed with external user.

Movement and Sport Sciences

Watersportlaan 2
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Nematology research unit

// Website research group

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

// Contact research infrastructure

Wim Bert (wim.bert@UGent.be)

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Nematology laboratory
	Analysis equipment, services and techniques	• Transmission Electron Microscopy (TEM, JEOL JEM100), part of the UGent Transmission Electron Microscopy Expertise Centre. [2] See also: *http://users.ugent.be/~myrclaey/WWW* • Scanning Electron Microscopy (SEM, JEOL JSM-840) [1,*] • Video Capture and Editing microscopy [4]
	Collections	Nematode slide collection UGent and voucher specimens

**Exceptional*

Nematology

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Research group **Palaeontology and Palaeoenvironments**

// Website research group

www.ugent.be/we/geologie/en

// Contact research infrastructure

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Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Paleontological lab
	Analysis equipment, services and techniques	• Scanning electron microscope [2] • 2 Zeiss AxioImager [1] • A light microscopes + AxioCam MRc5 digital camera [1] • Zeiss Axioskop2 light microscope + AxioCam MRc5 digital camera [1] • Several high-end binocular microscopes [1]

Palaeontology and Palaeoenvironments
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Particle and Interfacial Technology group

// Website research group

www.ugent.be/bw/tafc/en/research-groups/paint

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	PSA
	Type of laboratory / analyses	• Membrane filtration • Colloidal system preparation + characterisation • Physico-chemical water treatment
	Analysis equipment, services and techniques	**Equipment** • RO, NF, FO, UF, MD membrane systems, crossflow and dead-end [2,3] • Rheology: Bohlin rheometer + Brookfield viscometers [2,3] • Particle sizing: Malvern Mastersizer, Ultraturax mixer, microfluidizer [2,3] • Particle charge: Rank Brothers + Malvern zetasizers [2,3] • Interfacial chemistry: Qsense QCM-D [2,3] • Surface tension: Krüss DSA-10 goniometer [2,3] • Colloidal stability: LUMIfuge, flocculator [2,3] • Thin films: Elcometer film applicator + casting knife [2,3] • IEX, GAC columns [2,3] • Model high-pressure steam boiler [2,3] • Solution characteristics: ion chromatography, ICP-OES, conductivity, pH, density (Anton Paar DMA 5000) [2,3] **Services** • Membrane filtration feasibility tests [2] • Membrane autopsies [2] • Coagulation-flocculation [2] • IEX, GAC polishing [2]

Differentiation between research in non-profit sector (co-authorship) and private sector (payment).

PaInT

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Department **Pathology, Bacteriology and Poultry Diseases**

// Website research group

www.ugent.be/di/di05/nl

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	**Laboratory for Veterinary Pathology** • Histology [2,3] • immunohistochemical staining techniques and image analysis [2,3] **Laboratory for Veterinary Bacteriology and Mycology** In the framework of research, no routine diagnostics: culture, in vitro and in vivo studies, etc. **Necropsy room [2,3]** Health assessment of fish including necropsy and sample taking [2,3]
	Analysis equipment, services and techniques	**Equipment** • Equipment for histological and immunohistochemical analyses [2,3]: • Paraffine dispenser, cooling plate, heating plate, microtome, cryotome, tissue processor, automated slide stainer, automated immunostainers, automated cover slipper, seven-headed light microscope, four light microscopes, fluorescence microscope, image analysis, etc. [2,3] • Equipment for research involving bacteria and fungi [2,3] • Microbiological safey cabinets, fume hoods, centrifugation apparatus, incubators, autoclave, MALDI-TOF equipment, etc. [2,3] • Equipment to perform health examination and necropsies [2,3] • Dissection kits and tables, microscopes, fume hood, microbiological safety cabinet [2,3] **Services** • Experimental challenge trials for vibriosis in marine fish larvae [2,3] • Development of experimental challenge models for diseases [2,3] • Clinical examination of fish & Post-mortem examination of fish [2,3] • Histology & Immunohistochemistry [2,3] • Impact assessment of potentially noxious and beneficial substances on fish **Techniques** • Development of experimental challenge models for diseases [2,3] • Clinical examination of fish & Post-mortem examination of fish [2,3] • Histology & Immunohistochemistry [2,3]
	Aquaculture experimental facilities	• Infrastructure for housing Dover sole and seabass larvae [2,3] • Sixteen fully separate 100l tanks each supplied with a cooling / heating device, aeration, protein skimmer, mechanical and biological filter suitable for seawater experiments [2,3] • Six 1000l tanks each supplied with a cooling/heating device, aeration, mechanical and biological filter suitable for seawater experiments [2,3]

Pathology, Bacteriology and Poultry Diseases

Salisburylaan 133
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Phycology research group

// Website research group

www.phycology.ugent.be

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Molecular laboratory
	Analysis equipment, services and techniques	**Equipment** • DNA/RNA extraction facilities [2,3] • NGS library preparation (semi-automated) [2,3] **Services** Molecular cloning [2,3] **Techniques** Microscopy [2,3]
	Aquaculture experimental facilities	Temperature controlled cabinets [2,3]
	Num. models, spec. software and comp. IR	Computational infrastructure (Linux servers for distribution modelling and genomic pipelines) [2,3]
	(Marine) libraries	A library of books, dissertations, journals and reprints that currently includes over 23,000 titles which are all indexed in a database system.
	Collections	• Ghent University algal herbarium (GENT) (25,000 algal specimens) • Culture collection of over 200 different strains of living green algae, representing most lineages of the *Chlorophyta*

Phycology

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VIB-UGent Center for **Plant Systems Biology**

// Website research group

www.psb.ugent.be/

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Analysis equipment, services and techniques	**Equipment** • Confocal microscopy [3] • Bright field microscopy [3] • Storage (HD) [2] • Computation (CPU time) [2] • Hosting of results from assembly & annotation [1] **Services** • Genome assembly [2,3] • Whole genome annotation [2,3] • Comparative Genomics (broad) [3]
	Num. models, spec. software and comp. IR	• HPC infrastructure (local ~500 cores, storage, webserver and database server) • UGent HPC infrastructure • Several gene-prediction software • Several NGS assembly software • Several Comparative Genomics packages

Plant Systems Biology

Technologiepark 927
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Laboratory of **Protistology and Aquatic Ecology**

// Website research group

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// Contact research infrastructure

Renaat Dasseville (Renaat.Dasseville@UGent.be)

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	PSA CHR
	Type of laboratory / analyses	Molecular lab, experimental facilities for microbial studies, microscopy lab [2]
	Class or accreditation	ISO 9001 certification of BCCM/DCG culture collection
	Analysis equipment, services and techniques	• Fluorescence microscope: Zeiss Axioplan 2 + Axiocam MRm [2] • Scanning electron microscope: JEOL JSM-5600 LV [2] • Gas chromatography (GC): Agilent Technologies 6890N Network GC System + 7683B Series Injector + 5973 Network Mass Selective Detector [2] • LAMBDA 650S UV/Vis Spectrophotometer UV WinLab and 150 mm Integrating Sphere [2] • Beckman Multisizer 3 Coulter Counter [2] • Perkin Elmer VICTOR 3 1420 Multilabel Counter [2] • IMAGING Pulse Amplitude Modulated (PAM) fluorometry, M-series (maxi version & microscopy version), DIVING PAM, WATER PAM, Walz Mess- und Regeltechnik [2] • Cytation multiplate reader [2] • Surface Optics 710 VP hyperspectral imaging system with internal scanning system [2] • Amnis Imaging Flow Cytometer [2] • Agilent HPLC [2] • Infors bioreactors [2] For BCCM/DCG services see collection website [2]
	Aquaculture experimental facilities	Experimental facilities for microalgae cultivation [2]
	Collections	Diatom culture collection (*http://bccm.belspo.be/catalogues/dcg-taxon-browser*) [2]

LPAE

Campus Sterre
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Renard Centre of Marine Geology

// Website research infrastructure

www.rcmg.ugent.be/equipment.html

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Ship-based instrumentation	High and very-high resolution reflection seismic equipment: • In-house developed “Centipede” sparker [2,3] • SIG sparker [2,3] • Geopulse 3.5 kHz subbottom profiler [2,3] • Seistec boomer-receiver system [2,3] • Delph Seismic acquisition system (IXSEA) [2,3] Side-scan sonar: • Klein 3000 side-scan sonar [2,3] Multibeam swath-bathymetry echosounder: • Seabeam 1050 (50 kHz) [2,3] • Octans motion sensor [2,3]
	Fixed platforms, moorings and landers	Technicap PPS 4/3 24S sediment trap [2,3]
	Field instrumentation	Lake-coring equipment: • Uwitec coring platform [2,3] • Deep-water (300 m) piston and Livingston corer [2,3] • Bob corer [2,3]
	Overview	PSA
	Type of laboratory / analyses	• Sediment grainsize analysis (sedigraph, Malvern) [2,3] • Multi-sensor core logging (Geotek) [2,3] • Carbonate content of sediments (coulometry) [2,3]
	Analysis equipment, services and techniques	• Geotek multi-sensor core logger (gamma density, magnetic susceptibility, spectrophotometer, high-resolution photo line scanning) and core splitter [2,3] • Malvern Mastersizer 3000 [2,3] • Sedigraph III plus [2,3] • UIC CM140 Coulometer with acidification unit [2,3]
	Num. models, spec. software and comp. IR	Geophysical software packages (e.g. Kingdom Suite, RadexPro, ArcGIS, Fledermaus, etc.) [2,3]

RCMG

Campus Sterre
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Soete laboratory

// Website research infrastructure

www.ugent.be/ea/eemmecs/en/

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure	
	Overview		
	Type of laboratory / analysis	Soete laboratory offers research collaboration and industrial services in component design, material characterisation, testing and consultancy. Our strength lies in the fields of tribological investigation of friction and wear analysis, fracture mechanics and fatigue. Both experimental and computational expertise is available to provide professional and in-depth analysis. [2,3]	
	Marine land-based facilities for engineering	**Universal multi-purpose test rigs with load range from kN to MN** • Tension, compression, quasi-static, fatigue (up to 25 Hz) [2,3] • Modular test floor (components up to 20 x 4 x 3 m³) [2,3] **Tribological test rigs in N to MN range** Standard test rigs: High Temperature Tribometer, Pin-on-disc tester, Plate-on-plate clutch tester [2,3] In-house developed and customised equipment: • Large-scale reciprocating bearing test rig [2,3] • (inner bearing diameter up to 400 mm) [2,3] • Medium- to large-scale flat on flat tribometer [2,3] • (samples up to 200x300mm²) [2,3] • Torque Machine up to 5000 Nm [2,3] • Modified FZG tester [2,3] • Plint reciprocating stick-slip tester [2,3] • Conveyor chain wear test rig [2,3] • Shackle chain wear test rig [2,3] **Fatigue Testing** • Resonant bending fatigue setup for pipelines and risers (up to 14 inch, up to 30 Hz) [2,3] • Three/Four point bending of beams and girders up to 1000 kN [2,3] • Internal pressure up to 210 bar [2,3]	**Fracture Mechanics Testing** • Curved Wide Plate Tensile test setup up to 8 MN [2,3] • Charpy impact pendulum test setup up to 400 J [2,3] • CTOD, SENT, DENT, CT test capabilities [2,3] • Tensile testing of standardized and non-conventional components [2,3] **Advanced measurement and monitoring techniques** • 3D Dynamic high speed optical displace-ment measurement system (PONTOS) [2,3] • 3D Optical full-field deformation, strain and profile measurement system (VIC-3D) [2,3] • Direct Current Potential Drop for e.g. on-line crack growth measurement [2,3] • High accuracy infrared thermography [2,3] • Vickers hardness with automatic mapping functionality [2,3] • Various roughness testers [2,3] • 3D surface characteristation using white light interferometry (down to 0.1 µm) [2,3] • High speed multi channel (>64) strain gauge measurement [2,3] • In situ condition monitoring [2,3] Soete laboratory is specialised to tailor equipment for harsh, including marine, environments
	Num. models, spec. software and comp. IR	**Finite Element Software** • Abaqus, Ansys [2,3] **Numerical and analytical calculations** • Matlab, Maple, Python [2,3] • Computational Fluid Dynamics [2,3] • CAD/CAE: SolidWorks [2,3]	**Data axquisition software** • LabVIEW, Python [2,3] • Access to High-Performance-Computing (HPC) infrastructure [2,3] • In-house software development and automated execution of parametric studies [2,3]

Soete Laboratory

Technologiepark 903
B-9052 Zwijnaarde (Ghent)

Research group **Soil Spatial Inventory Techniques**

// Website research infrastructure

www.ugent.be/bw/soilmanagement/nl/onderzoek/bodeminventarisatietechnieken-orbit/services

Sampling, observation & survey infrastructure

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	The following soil sensors are used: • Electromagnetic induction (EMI): Dualem 1, Dualem 21, Dualem 421 set-up [2] • Ground penetrating radar (GPR): 3D radar GPR & GSSSI Scan Utility DF [2] • Magnetometry: Sensys, 5 gradiometers [2]
	Num. models, spec. software and comp. IR	The mobile proximal soil sensors are combined with precise GPS-positioning, geostatistical processing and GIS-cartography. [2] Most of the processing tools are developed in-house.

ORBit

Coupure links 653, build. B
B-9000 Ghent

Research group **Thermochemical Conversion of Biomass**

// Website research infrastructure

www.ugent.be/ea/eemmecs/en/

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	CHR MS
	Type of laboratory / analysis	Biomass conversion / biomass analysis laboratory
	Marine land-based facilities for engineering	**Equipment** • Elemental analyzer (C, H, N, O, S) [2] • pyrolysis-GC-MS [2,3] • Bomb calorimeter [2] • Compact-GC (for permanent gas analysis) [2] **Services** • Elemental analysis (C, H, N, O, S) [2] • Bomb calorimetry [2] • py-GC-MS of solid samples or for solid/catalyst testing [2,3] • Small-scale production of pyrolysis oils and bio-crudes from biomass materials (including algae) [2,3] • Small-scale production of chars and biochars from biomass materials (including algae) [2,3]
	Other experimental facilities and analysis capacity	Various pyrolysis furnaces for small-scale (< 1 kg) thermochcemical biomass conversion.

With certain techniques, co-authorship or payment are both possible - depending on whether the analysed data will be used within a collaboration or not.

TCCB

Coupure Links 653, build. B
B-9000 Ghent

Vrije Universiteit Brussel

// 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 Science and Bio-engineering Sciences

- Plant Biology and Nature Management laboratory
- Research group Analytical, Environmental and Geochemistry
- Research group Physical Geography
- Research group Marine Biology

Acoustics and Vibration research group

// Website research infrastructure

http://mech.vub.ac.be/avrg/consulting.htm#Vibration%20Testing

http://mech.vub.ac.be/facilities.htm

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Field instrumentation	• Monitoring systems on C-Power offshore wind farm [3] • Monitoring systems on Nobelwind offshore wind farm [3]
	Analysis, equipment, services and techniques	**Equipment** • Mobile dynamic measurement system [2] • Stand-alone dynamic measurement system with 3G capability [2] • Permanent monitoring system for dynamic monitoring [2] **Services** • Design verification [2] • Short-term dynamic assessment [2] • Permanent monitoring of dynamic system [2]
	Marine land-based facilities for engineering	• Anechoic Acoustic Room • Polytec Scanning Laser Doppler Vibrometer • IST Hydraulic Test Rigs • LMS Scadas-III Front-End • Combustion Engine Test Rig • Wind Tunnels: - Low speed tunnel for turbulence research with a deformable upper wall (length 8 m, test section 1.4 m x 0.4 m) - Low speed tunnel for industrial aerodynamics (length 12 m, test section 2 m x 1 m) • Turbomachinery: Test rig for hydraulic turbines and pumps - Laser Doppler System with Test Bench - Axial Test Pump in Test Bench with LDS probe lens
	Num. models, spec. software and comp. IR	Signal Processing and Modal Analysis

AVRG

Pleinlaan 2, build. Z
B-1050 Elsene (Brussels)

Research group **Analytical, Environmental and Geochemistry**

// Website research infrastructure

http://we.vub.ac.be/~essc

// Contact research infrastructure

Prof. dr. Philippe Claeys (Phclaeys@vub.ac.be)

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Underwater vehicles, drifters and floats	Seaglider
	Field instrumentation	Portable XRF
	Overview	CHR MS
	Type of laboratory / analyses	• Trace elemental labs including clean rooms [1,2,3] • Stable isotope laboratory [1,2,3]
	Class or accreditation	Clean rooms
	Analysis equipment, services and techniques	• Nu-Plasma Dual Inlet Perspective stable isotope mass spectrometer instrument dual inlet coupled with an automated carbonate device and a GasPrep Equilibration device [1,2,3] • 3 Isotope ratio mass spectrometers including coupling with GC, and other automated peripherals[1,2,3] • Picarro Cavity Ring-Down Spectroscopy ∂D, $\partial_{18}O$ [1,2,3] • High resolution and low resolution ICPMS including coupling with laser ablation [1,2,3] • A CALUX (chemically activated luciferase expression) bio-assay [1,2,3] • FTIR spectroscopy and microscopy [1,2,3] • Micro-X-ray fluorescence for major and trace elements determination, with 25 µm resolution mapping capability [1,2,3]

AMGC

Pleinlaan 2
B-1050 Elsene (Brussels)

Department of **Art Sciences and Archaeology**

// Website research group

www.vub.ac.be/SKAR

Sampling, observation & survey infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	• Foerster Magnetometer • XRF-instrument

SKAR

Pleinlaan 2
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Department of **Hydrology and Hydraulic Engineering**

// Website research group

wwws6.vub.ac.be/hydr/default.htm

// Contact research infrastructure

Prof. dr. ir. Margaret Chen (margaret.chen@vub.ac.be)


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Fixed platforms, moorings and landers	Mobile underwater sampling frame with multiple sensors [3]
	Field instrumentation	Multiple sensors for sediment transport and hydraulics [3]
	Overview	
	Type of laboratory / analyses	• Radio-isotope lab analysis [2,3] • Sedimentological lab analysis [2,3] • Particle analysis [2,3]
	Analysis, equipment and techniques	**Equipment** Multiple open channel flumes for hydraulic experiment [3] **Techniques** Flocculation analysis [2,3]
	Num. models, spec. software and comp. IR	Developing a storm surge model and a flooding model of the Belgian coastal area. [3]
	Marine data centres	Coast and marine data for wind, wave, sediment, hydraudynamics [3]

Hydrology and Hydraulic Engineering

Pleinlaan 2
B-1050 Elsene (Brussels)

Research group **Marine Biology**

// Website research group

http://we.vub.ac.be/en/marc-kochzius

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	• Molecular genetic laboratory [1,3] • Wet lab + aquarium [1,3]
	Analysis equipment, services and techniques	**Equipment** • PCR den bench • Thermo cyclers • Gel electrophoresis • Gel documentation **Techniques** PCR
	Aquaculture experimental facilities	Tropical marine aquarium
	Collections	Tissue samles of tropical Indo-Pacific coral reef and mangrove fauna.

Marine Biology

Pleinlaan 2
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Research group **Physical Geography**

// Website research group

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

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Analysis, equipment and techniques	**Equipment** • Narod radio-echo-sounding equipment [3] • Drone DJI Mavic [3] • Drone DJI Phantom Pro • Trimble GNSS DGPS [1] • Mala ground-penetrating radar [3] • Heucke steam drill [1]
	Num. models, spec. software and comp. IR	• 3-D thermomechanical ice-sheet model [3] • Positive degree-day mass balance model [3] • Energy balance model [3]

FARD

Pleinlaan 2
B-1050 Elsene (Brussels)

Plant Biology and Nature Management laboratory

// Website research group

http://we.vub.ac.be/en/ecology-and-biodiversity

// Contact research infrastructure

dr. Elisabeth Robert (erobert@vub.ac.be)

Marine & Coastal station

Satellites & (airborne) remote sensing capacity

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Marine and coastal stations	Mostly through collaboration with the Gazi field station of the Kenya Marine Fisheries Research Institute (KMFRI).
	Satellite & (airborne) remote sensing capacity	According to research needs (see reference to remote sensing in publications).
	Overview	
	Type of laboratory / analyses	• Conservation Genetics lab / Microsatellite development, multiplexing PCR, sequencing, cpDNA genome analysis • Stable isotope analysis and analytical chemistry in collaboration with the Chemistry Department, VUB
	Analysis equipment, services and techniques	Micro-CT-scan (Skyscan1172)
	other experimental facilities and analysis capacity	Greenhouses where (amongst others) mangrove plants are grown.
	Num. models, spec. software and comp. IR	In collaboration with NASA – JPL (dr. D. Menemenlis) – high spatio-temporal resolution models on global ocean wind and currents. This research is through postdoctoral researcher Dr. Tom Van der Stocken, now affiliated to NASA - JPL.
	Collections	Herbarium BRVU (specimens and voucher specimens); now almost entirely relocated to the Botanical Garden, Meise

APNA

Pleinlaan 2
B-1050 Elsene (Brussels)

Flemish scientific institutes

Flemish scientific institutes

// Policy Domain Economy, Science and Innovation

- Botanic Garden Meise
- Flanders Marine Institute
- Flemish Institute for Technological Research

// Policy Domain Agriculture and Fisheries

- Flemish Research Institute for Agriculture, Fisheries and Food

// Policy Domain Mobility and Public Works

- Flanders Hydraulic Research

// Policy Domain Environment

- Flanders Heritage Agency
- Research Institute for Nature and Forest

Botanic Garden Meise

// Website research group

www.plantentuinmeise.be

// Contact research infrastructure

Prof. dr. Bart Van de Vijver (vandevijver@br.fgov.be)
Mrs. Ann Bogaerts (ann.bogaerts@br.fgov.be) (*collection manager*)

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Molecular lab facilities [2]
	Analysis equipment, services and techniques	JEOL JSM-7100F High Performance FE-SEM [3]
	(Marine) libraries	Library of the Botanic Garden Meise (*www.plantentuinmeise.be/RESEARCH/LIBRARY/index.php*) [1]
	Marine data centres	The Botanic Garden Meise disposes of several databases: *www.plantentuinmeise.be/RESEARCH/COLLECTIONS/alldatabase.php* [1]
	Collections	**Conservation** • The Seed Bank [1] • The Seed List [1] • Wild Phaseoleae (Bean) Database [1] **Collections** • Plant Herbarium [1] • Non-vascular Cryptogams Herbarium (including Van Heurck collection) [1] • Botanical Illustrations [2] • Living Collections[1] See: *www.plantentuinmeise.be/CONSERVATION/index.php* and *www.plantentuinmeise.be/RESEARCH/COLLECTIONS/index.php*

Botanic Garden Meise

Nieuwelaan 38
B-1860 Meise

Flanders Heritage Agency

// Website research infrastructure

www.onroerenderfgoed.be/nl/diensten

// Contact research infrastructure

dr. Marnix Pieters

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Type of laboratory / analyses	Depot and conservation lab for archaeological finds (*www.onroerenderfgoed.be/nl/diensten/depot*) [1]
	Analysis equipment, services and techniques	• Vats • Lifting device (limited to 2,000 kg) [1] • A set for producing demineralised water for treating archaeological objects from the sea
	(Marine) libraries	The library of the Flanders Heritage Agency (*www.onroerenderfgoed.be/nl/diensten/bibliotheek*) [1]
	Marine data centres	Several databases, geoportals and registers, *inter alia* about historical fleet and maritime archeology (*www.maritieme-archeologie.be*)[1]
	Collections	Archives (*www.onroerenderfgoed.be/nl/diensten/archief*) and an image collection (*www.onroerenderfgoed.be/nl/diensten/beeldbank*) [1]

Flanders Heritage Agency

Havenlaan 88 box 5
B-1000 Brussels

Flanders Hydraulics Research

// Website research infrastructure

www.flandershydraulicsresearch.be/facilities-and-tools

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Underwater vehicles, drifters and floats	Wave-resisting drifters for 1 m depth velocity measurements in the intertidal zone.
	Ship-based instrumentation	ADCP, LISST, Echosounder, Aanderaa, YSI
	Fixed platforms, moorings and landers	Inox frames for mounting oceanographic instruments (HERCULES frame: L x W x H: 2.4 m x 2.4 m x 1.8 m; HYLAS frames: L x W x H: 2 m x 2 m x 1.5 m)
	Field instrumentation	AWAC, Aquadopp, Vector, OBS, High Frequency pressure sensors, Sand Ripple Profiler, Aquascat, datalogger synchronisation, Valeport ECM
	Overview	PSA
	Type of laboratory / analyses	Sedimentological laboratory
	Analysis equipment, services and techniques	• Sediment concentration in water samples • Grain-size analysis • Organic material content • Salinity of water samples • Microscopic analyses (incl. electronic microscopy) • Calibration of instruments • Etc.
	Marine land-based facilities for engineering	• Wave flume (70 m x 4 m x 1.4 m) with a piston-type wave generator • Wave basin (17.5 m x 12.2 m x 0.45 m) • Multifunctional test basin (19 m x 9.8 m x 1.6 m) • Towing tank (88 m x 7 m) (in cooperation with Ghent University) • Two experimental flumes (31.7 m x 0.7 m x 0.86 m and 34.8 m x 0.5 m x 0.76 m) • Current flume (56.2 m x 2.4 m x 1.15 m) • A physical model of the port of Zeebrugge
	Num. models, spec. software and comp. IR	**Hydraulic and hydrological software** • DELFT3D software of Deltares • SWAN software of TUDelft • LITPACK software of Danish Hydraulic Institute • MIKE11 software of Danish Hydraulic Institute • 1D-model developed by Flanders Hydraulics Research • SIS software of HR Wallingford • PHAROS software of Deltares • The HYDRA information system (data management system)
	Simulators	**Three bridge simulators for ship manoeuvring** • SIM 360+ • SIM 225 • LARA
	(Marine) libraries	Flanders Hydraulics Research library: (*www.flandershydraulicsresearch.be/publications*)

Modalities are discussed on a case by case basis

WatLab

Berchemlei 115
B-2140 Borgerhout (Antwerp)

Flanders Marine Institute (VLIZ)

// Website research infrastructure

www.vliz.be/en/equipment

// Contact research infrastructure

dr. André Cattrijsse (andre.cattrijsse@vliz.be)


Research Vessel


Marine & Coastal station


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure


Logistics

Infrastructure Categories		Infrastructure
		• Regional vessel: RV Simon Stevin (36 m) (*www.vliz.be/en/rv-simon-stevin*) [1,2,3] • RIB Zeekat (*www.vliz.be/en/rib-zeekat*) [1,2,3]
		Marine Station Ostend (*www.vliz.be/en/marine-station-ostend*) [1,2,3]
	Underwater vehicles, drifters and floats	• ROV Genesis (*www.vliz.be/en/rov-genesis*) [1,2,3] • Mini ROV [1,2,3]
	Ship-based instrumentation	**Sampling of marine organisms** • Bongo net [1,2,3] • Beam trawl [1,2,3] • Otter trawl [1,2,3] • Pelagic otter trawl [1,2,3] • Bowers and Connelly multi-corer [1,2,3] • Hamon grab [1,2,3] • Hyperbenthic sledge [1,2,3] • MIK net [1,2,3] • Neuston net [1,2,3] • Sieving table [1,2,3] • Apstein plankton net [1,2,3] • CalCoFi plankton net [1,2,3] • Vertical plankton net – WP2 [1,2,3] • Plankton pump [1,2,3] • Reineck box corer [1,2,3] • Van Veen grab [1,2,3] • Fish sorting table [1,2,3] • Wilson auto-siever [1,2,3] • Flow cytometry [1,2,3] • Video plankton recorder [1,2,3] **Sampling & mapping of the seabed** • Bowers & Connolly multi-corer [1,2,3] • Cohesive Strength Meter (CSM) [1,2,3] • Hamon grab [1,2,3] • Multibeam sonar [1,2,3] • Reineck box corer [1,2,3] • Sediment Profile Imaging [1,2,3] • Singlebeam sonar [1,2,3] • Van Veen grab [1,2,3] • Video frame [1,2,3] **Sampling & characterisation seawater** • Acoustic current meter (ADCP) and speed log [1,2,3] • Carrousel 6 x 4 l Niskin bottles [1,2,3] • CTD's can be equipped with [1,2,3]: - Photosynthetically active radiation (PAR) - Dissolved oxygen - Turbidity - Acidity and oxidation reduction potential (ORP) - pCO_2 sensor • Fluorimeter [1,2,3] • Go-Flo bottle 10l [1,2,3] • Multibeam sonar [1,2,3] • Niskin 5 litre bottle [1,2,3] • Secchi disc [1,2,3] • LISST-100X turbidity meter [1,2,3] • LISST-200X turbidity meter [1,2,3] **Onboard underway data acquisition system** • Thermosalinograph [1,2,3] • Fluorimeter [1,2,3] • Surface pCO_2 [1,2,3] • Oxygen sensor [1,2,3] • CO_2 and CH_4 gas analyser [1,2,3] • CH_4 sensor [1,2,3] (see *www.vliz.be/en/equipment*)
	Fixed platforms, moorings and landers	• Tripod [1,2,3] • Buoy with measurement devices for biological and chemical parameters [1,2,3]
	Field instrumentation	• Fish acoustic receiver network (VEMCO) [1,2,3] • Sensor network for large birds [1,2,3] • Acoustic porpoise detectors [1,2,3] • Underwater camera [1,2,3] • USBL system GAPS [1,2,3]

VLIZ

Wandelaarkaai 7
B-8400 Ostend

	Overview	
	Type of laboratory / analyses	• Multifunctional laboratories in the Marine Station Ostend (wet and dry laboratories) [1,2,3] • Molecular laboratory for DNA extraction [1,2,3] • Carbon chemistry laboratory [1,2,3]
	Analysis equipment, services and techniques	**Equipment** • Semi-automatic zooplankton recognition tool (ZooSCAN) [1,2,3] • Semi-automatic phytoplankton recognition tool (FlowCam) [1,2,3] • Stereomicroscopes [1,2,3] • Microscopes [1,2,3] **Services** • Nutrient analysis [1,2,3] • Total Alkalinity analysis [1,2,3] • Dissolved Organic Carbon Analysis [1,2,3] • Oxygen titrator [1,2,3] • pH analysis [1,2,3]
	Aquaculture experimental facilities	Seawater tanks for experimental biology [1,2,3]

	(Marine) libraries	The VLIZ Library is a public marine scientific information centre. It is the central point of contact for marine information for scientists, policymakers and the public at large (*www.vliz.be/en/vliz-library*). [1] • Approximately 112,000 publications and references • 32,500 publications are disclosed in open access • The compilation of the Belgian Marine Bibliography: currently around 34,000 references of which 85% are available (digital or printed)
	Marine data centres	**VLIZ Data Centre** [1] • National Oceanographic Data Centre (NODC) • General data management to support Flemish marine research • The development of data systems and technologies (see also *www.vliz.be/en/datasystems*) • International e-infrastructures: LifeWatch, the central portal for the European Marine Observation and Data network (EMODnet), World Register of Marine Species (WoRMS), Global Sea Level Observing System (GLOSS), Ocean Biodiversity Information System (EurOBIS), Marine Regions

	• Compressor for filling diving cylinders [1,2,3] • Core repository – cold store for drill cores [1,2,3] • Freezers [1,2,3] • Conference rooms and meeting facilities [1,2] • Delivery van and an off-road vehicle for scientific sampling [1]

Flemish Institute for Technological Research (VITO)

// Website research group

https://vito.be/nl


Sampling, observation & survey infrastructure


Satellites & (airborne) remote sensing capacity


Data & information management and computing infrastructure


Logistics

Infrastructure Categories		Infrastructure
	Underwater vehicles, drifters and floats	• An Unmanned Surface Vessel (USV) [2,3] • Aquadrone (mobile sensor platform) [2,3]
	Field instrumentation	Several spectroradiometers, sunphotometers, GPS, etc. [2,3]
		**Platforms, RPAS** • Fixed Wing "Cruiser": up to 35 kg Maximum takeoff Weight, Payload: 6-10 kg, Wingspan: 380 cm, Length: 280 cm, Endurance: 4-5 hours [2,3] • Octocopter AT 8: Endurance 7 min with max payload of 1.5 kg [2,3] • Octocopter AT x8 'zenith': Endurance 15 min with max payload of 3 kg [2,3] **Platforms, Satellite** PROBA-V: a small earth observation satellite for global vegetation monitoring, in operation since December 2013 [2,3] **Instruments** • APEX: an airborne (dispersive push broom) imaging spectrometer [2,3] • LiCrIS – Liquid Crystal based Imaging Spectrometer [2,3] • Headwall Micro Hyperspec [2,3]
	Marine data centres	The remote sensing unit of VITO hosts an extensive data centre focused on powerful parallel computing. It serves both internal and external customers. The data centre excels in its state-of-the-art infrastructure, without losing sight of energy efficiency. The VITO-experts are highly committed to achieve advanced image processing via optimised software computing chains on high performance processing clusters. Thanks to the scalable system in place, the institute is able to expand the data centre continuously. The total storage capacity today -on disk- is ca. 5 PB.The stable and secure IT environment ensures that the data archived in the data centre is protected effectively against cyber attacks. Crucial data are archived at a number of different locations, which ensures that they have the extra protection required. Additionally it is possible to process data remotely on demand, i.e. the data remains in the data centre, but the researcher can access the data and perform the processing he/she desires. Starting on Jan 1, 2018 VITO Remote Sensing operates the TERRASCOPE platform, ESA's Collaborative Ground Segment in Belgium. TERRASCOPE is an initiative of the Belgian Science Policy to maximise the usability and uptake of Copernicus satellite data. The goal is to get as much value out of the Sentinel data as possible. Not just for the research communities but for industrial players, public authorities and the general public as well. [1,2] (*www.terrascope.be/*)
		The remote sensing unit has a van equipped for unmanned airborne campaigns [2,3]

VITO

Boeretang 200
B-2400 Mol

Flemish Research Institute for Agriculture, Fisheries and Food (ILVO)

// Website research infrastructure

http://www.ilvo.vlaanderen.be/EN/Services-and-Products

// Contact research infrastructure

Hans Polet (Hans.polet@ilvo.vlaanderen.be)

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Ship-based instrumentation	• 8 m sampling beam trawl (40 mm) [2,3] • 6 m survey beam trawl (20 mm) [2,3] • 4 m survey beam trawl (40 mm) [2,3] • 8 m twin beam trawl (experimental) [2,3] • 8 m sampling beam trawl (22 mm) * • 3 m survey beam trawl (22 mm) * • Hyperbenthic sledge (1mm & 0.5 mm nets) * • Rinsing & sortingmachine (cfr. shrimps) * • Sieving table (mesh sieze 1mm) * • Several Van Veen grabs (0.1m²) * • Several sorting and (digital) measuring tables [2] • Fish and invertebrate survival equipment [3,*]
	Fixed platforms, moorings and laders	Several boeys, mooring weights, fish and invertebrate cages *
	Field instrumentation	• Drone with RGB-camera, hyperspectral camera and thermal camera [2,3] • CTD [2] • Acoustic equipment for underwater measurements [2,3]
	Overview	CHR MS
	Type of laboratory / analyses	• The laboratory complex includes: chemical analysis, genomics, microbiology, microscopy (MCL), seafood and wetlab, toxicology, otoliths. Also several experimental and aquaculture lab facilities/rooms available. Each laboratory has adequate and high quality instrumentation, described below. [2,3] • Analyses with regard to the marine environment (fishing gear, seawater), sediment, epibenthos, macrobenthos, plankton, demersal and pelagic fish, microbiome [2,3] *https://www.ilvo.vlaanderen.be/Default.aspx?TabID=6539#.W_ffLWZReJB*
	Class or accreditation	All laboratories work according to the criteria of the NBN EN ISO/IEC 17025 standard
	Analysis equipment, services and techniques	**Equipment** Design and performance of fishing gear: • Tension meter: measures the tension in the fishing line with digital recording per second [2,3] • Underwater camera: high quality video recordings of fishing and other underwater activities [2,3] • Scanmar, Marport: acoustic equipment for measuring net characteristics during fishing [2,3] • OMEGA Mesh Gauge [2,3] • 2 pulse generators for laboratory experiments [2,3] • 2 pulse generators (400W) to generate electric fields in the net [2,3] • 1 pulse wing for electric fishing on shrimp [2,3] • 2 winches for communication & energy supply to pulse generators or pulse wing [2,3] • 8 go pro's with waterproof housings with spare batteries & memory cards + 5 mounting racks for go pro's to protect them and attach them in the nets [2,3] • 4 bulletcamera's for realtime underwater imaging + mobile winch for communication and energy supply [2,3] • Several professional deepfreezers (incl. -80°C) and refirigerators (upto 1400 litres) [2]

ILVO

Ankerstraat 1
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	Analysis equipment, services and techniques *(continuation)*	Chromatography equipment: • GC-MS (PTV injection, SPME), LC-MS², LC-HRMS, LC-UV, LC-fluorensence, GC-ECD [2,3] • Chemical extraction and clean-up: PLE, soxhlet, GPC, SPE, etc. [2] • 5 X Stereomicroscopes (bin- and trioculuar) (LEICA resp. 165C (2) & M205C (3)) + 2 digital cameras [2,3] • Sort & rincing installation (macrobenthos) and certified sieves (0.5 & 1 mm) [2] • Muffle furnace (30 - 3000°C), Lab ovens, rinsing machines, fume hoods, etc.* • Several analytical balances (readability down to 0.01 mg) [2] • Malvern Mastersizer 2000 (sediment analysis) [2,3] Genomics equipment: • LAF cabinets, centrifuge (tubes, well-plates), thermomixers, PCR, qPCR (Roche Light-cycler), dPCR (Biorad), electrophoretic units, Qiaxcel, Geldoc system, Nanodrop 2000, Quantus Fluorometer, autoclave (Tuttnauer 385e), bead beater (FastPrep-24), homogenisation of samples (IKA tube mill) [2,3] **Services** • Authenticity tests for fish and seafood (including mixed samples) [2,3] • Otolith daily growth rings [2,3] • Survival and toxicology experiments [2,3] **Techniques** • Chromatographic analyses of organic compounds (ILVO) and inorganic compounds (in co-operation with CODA-CERVA) [2,3] • Microplastic determination in different matrices [2,3] • Exposure experiments for aqueous organisms in climate controlled exposure rooms [2,3] • DNA barcoding and quantification of fish, seafood, macrobenthos [2,3] • Metabarcoding benthos (micro, meio, macro, epi, fish) [2,3] • Genotype-by-sequencing of invasive and commercially important marine organisms [2,3] • Microscopic and macroscopic species determination [2,3] • Stomach content analyses [2,3] *www.ilvo.vlaanderen.be/language/en-US/EN/Services-and-Products.aspx*
	Aquaculture experimental facilities	• 10 tanks of 500 l on a separate recirculation system for general purposes [2,3] • For feed experiments and survival tests: 20 small (30 l) fish tanks on one recirculation system under controlled light and temperature conditions [2,3] • 2 tanks of 2000 l on a seperate recirculation system under controlled light and temperature conditions • 10 tanks of 1000 l on a seperate recirculation system under controlled light and temperature conditions [2,3] • 17 small (120 l) fish tanks on a recirculation system [2,3] • 5 large fish tanks (2,000 l) on one recirculation system [2,3] • Various fish tanks from a few litres up to 3,000 l [2,3] • Various tanks for fish eggs and larvae with their own recirculation system or flow through [2,3] • 4 aquaria (60 x 30 x 35 cm – 50 l) available to perform exposure experiments with toxic chemicals [2,3] • Exposure room with a separate recirculation and cooling system. It contains 16 cilindro-conical tanks (11 l) and 10 small fish tanks (120 l). Either flow-through or recirculation are available [2,3] • A direct connection to the sea to pump up seawater (stored in a tank of 40 m³) [2,3] • Various recirculation systems for stocking (fish and shrimp) and testing of: 8 medium-sized fish tanks (570 l) and 18 small fish tanks (100 l). Separate room with its own cooling and recirculation system [2,3]
	Marine land-based facilities for engineering	A towing tank is available (6.6 m x 1.5 m x 0.7 m (7 m³))
	Num. models, spec. software and comp. IR	Server for analysis of next generation sequencing data
	Marine libararies	Macrobenthos determination keys
	Marine data centers	• Fisheries data (otolits, catches, discards, effort, VMS, economic, fuel) [2,3] • DNA barcodes macrobenthos
	Collections	Macrobenthos reference collection (BNS)

ILVO

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Research Institute for Nature and Forest (INBO)

// Website research group

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Research Vessel


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
		Boats / RIBs: Pioneer Multi 60 HP
	Field instrumentation	• Network of 150 VEMCO VR2W (69 kHz) listening stations for acoustic underwater telemetry in the River Schelde catchment. Part of LifeWatch observatory [1,2] • GPS tracking network for large birds. Part of LifeWatch observatory [1,2]
	Overview	
	Type of laboratory / analyses	• Analytical laboratory: presence of nutrients and contaminations in soil, water and tissue samples and physical soil analyses [4] • The molecular-genetic and in-vitro laboratory studies the genetic diversity of populations and species and supports tree breeding as well as the construction of gene banks [4] • The phytopathology laboratory investigates diseases caused by fungi and bacteria [4] • Centre for tree diagnosis [4]
	Aquaculture experimental facilities	Outdoor and indoor aquaculture facilities
	Num. models, spec. software and comp. IR	• WateRinfo: R package to get data from waterinfo.be (*https://inbo.github.io/wateRinfo/*) [1] • Etn: R package with functions to access and process data from the European Tracking Network (ETN) (*https://github.com/inbo/etn*) [1] • Bird-tracking-etl: R package to extract and transform bird tracking data from UvA-BiTS embedded within automated cloud based data pipeline (*https://github.com/inbo/bird-tracking-etl* [1] • Pywhip: Python package to validate data against whip specifications (*https://github.com/inbo/pywhip*) [1]
	(Marine) libraries	INBO library
	Marine data centres	INBO IPT: repository for GBIF-compatible occurrence, sampling and checklist datasets [1]

INBO

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Universities and graduate schools of the Wallonia-Brussels Federation

Haute École Paul-Henri Spaak

// Paramedical Department

- Environmental, Occupational Physiology laboratory

Environmental, Occupational Physiology laboratory

// Contact research infrastructure

Prof. Constantino Balestra (balestra@daneurope.org)


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	Every data acquisition system is always portable and adaptable in order to be able to analyse and acquire data in hostile, and remote environments. [3]
	Type of laboratory / analyses	Every human based physiological-medical transportable system: neurophysiological, respiratory, cardiac, echographic, echocardiographic, basic blood analysis (capillary samples: glucose, hematocrit, hemoglobin, hactate, etc.), psychometry, anthropometry, body composition, etc. [3]
	Analysis equipment, services and techniques	• Cardiorespiratory analysis systems (telemetry, Cyclo-ergometer, treadmill, etc.) [3] • 2 non-transportable ultrasound system [3] • 7 portable ultrasound system [3] • Infrared Cabin [3] • Climate room [3] • Immersion tank [3] • Fitness analysis [3] • Heart Rate variability [3] • Neurophysiological analysis including autonomic nervous system [3] • Bioimpedencemetry, multifrequency and body composition analysis [3] • Anthropometry [3] • Hyperbaric Chamber (hospital based) [3]
	Other experimental facilities and analysis capacity	• Hyperbaric Chamber (hospital based) [3]
	Num. models, spec. software and comp. IR	• Fractal and statistical analysis • Automatic measurement of ultrasound images • Neuropsychological analysis
	Simulators	30 and 40 m Deep Diving Pools [2,3]
	Marine data centres	• Divers Alert Network database • An in-house dedicated Physiological Diving Bubble related analysis database

Environmental, Occupational Physiology

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Université Catholique de Louvain

// Science and Technology Sector

- Marine Biology laboratory
- Applied Mechanics unit
- Institute of Life Sciences
- Georges Lemaître Center for Earth and Climate Research

Applied Mechanics unit

// Website research infrastructure

https://uclouvain.be/en/research-institutes/immc/mema

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Num. models, spec. software and comp. IR	• Gmsh: a three-dimensional finite element mesh generator with built-in pre- and post-processing facilities • MAdLib: an open source Mesh Adaptation Library • Second-generation Louvain-la-Neuve Ice-ocean Model (SLIM)
	(Marine) libraries	Bibliothèque Euler (*www.uclouvain.be/376388.html*)

MEMA

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Lemaître Centre for Earth and Climate Research

// Website research group

www.uclouvain.be/teclim

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Num. models, spec. software and comp. IR	**Climate models *** • LOch–Vecode-Ecbilt-CLio-agIs Model (LOVECLIM) [1] • Ec-Earth [1] **Ocean and sea ice models *** • Louvain-la-Neuve sea Ice Model (LIM) / Nucleus for European Modelling of the Ocean) (NEMO) [1] • Second-generation Louvain-la-Neuve Ice-ocean Model (SLIM) [1] • Constituent-oriented Age and Residence time Theory (CART) [1]

**All the models we are using are in open access (no condition) to use them but we do not provide facilities to perform the simulations (we ourselves have to run the models on different infrastructures outside the group).*

TECLIM

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Institute of **Life Sciences**

// Website research infrastructure

https://uclouvain.be/fr/node/2517

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Molecular biology lab and aquaculture facilities
	Analysis equipment, services and techniques	• DNA sequencing • Cell culture (fish, mammals) • Transcriptomics (Agilent microarray platform) • Proteomic and protein analysis by mass spectrometry (MASSPROT) (ThermoScientific LTQ XL linear ion trap mass spectrometer and Applied Biosystems 4800 MALDI-TOF-TOF (“matrix-assisted laser desorption ionisation – Time of flight”) mass spectrometer) • Confocal and atomic force microscopy • Chemical analysis of small molecules (fatty acids, vitamins, PCBs) (HPLC, GC-FID, GC-MS, UPC^2)
	Aquaculture experimental facilities	• Platforme technologique et didactique en biologie aquicole Marcel Huet (specific infrastructure with cold and hot water, open circuit and closed circuit with digestion cages) • CoSMos, Pisciculture domaniale d’Erezée, (specific infrastructure with cold water in open circuit

ISV

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Marine Biology laboratory

// Website research group

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// Contact research infrastructure

Prof. dr. Jérôme Mallefet

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	• Scuba diving • Photo and video underwater equipment • Luminometers • Microspectrophotometers
	Overview	
	Type of laboratory / analyses	• Chemistry, enzymology, microscopy, luminometry, etc. • Dark lab, aquarium , cold room, temperate room
	Analysis equipment, services and techniques	**Equipment** • Hyperbaric Chamber (hospital based) [3] • Epi-fluorescent microscopes • Intensified video camera • Video-imaging analysis software (noldus) • PCR - Western Blot **Techniques** • Video-imaging analysis software (noldus) • PCR - Western Blot
	Num. models, spec. software and comp. IR	• 3D image analysis • Video-imaging analysis software (noldus)

BMAR

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Université Libre de Bruxelles

// Faculty of Sciences

- Biogeochemistry and Earth System Modelling group
- Research group Marine Biology
- Laboratory of Systems Ecology and Resource Management
- Glaciology unit
- Laboratory G-Time

// Faculty of Applied Sciences / Brussels Polytechnic School

- Environmental Hydroacoustics lab

// Interfacultary School of Bio-engineering

- Laboratory of Ecology of Aquatic Systems

Biogeochemistry and Earth System Modelling group

// Website research infrastructure

http://biogeomod.ulb.be

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Logistics

Infrastructure Categories		Infrastructure	
	Ship-based instrumentation	**Sampling equipment** • Sediment traps • In situ pumps (stand-alone pumps)	
	Field instrumentation	**Field equipment** • Field vehicle • Electricity generator • Compressor (Kaeser) • Sensors (temperature, pH, conductivity, oxygen)	
	Overview	PSA	
	Type of laboratory / analyses	Geochemical lab	
	Class or accreditation	Clean room with class 100 laminar flow hood	
	Analysis equipment, services and techniques	**Analysis of dissolved and particulate major and trace elements** • Electrothermal Atomic Absorption Spectrometry (ETAAS) with Zeeman correction (SpectrAA Varian) • Inductively coupled plasma atomic emission spectroscopy (ICP-OES) (Liberty Series II Varian) • Chemiluminesence Flow Injection Analysis of Iron • Dissolved organic and inorganic carbon analyser (Shimadzu) • Elemental particulate C, N, S analyser (Fisons) • AutoAnalysers (Technicon and Skalar) • UV-Visible spectrophotometer **Radiotracer techniques for biogeochemical studies of the aquatic media** • Controlled laboratory devoted to radiotracers experiments	• Light meter • Incubators (laboratory and for usage on board research vessels) **Measurement of physico-chemical parameters** • pH meter • Oxygen meter • Conductivity meter • Alkalinity • Balances (weighing range: 0.01 mg – 5 kg) • Refrigerated centrifuge • Titrators (Metrohm) • Ultrasonic apparatus • UV treatment device • Oven • Furnace up to 1000 °C (Vectra)
	Num. models, spec. software and comp. IR	• COAST SOM-FFN • C-GEM • GEOCLIM reloaded	• OMEN-SED • ORCHILEAK
	Simulators	BRINS	
		Mechanic and electronic workshop	

Modalities are discussed on a case by case basis.

BGéoSys

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Laboratory of **Ecology of Aquatic System**

// Website research infrastructure

http://esa.ulb.ac.be/equipment

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Logistics

Infrastructure Categories		Infrastructure
	Field instrumentation	Field salinometer and pH meter
	Overview	
	Analysis equipment, services and techniques	**Incubators & culture cabinets** • Simulated in situ deck incubators equipped with light attenuation filters [3] • Laboratory incubator equipped with light attenuation filters [3] • Photosynthetron (CHPT) [3] • Thermoregulated cabinets [3] • Thermoregulated illuminated culture room [3] • Thermoregulated light cabinets (-20 °C - +60 °C) (Rumed GMBH) [3] • Thermoregulated incubator shakers Innova 44R (20 °C below ambient – +80 °C), New Brunswick [3] • Sedimentation column (SEDCOL) [3] • Rolling device for aggregate formation [3] • Incubators for the study of biofilms in water supply networks [3] **Optical instruments** • Flow cytometer (Accuri C6) [3] • Spectrophotometer (Lambda 650S) [3] equipped with integrated sphere (Perkin Elmer) [3] • Fluorometer with integration sphere (Kontron) [3] • Fluorometer LS 55 (Perkin Elmer) [3] • Spherical microquantameter US-SQS/LI (Walz) [3] • Atmospheric and underwater light sensors (Li-COR) [3] • Profiling Natural Fluorometer System PNF-300 (Biospherical Instruments) [3] • Light absorption and attenuation sensor AC9 (WET-Labss) [3] • Pulse Amplitude Modulated (PAM) Fluorimeter (Walz) [3] **Microscopy** • Inverted microscope (Leica) [3] • Epifluorescence microscope DMRXA (Leica) [3]	• Digital camera (Nikon) [3] • Digital image analyser (Lucia 4.6) [3] • FlowCAM [3] **Molecular biology** • DGGE Dcode-Kit (Biorad) [3] • Thermocycler (Eppendorf) [3] • Transilluminator UV HI/LO 302 nM 20 x 20 [3] • Electrophoresis system mini-gel (I-MUPID) [3] • Laminar flow hood RNA/DNA (Biocap) [3] • Vertical Laminar flow hood class II BSC, Esco, Analis [3] • Real-Time PCR System Stepone Plus,Applied Biosystems [3] • Centrifuge 5424, Eppendorf [3] **General equipment** • Liquid scintillation counter (Packard) [3] • High temperature furnace (HC) [3] • Autoclave (Systec 3870) [3] • Laminar flow hood (ADS) [3] • Laminar flow hood (CLF 475) [3] • Laminar flow hood, Captair Bio,Biocap • Ultra pure water system (MilliQ) [3] • Thermoregulated centrifuge (Sigma) [3] • Thermostatic bath (Polyscience) [3] • Rotating table (Vel) [3] • Filtration systems (Millipore) [3] • Manifold filtration system for microbiological analysis [3] • Vacuum/Pressure Pumps (Millipore) [3] • Peristaltic pump (Vel) [3] • Thermos bottle for liquid nitrogen (Locator) [3] • Ultrasonics bath and probe (Labsonic) [3] • Marine snow catch bottle (prototype) [3] • Balance, Mettler-Toledo [3] • Precision Balances, Analis [3]
		Ultra-low temperature freezer (-80°C), New Brunswick

ESA

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Environmental Hydroacoustics lab

// Website research group

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// Contact research infrastructure

Prof. dr. Jean-Pierre Hermand


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Underwater vehicles, drifters and floats	EHL custom equipment and in partnership
	Ship-based instrumentation	EHL custom equipment
	Fixed platforms, moorings and landers	EHL custom seafloor frames for acoustic and oceanographic observations
	Field instrumentation	• Range of underwater acoustic transducers, control and data acquisition systems (EHL custom) • Range of oceanographic sensors and autonomous data loggers • Range of custom-made acoustic data recorders • Range of satellite-based positioning and timing systems
	Type of laboratory / analyses	Ultrasonic materials characterisation
	Analysis equipment, services and techniques	In partnership
	Other experimental facilities and analysis capacity	Large water tank for acoustic transducer calibration and system testing
	Num. models, spec. software and comp. IR	• Underwater acoustic propagation modelling - COMSOL Multiphysics • Own softwares for a variety of hydroacoustic signal processing needs • Own softwares for acoustic and environmental data inversion and assimilation • EHL-owned high-performance workstations • General purpose HPC HYDRA cluster • VEGA many-cores cluster part of CECI consortium
	Marine data centres	Database of hydroacoustic recordings since 1994

EHL

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Glaciology unit

// Website research infrastructure

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


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Logistics


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	Field equipement for ice drillng and water sampling
	Overview	CHR
	Type of laboratory / analyses	Glaciological lab
	Class or accreditation	Class 100 clean room for measurements of trace metals in melted ice samples.
	Analysis equipment, services and techniques	• Pneumatic compression apparatus for high precision uniaxial compression tests • Ion chromatograph for measurements of major anions (Cl^-, SO_4^{2-}, NO^{3-}, etc.) • Precision diamond wire saws for cutting ice samples • Band saw for ice cutting • Microtome for the thickness reduction of ice thin sections and precise chemical ice sampling • Toepler extraction pump for measurement of total gas content in the ice • Gas Chromatographs (GC) for measurement of the gas composition in CO_2, O_2, N2, Ar, CH_4 and DMS in ice • Automatic Fabric Analyser (AFA): G 50 Instrument • Two types of dry extraction methods (grating and crushing) for gas analysis • Universal stage for the measurement of the C-axis orientation of ice crystals • Flame atomic absorption spectrometer for measurement of major cations (Na^+, K^+, Mg^{2+}, Ca^{2+}, etc.)
	Num. models, spec. software and comp. IR	Ice sheet and ice shelf model development with a specific focus on ice-ocean interaction.
		Two cold rooms (0°C to -30°C) for ice samples cutting and treatment.

Glaciology unit

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Laboratory **G-Time**

// Website research infrastructure

http://gtime.ulb.ac.be/Services.html
http://gtime.ulb.ac.be/Facilities.html

Experimental facilities
& analysis capacity

// Contact research infrastructure

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Infrastructure Categories		Infrastructure
	Overview	MS
	Type of laboratory / analyses	Geochemical lab
	Class or accreditation	3 class 100 and 1 class 1000 clean labs for preparation (acid digestion and ion chromatography) and chemical analysis: major, minor and trace elements
	Analysis equipment, services and techniques	**Equipment** • 2 High resolution multiple collector - inductively coupled plasma - mass spectrometry (MC-ICP-MS-HR) (Nu Plasma) for isotopic measurement (Pb, Lu/Hf, Nd/Sm, Fe, Mg, Cu, Zn, Cd) • 1 Thermo TIMS (Triton) • Dessolvating systems (DSN-100, Cetac Aridus II, Apex) • Quadrupole inductively coupled plasma - mass spectrometry (ICP-MS) Agilent 7700 for trace element analyses • I-Cap for major element analyses **Services** • Analysis of isotopic compositions by MC-ICP-MS of Pb, Nd, Hf, Cu, Zn, Fe. Measurements can be performed in wet plasma and in dry plasma. • Sample preparation for Sr isotopic analysis

G-Time

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Research group **Marine Biology**

// Website research group

http://biomar.ulb.ac.be


Research Vessel


Sampling, observation & survey infrastructure


Experimental facilities & analysis capacity


Data & information management and computing infrastructure


Logistics

Infrastructure Categories		Infrastructure
		RIB: Zodiac Mark II, 40hp [2]
	Underwater vehicles, drifters and floats	MicroROV: Videoray pro 3 GTO-XE (150 m depth grade, observation class ROV) [3]
	Field instrumentation	• Basic field instruments, including e.g.: GPS, Salinometer, pH-meters, VHF, etc. [4] • SeaFet pH recorder [3] • ADV currentmeter SonTek 10MHz [3]
	Overview	
	Type of laboratory / analyses	• Ecotoxicology lab: trace metals analysis [2,3] • Physiology [2,3] • Cell culture and microbiology [2,3]
	Analysis equipment, services and techniques	• Photoinic microscopy incl epifluorescence and Nomarsky optics and image analysis facility [1] • Carbonisation furnace [1] • Instron 5543 force testing stand [3]
	Aquaculture experimental facilities	• Controlled temperature/pH aquariology setup [3] • Large aquaria facility (3x1,000 l) for maintenance of marine organisms [1,3]
	Num. models, spec. software and comp. IR	• Specialised Software: ArcGIS, R (incl. custom scripts, Mothur, Q-GIS, Genetics analysis) [3] • Modelisation: Dynamic Energy Budget models (DEB), Species Distribution Models (SDM) [3] • Supercomputing: access to Hydra for intense calculation (e.g. Mothur pipelines) (*https://cc.ulb.ac.be/hpc*) [3]
	(Marine) libraries	CIBIM database (11k+ references on *Echinoderms*) - digitisation in progress with VLIZ [1]
	Collections	Starfish reference collection, various field samples collection [3]
		Scuba diving (including in Polar regions) [4]

BIOMAR

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Laboratory of **Systems Ecology and Resource Management**

// Website research group

www.ulb.ac.be/sciences/biocomplexity

Sampling, observation & survey infrastructure

Satellites & (airborne) remote sensing capacity

Data & information management and computing infrastructure

Logistics

Infrastructure Categories		Infrastructure
	Field instrumentation	Vegetation and environmental analyses
		• Ikonos, QuickBird, Geo-Eye, World-View imagery • Phantom Quadcopter drones + imagery • Historic archives and aerial photographs • Computer hardware
	Marine data centres	Data on mangrove ecology and socio-ecology from Mexico, Jamaica, Martinique, Guadeloupe, Colombia, Brazil, Mauritania, Senegal, The Gambia, Benin, Cameroon, Kenya, Madagascar, South Africa, India, Sri Lanka, Malaysia, Singapore, Vietnam and China. [3]
	Collections	Mangrove Reference Database and Herbarium (*www.vliz.be/vmdcdata/mangroves*)
	Logistics	Well-established contacts in countries with mangrove forests world-wide, particularly in Kenya, Sri Lanka and Malaysia.

Systems Ecology and Resource Management
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University of Liège

// Faculty of Veterinary Medicine

- Department of Morphology and Pathology

// Faculty of Sciences

- Center for Protein Engineering
- Animal Ecology and Ecotoxicology laboratory
- GeoHydrodynamics and Environmental Research group
- Chemical Oceanography unit
- Laboratory of Oceanology
- Palaeobiogeology, Palaeobotany and Palaeopalynology laboratory
- Sedimentary Petrology laboratory
- Laboratory of Animal Physiology

// Faculty of Applied Sciences

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

// Gembloux Agro-Bio Tech

- Microbiology and Genomics unit

Animal Ecology and Ecotoxicology laboratory

// Website research group

http://leae-ulg-be.e-monsite.com

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	CHR
	Type of laboratory / analyses	• Ecotoxicological lab • Analytical chemistry of organic micropollutants • Farming facilities for marine and freshwater invertebrates
	Analysis equipment, services and techniques	• Analysis of POPs by gas chromatography in various biological and environmental matrices • Measurement of the activity of mono-oxygenase (e.g. EROD-PROD-ECOD) in invertebrates and fish • Proteomic and genomic analysis • Tests acute and chronic toxicity on (*Daphnia magna* and *Brachionus calyciflorus*), benthic crustaceans and molluscs • Technical standard sampling and physicochemical analysis of water in the field and in the laboratory • Determination of invertebrates • Study of incidents in the marine and freshwater environments • Fluorescent stereoscopic microscope, image analyser
	Aquaculture experimental facilities	• Continuous breeding of the following planktonic organisms: *Enterobacter aerogenes*, *Euglena gracilis*, *Chilomonas paramecium*, *Chlorella vulgaris*, *Dictyoshpaerium ehrenbergianum*, *Chlamydomonas reinhardtii* • Continuous breeding of freshwater planktonic organisms: *Brachionus calyciflorus* and *Daphnia magna* • Breeding of freshwater amphipods (*Gammarus pulex* and *G. fossarum*) and of freshwater gastropods (*Lymnaea stagnalis* and *Potamopyrgus antipodarum*)

LEAE

Quartier Agora
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Laboratory of **Animal Physiology**

// Website research infrastructure

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

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Overview	 
	Analysis equipment, services and techniques	The technical expertise of the group consists of: • Oxidative stress biomarkers (enzymatic assays, TBARS, GSH, etc.) • Cell culture • Histology • Western blotting • Oxymetry and fluorimetry
	Aquaculture experimental facilities	Corals and sea anemones culture facilities

The services and equipment mentioned in the infrastructure table are available for external parties on a case by case basis. The conditions are co-authorship on the pubilcation based on the data generated by the infrastructure.

Animal Physiology

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Chemical Oceanography unit

// Website research group

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// Contact research infrastructure

dr. Alberto Vieira Borges

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Ship-based instrumentation	Equilibrator designed for coastalenvironmentsto measure partial pressure of CO_2 (pCO_2). This instrument can also be used on buoys and fixed stations.
	Overview	CHR
	Type of laboratory / analyses	Chemistry laboratory
	Analysis equipment, services and techniques	**Equipment** • Infra-red gas analyser Li 6252 [4] • Infra-red gas analyser Li 6262 [4] • Infra-red gas analyser Li 840 [4] • Infra-red gas analyser Li 820 [4] • LGR CH_4 analyser [4] • LGR N_2O isotope analyser [4] • HPLC for phytoplankton pigments [4] • Gas chromatograph SRI for CH_4/N_2O [4] • Gas chromatograph Agilent for DMS(P)(O) [4] • Titrator for total alkalinity [4] • pHmeter field and laboratory [4] • Scan-fluorimeter to analyse fluorescent dissolved organic matter (FDOM) [4] **Techniques** • Partial pressure of CO_2 (pCO_2) [2] • Gas chromatography to measure dissolved CH_4 and N_2O concentration, DMS, DMSP, DMSO [2] • Dissolved N_2O stable isotopes by Off-Axis Integrated Cavity Output Spectroscopy [2] • Colored dissolved organic matter (CDOM) by spectrophotometry [2] • Fluorescent dissolved organic matter (FDOM) by scan-fluorimetry [2] • Interfacial CO_2 fluxes using the floating chamber method [2] • Interfacial CO_2 fluxes using the automated / autonomous chamber method [2] • Interfacial CO_2 fluxes by eddy-covariance [2] • pH is measured with a combined electrode either continuously or on discrete samples in the field or in the laboratory [2] • Total Alkalinity (TAlk) is measured by Gran electrotitration [2] • Dissolved inorganic carbon (DIC) is measured by CO_2 determination on acidified samples [2] • Dissolved oxygen (O_2) is measured on discrete samples by the Winkler method with a potentiometric end-point determination, or, continuously using an optode. [2] • Chlorophyll-a by fluorimetry [2] • NO_3^-, NH_4^+, dissolved silica, phosphate by colorimetry [2]

Chemical Oceanography

Quartier Agora
Allée du six Août 17
B-4000 Liège

Geohydrodynamics and Environmental Research group

// Website research infrastructure

http://modb.oce.ulg.ac.be/mediawiki/index.php/Software

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Num. models, spec. software and comp. IR	**Interpolation** • DINEOF (Data Interpolating Empirical Orthogonal Functions): a tool for removing missing data in geophysical data sets [1] • DIVA (Data-Interpolating Variational Analysis): a spatial interpolation software [1] • "Diva on web" Diva's web-interface [1] • "OceanBrowser" A web-interface for visualising NetCDF files [1] **Data assimilation** • Ocean Assimilation Kit: toolkit for ensemble and reduced-order assimilation [1] • Weakly Constrained Ensembles Method to create dynamically constrained ensemble perturbation for ensemble forecasts and data assimilation [1] • Octave/Matlab toolboxes [1] • Octcdf, a NetCDF toolbox for Octave [1] • Loadgrib, a GRIB decoder for Octave [1] • Optiminterp, Optimal interpolation Fortran module with Octave interface [1] • Filtering inertia-gravity waves from the initial conditions of the linear shallow water equations [1] **Models** • GHER3D Three dimensional primitive equation model [1] • Access to NIC4 and CECI supercomputers [1]

GHER

Quartier Agora
Allée du six Août 19C
B-4000 Liège

Microbiology and Genomics unit

// Website research group

www.gembloux.ulg.ac.be/microbiologie-et-genomique/

Experimental facilities
& analysis capacity

Infrastructure Categories		Infrastructure
	Type of laboratory / analyses	Laboratory of Microbiology and molecular biology [3]

Microbiology and Genomics
Avenue de la Faculté 2b
build. TERRA
B-5030 Gembloux

Department of **Morphology and Pathology**

// Website research infrastructure

www.marinemammals.be

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Marine data centres	The Marine Mammals Biobank

Morphology and Pathology

Quartier Vallée 2
Avenue de Cureghem 6
B-4000 Liège

Research unit **Naval architecture, Maritime engineering, Inland and Sea shipping, Transport System Analysis**

// Website research group

www.anast.ulg.ac.be

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Marine land-based facilities for engineering	• Towing tank: length: 100 m, height: 6 m, Depth: 4 m • Moving platform (Max speed : 6 m/sec, Length measuring the maximum speed: 30 m, Fully automated and programmable controls, Model up to 4 m) • Wave generator (Generator type component single joint (computer control), Wave type: regular or random, Maximum amplitude waves: 0.4 m, Period : 1 s to 10 s) **Associated equipment** • 1 component dynamometer balance • 6 components dynamometer balance • Measurement system of self-propulsion • Motion capture with camera • System data acquisition, processing and calculation
	Num. models, spec. software and comp. IR	**Several software packages were developed for fluvial and maritime transport** • AIWAT (fluvial traffic) • ESTIMA (choice of mode of transport) • OLEMSE1 (optimisation of location emergency posts) • OLEMSE2 (optimisation of emergency routes) • WINOLEMSE (integration of OLEMSE1 and OLEMSE2 for Windows) • Traffic management in locks • Traffic management in ports • Economic evaluation of cost/benefits • Market analysis (attractiveness & competitiveness) • Development of software in support of multi-criteria decision • CCT-VEI, (cost of fluvial transport) • Costs of transport of an intermodal transport chain **Software for ship building** • LBR-5 (optimisation of floating and sailing structures) • LUNAIS (construction of ships)

ANAST

Quartier Polytech 1
Allée de la Découverte 9
B-4000 Liège

Laboratory of **Oceanology**

// Website research group

www2.ulg.ac.be/oceanbio/Recherche.htm

// Contact research infrastructure

Prof. Sylvie Gobert (Sylvie.gobert@ulg.ac.be)

Marine & Coastal station

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
		Oceanographic Station STARESO (Calvi, Corsica) - Mediterranean Sea [2]
	Ship-based instrumentation	CTDs, Niskin Bottles, Plankton Nets [3]
	Fixed platforms, moorings and landers	Mooring in front of STARESO: seawater temperature, light probes at different depths [1,3]
	Field instrumentation	Meteorological stations [1,3]
	Overview	CHR MS
	Type of laboratory / analyses	• Isotopic analysis of carbon, nitrogen and sulfur in environmental sciences (EA-IRMS) [2,3] • Trace element analysis and mercury analysis (ICP-MS; DMA Milestones) [2,3] • Nutrient analysis in seawater (adapted for oligotrophic waters) (Technicon and Skalar) [2,3]
	Class or accreditation	Aquarium for in vivo expositions - Convention LA 1610430 approved by the Ethical Commission [2,3]
	Analysis equipment, services and techniques	• Isoprime 100 mass spectrometer (Isoprime, UK) coupled to an elemental analyser (Isotopic ratios of C, N,S) [2,3] • ICP-MS [2,3] • DMA Milestones for T-Hg analysis [2,3]
	(Marine) libraries	*http://orbi.ulg.ac.be*
	Marine data centres	The 'RACE database': more than 5 million of chemical, biological and physical data records in front of STARESO
	Collections (e.g. for biological resources)	• Weekly zooplankton samples in front of STARESO since 2003 • Marine mammals samples (in collaboration with T. Jauniaux)

Oceanology

Quartier Agora
Allée du six Août 19
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Palaeobiogeology, Palaeobotany and Palaeopalynology laboratory

// Contact research infrastructure

Prof. dr. E. Javaux

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Microscopy, Microspectroscopy and Palynology Laboratory
	Analysis equipment, services and techniques	**Equipment** Micro-Raman spectroscopy, micro-FTIR spectroscopy, chemical lab for organics extraction and palynological preparation, optical microscopy **Services** Microfossil identification, biostratigraphy, thermometry of organics, sample preparation and palynological slides from all types of lithologies and ages
	Other experimental facilities and analysis capacity	Access to electronic microscopy platform (ULg catμ), thin sections and polished thin sections
	Num. models, spec. software and comp. IR	Microspectroscopic (Raman and FTIR) database of organics and minerals useful for paleobiology and astrobiology with Renishaw and Bruker softwares
	Collections	Organic microfossil collection of Precambrian (marine) and Palaeozoic (shore and terrestrial) sections (palynological slides)

PPP

Quartier Agora
Allée du six Août 14
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Center for **Protein Engineering**

// Website research infrastructure

http://labos.ulg.ac.be/cip/services/

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

// Contact research infrastructure

Prof. dr. E. Javaux

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	• Isolation and cultivation of cyanobacterial strains [2,3] • Public culture collection of cyanobacteria: BCCM/ULC [1,2] • Characterisation and preservation of cyanobacteria [2,3]
	Class or accreditation of lab	ISO9001 for BCCM/ULC deposits and distribution
	Analysis equipment, services and techniques	**Equipment** • Thermostatised incubators with light [2,3] • Molecular biology equipement (PCR machines, electrophoresis, etc.) [2,3] • Cultivation equipment and laminar flow hood [2,3] **Services** • Isolation and cultivation of cyanobacterial strains [2,3] • Characterisation and preservation of cyanobacteria [2,3] • Deposits of cyanobacterial strains in public collection [1] • Distribution of cyanobacterial strains/DNA of the public collection [2] • Safe deposits of cyanobacterial strains [2] • Molecular characterisation of cyanobacterial strains [2,3] • Cryopreservation of cyanobacterial strains [2] • Training in cultivation and preservation of cyanobacteria [2] • Training in systematics and identification of cyanobacteria [2] **Techniques** • Cultivation of cyanobacterial strains [2,3] • Molecular biology methods for characterisation [2,3]
	Collections	Public Culture collection of cyanobacterial strains BCCM/ULC [1,2,3]

CIP

Quartier Agora
Allée du six Août 13
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Sedimentary Petrology laboratory

// Website research infrastructure

www2.ulg.ac.be/geolsed/servicesUK.htm

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Infrastructure Categories		Infrastructure
	Field instrumentation	Mobile KT-10 magnetic susceptibility meter
	Overview	
	Type of laboratory / analyses	Geological / sedimentological / mineralogical lab
	Analysis equipment, services and techniques	• Manufacturing of thin sections and polished sections • Petrographic analyses and sedimentological (Cathodoluminescence CITL CL Mk5) • Magnetic susceptibility measurements (AGICO KLY-3) • Study of deposits, geological mapping, impact assessment and surveys

Sedimentary Petrology

Quartier Agora
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University of Mons

// Faculty of Sciences

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

Laboratory of **Biology of Marine Organisms and Biomimetics**

// Website research group

www.bio-mar.com

Research Vessel

Marine & Coastal station

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Logistics

Infrastructure Categories		Infrastructure
		3 boats in Madagascar (For 7, 7 and 3 persons)
		Field laboratory in Madagascar Tuléar
	Ship-based instrumentation	Scuba diving services in Madagascar
	Overview	
	Type of laboratory / analyses	• Classical histology • SEM, TEM • Sequencing and phylogenetic inference methods • Metaproteomic, metagenomic
	Aquaculture experimental facilities	In Madagascar: Polyaquaculture Research Unit (*www.polyaquaculture.mg*) + 100 m² of ponds and other facilities
		4-wheel drive in Madagascar

BOMB

Avenue du champ de Mars 6
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Numerical Ecology and Aquatic Systems group

// Website research group

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// Contact research infrastructure

Prof. dr. Philippe Grosjean (Philippe.Grosjean@umons.ac.be)
Antoine Batigny (Antoine.Batigny@umons.ac.be) (*Logistics*)

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Marine chemistry lab (pH, pCO_2, alkalinity, DIC, Ca, Mg, NO_3, NO_2, NH_3, PO_4). Automatic titrators, Li/Cor IRGA, and Seal AA3. [2,3]
	Analysis equipment, services and techniques	MiniPAM, imaging PAM [3]
	Aquaculture experimental facilities	• Four 1-2 l prototypes of a new kind of chemostat. These original experimental devices, which are being patented (UK patent application number 1112269.4), allow us to maintain and study coral holobionts in both controlled and monitored environmental conditions. [2,3,4] • Two identical mesocosms of 1,500 l each. They are made of a main tank of 500 l to grow mother colonies, or two times two experimental aquaria of 300 l each that can be disconnected from the main water circuit to study coral fragments in different physico-chemical conditions, and of complete filters: mechanical, biological, skimmer and chemical (calcreactors). The systems are completed with “refugia” where macroalgae are cultured to regulate nitrogen and phosphorus concentrations in the water, down to submicromolar values. [2,3]
	Num. models, spec. software and comp. IR	• Development of a software called Zoo/PhytoImage which targets the creation of plankton space-time ecological series by automating a part of the process of the samples. This open source software allows to analyse various kinds of digital plankton images (micro- or macrophotographies, scanned images, or pictures acquired using a FlowCAM). [1,2,3] • Development of specialised packages for R, like PASTECS, (Package for the Analysis of Space-Time Ecological Series). [1,3] • Development of SciViews, which provides a graphical user interface for easier use of R.[1]

Numerical Ecology of Aquatic Systems
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University of Namur

// Faculty of Sciences

- Research unit in Environmental and Evolutionary Biology

Research unit **in Environmental and Evolutionary Biology**

// Website research infrastructure

www.unamur.be/sciences/biologie/urbe/services.html

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

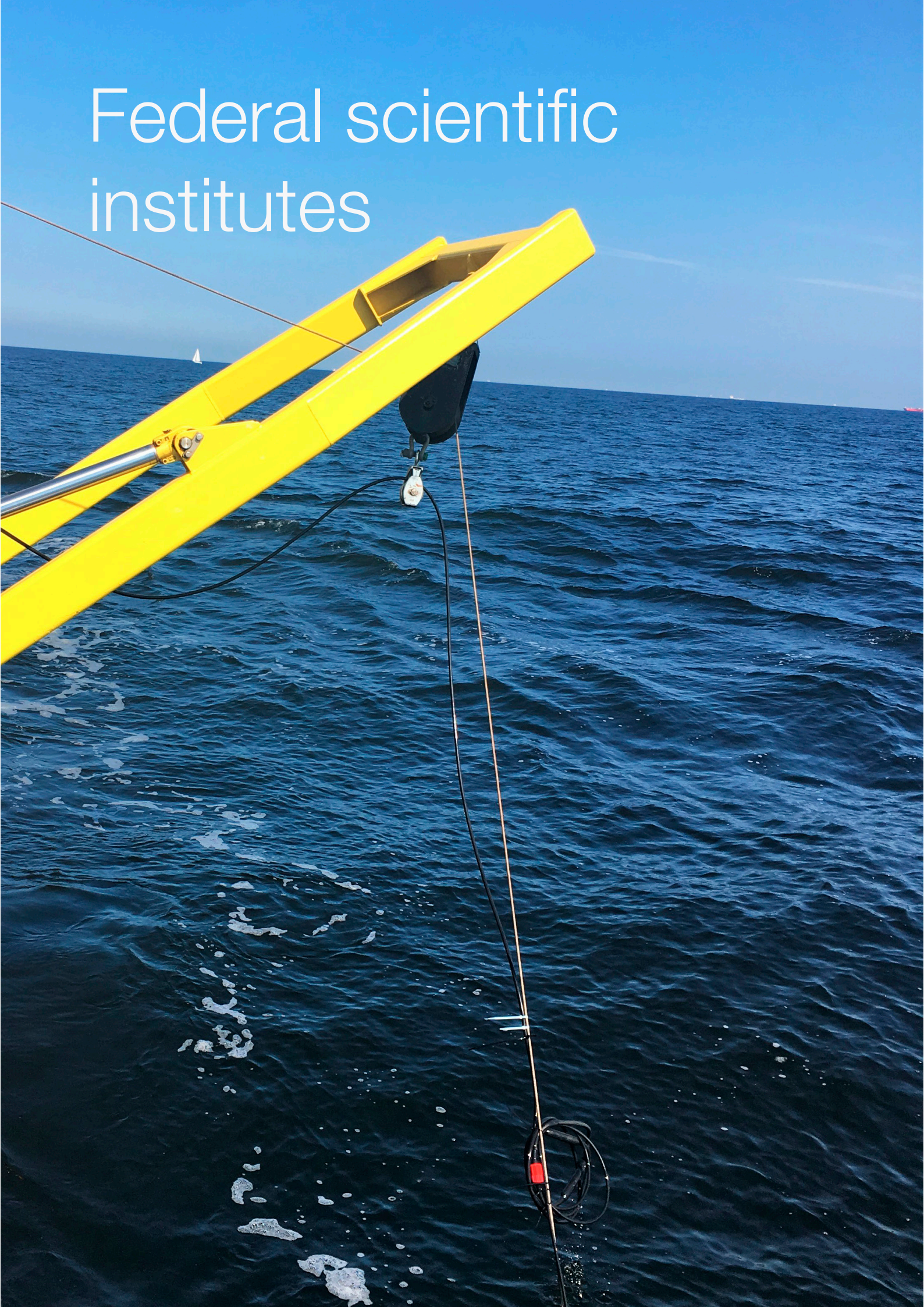
Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	Techniques for the sampling of fish communities (electric fishing nets)
	Overview	CHR
	Analysis equipment, services and techniques	**Services** • Routine sampling and analysis of water (field and laboratory), use of radiotracer techniques • Centrifugation (e.g. fractionation by density gradient) • Liquid Chromatography (HPLC), Gas Chromatography (GC) and electrophoresis • Elemental analysis (CHN) • Perfusion of gills • Isolation of cells and cell cultures • Scintillation counter (beta radiation) • Spectrophotometry • Fluorimetry
	Aquaculture experimental facilities	• Experimental closed circuit infrastructure for fish, crustaceans and amphibians (ecophysiology, endocrine disruption and aquaculture) • Semi-industrial open breeding facilities • Indoor breeding facilities (greenhouse) • Associated breeding facilities in Rwanda
	(Marine) libraries	• Online key for the determination of benthic macro-invertebrates • Several magazine subscriptions (*www.unamur.be/sciences/biologie/urbe/revues*)

URBE

Rue de Bruxelles 61
B-5000 Namur

Federal scientific institutes



Federal scientific institutes

// Royal Belgian Institute of Natural Sciences

- Operational Directorate Earth and History of Life
- Operational Directorate Natural Environment
- Operational Directorate Taxonomy and Phylogeny

// Other Federal scientific institutes

- Belgian Nuclear Research Centre
- Royal Museum for Central Africa
- Royal Military Academy

Belgian Nuclear Research Center

// Contact research infrastructure

https://www.sckcen.be/nl

// Contact research infrastructure

Eric van Walle eric.vanwalle@kuleuven.be

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Logistics

Infrastructure Categories		Infrastructure
	Overview	XRD MS
	Type of laboratory / analyses	• Radioechemical analysis laboratory with capacity to perform radiochemical separation and purification of radionuclides in environmental matrices (dissolution, preconcentration, solvent extraction, ion exchange and electroplating). [2] • Fully equiped suite of nuclear counting instrumentation: high-resolution gamma, beta and alpha spectrometry, liquid scintillation counting. We have analysed marine samples including samples taken by the RV BELGICA and biological samples from Fukushima. [2] • In situ techniques for extracting radiocaesium and other radionuclides from large volume water samples and determining the colloidal fraction using sorption on aluminium oxide filters. [2]
	Class or accreditation of lab	The laboratories for low-level radioactivity measurements are ISO 17025 accredited
	Analysis equipment, services and techniques	**Equipment** • 20 shielded HPGe detectors for gamma-ray spectrometry analysis [2] • 5 Liquid scintillation counters (for alpha-beta analysis) [2] • 68 alpha spectrometry chambers with PIPS detectors [2] • Sample preparation laboratories including controled area for treatment of contaminated samples [2] **Services** • Radioactivity analyses for alpha, beta and gamma emiters with the equipment mentioned above [2] **Techniques** • Gamma-ray spectrometry + alpha spectrometry + liquid scintillation counting [2]
	Other experimental facilities and analysis capacity	Experience in performing and plans to implement closed tank uptake / depuration experiments for the study of transfer of radiotracers (Cs, I) to marine organisms (microalgae, crustaceans and molluscs) intended for the calculation of biological half-lives of elimination.

SCK - CEN

Boeretang 200
B-2400 Mol

	Num. models, spec. software and comp. IR	• Mathematical model “Dynamic Dose Assessment Tool” (D-DAT) - Use of model for dynamic calculation of biokinetic transfer of radionuclides (Cs, Sr, I, Pu, Am) to marine biota (fish, crustaceans, macroalgae, molluscs and plankton) and the sediment column [2,3] • Mathematical model “Multi-Analysis RadiologIcal aSSessment cAlculator” (MARISSA) - Use of model for radiological impact assessment of marine releases on marine biota [2,3] • Mathematical model “Biological Radiation Effects model for Non-human population Dose Assessment” (BRENDA) for calculating the impact of radiation on age-structured populations of marine biota (fish and crustaceans) including mortality, morbidity and reproduction effects, including a radiation repair pool [2,3] • ERICA assessment approach and modelling tool for the assessment of radiological risk to marine biota [1,2]	• Monte-Carlo model “Tool for Absorbed fraction and DCC poInt-kernel Simulation” (TARDIS) for the calculation of dose conversion coefficients in non-human marine biota [2,3] • Decision support tools for impact assessment of accidental releases in Belgian inland rivers, estuaries, coastal and open waters [2] • Models to simulate the water flow (advection/dispersion), sediment transport and the interaction of radionuclides with sediments (sorption-desorption kinetics) at different locations along the sides of the Scheldt Estuary and at the Belgian coast: RADYUELA bespoke surface hydrology model and third-party codes such as DELF3D, MIKE 11, TELEMAC and the unstructured-mesh, finite element model SLIM to simulate the transport of radionuclides in riverine, coastal and marine environments [2,3] • We are developing an integrated model for the assessment of dose to marine biota coupled with marine and estuarine models and considering the mobility of species in the coastal environment [2]
	Marine data centres	Allometric database of biological half-lives and concentration factors for radionuclides in marine biota. [2,3]	
	Collections	Course training materials on marine radioecology and marine dispersion, exposures and effects of radiation on marine animals and plants & the Fukushima accident.[2,3]	

	• Inter-comparisons of dynamic models for advection / dispersion and radionuclide transfer to marine biota [2,3] • Exchange of data for model parameterisation, model output comparisons (benchmarking) and model validation based around using own codes [2,3] • Design and optimisation of monitoring campaigns for marine biota [2,3]

SCK - CEN

Boeretang 200
B-2400 Mol

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

// Website research infrastructure

www.naturalsciences.be/en/science/do/547/scientific-research/laboratories/94

Sampling, observation & survey infrastructure

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Field instrumentation	Field magnetic susceptibility equipment (Bartington MS3) [2,3]
	Overview	XRD
	Type of laboratory / analyses	• A meteorite laboratory [2,3] • A microbotany laboratory [2,3] • A microvertebrates laboratory [2,3] • Bio Arch ID Laboratories [2,3]
	Analysis equipment, services and techniques	• Fossil preparation and casts tools [1] • Optical microscopy • Rock preparation equipment (Fritsch crusher, Fritsch planetary mill and McCrone micronising mill) [1] • Thermal conductivity Scanning (Lippman&Rauen Optical scanning method) [2,3] • Environmental scanning electron microscope (ESEM, FEI), with Energy Dispersive Spectroscopy (EDS), Wavelength Dispersive spectroscopy (WDS) and Electron backscatter diffraction (EBSD) (EDAX equipment) [2,3] • Raman microspectrometer (Brücker Senterra) [2,3] • X-ray diffractometer (XRD, PANanlytical Empyrean) [2,3] • Gamma rays spectrometry equipment (GF Instruments Gamma Surveyor) [2,3] • Magnetic laboratory station (AGICO MFK1-A Spinner Kappabridge + CS-3 High temperature furnace module +CSL Low temperature cryostat module) [2,3]
	(Marine) libraries	Scientific library of the RBINS (*www.naturalsciences.be/en/science/museum-library*) [1]
	Marine data centres	Maintenance of a data base (GeoDoc) with information about the Belgian subsoil. [1]
	Collections	Collections of the RBINS (*www.naturalsciences.be/science/collections*): *inter alia* a Mineralogy collection, collections of fossil and extant faunas of the North Sea (vertebrates and invertebrates). [1]

Earth and History of Life

Vautierstraat 29
B-1000 Brussels

Operational Directorate **Natural Environment** (RBINS)

// Website research group

http://odnature.naturalsciences.be/home


Research Vessel


Sampling, observation & survey infrastructure


Satellites & (airborne) remote sensing capacity


Experimental facilities & analysis capacity


Data & information management and computing infrastructure


Logistics

Infrastructure Categories		Infrastructure	
		• RV Belgica (regional vessel) (*http://odnature.naturalsciences.be/belgica/nl*) [1] • RHIB Tuimelaar [1]	
	Ship-based instrumentation	• Fisheries laboratory [1] • A wet laboratory for the distribution and prior treatment of the samples [1] • Chemistry laboratory [1] • Biochemistry laboratory [1] • Microbiology laboratory [1] **CTD equipment** • Sea-Bird SBE19 CTD (2x) [1] • Sea-Bird SBE9plus CTD (2x) [1] • Sea-Bird SBE21 thermosalinograph (2x) [1] **Water sampling equipment** • Sea-Bird model 32 carousel for 12 10 liter Niskin bottles (2x) [1] • Various Niskin and Go-Flo water sampling bottles [1] **Sediment sampling equipment** • Boxcorer NIOZ model [1] • Van Veen grab, Reineck corer [1] • Bowers & Connelly multicorer [1] **Biological sampling equipment** • Benthic sledge [1] • High speed encased Gulfstream Plankton sampler [1] • 3 m trawl with shrimp net [1]	**Depth measuring equipment** • Kongsberg EM3002D shallow water multibeam echosounder system [1] • Kongsberg EA400 with 33, 38 and 210 kHz transducer [1] • Auxiliary sensors: Seatex MRU5 motion sensor, Valeport miniSVS sound velocity sensor, Applied Microsystems SVplus sound velocity profiler [1] **Seawater current measurements** • Hull mounted Teledyne RDI ADCP model Workhorse Mariner 300 kHzn Teledyne RDI ADCP model [1] • Workhorse sentinel 1,200 kHz for deployment on tripod or TRBM (trawl resistant Bottom Mount) [1] • Valeport model 106 velocimeter [1] **Autonomous Underway Measurement System (AUMS)** • Parameters measured by the AUMS: turbidity, oxygen, pH, chlorophyll, blue algae, CDOM, salinity, pCO_2, fluorescence, Par, hyperspectral irradiance, NO_3, NH_3, PO_4, SiO_2 and NO_2 [1]
	Fixed platforms, moorings and landers	• Up to three tripods equipped with measuring instruments can be deployed from the RV Belgica. The available instruments are: SonTek Acoustic Doppler Velocimeter ADVOcean 5 MHz, SonTek ADP 3 MHz acoustic Doppler profiler, Sea-Bird SBE37 CT system, Campbell Scientific OBS-3+ turbidity sensor, Nortek Aquadopp current profiler, Sequoia Scientific LISST-100X (Laser In-Situ Scattering and Transmissometer), Aquascat 1000 ABS (Acoustic Backscatter System) [2,3] • Artificial Hard Substrate Garden deployed in Belgian waters	
		• Airplane: Britten Norman Islander for airborne surveillance of the North Sea • Processing of satellite imagery of various sensors: e.g. NOAA AVHRR, SeaWiFS, MERIS, MODIS, CHRIS.	

Natural Environment

Vautierstraat 29
B-1000 Brussels

	Overview	CHR MS	
	Type of laboratory / analyses	• Marine biology • Marine chemistry: Nutrient, POP, organic and inorganic carbon parameters, physical parameters. • Molecular laboratory analyses	
	Class or accreditation	• Marine biology - none • Marine chemistry - NEN/ISO 17025	
	Analysis equipment, services and techniques	**Equipment** • FWB: Thermoshakers, microcentrifuges, flow, incubators, PCR machines, Sanger capillary sequencer, Nanodrop, qbit, agarose gel electrophoresis equipment, digital foto documentation, tissue analyser, DNA fragment selector (pipin) • GC-MS • GC-QqQ • UPLC-Fluorescence • Skalar autoanalyser • Salinometer • ASE extractor • GPC chromatography • Automated water extractor • Bullet blender homogenisers • Ball mill • Lyophiliser **Services** • Marine Taxonomic Reference Centre: taxonomic expertise • DNA and RNA extraction from various sources (animals, plants, sediments, open water) and from recent & ancient samples • DNA barcoding • Phylogenetic reconstructions • Biodiversity estimates	• Detection of cryptic diversity and small range endemics • Estimates of bacterial diversity • Transcriptomics & differences in gene expression • Population connectivity studies • Valve outline analyses • Ostracod identification & dissections • Editing of scientific publications • nutrient analysis • algal pigment analysis (HPLC) • SPM, salinity, pH, dissolved oxygen • TBT in water, sediment and biota • TNT and degradation products in sediment • PBDEs in sediment and biota • PAHs in water and sediment **Techniques** PCR amplification, Sanger sequencing,molecular taxonomy, eDNA, metagenomics, transcriptomics, metagenomics, mitogenomics, phylogenetics, coalescent, population differentiation
	Aquaculture experimental facilities	Temperature- and light-controlled rooms and culture chambers	

	Num. models, spec. software and comp. IR	• COHERENS Aquatic Modelling System (*http://odnature.naturalsciences.be/coherens/*) [1] • OMNECS Hypas refra, scheld • optos_cms, optos_nos, optos_bcz based on COHERENS V1	• optos_cms, optos_nos, optos_bcz based on COHERENS V2 • WAM • optos_adi • OSERIT • float • HNS-MS

	VW van and Isuzu jeep & 2 trailers [4]

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

// Website research group

http://darwin.naturalsciences.be

Experimental facilities & analysis capacity

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	Overview	
	Type of laboratory / analyses	Molecular Systematics Laboratory [2,3]
	Analysis equipment, services and techniques	• Molecular techniques in the fields of systematics, population genetics and phylogeny, including DNA barcoding and new generation DNA sequencing (NGS) [2,3] • Computed tomography (Scientific Service Heritage) [2,3] • Scanning electronic microscope for biological preparations [2,3] • High definition stacking photography [1,2,3]
	(Marine) libraries	• Scientific library of the RBINS (*www.naturalsciences.be/en/science/museum-library*) [1] • Extensive collection of classical reprints in the OD Taxonomy and Phylogeny, including > 2500 books in PDF and > 50,000 PDFs of individual papers [1]
	Marine data centres	Darwin database (main management tool for the RBINS' scientific collections) [1]
	Collections	• Collections of marine taxa, including: *Porifera*, *Cnidaria*, *Mollusca*, *Annelida* (limited), *Crustacea*, *Echinodermata*, fishes; smaller collections of most other marine taxa. Faunal collections focus on Belgian marine waters (Collection Gilson), Antarctica, Papua New Guinea. [1] • Entomological and arachnological collections (The Insect Collections contain more than 15,000,000 specimens) (*www.naturalsciences.be/science/collections*). [1]

Taxonomy and Phylogeny

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Royal Military Academy

// Website research group

www.rma.ac.be


Research Vessel


Sampling, observation & survey infrastructure


Satellites & (airborne) remote sensing capacity


Experimental facilities & analysis capacity


Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
		RV Belgica [4]
	Underwater vehicles, drifters and floats	• Underwater sonars [4] • Towed gradiometer [4]
		Access to ESA data (ERS scatterometer data, Sentinel-1/2, etc.) [2,3]
	Type of laboratory/ analyses	• RF and Near-range EM lab [2,3] • EM Anechoic chamber [2,3]
	Num. models, spec. software and comp. IR	• ANSYS, Fluent, Matlab, FEKO, etc. [2,3] • Computing cluster [2,3]

RMA

Hobbemastraat 8
B-1000 Brussels

Royal Museum for Central Africa

// Website research group

www.africamuseum.be

Data & information management and computing infrastructure

Infrastructure Categories		Infrastructure
	(Marine) libraries	RMCA's library (*www.africamuseum.be/research/libraries*) [1]
	Marine data centres	A subset of FishBase with all data about African brackish water and freshwater fishes (*www.fishbaseforafrica.org*). [1]
	Collections	Extremely varied collections mainly come from DR Congo, but also from other countries of the African continent (*www.africamuseum.be/collections*). It concerns *inter alia*: • *Coelenterata*: 2,410 lots of specimens, 538 species [1] • *Crustacea*: 58,000 lots of specimens, 1,114 species including 5,500 identified, most of them in alcohol [1] • *Echinodermata* and other groups of marine animals: over 500 species [1] • *Mollusca* : ± 20,000 lots of specimens, 5,500 species, in alcohol [1] • The largest collection of fresh- and brackish water fishes from Africa in the world 750,000 specimens [1]

RMCA

Leuvensesteenweg 13
B-3080 Tervuren