VLIZ

ANNUAL REPORT 2020

2020 ANNUAL REPORT

The Flanders Marine Institute (VLIZ) promotes accumulation of marine knowledge and excellence in marine research in Flanders. The marine research areas are the ocean and seas, the coast and the tidal systems. The target groups for knowledge accumulation are the marine research community as well as educational institutions, the general public, policymakers and the industry (within the scope of the blue economy).

Vlaanderen
verbeelding werkt

west-vlaanderen
de gedreven provincie

RICHTING MORGEN
MET WETENSCHAP, TECHNOLOGIE, CREATIVITEIT & INNOVATIE

PROF. DR. JAN MEES
General Director of VLIZ

Dear reader,

It goes without saying that 2020 was quite an unusual year. The coronavirus had a significant impact on all of us and determined to a considerable extent the course of the year. It affected not just our personal lives, but also the professional activities of VLIZ. For instance, we were compelled to cancel, postpone or reshape a wide range of planned activities and events, including the festivities on the occasion of VLIZ's 20th anniversary.

However, COVID-19 also created opportunities. In 2020, VLIZ demonstrated its flexibility by swiftly adopting a new modus operandi and by reorganising its activities. In addition to the provision of basic services, projects and ongoing research, we also focused on new initiatives, resulting in a varied package of innovative research projects, new publications and revamped (digital) communication formats related to the COVID-19 pandemic. A selection of these initiatives is listed under the highlights of 2020.

Also in 2020, we made considerable progress in the two construction projects of VLIZ: the InnovOcean Campus and the Ocean Innovation Space. Together, these buildings form a facility which enables VLIZ to focus on conducting and supporting marine research as well as on maritime innovation in Flanders and beyond. Only three years after the start-up of the Research department, it is now safe to say that research has picked up steam at VLIZ, as appears from the 54 peer-reviewed publications and 25 research projects undertaken in 2020 as well as the 16 doctoral research projects which VLIZ has initiated or facilitated since 2017. Other milestones from the past year are (1) the establishment of a legal framework for the time spent at sea by the research vessel (RV) Simon Stevin, (2) the large number of VLIZ policy-informing briefs, some of which dealing with the coronavirus, aimed at disseminating research results in marine and coastal policy issues, (3) the updated electronic VLIZ newsletter titled 'Testerep magazine', (4) the very first Belgian uncrewed surface vehicle that entered and left a commercial seaport with the help of pilots in an onshore control centre, (5) the consolidation of four ongoing data projects and initiatives in which the Flanders Marine Data and Information Centre and the VLIZ IT division play a crucial role, and (6) the publication of a comprehensive overview of the non-indigenous marine and coastal species that have become naturalised in the Belgian part of the North Sea and adjacent estuaries.

So despite the exceptional circumstances, 2020 brought us a great deal of positive things. We bring 2020, a year that was dominated by the coronavirus, to a conclusion with this annual report. The new year proves to be promising with the official start of the United Nations Decade of Ocean Science for Sustainable Development that spans the globe. Until the end of 2030, we will join forces worldwide to achieve the 14th sustainable development goal (SDG 14): *'Conserve and sustainably use the ocean, seas and marine resources for sustainable development'*. In the past year, VLIZ actively worked behind the scenes to help prepare this unique decade in Flanders and raise awareness about it among various stakeholders.

Finally, we will also look forward to 2022, the year of our relocation and the start of our new five-year management agreement with the Flemish government and the province of West Flanders. The preparations for this new covenant are well under way and are accompanied by a thorough evaluation of our institute. As the hub for marine and coastal research in Flanders, VLIZ will focus more than ever on multidisciplinary (inter)national scientific research. It will play this role as a liaison and catalyst within the quadruple helix, the cooperation between scientists, citizens, policymakers and industry.

JAN MEES
General Director of VLIZ

Ostend, March 2021

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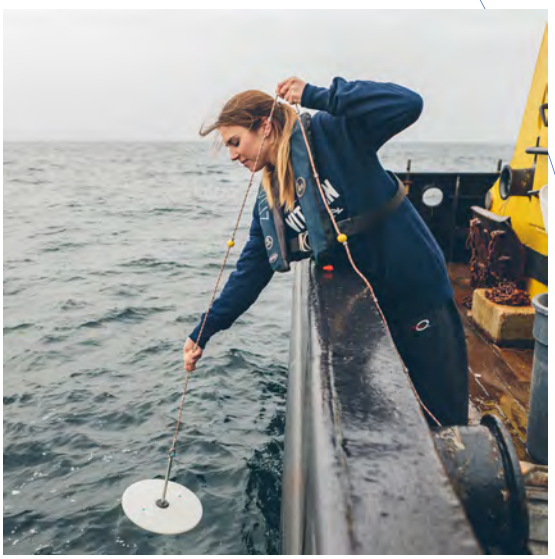

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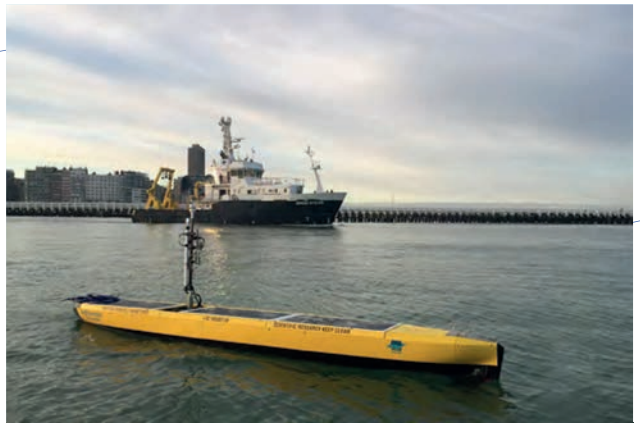
HIGHLIGHTS 2020

The highlights are the special events, achievements, activities or projects of VLIZ that took place in 2020. They are often the result of intensive cooperation between various departments and divisions.



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HIGHLIGHTS 2017-2020

The chapter “Highlights 2017-2020” provides a selection of the achievements of VLIZ since the start of the current convenant in 2017. These highlights have been achieved thanks to intense collaboration between different departments and divisions.

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SUPPORT TO INTERNATIONAL ORGANISATIONS

By order of the Flemish government, VLIZ supports several international organisations. This capitalises on VLIZ’s international experience and reputation, and makes it possible to embed important European initiatives in Flanders. This chapter briefly explains the specific partnerships in which VLIZ participated in 2020.

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KEY PERFORMANCE INDICATORS

The Key Performance Indicators (KPIs) refer to important services provided by VLIZ to marine scientific researchers, policymakers, educators and the general public. These are criteria to evaluate the operation of VLIZ. As stated in the covenant for the period 2017-2021, VLIZ has to deliver on at least twelve KPIs every year.

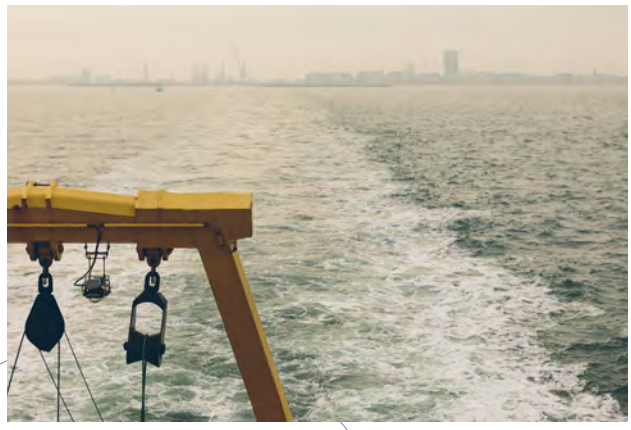
ANNEXES

Only available in digital format: downloadable from the VLIZ website www.vliz.be/en/vliz-annual-report

4 (Annexes)

ORGANISATION VLIZ

VLIZ is administered by the Board of Directors and consults the Scientific Committee for its scientific support tasks. The General Assembly provides assistance in managerial and administrative decisions.



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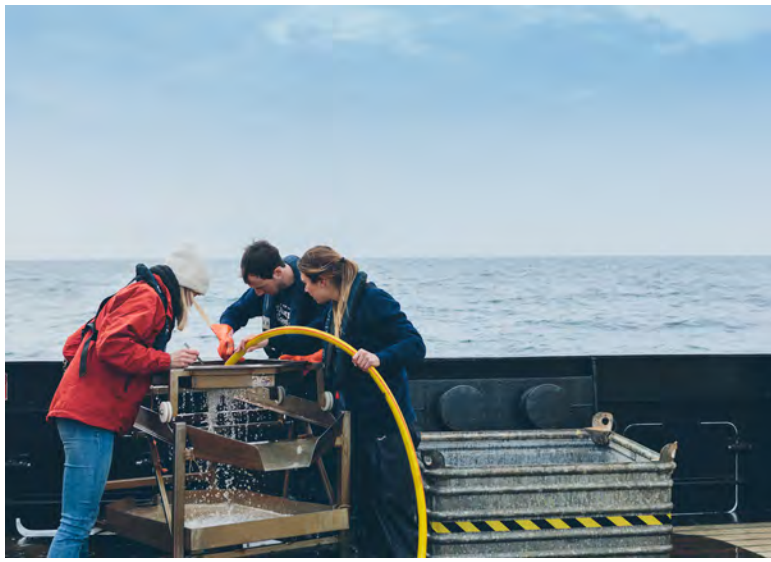
14 (Annexes)

MANAGEMENT INDICATORS

The Management Indicators refer to important services provided by VLIZ to marine scientific researchers, policymakers, educators and the general public. They complement the Key Performance Indicators (KPIs), which are criteria to evaluate the operation of VLIZ.



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38 (Annexes)

OTHER ANNEXES

An overview of the national and international networks in which VLIZ participates, projects for which VLIZ receives external funding, the scientific equipment and infrastructure made available by VLIZ, the events (co-)organised by VLIZ and the publications published by VLIZ.

HIGHLIGHTS

The highlights are the special events, achievements, activities or projects of VLIZ that took place in 2020. They are often the result of intensive cooperation between various departments and divisions.

THE INNOVOCEAN CAMPUS AND THE OCEAN INNOVATION SPACE

Press release and after-movie of the foundation-stone laying ceremony for the InnovOcean Campus: www.vliz.be/en/press-release/flemish-minister-hilde-crevits-lays-foundation-stone-new-innovocean-campus-oostende
An impression of the Ocean Innovation Space: www.vliz.be/en/multimedia/vliz-events?album=5408

In 2020, a great deal of progress was made with regard to VLIZ's two new construction projects: the InnovOcean Campus and the Ocean Innovation Space. Together, these buildings form a facility which will enable VLIZ to focus on conducting and supporting marine research as well as on maritime innovation in Flanders and beyond.

On 30 June 2020, Flemish Minister for Economy, Innovation and Agriculture Hilde Crevits lay the symbolic first stone of the **InnovOcean Campus**. VLIZ, its national and international partners and the marine research department of the Flanders Research Institute for Agriculture, Fisheries and Food (ILVO) will move into the brand-new campus located on Ankerstraat in Ostend in mid-2022.

The building will be a new landmark on the Ostend skyline. This state-of-the-art complex with a surface area of 8,000 m² should give a boost to marine research in Flanders. It will boast offices, conference facilities, a specialised library and numerous workrooms and laboratories. The campus will accommodate 170 employees. Its construction involves an investment of € 20 million.

Under the name **'Ocean Innovation Space'**, VLIZ also initiated the expansion of the laboratory facilities of its Marine Station Ostend on 2 October 2020. The new, more energy-efficient building will enable VLIZ to expand its research capacity and cater to the institute's steady and fast growth. The Ocean Innovation Space will thus house the Marine Robotics Centre, technical workrooms, cold and freezer rooms as well as laboratories. A special water pipe will provide the laboratories with seawater from the beach, making it possible to fill a test bath with seawater at the Ocean Innovation Space.

The architects designed a contemporary and compact nearly Zero Energy Building (nZEB), taking into consideration the site's heritage value. Based on the typology of a Scandinavian maritime warehouse, the new design features a sloping roof structure and façade materials that are reminiscent of the demolished buildings. As a result, the three-storey new building will fit in perfectly with the existing buildings of the current Marine Station located on the Halve Maan Site in Ostend. The site also includes a bunker from the Second World War, which will eventually house a biobank for the European LifeWatch research infrastructure and a digital experience space.

The construction of the Ocean Innovation Space initiates the first phase of the masterplan for the site, which covers an area of 1,250 m² in total. In addition to the previously allocated amount of € 2 million, de Flemish government awarded a one-off grant of € 945,000 at the end of December 2020 to complete the entire first phase of the Ocean Innovation Space by the spring of 2022. In the second phase, it is our ambition to develop additional wet and dry workrooms, laboratories, storage space, offices and multifunctional rooms for the educational and public activities of VLIZ.

The symbolic foundation-stone of the InnovOcean Campus in Ostend was laid on June 30, 2020. Front row (l.t.r.): Bart Tommelein (Mayor of Oostende), Hilde Crevits (Flemish Minister for Economy, Innovation and Agriculture), Carl Decaluwé (Gouvernor Province of West Flanders). Back row (l.t.r.): Sandra Schippers (EVR Architects), Carine Drumont (Group Van Roey), Jan Mees (General Director VLIZ), Joris Relaes (Administrator-General ILVO). © ILVO & VLIZ (Els Verhaeghe).

An impression of the Ocean Innovation Space, based on a Scandinavian maritime warehouse and built as an annex to the Marine Station Ostend (Claeys/Haelvoet architects).

» Over the years, VLIZ has earned its stripes as Flemish knowledge institution of international renown in the marine research community. To enable VLIZ to continue playing a leading role in marine research in the coming years, we support the development of the Marine Station Ostend into a modern multifunctional complex for world-class research.«

HILDE CREVITS, FLEMISH MINISTER FOR ECONOMY, INNOVATION AND AGRICULTURE

945,000

EURO

The amount of the one-off grant awarded to VLIZ by the Flemish government at the end of 2020 for the further extension of the Marine Station Ostend.

In 2020 VLIZ took the measures necessary to contain the spread of the coronavirus and protect the health and safety of its employees as well as their contacts, such as mandatory telework and closure of its offices and of the VLIZ library for visitors. © mattthewafflecat from Pixabay

In the spring of 2020, VLIZ and the Research Institute for Nature and Forest (INBO) conducted a survey into the germination of plants on the beach to assess the effect of reduced human activity on seashore wildlife. © VLIZ

VLIZ DURING THE CORONAVIRUS PANDEMIC

VLIZ webinars: https://youtube.com/playlist?list=PLIFvvLeEE2QRmhEj2CmEFt5j6AH3scvrG
'Boekentip uit de VLIZ-bib': https://youtube.com/playlist?list=PLIFvvLeEE2QRVdp7vTYJDXRN3I7OykiUX
Slow television: https://youtube.com/playlist?list=PLIFvvLeEE2QS-3IV2S_QYKYu6ZWXSKh0r

VLIZ was also faced with the consequences of the coronavirus pandemic from March 2020 onwards. However, COVID-19 also created opportunities. In the past year, VLIZ demonstrated its flexibility by swiftly adopting a new modus operandi and by reorganising its activities. In addition to the provision of basic services, projects and ongoing research, we also focused on new initiatives within the scope of the COVID-19 pandemic. This resulted in a varied package of initiatives.

New research related to the coronavirus crisis

In the spring of 2020, VLIZ and the Research Institute for Nature and Forest (INBO) conducted a survey along the entire Flemish coastline to assess the effect of significantly reduced human activity on seashore wildlife. Within this scope, volunteers monitored the germination of plants on the beach (with a focus on sea rocket, a pioneer species on sand dunes). Other researchers from VLIZ, KU Leuven and Ghent University launched a survey to study the impact of outdoor activities (including by the sea) on people's mental wellbeing during lockdown. The coronavirus also had a clear effect on shipping traffic in the Belgian part of the North Sea and the Western Scheldt. VLIZ studied the effect of these changes on the acoustic environment of the otherwise very busy North Sea by deploying the LifeWatch observation and data-infrastructure as well as a marine robot from the VLIZ Marine Robotics Centre. Finally, researchers from VLIZ and Ghent University initiated a new study on the stability and survival of coronaviruses in marine environments.

New publications related to the coronavirus crisis

In partnership with Ghent University and the province of West Flanders, VLIZ compiled the scientific knowledge on the risk of contagion by SARS-CoV-2 through seawater, litter and sand on the coast. The policy-informing brief *'Fact Check. Wetenschappelijke kennis over het coronavirus SARS-CoV-2 in de context van de Vlaamse stranden'* (*Fact Check. Scientific knowledge on the coronavirus SARS-CoV-2 in the context of the Flemish beaches*) also identifies the knowledge gaps that need to be filled in the short term (see page 16). In collaboration with ILVO, VLIZ also carried out a comparative analysis of the impact of the coronavirus crisis on offshore activities in the Belgian part of the North Sea and the Western Scheldt, with a focus on ship movements. The findings were compiled in the policy-informing brief *'Offshore activiteiten in Belgische wateren tijdens de coronacrisis'* (*Offshore activities in Belgian waters during the coronavirus crisis*) (see page 16). In 2020, VLIZ and ILVO also investigated the socio-economic and ecological effects of the coronavirus measures on Belgian recreational sea angling and published their findings in the policy-informing brief *'De impact van de coronacrisis op de recreatieve zeevisserij'* (*The impact of the coronavirus crisis on recreational sea fisheries*) (see page 16).

Digital communication related to the coronavirus crisis

To replace the many cancelled public events, VLIZ launched various new communication initiatives in 2020. To maintain contact with its inquisitive public, 4 interactive webinars full of marine facts and science were organised in the form of virtual beach walks. Each webinar dealt with a particular season and shed light on a few remarkable beach finds and phenomena on the Flemish coast. Inspired by the successful VLIZ webinars, VLIZ invited its loyal followers to an online version of the VLIZ members' day on Friday 18 September. In a ZOOM session, both members and non-members belonging to their bubble received the most up-to-date information on developments within VLIZ as well as some achievements which the VLIZ philanthropic project 'The sea as a good cause' was able to obtain by means of donations and contributions from members. The annual Science Day was also entirely digital in the past year. Specially for this occasion, VLIZ and DAB Fleet developed a 360° virtual guided tour of the research vessel Simon Stevin (see Highlight *'A legal framework for the deployment of RV Simon Stevin'* on page 14). In 2020, the VLIZ Science Communication division launched a series of videos titled *'Boekentip uit de VLIZ-bib'* (recommended books from the VLIZ library) in which an employee explains a book from the VLIZ Marine Library, and VLIZ also experimented with a slow television series shot on the beach.

A LEGAL FRAMEWORK FOR THE DEPLOYMENT OF RV SIMON STEVIN

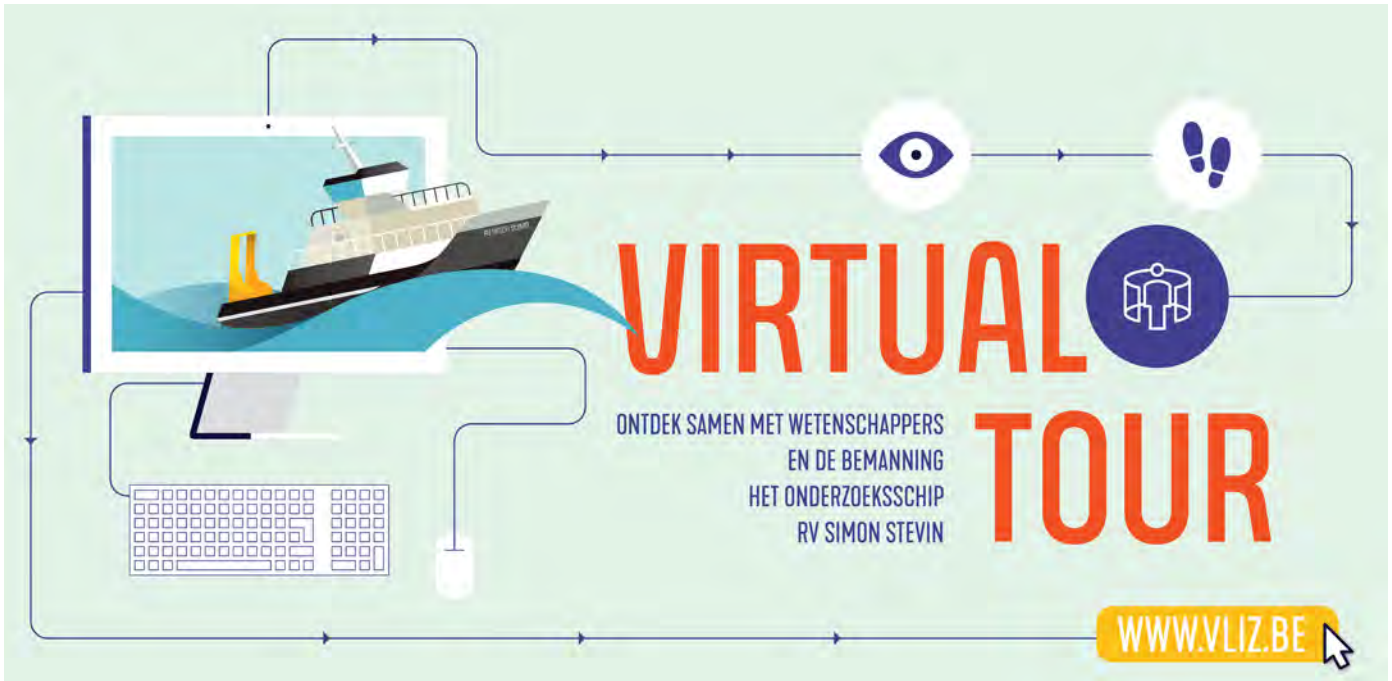
Virtually go on board the research vessel Simon Stevin: https://rvsimonstevin.virtualtour.vliz.be

The Flemish research vessel Simon Stevin celebrated its 8th anniversary in 2020 and has become a household name in the Flemish marine research community and far beyond. The ship has been assigned to DAB Fleet, the Flemish government service responsible for managing ships used for governmental tasks. VLIZ is responsible for the coordination of the oceanographic campaigns and research assignments. The Flemish government makes RV Simon Stevin available free of charge for trips at sea to end users from three categories: research, specialised education and monitoring & survey.

Eight years after the ship's commissioning and in light of a considerable increase in the demand for time at sea over the past few years, the establishment of a clear legal framework for putting the research vessel at the disposal of end users was required in 2020. To this end, the Flemish government approved a decree describing the rules for the allocation of the right to make use of the time spent at sea by the research vessel as an indirect subsidy on 4 September 2020. The decree entered into force on 1 January 2021 and makes it possible to establish formal arrangements for the use of the Flemish research vessel Simon Stevin by the Belgian federal government, federal scientific institutions (such as the Royal Belgian Institute of Natural Sciences, RBINS) and French-speaking knowledge institutions on the basis of a high degree of reciprocity. Within this scope, an agreement framework was discussed between VLIZ, the Federal Public Planning Service for Science Policy (BELSPO) and the Operational Directorate Natural Environment of RBINS in 2020 with a view to the joint use of RV Simon Stevin and the federal research vessel Belgica as well as their scientific equipment. In addition, time at sea was allocated in the planning to research campaigns conducted by the European research infrastructures LifeWatch, ICOS and EMBRC.

Since 2020, anyone who is interested in life and work on board RV Simon Stevin can virtually embark. On the occasion of the 10th edition of Science Day on 22 November 2020, VLIZ and DAB Fleet developed a 360° virtual guided tour of the research vessel Simon Stevin. During the virtual tour, which has remained available after Science Day, visitors autonomously navigate through the ship on their mobile device or computer and, at 10 locations, they find out more about the ship's operation and the research conducted on board.

© VLIZ (Bart De Smet)



Since 2020, anyone who is interested in life and work on board a research vessel can go on a virtual tour of RV Simon Stevin. © VLIZ

POLICY-INFORMING BRIEFS

Policy-informing briefs (PIBs) are an effective tool for VLIZ to disseminate research results in marine and coastal policy issues in a targeted manner, after translation. They also provide an insight into the various (research) projects in which VLIZ is actively involved. In 2020, VLIZ published no fewer than eight PIBs. The Policy Information division not only drew up briefs that were already included in the planning, but also drew inspiration from events that took place in the past year with 3 additional PIBs related to the coronavirus pandemic. Each PIB was followed up on, with some being taken up by policymakers and others resulting in new research projects to fill identified knowledge gaps.

Scientific knowledge on the coronavirus in the context of the Flemish beaches

In partnership with Ghent University and the province of West Flanders, VLIZ compiled the available scientific knowledge on the coronavirus in the context of the Flemish beaches. The brief deals with risk management and the underpinning of possible policy actions for three specific areas: the potential hazard of the presence of and contagion by SARS-CoV-2 through seawater, beach litter and sand. The advice resulting from this study was implemented at the consultations between the mayors of the Belgian coastal municipalities of 12 May 2020 to underpin a strategy for the reopening of the beaches to tourists. Furthermore, the brief laid the foundations for new research conducted by VLIZ into the survival of coronaviruses in marine environments.

Offshore activities in Belgian waters during the coronavirus crisis

In collaboration with ILVO, VLIZ also carried out a comparative analysis of the impact of the coronavirus crisis on offshore activities in the Belgian part of the North Sea and the Western Scheldt, with a focus on ship movements, on the basis of freely available Automatic Identification System data for the periods February-April 2019 and 2020. The evolution of shipping traffic represented in the PIB also served as background information for research conducted by VLIZ into underwater noise during the coronavirus crisis (see page 12).

Marine research in Flanders and Belgium

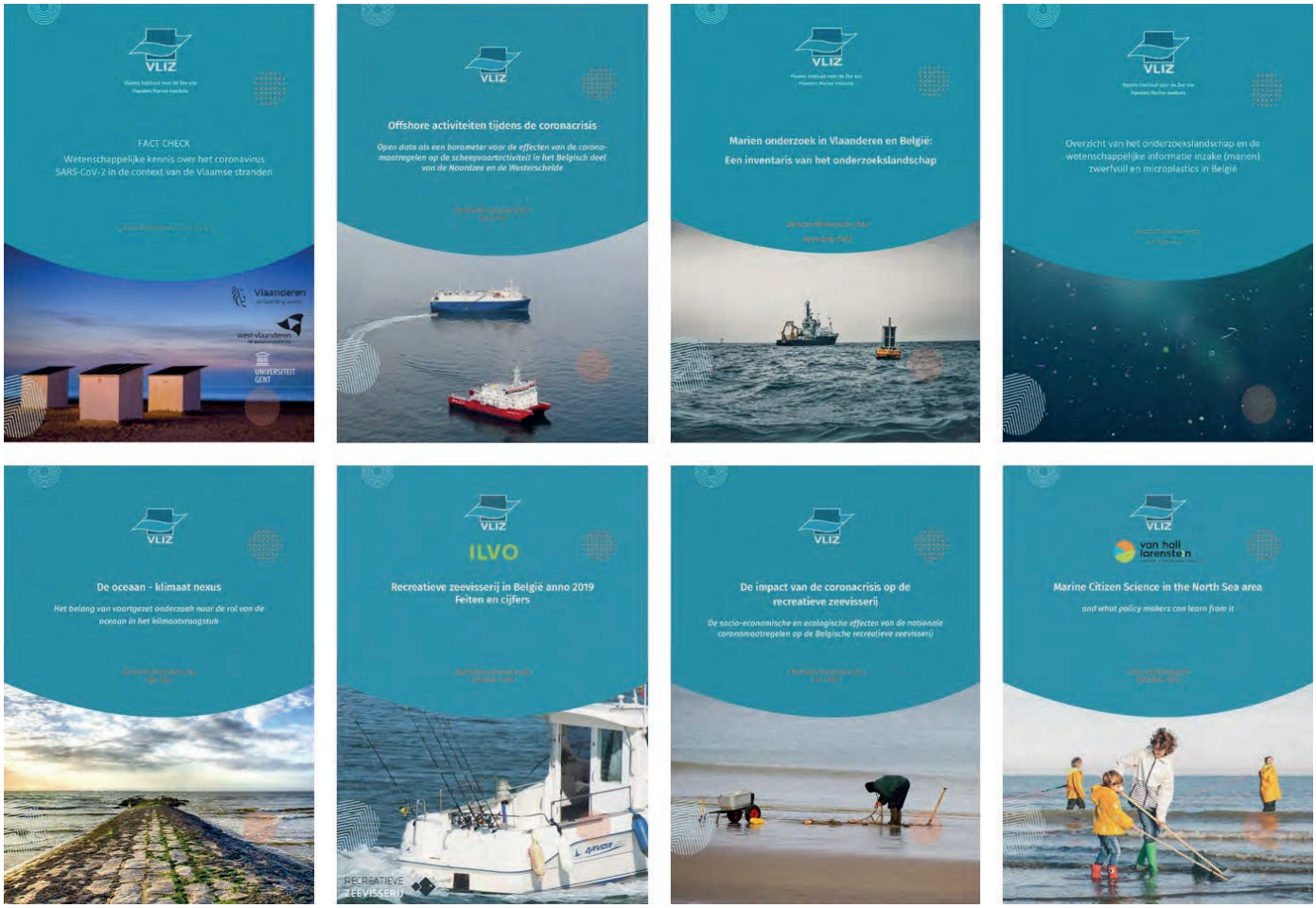
With this annual policy-informing brief, VLIZ intends to inform marine and maritime (scientific) policymakers, the marine research community as well as other stakeholders and parties involved about the nature and evolution of marine research in Belgium.

Marine litter and microplastics in Belgium

At the request of the national working group on marine litter coordinated by the Marine Environment Division (FPS Environment), VLIZ annually publishes an update of the available scientific information and expertise on marine litter and microplastics in Belgium.

The ocean-climate nexus

Following the 2019 United Nations Climate Change Conference, also known as COP25, VLIZ drew up a brief explaining the importance of our oceans, their biodiversity and their ecosystem services in the context of the climate challenge. The report also provides an overview of the relevant scientific expertise within the Belgian marine research community, and highlights the necessity of further developing the marine observation and research infrastructure. A summary of the PIB was handed over to West Flemish Governor and VLIZ chairman Carl Decaluwé and was the basis of part of the Governor's speech titled *'2020 Klimaatvriendelijk en -robuust West-Vlaanderen'* (2020 climate-friendly and climate-proof West Flanders). A sequel to this PIB is currently in the pipeline.



In 2020, VLIZ published no fewer than eight policy-informing briefs © VLIZ

Update on recreational sea fisheries in Belgium

In the monitoring report on Belgian recreational sea fisheries for the focus year 2019, VLIZ and ILVO focused solely on the recreational catches in the Belgian part of the North Sea. To this end, they developed a customised methodology which relied heavily on citizen science: catches reported on a voluntary basis by the recreational sea angling community. This update was part of the assignment for the FPS Environment, and the findings of the monitoring report were included in the European Marine Strategy Framework Directive (MSFD). The catch data for cod were also integrated into an international benchmark assessment (North Sea and Baltic Sea) under the direction of the ICES Working Group on Recreational Fisheries Surveys.

Impact of the coronavirus crisis on recreational sea fisheries in Belgium

In a second brief on recreational sea fisheries, VLIZ and ILVO investigated the socio-economic and ecological effects of the coronavirus measures on Belgian recreational sea angling. In June, VLIZ presented this brief to the Committee on Agriculture, Fisheries and Rural Policy in the Flemish Parliament.

Marine citizen science in the North Sea

In partnership with Van Hall Larenstein University of Applied Sciences (Leeuwarden, the Netherlands) VLIZ inventoried and analysed 127 marine citizen science projects in the North Sea, resulting in several recommendations for policymakers. The brief was picked up by SciVil, the Flemish platform for citizen science, and laid the foundations for a chapter of a report by BANOS CSA (Baltic and North Sea Coordination and Support Action), a joint research and innovation programme for the Baltic Sea and the North Sea. The contents of the policy-informing brief were also integrated into the manuscript *'A new look to Marine Citizen Science'* by the European Marine Board (EMB), which provides an overview of marine citizen science in Europe and was submitted for publication in an A1 journal.

VLIZ IN A MULTILATERAL CONTEXT

In 2020, VLIZ also made an important contribution to the global marine research community as an active player in a multilateral context.

The United Nations Decade of Ocean Science for Sustainable Development officially began on 1 January 2021. Until the end of 2030, we will join forces worldwide to achieve the 14th sustainable development goal (SDG 14 – *'Conserve and sustainably use the ocean, seas and marine resources for sustainable development'*) and other ocean-related SDGs (e.g. climate, food and biodiversity). In the past year, VLIZ actively worked behind the scenes to help prepare this unique decade in Belgium and Flanders and raise awareness about it among various stakeholders. VLIZ has played an active role in UNESCO/IOC for many years. On 14 December 2020, UNESCO launched the second edition of the Global Ocean Science Report (GOSR2020), an important building block in SDG14. VLIZ General Director Jan Mees acted as co-chair of the editorial board of GOSR2020.

Since 2020, VLIZ has coordinated the Belgian contribution to the worldwide Scientific Committee on Oceanic Research (SCOR), a thematic organisation of the International Science Council (ISC). After a period of inactivity, VLIZ re-established a Belgian SCOR Committee last year to represent ocean-related scientific research in Belgium.

Finally, VLIZ is a member of POGO (Partnership for Observation of the Global Ocean), a forum established in 1999 by directors and leaders of major oceanographic institutions to promote oceanography worldwide, with a focus on the implementation of an international and integrated global ocean observing system. In 2020, VLIZ took significant steps in the context of POGO, particularly with regard to the development of (biological) observation capacity.

Launched by UNESCO on 14 December 2020, the second Global Ocean Science Report (GOSR2020) provides an updated general overview of how, where and by whom ocean-related science is conducted. VLIZ contributed to the report as co-chair of the editorial board, author and reviewer.

2021
2030
United Nations Decade
of Ocean Science
for Sustainable Development

The United Nations Decade of Ocean Science for Sustainable Development officially begins on 1 January 2021.

1,479

SUBSCRIBERS

The number of subscribers who have received the new Testerep Magazine in their mailbox since September 2020.

TESTEREP MAGAZINE

Read Testerep magazine digitally: www.testerep-magazine.be

After 20 years of VLIZINE, VLIZ's new electronic newsletter was sent to the mailboxes of subscribers for the first time in September 2020. True to the familiar concept, Testerep Magazine keeps its followers informed of marine and coastal events, jobs, projects and the like via short messages. The more elaborate articles are a novelty compared to VLIZINE, intended by the editors to inform subscribers even better. For instance, one article was dedicated to the beginnings of life near hydrothermal vents in the deep sea, and another one dealt with quarantine measures preventing the spread of the plague via sea ports in the 18th-century Southern Netherlands.

With the new name and look, the VLIZ Science Communication division wanted to create an attractive digital newsletter with a strong visual aspect and centred around marine exploration.

The magazine's name refers to the former tidal island of Testerep, the original site of the city of Ostend and the home base of VLIZ. The geographical name is something Testerep Magazine has in common with De Grote Rede, VLIZ's magazine aimed at the general public.

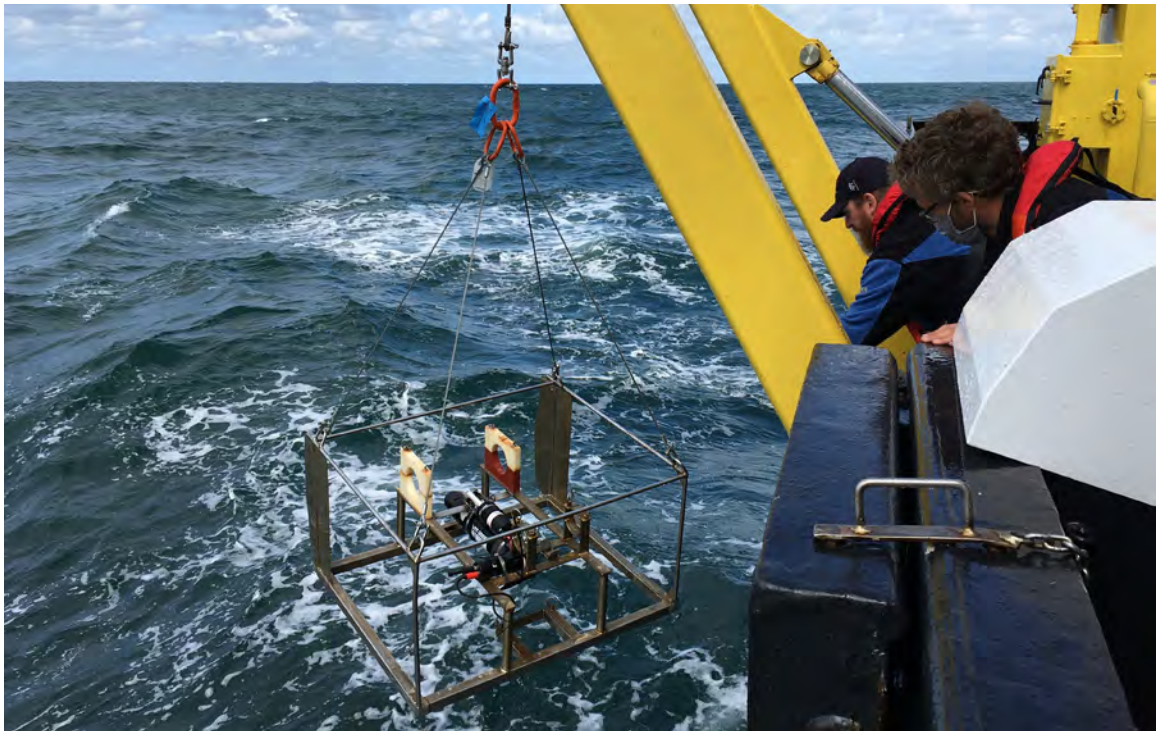
By revamping the newsletter, VLIZ hopes to attract new readers – whether they be scientists, journalists, policymakers, teachers, entrepreneurs or laypersons. Testerep Magazine has something to offer for everyone!

Those who want to be kept up to date of VLIZ news at any place and any time, can consult the website www-testerep-magazine.be for the latest news, click on the links to similar articles and search the archives. Every month, the editors send a selection of recent news items to the mailboxes of subscribers.

Haven't subscribed yet? You can subscribe free of charge by clicking the button on the home page of Testerep Magazine.

© VLIZ

RESEARCH HAS PICKED UP STEAM



In the summer of 2020, VLIZ researchers conducted tests on board the research vessel (RV) Simon Stevin to determine whether a multibeam sonar can be used to measure water turbidity within the scope of the TIMBERS project. For this purpose, they combined data collected by means of a multibeam sonar with measurements performed by means of Laser In Situ Scattering and Transmissometer (LISST), a tool that determines particle size. © VLIZ

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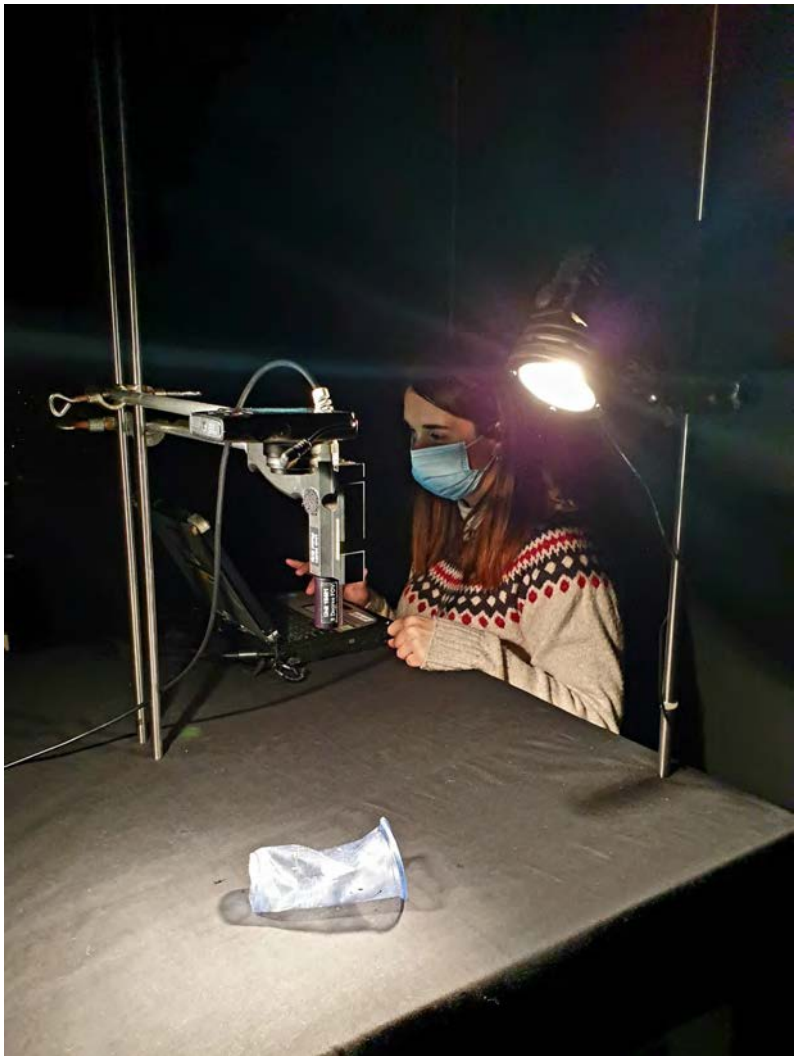
PUBLICATIONS

The number of peer-reviewed publications written by VLIZ employees in 2020.

In 2017, VLIZ was allocated the responsibility of initiating and performing research at the service of, in collaboration with or complementary to Flemish and international marine research groups. Just three years after start-up of the Research department, this activity has picked up steam at VLIZ, as appears from the following three indicators: the number of peer-reviewed publications, the project portfolio and the number of PhD projects initiated by VLIZ.

At the end of 2020, the number of peer-reviewed **publications** written by a VLIZ employee was 54. These included 41 published A1 publications (see page 60 of the annexes for a complete overview), 10 accepted A1 publications and 3 other peer-reviewed publications. In addition, 20 papers authored by a VLIZ employee were submitted in 2020 and are currently going through the peer-review process.



Researchers from VLIZ collect light spectra of plastic litter in a VITO laboratory for the PLUXIN research project. Within the context of the PLUXIN research project, VLIZ, VITO, Ghent University, the University of Antwerp and KU Leuven joined forces with Blue Cluster and 13 companies to monitor plastic pollution in several Flemish ports and rivers by means of innovative methods.© VLIZ

A total of 25 **research projects** were initiated, developed or continued in 2020, including 7 new externally financed projects. One example of a project that was given the green light by the Flemish government – Flanders Innovation & Entrepreneurship (VLAIO) in 2020 is the cSBO project PLUXIN (Plastic Flux for Innovation and Business Opportunities in Flanders). Within the context of this project, VLIZ (the coordinator), VITO, Ghent University, the University of Antwerp and KU Leuven joined forces with Blue Cluster and 13 companies to monitor plastic pollution in several Flemish ports and rivers by means of innovative methods and quantify the flow of plastic into the marine environment through the development of models. PLUXIN also thoroughly investigates the opportunities for economic and social value creation. Thanks to the project partners' strong knowledge base and extensive technological know-how, the newly acquired knowledge should result in interdisciplinary, plastic-related innovation projects for Flemish companies and knowledge institutions active in marine and riverine construction, monitoring, decontamination and waste processing.

16 diverse **doctoral research projects** have been initiated at or in cooperation with VLIZ since 2017. Each one of these projects is a collaboration between VLIZ on the one hand and one or several universities and research institutions on the other hand. Consequently, each doctoral research project initiated by VLIZ has a multiplier effect on the Flemish / Belgian research landscape. These PhD students include eight researchers who are funded by means of a basic subsidy for VLIZ research, two doctoral researchers affiliated to VLIZ who receive an FWO grant and six researchers who receive external (project) financing.

On Friday 20 November 2020, USV Adhemar became the first Belgian uncrewed surface vehicle remotely controlled by pilots to leave and enter Ostend's seaport. © VLIZ

Press release www.vliz.be/en/press-release/first-belgian-unmanned-vessel-ostend
Watch how USV Adhemar leaves the port of Ostend: www.youtube.com/watch?v=wvMeskbB6xI

» Flanders invests in offshore innovation projects because our blue economy and marine knowledge are absolutely world class. Uncrewed surface vehicles and marine robots will certainly play a key role in the blue economy of the future. Located in Ostend, VLIZ's Marine Robotics Centre is at the cutting edge of this trend and, together with its partners, is taking important steps towards the operational deployment of uncrewed surface vehicles at sea. With the first Belgian uncrewed surface vehicle leaving and entering Ostend's harbour, we have proven that our innovative projects produce concrete results.«

HILDE CREVITS, FLEMISH MINISTER FOR ECONOMY, INNOVATION AND AGRICULTURE

THE VERY FIRST BELGIAN UNCREWED SURFACE VEHICLE IN THE PORT OF OSTEND

On 20 November 2020, VLIZ's uncrewed surface vehicle Adhemar was the first Belgian USV to leave and enter a commercial seaport with the help of pilots in an onshore control centre. Conducted entirely remotely from the port of Ostend, this successful research mission was aimed at measuring underwater noise, a task for which this silent robot is perfectly suited. The success of this expedition went hand in hand with significant improvements in USV Adhemar's operational capacity on the basis of previous sea trials carried out in 2020. Within this scope, the original vessel (Autonaut USV) underwent several technological innovations. The speed of communication between the onshore control centre and USV Adhemar was considerably increased in order to respond quickly to unforeseen situations at sea. The platform's propulsion was upgraded so as to ensure smooth navigation in the often rough North Sea conditions.

Even though this may seem something from a distant future to some, a handful of sea trials with uncrewed surface vehicles have already been carried out in the North Sea over the past years. A number of them fell within the start-up of the Marine Robotics Centre (MRC) of VLIZ. In 2019, a British uncrewed surface vehicle had already successfully crossed the Channel to Ostend and back. However, USV Adhemar was the first Belgian uncrewed platform fully operated from a control centre to leave and enter a commercial seaport. In time, uncrewed surface vehicles will ensure that various tasks at sea are performed more efficiently and safely. The technologies developed for USVs will have an impact on other areas as well. For instance, this technology will be increasingly used on crewed vessels and in offshore operations, which in turn will make working at sea safer, greener and more efficient.

With the Marine Robotics Centre, equipped with three fully fledged high-tech robots (USV Adhemar, AUV Barabas and ROV Zonnebloem), Flanders has involved VLIZ in this trend since 2018. The objective is to carry out more and better measurements by means of robotic platforms for marine research and innovation projects as well as for major infrastructure projects (e.g. offshore windfarms). Belgian Minister for the North Sea Vincent Van Quickenborne also explicitly referred to autonomous vehicles in his recent policy statement. The Marine Robotics Centre currently serves as a trailblazer for uncrewed vehicles in the Belgian part of the North Sea.

The sea trials carried out by VLIZ with USV Adhemar could not have been possible without close cooperation with the competent Belgian and Flemish government authorities. FPS Mobility and the Maritime Rescue and Coordination Centre (MRCC) of the Agency for Maritime and Coastal Services (MDK) took care of the approval and supervision of the USV trials with a view to ensuring maritime safety. This made it possible to build trust and work towards a completely uncrewed mission by taking sufficiently safe intermediate steps. One of the challenges, besides further developing the capacity, is to expand the regulations with regard to (research) vessels to make longer missions at sea possible. In this context, VLIZ makes efforts to increase the range of the uncrewed surface vehicles and to develop an onshore control centre. Building on the trials carried out with USV Adhemar, the ultimate objective is to make continuous (24/7) real-time observations at sea with a fleet of uncrewed surface vehicles possible. These robotic platforms are highly complementary to the state-of-the-art research vessel (RV) Simon Stevin, and together, they will provide the necessary observation capacity for research and innovation projects as well as new developments at sea in the future.

This milestone has been made possible thanks to the Flemish government's investment in VLIZ's Marine Robotics Centre.

CONSOLIDATION OF VLIZ DATA PROJECTS

ScheldeMonitor: https://www.scheldemonitor.be/en
EMODnet Biology: www.emodnet-biology.eu/

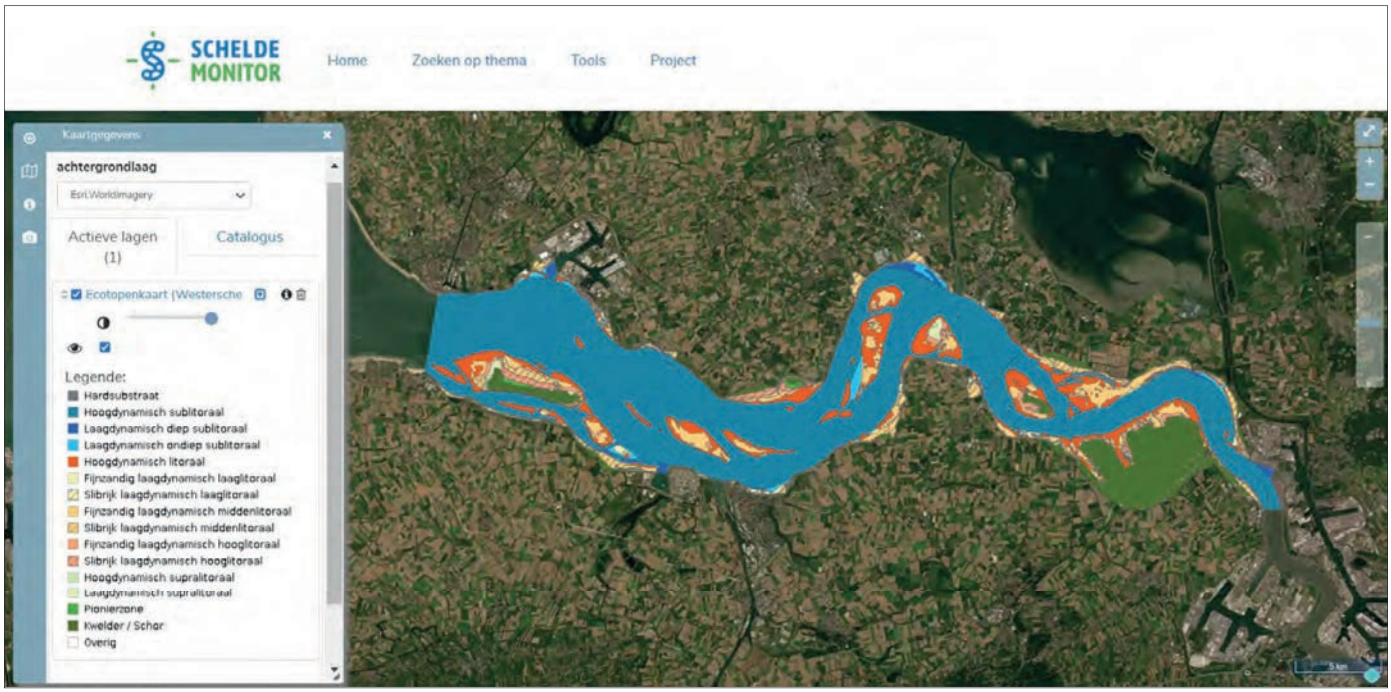
Four ongoing data projects and initiatives in which the Flanders Marine Data and Information Centre (VMDC) and the VLIZ IT division play a crucial role were consolidated in 2020. This consolidation concerns the coordination of ScheldeMonitor and EMODnet Biology, supplier for the OMES monitoring project and an active member of the Flemish Research Data Network (FRDN). The continuity of the project activities is thereby ensured for the coming years, and the users of these data initiatives will be permanently served as before.

ScheldeMonitor is a Flemish-Dutch knowledge and information portal concerning research and monitoring in the Scheldt estuary. The project is aimed at building a bridge between the marine and the terrestrial environment, thus constituting one of the few VLIZ projects with a focus on the Scheldt estuary. At the behest of the Flemish-Dutch Scheldt Commission, VLIZ has been responsible for the management and further development of the portal since 2004. The restyled ScheldeMonitor website went online in June 2020. In 2020, the project's continuity was guaranteed for the coming 4 years.

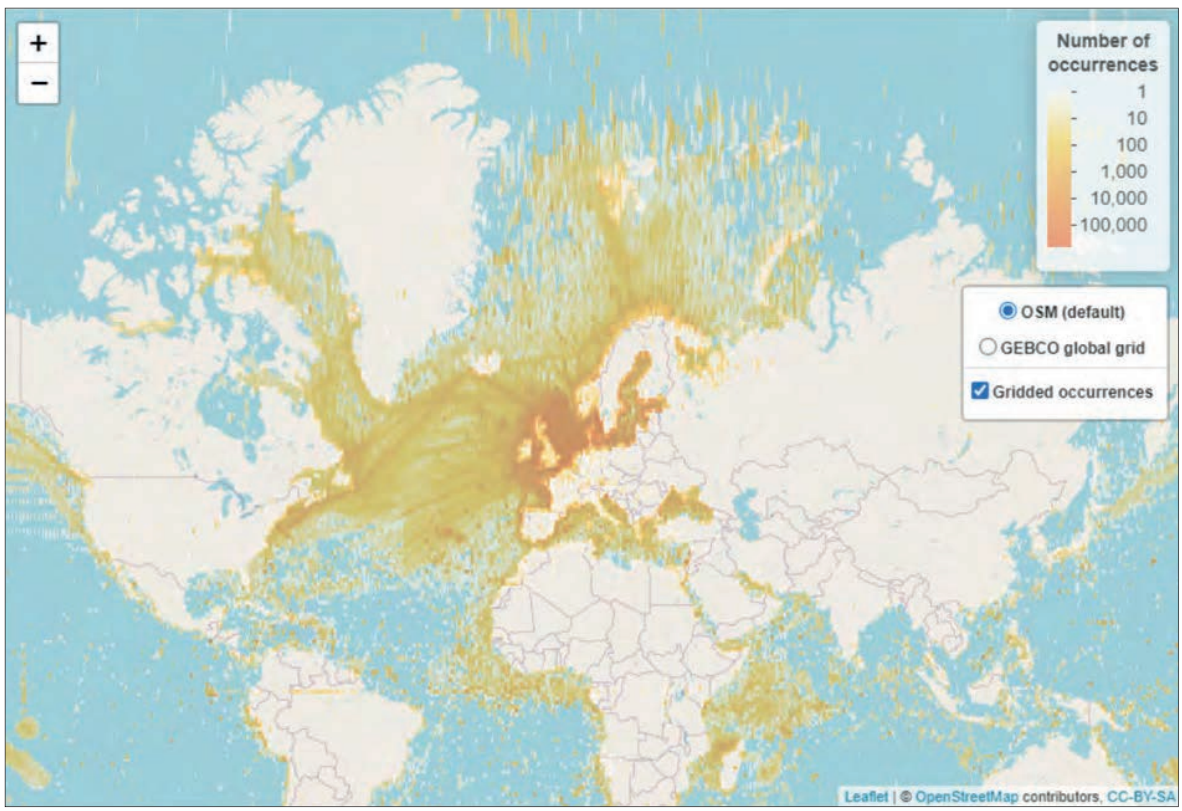
The **EMODnet Biology** data portal provides free access to data concerning the temporal and spatial distribution as well as the characteristics of marine species for all European regional seas. As the biological component of European Marine Observation and Data Network, EMODnet Biology is closely linked to the World Register of Marine Species (WoRMS) and the European Ocean Biodiversity Information System (EurOBIS). The financing of EMODnet Biology was extended by two years in 2020.

The research and monitoring programme **OMES** (Research Programme on Environmental Effects of the Sigma Plan) enables Flemish water managers and scientists to closely monitor the water quality and quantity as well as the flora and fauna of the Scheldt estuary. The project collects important data to support policy development in the Scheldt estuary. The project is funded by De Vlaamse Waterweg and coordinated by the University of Antwerp. As a subcontractor of the University of Antwerp, VLIZ fulfils the role of data manager.

The Flemish Open Science Board (FOSB) was established in February 2020 on the initiative of Flemish Minister for Economy, Innovation and Agriculture Hilde Crevits. The FOSB's mission is to draw up a road map with which Flanders can prepare for joining the European Open Science Cloud (EOSC), an ambitious cross-disciplinary project aimed at providing an environment to store, manage, analyse and re-use digital data and information to promote science and innovation. Flanders thereby fully participates in Open Science in a European context. In addition to participation in the FOSB and several study groups of the **Flemish Research Data Network**, VLIZ is involved in the facilitation of Open research data in Flanders and the implementation of the FAIR (Findable, Accessible, Interoperable and Reusable) principles. VMDC fulfils the role of Data Steward within the Flemish marine research landscape.



The ScheldeMonitor was restyled and extended for the coming 4 years in 2020.



The geographic distribution of all available references to marine species in the EMODnet Biology portal.

NON-INDIGENOUS SPECIES IN 2020

Download the book on www.vliz.be/en/imis?module=ref&refid=331869
Consult the new interactive website www.vliz.be/niet-inheemse-soorten/nl

The book titled *'Niet-inheemse soorten in het Belgisch deel van de Noordzee en aanpalende estuaria anno 2020'* (non-indigenous species in the Belgian part of the North Sea and adjacent estuaries in 2020) is based on and provides an update on the compendium by Vandepitte *et al.*, 2012 © VLIZ

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NON-INDIGENOUS SPECIES

The number of non-indigenous species with established populations that were identified in the Belgian part of the North Sea and adjacent estuaries in 2020.

Japanese wireweed (*Sargassum muticum*) is a brown seaweed from East Asia which was introduced into Europe together with Japanese oysters in the 1970s. © Graça Gaspar

At the end of 2020, VLIZ published a comprehensive overview of the non-indigenous marine and coastal species that have become naturalised in the Belgian part of the North Sea and adjacent estuaries. A non-indigenous or introduced species is an organism that has colonised an area outside its native distributional range, where it does not occur naturally. Such species have often arrived there by human activity, either deliberately or accidentally. In 2020, a total of 79 non-indigenous species with established populations were identified in the study area. For each one of these species, the authors describe the ecology, the manner of introduction, the distribution, the environmental and economic effects as well as any measures taken or planned to prevent the species from spreading further. In addition, the book provides information about the project design and an overview of the national, European and international legislative and policy framework with regard to non-indigenous marine species.

This publication is based on the compendium from 2012 (Vandepitte *et al.,* 2012) and is the result of a collaboration with scientists from various national and international knowledge institutions, the so-called 'VLIZ Alien Species Consortium' coordinated by VLIZ. Together with the 'VLIZ Alien Species Consortium', VLIZ also closely monitors a watch list of species that are only sporadically sighted (and whose establishment has not yet been scientifically demonstrated) or that have been found in neighbouring waters but not yet in Belgium.

VLIZ launched a brand-new website accompanying the book. A unique feature of the website is the interactive search engine which allows the user to select species by category, manner of introduction and area of origin.


SIMON STEV
POSITION REMOTELY MONITORED
Adhemar
Oostende
+32 59342130
SCIENTIFIC RESEARCH

HIGHLIGHTS 2017-2020

The chapter ‘Highlights 2017-2020’ provides a selection of the achievements of VLIZ since the start of the current convenant in 2017. These highlights have been achieved thanks to intense collaboration between different departments and divisions.

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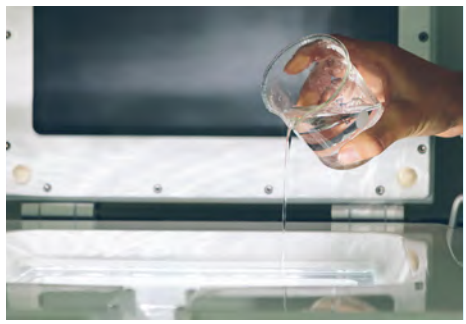

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1. VLIZ EXPANDS

The past year was centred around two VLIZ new construction projects in Ostend: (1) the InnovOcean Campus and (2) the Ocean Innovation Space. The InnovOcean Campus will be the new VLIZ headquarters: together with ILVO, we are building a state-of-the-art complex with a surface area of 8,000 m² which will give a boost to marine research in Flanders. The Ocean Innovation Space (incl. Marine Robotics Centre, laboratories and a seawater pipe) is the first phase of the masterplan for the Marine Station Ostend. Together, these buildings form a facility which enables VLIZ to focus on conducting and supporting marine research as well as on blue innovation in Flanders.

2. VLIZ RESEARCH HAS PICKED UP STEAM!

VLIZ was given a research mandate by the Flemish government in 2017. This soon resulted in the creation of a new department with a Research Department Manager, a research strategy based on six topics, a team of 40 employees and a range of projects, including several innovation projects concerning the blue economy. Just three years after start-up of the Research department, it is safe to say that this activity has picked up steam at VLIZ.

3. BLUE ECONOMY AND RESEARCH GO HAND IN HAND

Upon commencement of the current covenant, VLIZ was tasked with further developing the interface between marine research and the blue economy. In this context, VLIZ played a crucial role in the creation of the Blue Cluster (DBC). VLIZ's newly established Valorisation & Innovation department represents the Flemish marine research community in various formal consultation forums regarding the Blue Economy (e.g. the chairmanship of the scientific advisory board of DBC). In addition, VLIZ aims its research and development efforts at innovation and is instrumental in initiating and supporting innovation projects relating to the Blue Economy.

4. MARINE POLICY SUPPORT

Since 2017, VLIZ has strengthened its mandate at the interface of marine research and policy with a series of policy-relevant products and services. Policy-informing briefs (PIBs) are an effective tool to disseminate research results in marine and coastal policy issues in a targeted manner. Other examples are the Compendium for Coast and Sea (which discloses information, facts and figures from the Flemish/Belgian marine science community), KustINzicht (a booklet full of figures and time series concerning the Flemish coastal area drawn up in partnership with the province of West Flanders) and the Coastal Portal (a data portal giving users access to maps, data and information on the Belgian part of the North Sea and the coastal area).

5. VLIZ IN A MULTILATERAL CONTEXT

Over the past 5 years, VLIZ has made a significant contribution on a Flemish, European and global level. Globally, Belgium (and Flanders via VLIZ) led the way in the preparation of the Global Ocean Science Report 2020. On a European level, VLIZ contributed to the EMB flagship publication 'Navigating the Future V' which is important to European agendas such as Horizon Europe, and at the behest of the Department of Economy, Science and Innovation (EWI), VLIZ is part of the Baltic and North Sea Coordination and Support Action (BANOS CSA). On a Flemish level, VLIZ is the principal point of contact for ocean research and supports the internationalisation of the Flemish marine research and innovation agenda via bilateral agreements.

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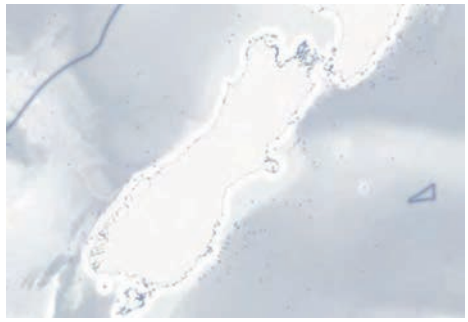
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6. UNIQUE MARINE ROBOTICS CENTRE GOT OFF TO A FLYING START

In 2017, the Flemish government allocated an investment budget to the development of the Marine Robotics Centre. With this centre, which has been fully operational since 2019 and boasts 3 sea-going robots, VLIZ has shown its ambition to become an international knowledge hub for 'marine autonomous systems'. And last but not least, VLIZ operated the first Belgian USV to leave and enter a commercial seaport in 2020, thanks to its close cooperation with the competent Belgian and Flemish government authorities.

7. VLIZ DATA CENTRE INTERNATIONALLY RECOGNISED AND RESPECTED

The Flanders Marine Data and Information Centre (VMDC) has been accredited as an IODE National Oceanographic Data Centre for marine data management and services since 2018, and develops and maintains numerous data systems that are used in international projects and networks (e.g. WoRMS, EurOBIS and Marine Regions). In 2020, VMDC ensured the continuity through the extension of several externally financed strategic projects and assignments (further development of Scheldemonitor, extension of the mandate of coordinator of EMODnet Biology, new stage of LifeWatch, etc.). In addition, VMDC is actively involved in Open Science for the marine research landscape within various study groups of the Flemish Research Data Network (led by FOSB) and, on a European level, within the EOSC.

8. THE PROVISION OF SERVICES REMAINS A PRIORITY

Providing services – both internally and externally – continues to form an integral part of the VLIZ DNA. To foster growth, VLIZ divided its internal organisation into 3 departments: 'Science Support' (with the Library, Science Communication, Data Centre, IT and Research Infrastructure divisions), 'Valorisation & Innovation' (Policy Information division and the Marine Robotics Centre) and 'Research' (Research division and the Marine Observation Centre), assisted by the Central Supporting Services. An important support service provided by VLIZ is making research infrastructure available, including the research vessel Simon Stevin and the Marine Station Ostend.

9. PHILANTHROPY

The VLIZ philanthropic project 'The sea as a good cause' is the only one in Flanders aimed at marine science. There were 753 VLIZ members at the end of 2020. Membership fees, gifts, donations and bequests are used for projects that contribute to the scientific knowledge about coastal and marine areas. Since 2017, 'The sea as a good cause' has awarded 12 Brilliant Marine Research Idea grants, each amounting to €5,000, so as to provide young researchers with inspiration and additional support. The VLIZ philanthropic project is a tool with a great deal of growth potential, especially in the context of the UN Decade of Ocean Science.

10. VLIZ BREAKS BOUNDARIES

For 20 years, VLIZ breaks boundaries. VLIZ has been able to develop this role further through the mandates assigned, expansion and reorganisation. In 2020, VLIZ adopted the quadruple helix approach, whereby marine research is shared with and developed in interaction with policymakers (see 4), the industry (see 2, 3) and the general public / educators (science communication by means of events, publications, STEM, press briefings and citizen science). VLIZ also promotes interaction between scientists by organising events such as the VLIZ Marine Science Day, by presenting scientific awards and by facilitating interdisciplinarity.

SUPPORT TO INTERNATIONAL ORGANISATIONS

By order of the Flemish government, VLIZ supports several international organisations. This capitalises on VLIZ's international experience and reputation, and makes it possible to embed important European initiatives in Flanders. This chapter briefly explains the specific partnerships in which VLIZ participated in 2020.

www.vliz.be/en/international-mandates

EUROPEAN MARINE BOARD

On 23 October 2020, the 7th EMB open forum brought together various stakeholders from the government, the academic world, NGOs and the business community in order to discuss the role played by big data, digitisation and artificial intelligence in marine science in support of the EU Green Deal, the EU 2030 Biodiversity Strategy and the development of the Digital Twin of the Ocean.

www.vliz.be/en/european-marine-board-emb
www.marineboard.eu

The European Marine Board (EMB) provides an independent Pan-European platform to its marine scientific member organisations to establish common research priorities, to promote marine research and to close the gap between science and policy. VLIZ represents FWO in the European Marine Board and was given the mandate by the Flemish government to accommodate and support the EMB secretariat.

The EMB secretariat, located at InnovOcean benefits from VLIZ support through the use of the general VLIZ infrastructure, IT support, and one EMB staff member. Jan Mees, VLIZ General Director, served as the EMB chairman from 2014 until June 2019 and the VLIZ head of Communications, Jan Seys, actively supports the EMB Communications Panel and chairs the EMB supported Working Group on Marine Science Communication in Europe.

Furthermore, in 2020 VLIZ staff members actively participate in the wide variety of EMB events and publications, such as the online EMB 7th Open Forum on Big Data in Marine Science on 23 October 2020, and in the COMMOCEAN 2020 conference (1-2 December 2020). VLIZ employee Elisabeth Debusschere is also active as an expert on the EMB Working Group on Underwater Noise, for which a publication is foreseen to be launched in 2021.

EMODNET SECRETARIAT

The European Marine Observation and Data Network (EMODnet) is a long-term European marine data service that unlocks the abundance of existing but often fragmented European marine data and observations and makes data and data products optimally accessible for use by government bodies, scientists and maritime companies. A Marine Knowledge initiative from the European Commission, EMODnet has become an essential tool for scientists, engineers, managers and policy-makers to generate the information necessary to improve our knowledge of the seas and to support sustainable economic growth and employment.

In practice, EMODnet consists of a network of more than 120 organisations supported by the EU's Integrated Maritime Policy which work together to observe the sea, process the data according to international standards and make that information freely available as interoperable data layers, data products and services.

Since 2013, the EMODnet Secretariat is hosted at the InnovOcean site in Ostend by VLIZ with the support from the Flemish Government. VLIZ provides office space for six (in 2020) EMODnet Secretariat staff members as well as IT and administrative support, such as the co-organisation of the EMODnet technical working group meetings. VLIZ also hosts and leads the technical development and continuous updates of the EMODnet Central Portal data services (www.emodnet.eu) and has assisted in setting up the EMODnet Confluence and JIRA tools, used for the management of internal projects, day-to-day tasks and software developments.

The Central Portal gives users access to the different EMODnet thematic activities (bathymetry, geology, biology, chemistry, human activities, seabed habitats and physics) to the regional activities (EMODnet Sea-basin Checkpoints) and to data services (map viewer, query tool, data catalogue, etc.). This year, a new section on the EMODnet Partnership for China and Europe (EMOD-PACE) (www.emodnet.eu/en/emod-pace), available in English and Chinese, has been added to the Central Portal with support from VLIZ.

Since March 2020, the EMODnet Secretariat and VLIZ have further increased collaborations to lay the foundations of the web centralisation of EMODnet, foreseen in 2021-2022. With this centralisation, all EMODnet data and data products will be findable, accessible and downloadable via the Central Portal. This task requires analysing the thematic portals infrastructures and their fitness for the planned centralisation and assessing/implementing technical solutions for the centralisation process in close collaboration with the EMODnet Secretariat and thematic lots, to start in 2021.

Finally, the work started for the repatriation of the Central Portal under the Europa domain. VLIZ provided the EMODnet Secretariat with a development server used for designing the new website layout, to be aligned with the EU guidelines by early 2021.

- www.vliz.be/en/european-marine-observation-and-data-network-emodnet
- www.emodnet.eu/about-secretariat

With the support of VLIZ, EMODnet added a new section about its partnership for China and Europe (EMOD-PACE) to the Central Portal in 2020

JPI OCEANS

Within the scope of the JPI Oceans project 'HOTMIC', researchers on board the research vessel SONNE collected floating pieces of plastic in the Atlantic Ocean © Rebecka Molitor, Heinrich-Heine University Düsseldorf.

www.vliz.be/en/jpi-healthy-and-productive-seas-and-oceans-jpi-oceans
www. jpi-oceans.eu

The Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans) is a pan-European intergovernmental platform that increases the efficiency and impact of research and innovation for sustainably healthy and productive seas and oceans. It is governed by a Management Board composed of governmental or national institutions such as ministries and funding agencies that develop, fund, and implement national research agendas. VLIZ is commissioned by the Flemish government to support the JPI Oceans Secretariat and does so by providing a full-time employee to the JPI Oceans secretariat in Brussels.

For JPI Oceans 2020 was the start of a new phase with a process of mapping and consultation which led to the revision of the JPI Oceans Strategic Research and Innovation Agenda (SRIA). The new Strategy Framework which will be officially launched in 2021 builds upon the existing design, vision and scope of JPI Oceans, while adopting a new lens shaped by and responding to the external developments that emerged since the adoption of the Strategic Research and Innovation Agenda 2015-2020. JPI Oceans was further instrumental in the preparation and consultation phase for the new Blue Economy Partnership which is foreseen as a co-funded partnership under the Horizon Europe framework programme 2021-27. In the coming years it will offer a platform to implement shared strategic ambitions of JPI Oceans and the Partnership in the area of ocean productivity and Blue Economy.

Operationally the year was marked by the launch of 42 research and innovation projects by JPI Oceans and its partners. Six new projects started their work conducting research on the sources of microplastics, the methods for identifying smaller micro- and (nano-) plastics and monitoring their circulation in marine systems, and their effects thereon. This was complemented by four transnational projects on climate-ocean interactions funded under the framework of JPI Climate & JPI Oceans and 19 marine bioeconomy projects funded by the Blue Bioeconomy Cofund in collaboration with the European Commission. Finally, together with the Belmont Forum and Future Earth, JPI Oceans awarded funding to 13 projects aimed at finding innovative solutions for ocean sustainability and climate change mitigation.

Preparing for an equally fruitful 2021, three new calls for research and innovation proposals with a total budget of over 35 million Euro were launched in partnership with the European Commission, the BlueBio and MarTERA Cofunds and the JPI's on Water and Antimicrobial Resistance. Complemented by the launch of a new knowledge hub on sea level rise and an action on 'Science for Good Environmental status' JPI Oceans is well set up for a productive period in the years to come.

UNESCO/IOC PROJECT OFFICE FOR IODE

www.vliz.be/en/unescoioc-project-office-iode
www.iode.org

© UNESCO/IOC Project Office for IODE

Since 2005 VLIZ hosts and supports the secretariat of the 'International Oceanographic Data and Information Exchange Programme' (IODE) of UNESCO's 'Intergovernmental Oceanographic Commission' (IOC). The 'UNESCO/IOC Project Office for IODE' is also the main training centre of the IODE programme worldwide and the Secretariat of the IOC's Capacity Development coordinator.

Due to the COVID-19 pandemic, none of the planned OTGA (OceanTeacher Global Academy) face-to-face courses could be organized. However, OTGA proved to be ready to move online and 9 courses were organised online involving almost 300 participants and supported another 2 non-IOC online training courses (EMODNet Biology and AWI-POGO Centre of Excellence).

2020 was also the start of a new phase for OTGA: a new call for hosting training centres was launched and Regional Training Centres were joined by Specialised Training Centres. The OTGA Network now comprises 16 Training Centres located in Argentina, Belgium, China, Colombia, Ecuador, Fiji, Ghana, India, Indonesia, Kenya, Malaysia, Mozambique, Norway, Portugal, Uruguay/Brazil and USA (Hawaii). These Training Centres, in close collaboration with the IOC Global Programmes and Regions, will deliver training courses that are regionally and locally relevant as from 2021, and with special attention to the UN Ocean Decade of Ocean Science for Sustainable Development. The IOC Project Office for IODE also hosts the IOC's capacity development coordination unit. In 2020 the unit carried out the 2nd IOC CD needs assessment survey that will be published in 2021.

This year, the Ocean Biodiversity (formerly Biogeographic) Information System (OBIS), celebrated its 20th anniversary and name change. OBIS, with its secretariat being accommodated by the IOC Project Office for IODE since 2012, manages a global database containing data on the distribution, abundance and diversity of all marine species. Despite the COVID19 pandemic's impact, a record number of new records was published in OBIS in 2020 (6 million presence records from 574 new datasets). VLIZ manages the European OBIS node, which contributed 114 new datasets to OBIS, serving a total of 22.2 million records. The VLIZ data centre has been actively involved in OBIS activities such as vocabulary standardization and taxonomic quality control.

A new FUST project, led by OBIS, aims to detect marine invasive species in Fiji using environmental DNA: 'Pacific Islands Marine Bioinvasions Alert Network (PacMAN)'. In 2020 the IOC Project Office for IODE started the Ocean InfoHub Project. The OIH will link and anchor a network of regional and thematic nodes that will improve online access to, and synthesis of existing global, regional and national data, information and knowledge resources, including existing clearinghouse mechanisms.

The project will not be establishing new databases but will be supporting discovery and interoperability of existing information systems. The project will support the initial development of the Ocean Data and Information System (ODIS) architecture, as well as develop communities of practice (information systems and their end users) in three pilot regions: Africa, the Latin America and Caribbean region and the Pacific Island Developing states. The Ocean InfoHub Project will provide an opportunity for partners and end-users to contribute to and access the UN Ocean Decade global data ecosystem on an equitable basis.

KEY PERFORMANCE INDICATORS

The Key Performance Indicators (KPIs) refer to important services provided by VLIZ to marine scientific researchers, policymakers, educators and the general public. These are criteria to evaluate the operation of VLIZ. As stated in the covenant for the period 2017-2021, VLIZ has to deliver on at least twelve KPIs every year.

KPI 1

AT LEAST TWENTY-TWO A1 PUBLICATIONS (THE AVERAGE FIGURE FOR 2018-2020) WRITTEN BY A VLIZ EMPLOYEE IN 2020

41

A1-PUBLICATIONS [1]

A1 publications written by VLIZ employees were published in 2020, including 11 A1 publications with a VLIZ employee as the first author and 30 A1 publications with a VLIZ employee as a co-author. An overview of the A1 publications is available on p. 60 of the annexes.

© VLIZ (Decombel)

[1] in 2019: 31

KPI 2

THE ORGANISATION OF AN ANNUAL EVENT BRINGING TOGETHER ACTORS FROM THE MARINE SCIENTIFIC COMMUNITY AND THE INDUSTRY

On 23 January, VLIZ organised the first consultation with various interested maritime companies and consultancy agencies (including Jan De Nul Group, DEME, Maritech, Haedes, Antea, Blue Cluster and Arcadis) during the first LifeWatch Maritime Industry Workshop. © VLIZ

The traditional 'Marine Science meets Maritime Industry' event was rebranded as 'Blue Economy Science Summit' (BESS) in 2020, but could not take place due to the COVID-19 measures. However, VLIZ organised several events that tie in with the basic principle of KPI2: bringing science and industry closer to each other.

On 30 January, VLIZ, Blue Cluster and Bluebridge organised a workshop regarding marine experience centres in relation to the blue economy, with stakeholders from the world of science, industry, policy and NGOs brainstorming together on new ideas and opportunities. This workshop resulted in formal follow-up projects with Technopolis and companies from the blue economy. A successful formal introductory meeting between VLIZ researchers and the Blue Cluster team took place on 27 September. The second introductory meeting was held digitally on 26 November. Via two Maritime Industry Advisory Boards that convened (digitally) on 23 January and 25 September, VLIZ and Blue Cluster brought together actors from the world of science and industry with regard to the use of LifeWatch data and observations. The second meeting also concerned the Flemish Supercomputer Center (VSC). On 28 May, a thematic meeting concerning underwater noise was held with Blue Cluster to match the marine research capacity to the needs detected by the offshore wind industry.

137

REPRESENTATIVES

from knowledge institutions, government authorities, NGOs and the business community participated in different events (co)organised by VLIZ that brought together actors from marine science and the industry.

KPI 3

AT LEAST 180 SAILING DAYS SPENT ON SCIENTIFIC RESEARCH, MONITORING AND EDUCATION EACH YEAR

RV SIMON STEVIN 137

RIB ZEEKAT 64

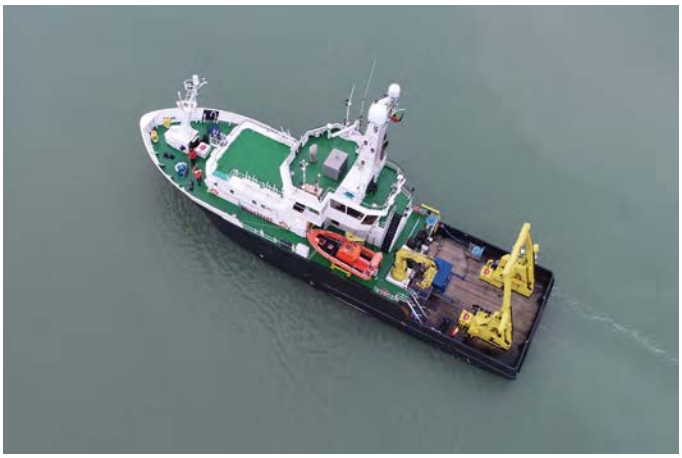
OTHER VESSELS EQUIPPED WITH VLIZ EQUIPMENT 42

ROV ZONNEBLOEM 0

243

DAYS SPENT AT SEA [1]

This is the total number of days spent at sea with RV Simon Stevin, RIB Zeekat, ROV Zonnebloem and other vessels equipped with VLIZ equipment.



RV Simon Stevin in the port of Ostend. © VLIZ

VLIZ provides researchers with logistical support by ensuring the management, maintenance and operation of research infrastructure and equipment.

RV Simon Stevin is deployed for academic coastal oceanographic research in the Southern Bight of the North Sea and the eastern part of the English Channel. It also serves as a training platform for students from marine sciences as well as maritime training courses. In 2020, a total of 574 scientists and divers boarded the ship. Ten marine research groups made use of RV Simon Stevin within the scope of 24 different projects (see annex p. 56). On account of COVID-19, 32 days spent at sea with RV Simon Stevin were lost in 2020, and no demonstrations or day trips for educational purposes took place. ROV Zonnebloem is an unmanned underwater vehicle deployed nationally and internationally from research vessels. The planned trips with the ROV were cancelled due to COVID-19. RIB Zeekat can be deployed from the research vessel Simon Stevin or from the shore, including for sampling in coastal waters, the Belgian ports and the Scheldt estuary. The reinforced keel is designed to run the vessel aground on tidal banks.

[1] in 2019: 255

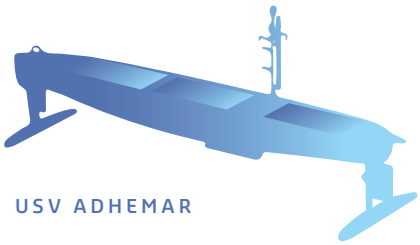
KPI 4

SEVEN MISSIONS A YEAR CONDUCTED WITH THE EQUIPMENT OF THE MARINE ROBOTICS CENTRE. THIS NUMBER INCLUDES THE MULTIPLE-DAY DEPLOYMENT OF EQUIPMENT IN FOUR-DAY PERIODS

The uncrewed surface vehicle (USV) Adhemar on board RV Simon Stevin in June 2020. © VLIZ

ROV ZONNEBLOEM

AUV BARABAS



USV ADHEMAR

10

MISSIONS [1] [2]

8 of which performed with USV Adhemar, 1 with AUV Barabas, 0 with ROV Zonnebloem and 1 Marine Robotics Centre training session on board RV Simon Stevin.

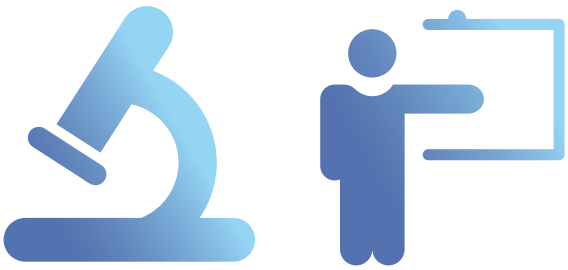
Remotely Operated Vehicle (ROV) Zonnebloem (formerly called 'Genesis') is deployed for national research in the Belgian part of the North Sea and for deep-sea research from international research vessels. ROV Zonnebloem has been operational since 2006 and has explored virtually all ocean basins: the Atlantic Ocean, the Indian Ocean, the South Pacific and the Southern Ocean. The Autonomous Underwater Vehicle (AUV) Barabas is a torpedo-shaped robot which performs measurements of the water column, the seabed and the soil. It is capable of diving to a depth of 1,300 metres and can remain submerged for up to 7 hours. The robot is ideally suited for mapping the seabed and heritage shipwrecks. The Uncrewed Surface Vehicle (USV) Adhemar exploits wave power for its propulsion while solar panels provide electricity for its measuring instruments. Since the power supply is largely dependent on renewable energy, the USV can perform measurements of water and atmosphere over long periods of time (for several months on end).

[1] in 2019: 16. From 2019 onwards, KPI 4 includes not only the number of missions with ROV Zonnebloem, but all missions with the measuring instruments of the Marine Robotics Centre. [2] 5 planned international missions were cancelled due to the COVID-19 restrictions. 1 planned mission was cancelled due to bad weather conditions.

KPI 5

EXTERNAL PARTIES USE THE MARINE STATION OSTEND FOR SCIENTIFIC OR EDUCATIONAL ACTIVITIES AT LEAST 120 CALENDAR DAYS A YEAR

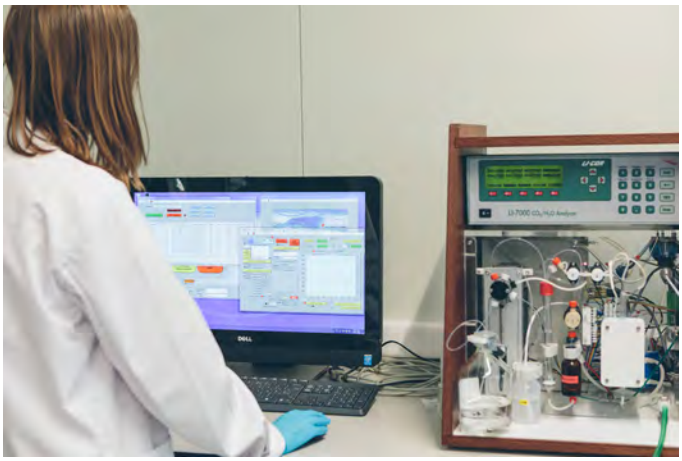
© VLIZ (Bart De Smet)



139

DAYS [1]

The number of days when external parties used the Marine Station Ostend for scientific or educational activities. On these days, a total of 242 scientists, students and visitors made use of the MSO infrastructure. The seawater tanks, climatic chambers and mesocosms were used for 472 days in the past year.[2]



© VLIZ (Decombel)

The Marine Station Ostend (MSO) is the satellite laboratory by the sea for all Flemish marine scientists and is used within the scope of the European infrastructure networks LifeWatch, ICOS and EMBRC. The MSO comprises multifunctional wet, dry and molecular laboratories, cold stores with water tanks for marine organisms, a storage and working space for data and research equipment, a core repository for cold storage of drill cores and a space for public activities.

[1] in 2019: 205

[2] An overview of marine scientific projects that made use of the MSO in 2020 can be found on page 57 of the annexes.

KPI 6

AT LEAST 30 DATA SETS A YEAR MADE AVAILABLE TO FLEMISH MARINE RESEARCHERS AND PUBLISHED IN 'OPEN ACCESS' AFTER HAVING BEEN ACQUIRED BY RV SIMON STEVIN OR THE FLEMISH ESFRI RESEARCH INFRASTRUCTURES, OR AFTER HAVING BEEN SUPPLIED WITHIN THE SCOPE OF INTERNATIONAL NETWORKS OR PROJECTS IN WHICH VLIZ IS INVOLVED

© Shutterstock

A great deal of data are collected within the scope of Flemish marine research. Data supplied to VLIZ are archived and – with permission of the data owner – integrated into data systems or processed into data products so that they can be efficiently disclosed. To facilitate the search for data, VLIZ provides a detailed description of the data in data sets and discloses them via an online information system. The data can be requested online via the VLIZ website: www.vliz.be/en/request-data.

233

DATA SETS [1]

were made available to Flemish marine researchers and published in 'Open Access' in 2020 after having been acquired by RV Simon Stevin or the Flemish ESFRI research infrastructures, or after having been supplied within the scope of international networks or projects in which VLIZ was involved.

[1] in 2019: 90

KPI 7

AT LEAST 3 DATA ANALYSIS AND TRAINING WORKSHOPS ORGANISED EVERY YEAR

5

DATA ANALYSIS & TRAINING WORKSHOPS [1]

were organised, including 1 COST-ETN data management workshop, 2 LifeWatch-WoRMS editor workshops, 1 advancing data stewardship workshop, and 1 online EMODnet Biology training course.

Various stakeholders discussed the differences and similarities between environmental and bio(technological) sciences in terms of data management at the workshop *'Advancing Data Stewardship: Insights from Environmental and Life Science Research Infrastructure'* that took place in Ostend on 28 February 2020. © VLIZ

VLIZ manages several taxonomic, biogeographical and traits-related databases. Considerable investments were made in training experts who provide data to these databases in 2020.

[1] in 2019: 9

KPI 8

ANNUAL GROWTH OF THE NUMBER OF NEW REFERENCES IN THE OPEN MARINE ARCHIVE OF AT LEAST 2,500 UNITS A YEAR (BROKEN DOWN BY NUMBER OF ARTICLES, THESES, BOOKS AND REPORTS, CONFERENCE PROCEEDINGS [INCL. ABSTRACTS], ETC.).

80.2%

3,452
ARTICLES

12.5%

433
A1-ARTICLES

19.5%

841
REPORTS,
BOOKS, ETC.

0,3%

13
THESISSEN

The VLIZ Library manages a very extensive collection of (inter)national marine scientific literature. The collection contains books, maps, periodicals, reports and theses, and can be searched via the online catalogue. VLIZ strives for open communication. The VLIZ Library aims to make as many publications as possible freely available in digital form. A great deal of Belgian marine literature is digitally available via the HYPERLINK "http://www.vliz.be/open-marien-archief" Open Marine Archive (OMA), the principal collection component of the VLIZ library. In addition, search engines such as Google Scholar give publications included in OMA a prominent ranking.

4,306

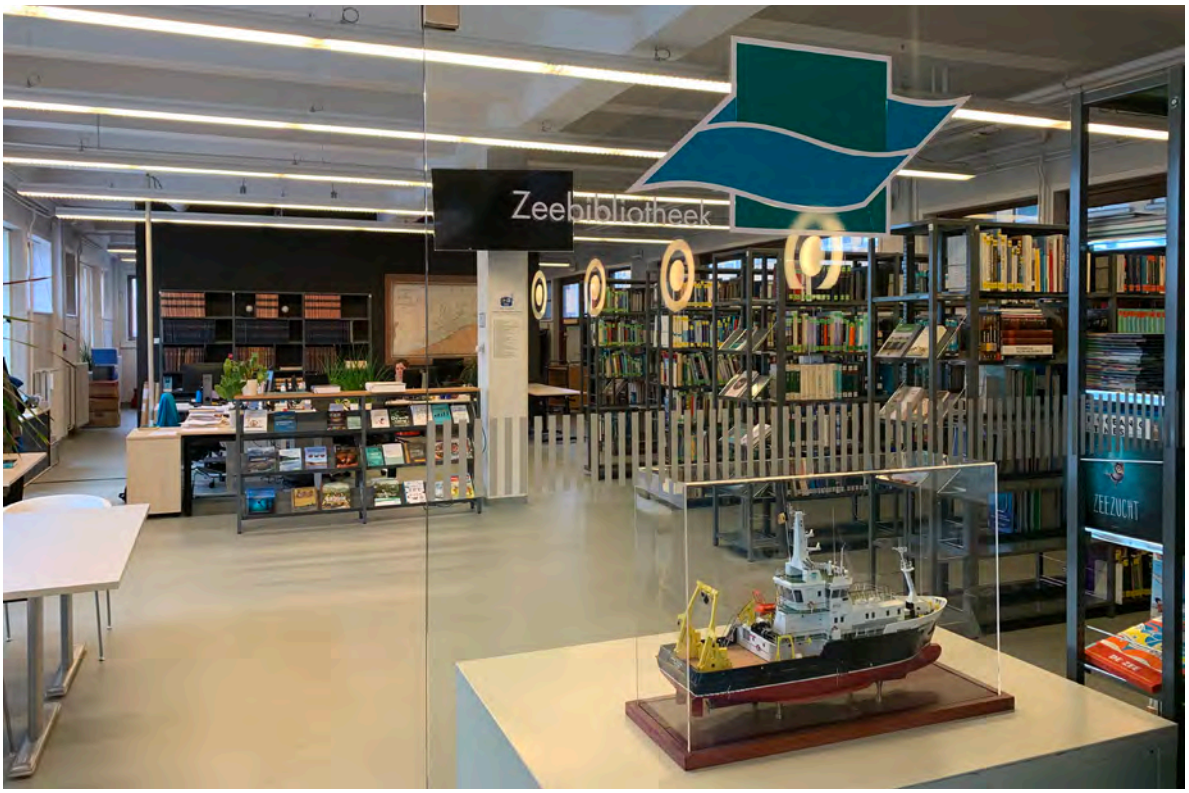
NEW REFERENCES [1]

were added to the Open Marine Archive in 2020 of which 80.2% (=3,452) articles, of which 12.5% (=433) A1-articles; 0.3% (=13) theses; and 19.5% (=841) reports, books, etc. This brings the total number of digital publications in OMA to 39,290.

[1] in 2019: 3,102

KPI 9

AT LEAST 90% OF LITERATURE REQUESTS PROCESSED BY THE LIBRARY RESULT IN DOCUMENT DELIVERY WITHIN ONE WORKDAY AFTER THE REQUEST



© VLIZ

94%

DOCUMENT DELIVERIES WITHIN ONE DAY

In 2020, the VLIZ library processed 1,986 literature requests. [1] 94% of document deliveries were made within one workday after the literature request.

[1] in 2019: 1,724 requests; 94.8%

KPI 10

PARTICIPATION IN AT LEAST TEN CONSULTATIONS AT FORMAL CONSULTATION FORUMS (IN ACCORDANCE WITH THE ANNUALLY UPDATED WORK PLAN OR STRATEGIC PLAN) AND THREE POLICY RECOMMENDATIONS WITH REGARD TO RESEARCH INTO THE BLUE ECONOMY, PROVIDED WITHIN TWENTY WORKDAYS AFTER THEY HAVE BEEN REQUESTED, WITHIN THE SCOPE OF AN ANNUALLY UPDATED STRATEGIC PLAN CONCERNING 'POLICY ADVICE ON THE BLUE ECONOMY'

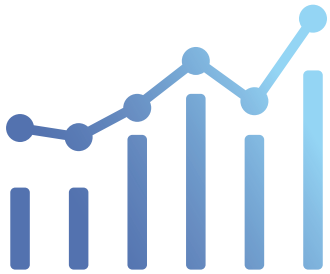
58

CONSULTATIONS [1]

participations in consultations at formal consultation forums, including 19 consultations concerning Blue Cluster, 10 consultations within the scope of the Complex Project Coastal Vision, 3 consultations with the Think Tank North Sea working group, 3 consultations of the Flemish Aquaculture Platform with the Strategic Aquaculture Steering Group (SSAQ), 4 consultations with Port Oostende and 19 sectoral consultations.

20

POLICY RECOMMENDATIONS [2]



with regard to research into the blue economy. The majority of policy advice requests came from the Flemish policy areas, in particular the Department of Economy, Science and Innovation (2), Department of the Environment (2), Department of Agriculture and Fisheries (2), Agency for Nature and Forests (1) and the Research Institute for Nature and Forest (1). Provincial requests came from the Governor of West Flanders (3) and federal requests came from the Federal Public Service (FPS) Environment (4). Finally, VLIZ made 4 policy recommendations on its own initiative and there was 1 other policy recommendation.

The industry was added to the target groups to be served in the recently concluded management agreement between the Flemish government and VLIZ (2017-2021). VLIZ was also given the task of representing the scientific community in initiatives to support the blue economy. To perform this task, VLIZ makes a valuable contribution to the implementation of the policy with regard to economic development at sea through participation in consultations at formal consultation forums and the provision of policy recommendations with regard to research into the blue economy.

KPI 10BIS

VLIZ ACTIVELY PARTICIPATES IN 4 INITIATED OR ONGOING RESEARCH AND INNOVATION INITIATIVES WITHIN THE SCOPE OF THE BLUE ECONOMY ANNUALLY

36

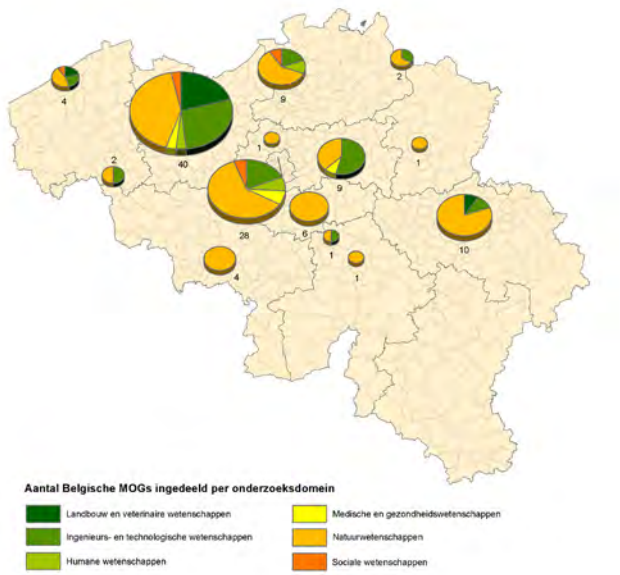
RESEARCH AND INNOVATION INITIATIVES [3]

initiated and ongoing innovation initiatives within the scope of the blue economy, including 20 ongoing projects relating to the blue economy, 9 project proposals linked to the blue economy and 7 other ongoing initiatives linked to the blue economy.

[1] in 2019: 73; [2] in 2019: 18; [3] in 2019: 25

KPI 11

ANNUAL UPDATE OF THE INVENTORY OF THE MARINE RESEARCH LANDSCAPE IN FLANDERS (COMPENDIUM FOR COAST AND SEA).



Left: With the policy informing brief 'Inventory of the marine research landscape in Flanders and Belgium' VLIZ tries to inform stakeholders and other persons concerned about the character and evolution of marine research in Belgium. Right: Marine research groups in Flanders and Belgium presented by research area (Pirlet *et al.* 2020).

Compendium for Coast and Sea: www.compendiumkustenzee.be/en
Download the full report here: www.vliz.be/en/catalogue?module=ref&refid=331419

Every year, the marine research landscape in Flanders and Belgium is surveyed by means of a fixed methodology. In December 2020, the current situation was reported in a policy informing brief by the VLIZ Policy Information division within the context of the Compendium for Coast and Sea.

Once again, the 2020 inventory demonstrated the diversity and productivity of marine research in Belgium. A total of 117 marine research groups were identified, with an annual output of approximately 600 peer-reviewed publications. This scientific output is comparable to that of larger marine institutes in neighbouring countries. Over the past 11 years (2008-2019), these research groups have published articles in nearly 1,300 different periodicals, and the share of open-access periodicals has increased to 54%, compared to only 5% in 2008.

Belgian marine research also has a strong international orientation. In nearly 80% of the publications, the research was conducted outside the Belgian part of the North Sea and 74% were the result of international collaboration. This international collaboration mostly takes place with the neighbouring countries and the US, but the network of our marine researchers covers no less than 145 countries. In approximately 26% of cases (2008-2019), a (research) vessel was deployed for data collection, with a total of 281 different (research) vessels from 43 countries.

With this annual update and inventory of the marine research landscape, VLIZ intends to inform marine and maritime (scientific) policymakers, the marine research community and other stakeholders.

KPI 12

AT LEAST 8 EVENTS ORGANISED AND COMMUNICATION PRODUCTS CREATED A YEAR IN COLLABORATION WITH SCIENTISTS, WITH MARINE INFORMATION BEING TRANSFERRED TO RESEARCHERS, THE GENERAL PUBLIC AND/OR EDUCATORS

To maintain contact with its inquisitive public, VLIZ organised 4 interactive webinars full of marine facts and science in the form of virtual beach walks in 2020.

On Heritage Open Day, Doris Klausing presented the new book 'Oesters en Walvissen' (Oysters and whales), published by VLIZ, about the life and work of Pierre-Joseph Van Beneden, a 19th-century Belgian professor and biologist. © VLIZ

5
EVENTS

13
COMMUNICATION PRODUCTS

One of the strategic objectives of VLIZ is to promote ocean literacy in Flanders and the visibility of marine research to the public at large. VLIZ tries to achieve this objective by disclosing high-quality marine information to very diverse target groups (young and old, professionals and the general public, local and international, education and research) through events, communication products and publications as well as the information desk and social media.

21

EVENTS, PRODUCTS, ETC. [1]

A total of 5 events (page 58 of the annexes), 13 communication products and publications (page 59 of the annexes) and 3 other activities. Other activities include (1) the information desk (page 23 of the annexes), where various target groups can ask questions, (2) VLIZ's presence and activities on social media (page 25 of the annexes) and (3) the VLIZ press briefings (page 65 of the annexes.

[1] in 2019: 29 events and communication products

COLOPHON

This 2020 Annual Report of the Flanders Marine Institute (VLIZ) has been presented for approval to the Board of Directors and the General Assembly on 31 March 2021.

COORDINATION AND FINAL EDITING

- **Jan Mees** - General Director of VLIZ
- **Tina Mertens** - VLIZ Assistant Director
- **Jan Seys** - Head of the VLIZ Communication division
- **Bart De Smet** - Senior Science Officer Communications VLIZ

Many thanks to all who contributed to the completion of this document.

FOTO COVER

The research vessel RV Simon Stevin enters the Port of Ostend © VLIZ (Bart De Smet)

ONTWERP

Zoe©k - Marc Roets & Yves Moerman

AVAILABILITY

This document is available as a PDF file on the VLIZ website (www.vliz.be/en/vliz-annual-report).

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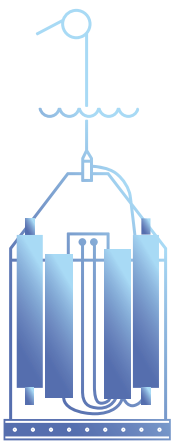
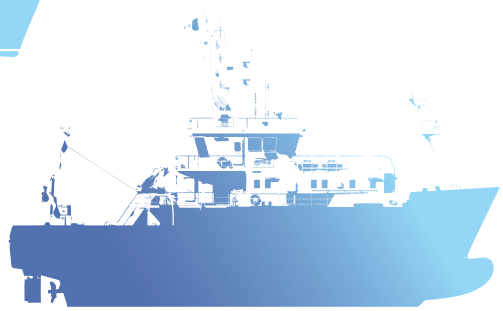
ANNEXES

ANNUAL REPORT 2020

ANNEXES ANNUAL REPORT 2020

ONLY AVAILABLE IN DIGITAL VERSION

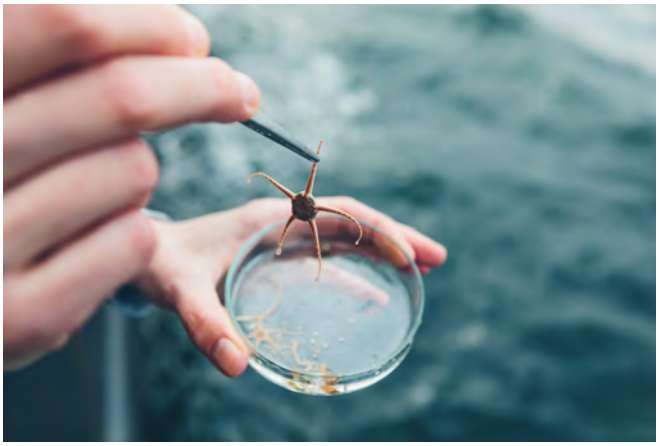




4

ORGANISATION AND FINANCIAL STATEMENT OF VLIZ

VLIZ is administered by the Board of Directors and consults the Scientific Committee for its scientific support tasks. The General Assembly provides assistance in managerial and administrative decisions.



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© VLIZ (Decomble)

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MANAGEMENT INDICATORS

The Management Indicators refer to important services provided by VLIZ to marine scientific researchers, policymakers, educators and the general public. They complement the Key Performance Indicators (KPIs), which are criteria to evaluate the operation of VLIZ.

© VLIZ

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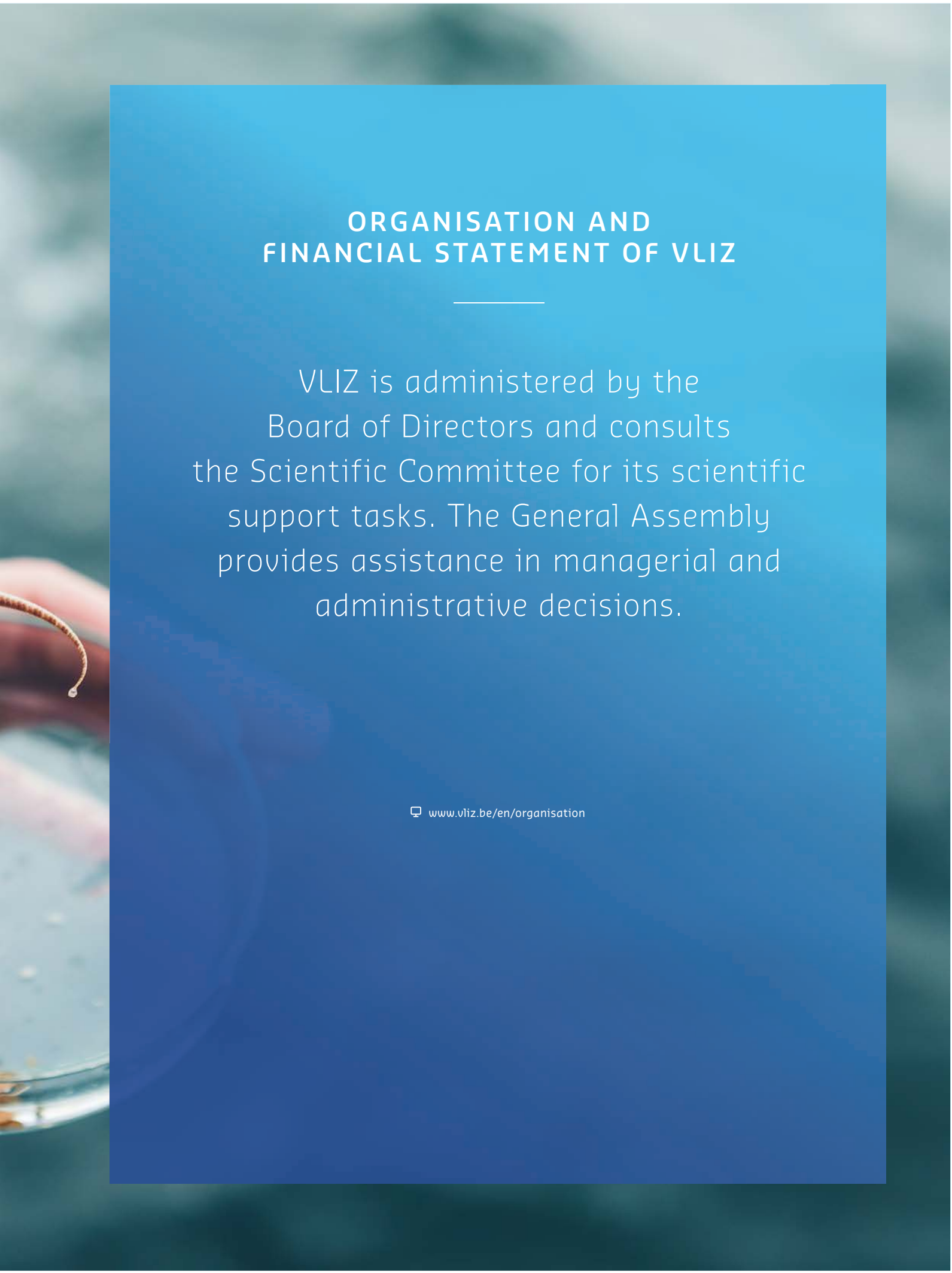
OTHER ANNEXES

An overview of the national and international networks in which VLIZ participates, projects for which VLIZ receives external funding, the scientific equipment and infrastructure made available by VLIZ, the events (co-)organised by VLIZ and the publications published by VLIZ.



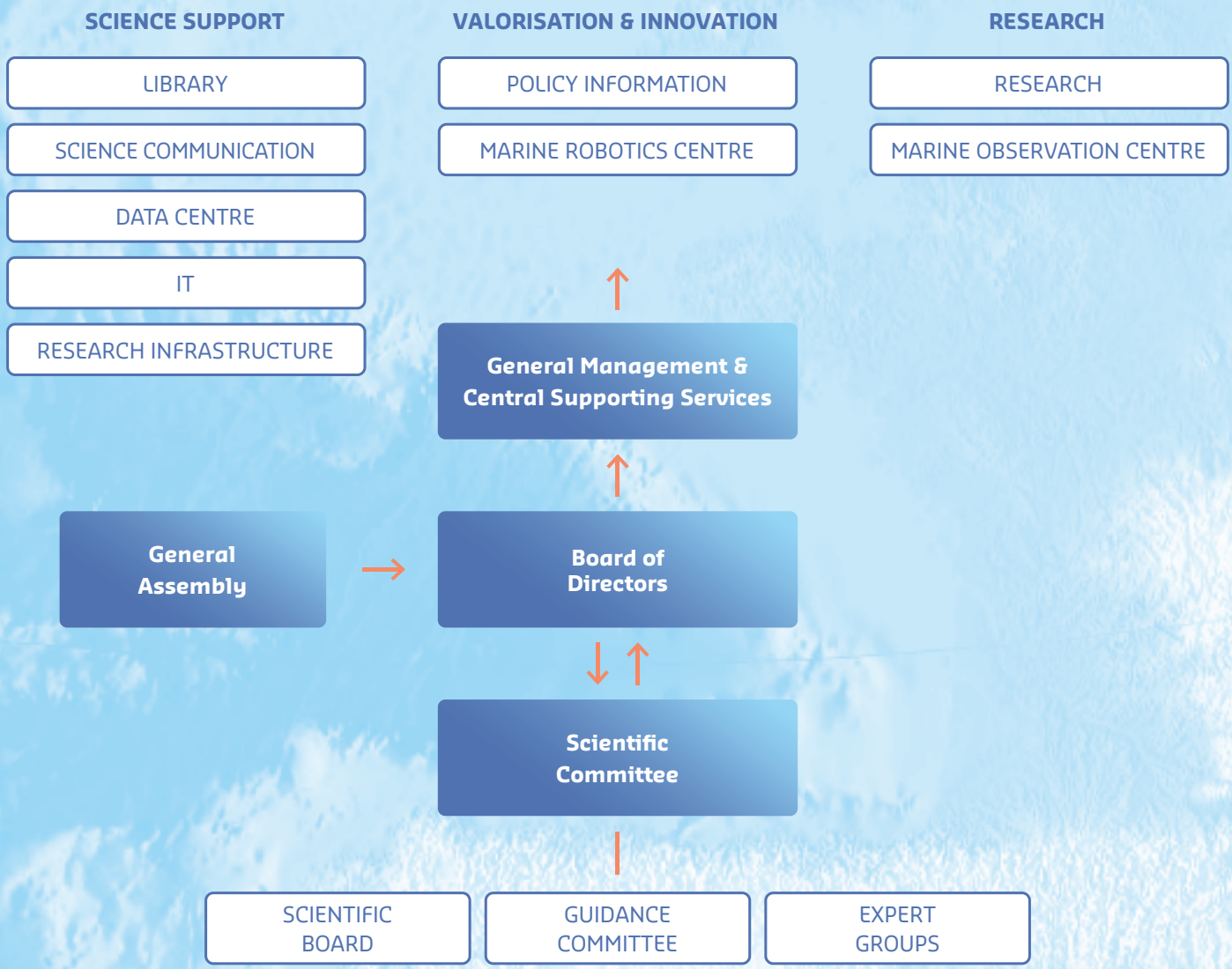
ORGANISATION AND FINANCIAL STATEMENT OF VLIZ

VLIZ is administered by the Board of Directors and consults the Scientific Committee for its scientific support tasks. The General Assembly provides assistance in managerial and administrative decisions.

www.vliz.be/en/organisation

VLIZ ORGANISATION

For more information about the organisation of VLIZ, visit:
www.vliz.be/en/organisation



The Flanders Marine Institute (VLIZ) is an autonomous institute with the legal status of a non-profit organisation under Belgian law that receives an annual allowance from the Flemish government, in particular from the department of Economy, Science and Innovation (EWI), and from the province of West Flanders. The highest ruling organ of VLIZ is the General Assembly. The organisation is administered by a Board of Directors, and its daily operations are overseen by the General Director, assisted by the Coordination division. VLIZ strongly focuses on three pillars: scientific support, valorisation & innovation, and research. These three pillars are reflected into the establishment of three eponymous departments, each including several divisions. A permanent team of scientists in the Scientific Committee, which advises the Board of Directors on all scientific aspects of the VLIZ operations, is consulted several times a year to define and adjust its scientific support tasks. This committee consists of three interconnected and mutually reinforcing components. The Scientific Board is a compact steering committee giving high-quality and scientifically sound advice to the Board of Directors. The Guidance Committee is convened annually for a plenary meeting open to a wide group of marine scientists to discuss important new and planned activities. Expert groups are thematic working groups composed of the most relevant experts from Belgium and abroad and are established for a limited or longer period of time.

COMPOSITION OF THE BOARD OF DIRECTORS

AT THE END OF 2020

VLIZ is administered by the Board of Directors, consisting of 12 members.

THE SIX MEMBERS NOMINATED BY THE FLEMISH GOVERNMENT ARE:

- **Carl Decaluwé**, governor of West Flanders, chairman
- **Mark Andries**, administrator-general VLAIO
- **Daphné Dumery**, mayor Blankenberge
- **Romina Vanhooren**, deputy head of the Gatz cabinet - general policy and Executive Councillor in Oudenburg
- **Wouter Vanlouwe**, councillor Veurne
- **Charlotte Verkeyn**, general policy and Executive Councillor in Ostend

THE TWO MEMBERS NOMINATED BY THE PROVINCE OF WEST FLANDERS ARE:

- **Claude Croes**, member of the Provincial Council
- **Patrick De Klerck**, member of the Provincial Council

THE FOUR INDEPENDENT MEMBERS ARE:

- **Colin Janssen**, Ghent University, vice-chairman
- **Jean Berlamont**, Katholieke Universiteit Leuven
- **Ann Overmeire**, Blue Cluster
- **Willy Versluys**, fishing vessel owner

THE GOVERNMENT COMMISSIONERS ARE:

- **Annie Cool**, councillor Cabinet Hilde Crevits
- **Danielle Raspoet**, secretary-director VARIO

ATTEND THE MEETINGS:

- **Gert Verreet**, Flemish Government Department of Economy, Science and Innovation
- **Patrick Braet**, province of West Flanders, financial manager
- **Jan Mees**, General Director of VLIZ
- **Tina Mertens**, VLIZ Assistant Director
- **Heidi Coussens,** VLIZ executive secretary and rapporteur

The **tasks and operation** of the Board of Directors as well as the appointment and qualifications of its members can be found in the **VLIZ Good Governance Charter**.

COMPOSITION OF THE GENERAL ASSEMBLY

AT THE END OF 2020

Mr **Carl Decaluwé**, governor of West Flanders, is **THE CHAIRMAN**.

THE TEN VOTING MEMBERS APPOINTED BY THE FLEMISH GOVERNMENT ARE:

- **Patric Jacobs**, Ghent University
- **Willy Baeyens**, Vrije Universiteit Brussel
- **Jean Berlamont**, Katholieke Universiteit Leuven
- **Ernest Schockaert**, Hasselt University
- **René Van Grieken**, University of Antwerp
- **Magda Vincx,** Ghent University
- **Philip Van Avermaet**, Flemish Government Department of Economy, Science and Innovation
- **Ulrike Vanhessche**, Coast Guard secretariat (MDK)
- **Ilse Hoet**, Mobility and Public Works Department
- **Jan Strubbe**, honorary director-general of the Waterways and Marine Affairs Administration

THE FOUR VOTING MEMBERS APPOINTED BY THE PROVINCE OF WEST FLANDERS ARE:

- **Claude Croes**, member of the Provincial Council
- **Patrick De Klerck**, member of the Provincial Council
- **Anthony Dumarey**, member of the Provincial Council
- **Patrick Braet,** Provincial Treasurer
- **Jan Denys**, principal of the Mercator Maritime Institute

THE MEMBER APPOINTED BY THE RESEARCH FOUNDATION – FLANDERS (FWO) IS:

- **Hans Willems**, secretary general of the Research Foundation – Flanders

The members of the Board of Directors of VLIZ have the right to attend the General Assembly with an advisory vote. Sympathising members have the right to participate in the discussions of the General Assembly.

The **competences** of the General Assembly as well as information on the meetings and voting procedure can be found in the VLIZ Good Governance Charter.

SCIENTIFIC BOARD

AT THE END OF 2020

The Scientific Board consists of **16 members** and the composition reflects the **inter-university and interdisciplinary character** of VLIZ.

THE CHAIRMAN is the vice-chair of the Board of Directors, **Mr Colin Janssen** (Ghent University).

TWO DELEGATES FROM GHENT UNIVERSITY (UGENT):

- **Marleen De Troch** (substitute: David Van Rooij)
- **Gilbert Van Stappen** (substitute: Peter Troch)

TWO DELEGATES FROM KATHOLIEKE UNIVERSITEIT LEUVEN (KULEUVEN):

- **Filip Volckaert** (substitute: Gert Jan Weltje)
- **Jaak Monbaliu** (substitute: Erik Toorman)

TWO DELEGATES FROM VRIJE UNIVERSITEIT BRUSSEL (VUB):

- **Margaret Chen** (substitute: Marc Kochzius)
- **Marc Kochzius** (substitute: Karolien Van Puyvelde)

TWO DELEGATES FROM THE UNIVERSITY OF ANTWERP (UA):

- **Ronny Blust** (substitute: Gudrun De Boeck)
- **Filip Meysman** (substitute: Patrick Meire)

ONE DELEGATE FROM HASSELT UNIVERSITY (UHASSELT):

- **Tom Artois** (substitute: Natalie Beenaerts)

ONE DELEGATE FROM THE INSTITUTE FOR AGRICULTURAL AND FISHERIES RESEARCH (ILVO):

- **Hans Polet** (substitute: Bart Sonck)

ONE DELEGATE FROM THE RESEARCH INSTITUTE FOR NATURE AND FOREST (INBO):

- **Maurice Hoffmann** (substitute: Eric Stienen)

ONE DELEGATE FROM THE FLEMISH INSTITUTE FOR TECHNOLOGICAL RESEARCH (VITO):

- **Roger Dijkmans** (substitute: Bart Deronde)

ONE DELEGATE FROM THE FLEMISH ENVIRONMENT AGENCY (VMM):

- **Didier D'hondt** (substitute: Marleen Van Steertegem)

ONE DELEGATE FROM THE FLANDERS HERITAGE AGENCY:

- **Marnix Pieters** (substitute: Tom Lenaerts)

ONE DELEGATE FROM FLANDERS HYDRAULICS RESEARCH (FHR):

- **Frank Mostaert** (substitute: Toon Verwaest)

ATTEND THE MEETINGS:

- **Jan Mees**, General Director of VLIZ
- **Tina Mertens**, VLIZ Assistant Director
- **Jan Seys**, rapporteur (substitute: Nancy Fockedey)

A DELEGATE FROM THE DEPARTMENT OF ECONOMY, SCIENCE AND INNOVATION (EWI):

- **Gert Verreet**

On Thursday afternoon 3 December 2020, the Guidance Committee of the VLIZ Scientific Committee met via an online ZOOM meeting. Marine experts from scientific institutions, policy and industry were invited to attend this open meeting. © VLIZ

BALANCE SHEET AND INCOME STATEMENT

DECEMBER 2020

BALANCE ON 31 DECEMBER 2020

ASSETS

(kEUR)	31-12-2019	31-12-2020
Intangible fixed assets	0.65	0.33
Tangible fixed assets	6,818.67	6,292.64
Financial fixed assets	17.93	17.93
Stocks	17.86	18.61
Amounts receivable within one year	2,990.27	3,388.49
Cash investments	0	0
Liquid assets	2,043.68	5,953.56
Deferred charges and accrued income	0	54.49
TOTAL	**11,889.06**	**15,726.05**

LIABILITIES

(kEUR)	31-12-2019	31-12-2020
Allocated funds	652.00	775.00
Profit and losses brought forward	2,083.92	2,578.07
Capital grants	7,358.77	7,167.95
Provisions for liabilities and charges	0	0
Amounts payable after one year	0	0
Amounts payable within one year	1,794.37	5,205.03
Deferred charges and accrued income	0	0
TOTAL	**11,889.06**	**15,726.05**

The figures of the balance sheet and income statement include all subsidies received by VLIZ as stated in the management agreement or the covenant.

No surplus of the allocated subsidy was brought forward as a reserve in 2020 (art. 12 § 3 of the covenant).

Budgetary deviations from the 2020 budget (art. 12 § 3 of the covenant): none.

INCOME STATEMENT ON 31 DECEMBER 2020

INCOME

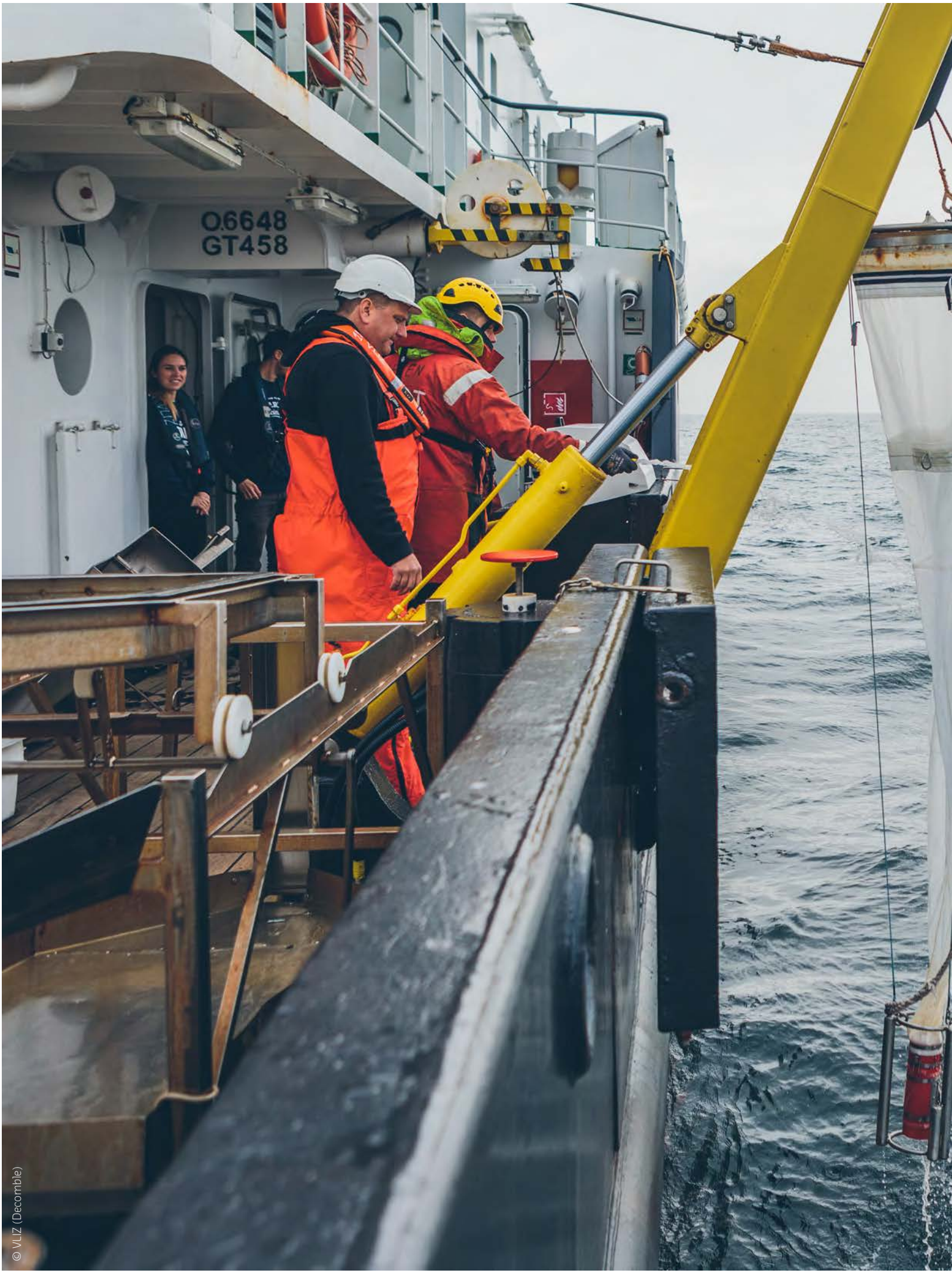
(kEUR)	31-12-2019	31-12-2020
Operating income	12,277.97	14,255.93
Financial income	1,260.49	1,101.13
Exceptional income	2.28	3.77
TOTAL	**13,540.74**	**15,360.83**

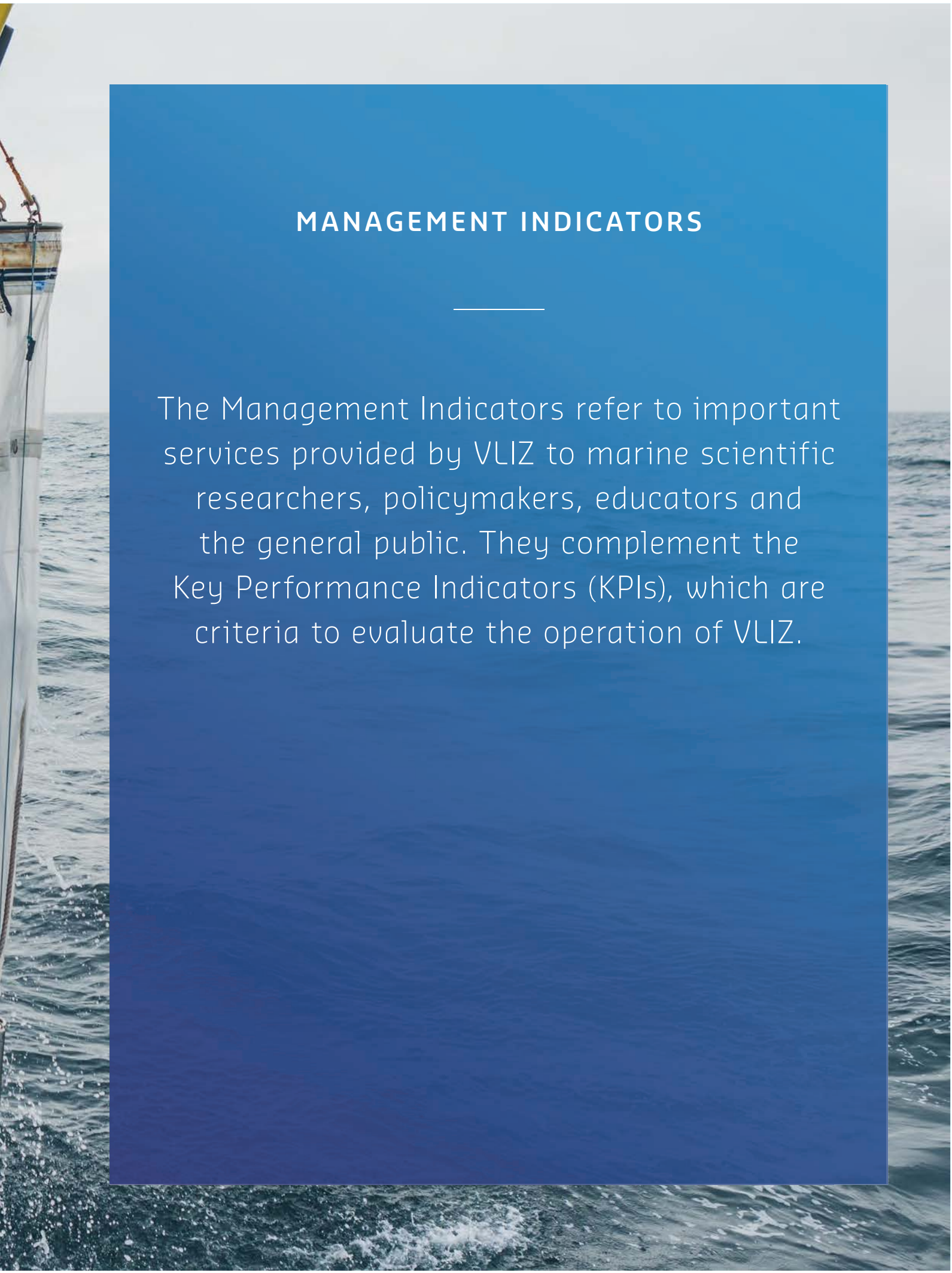
COSTS

(kEUR)	31-12-2019	31-12-2020
Stocks	1.63	2.37
Remuneration and social security	7,531.05	9,658.30
Services and other goods	2,057.90	1,962.06
Provisions for liabilities and charges	0	0
Depreciation	1,430.92	1,536.84
Financial expenses	7.15	11.39
Other operating expenses	2,170.76	1,572.33
Exceptional expenses	1.32	0.39
TOTAL	**13,200.73**	**14,743.68**

RESULT

(kEUR)	2019	2020
Result for the financial year	340.01	617.15
Transfer to allocated funds	68.00	123.00
Profit brought forward as of 31/12	2,083.90	2,578.05





MANAGEMENT INDICATORS

The Management Indicators refer to important services provided by VLIZ to marine scientific researchers, policymakers, educators and the general public. They complement the Key Performance Indicators (KPIs), which are criteria to evaluate the operation of VLIZ.

SOCIAL INDICATORS

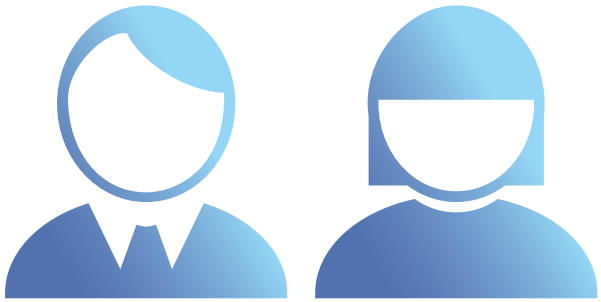
2020

126

EMPLOYEES [1]

Number of people of foreign origin: 11.

Number of people with an employment disability: 1.

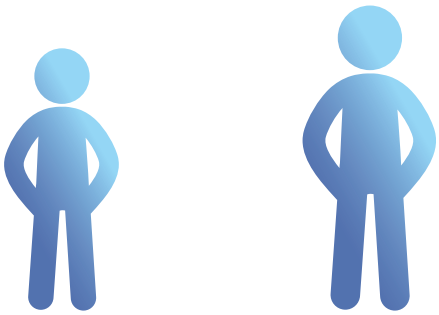


MEN

65

WOMEN

61



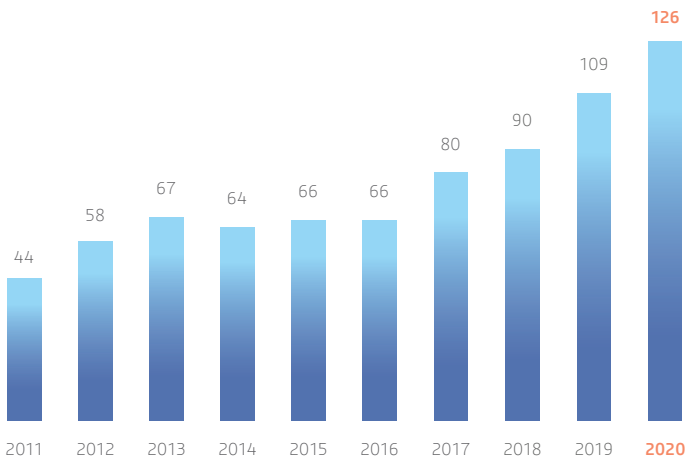
PERMANENT

52

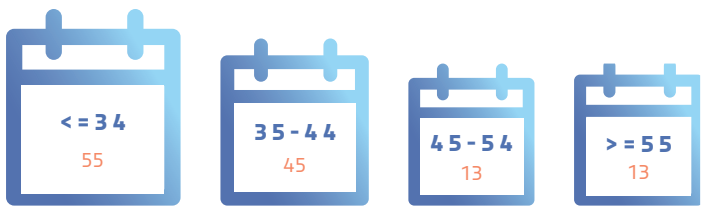
TEMPORARY

74

NUMBER OF EMPLOYEES



AGE OF THE EMPLOYEES



[1] Source: Wikipedia (Flemish perspective): any person living in the Flemish or Brussels Region, of whom at least one grandparent was born outside the European Union – excluding other Western and Northern European states, the USA and Canada.

STAFF TURNOVER

IN

35

OUT

10

19.6%

LEAVE ETC. [1]

The total number of days of absence as a result of maternity leave, parental leave, time credit, leave, sickness, etc. versus the total number of days to be performed.

2.2%

SICKNESS ABSENCE [2]

2.2% of the total number of days to be performed.

139

DAYS OF TRAINING [3]

received by 105 employees.

111

PERFORMANCE INTERVIEWS [4]

116

HIGHER-EDUCATED EMPLOYEES [5]

and 10 persons who completed secondary education at most (ESF definition).

A	B	C	D
94	22	8	2

[1] in 2019: 22.2%
[2] in 2019: 2.77%
[3] in 2019: 59 days of training received by 23 employees
[4] in 2019: 85; [5] in 2019: 101

RESEARCH PROJECTS

2020

20 RESEARCH PROJECTS WITH EXTERNAL FUNDING INITIATED [2]

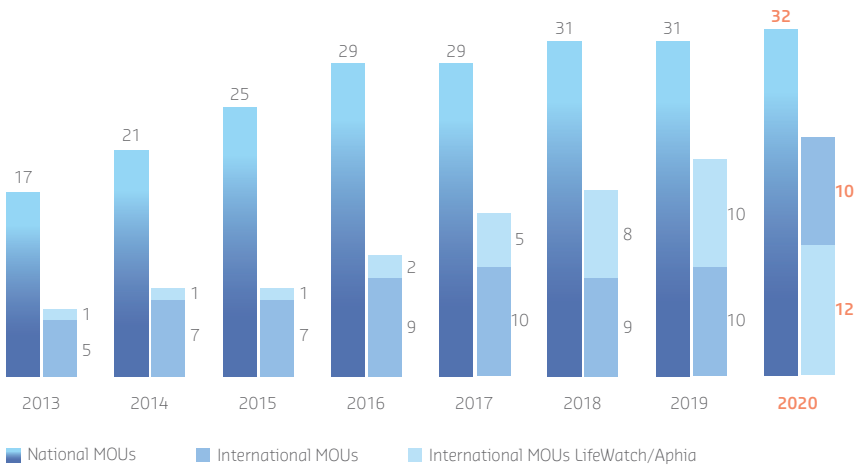
PROJECT	TOTAL PROJECT BUDGET	VLIZ BUDGET	NUMBER OF PARTNERS [1]
EMODnet Bathymetry	N A	€ 21,000,00	31 (2)
FOSB	€ 5,000,000,00	€ 75,000,00	31 (31)
Mission Atlantic	€ 11,501, 717.50	€ 350,112.50	32 (2)
PLUXIN	€ 1,764,998.00	€ 461,187.00	4 (4)
SUMES	€ 1,663,431.00	€ 320,500.00	3 (3)
Microfish	€ 78,966.00	€ 26,322.00	1 (1)
Survival of coronaviruses in aquatic environment	€ 12,000.00	€ 12,000.00	1 (1)
OVAM/Fostplus - Nulmeting plastic flux	€ 150,000.00	€ 70,000.00	4 (4)
PacMAN	€ 856,822.00	€ 0.00	3 (1)
Ocean InfoHub	€ 1,191,915.00	€ 0.00	11 (2)
ANDROMEDA	€ 2,619,000.00	€ 140,000.00	5 (1)
LifeWatch IJI	€ 200,000.00	€ 200,000.00	1 (1)
SEA(A)BASS	€ 123,464.00	€ 32,670.00	2 (2)
Coastbusters 2.0	€ 2,014,864.00	€ 581,333.30	4 (4)
JERICO S3	€ 10,000,000.00	€ 212,103.00	37 (1)
DISARM	€ 2,520,810.00	€ 800,068.00	5 (5)
Drawing up an inventory of 100-year-old shipwrecks	€ 31,514.45	€ 31,514.45	1 (1)
EMOD-PACE	€ 3,500,000.00	€ 168,785.00	17 (2)
The Rich North Sea	€ 20,223.00	€ 20,223.00	1 (1)
Book PJ Van Beneden	€ 1,471.00	€ 1,250.00	1 (1)

2 RESEARCH PROJECTS WITH INTERNAL FUNDING INITIATED

Corona survey and PhD project BluePsychology - *How coastal environments improve psychological wellbeing: underlying mechanisms.*

NATIONAL AND INTERNATIONAL COOPERATION AGREEMENTS

2020



The number of cooperation agreements in force per year for the 2013–2020 period, divided into national MOUs, international MOUs and international MOUs within the framework of LifeWatch/Aphia.

A list of all agreements is available on www.vliz.be/en/cooperation-agreements.

[1] number of Belgian/Flemish projects (figure between brackets)

[2] in 2019: 14 research projects with external funding and 12 research projects with internal funding initiated

ENVIRONMENTAL INDICATORS

2020

62,480

NUMBER OF PRINTS AND COPIES [1]

One print/copy corresponds to one page.

0.11

TONER CONSUMPTION [2]

used for printers and photocopiers per staff member.

GAS, WATER & ELECTRICITY CONSUMPTION [3]

33,394	239,280	261
m³	kWh	m³

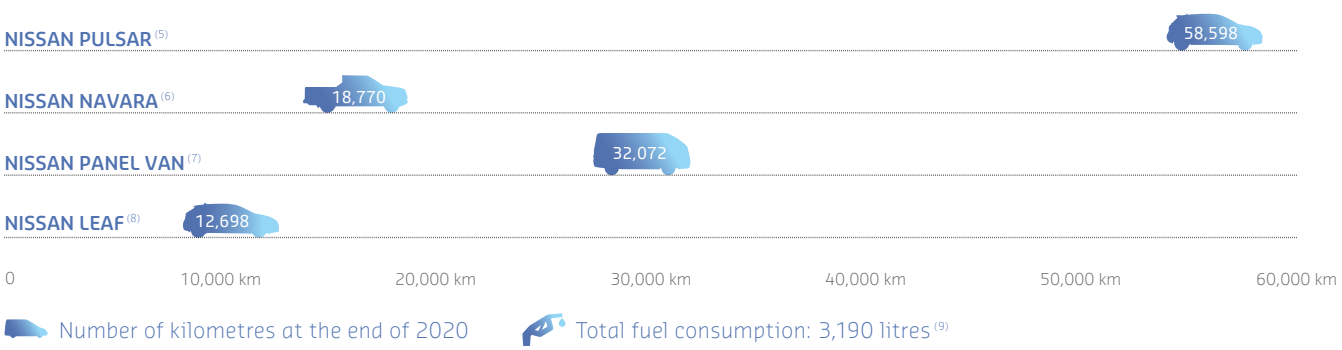
COMMUTING [4]

€ 88,589

TRAIN, TRAM & BICYCLE ALLOWANCES

refunded to employees.

NUMBER OF KILOMETRES AND FUEL CONSUMPTION OF VLIZ CARS AT THE END OF 2020



[1] in 2019: 97,246 prints and copies
[2] in 2019: 0.31 toner consumption
[3] in 2019 gas: 39,024 m³, electricity: 244,243 kWh, water: 566 m³
[4] in 2019: € 102,902 train, tram and bicycle allowances
[5] in 2019: 52,861 km.
[6] in 2019: 14,055 km.
[7] in 2019: 23,992 km
[8] in 2019: 10,533 km
[9] in 2019: 3,957 liter

VLIZ TURNOVER

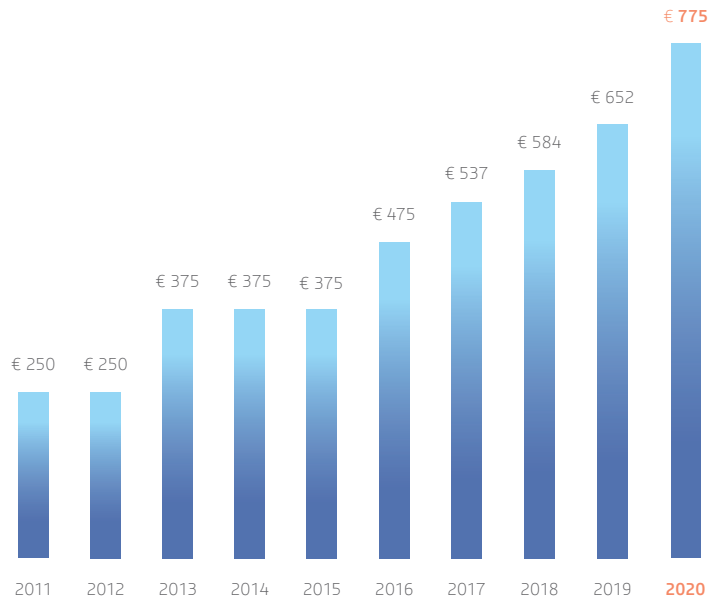
IN MILLION EURO

2020: € 13,736,056

Membership fees, donations, legacies and subsidies

SOCIAL LIABILITIES

IN THOUSAND EURO



2020: € 775,000

TURNOVER OF INNOVOCEAN SITE PARTNERS

IN EURO

€ 974,403

TOTAL

IOC PROJECT OFFICE FOR IODE

€ 573,203

EUROPEAN MARINE BOARD SECRETARIAT

€ 128,868

EMODNET-SECRETARIAT

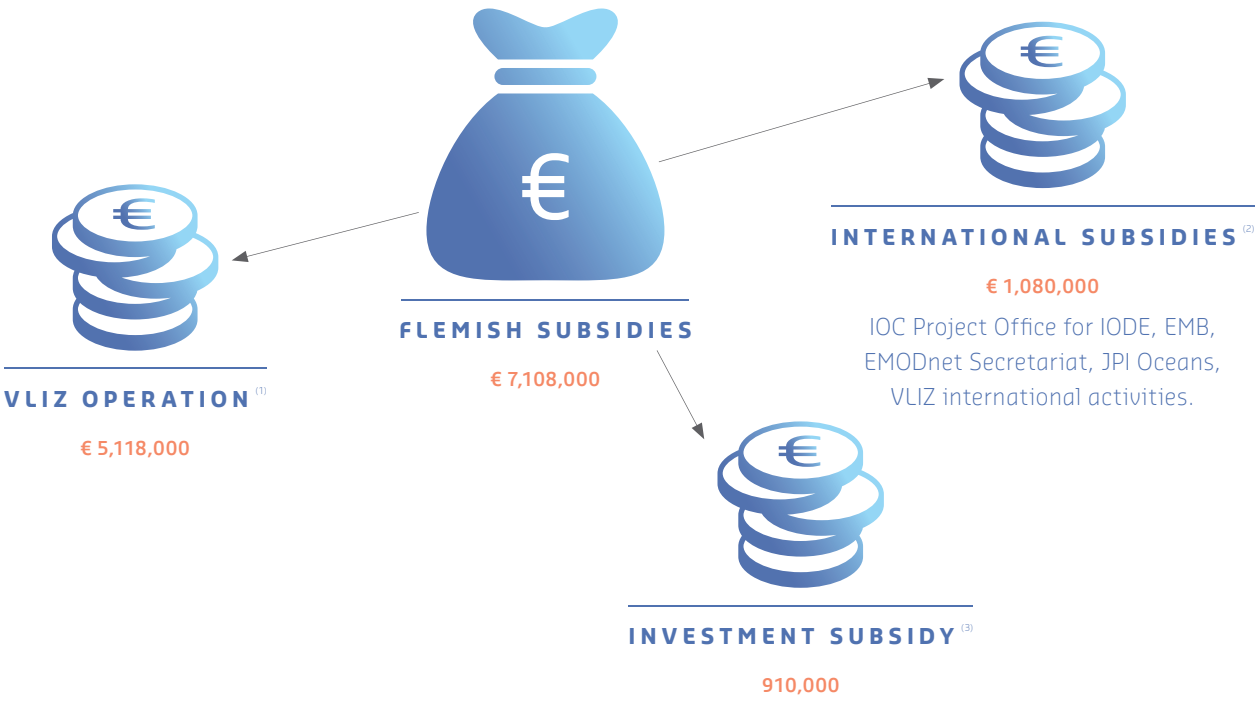
€ 172,332

JPI OCEANS

€ 100,000

OVERVIEW OF SUBSIDIES

IN EURO



FLEMISH SUBSIDIES

€ 7,108,000

VLIZ OPERATION [1]

€ 5,118,000

INTERNATIONAL SUBSIDIES [2]

€ 1,080,000

IOC Project Office for IODE, EMB, EMODnet Secretariat, JPI Oceans, VLIZ international activities.

INVESTMENT SUBSIDY [3]

910,000

EXTERNAL FUNDING

€ 4,975,131

PROVINCE OF WEST FLANDERS [4]

€ 163,713

ESFRIs [5]

€ 1,290,000

LifeWatch, ICOS, EMBRC

NATIONAL AND INTERNATIONAL PROJECTS [6]

€ 3,521,418

70%

The external funding amounts to 70% of the Flemish subsidies [7].

[1] in 2019: € 5,118,000; in 2014: €2,222,600, in 2009: € 1,204,434
[2] in 2019: € 1,080,000; in 2014: € 1,100,000, in 2009: € 726,000
[3] in 2019: € 910,000; in 2014: € 1,090,200, in 2009: € 1,122,000
[4] in 2019: € 160,804; in 2014: € 153,352; in 2009: € 140,146
[5] in 2019: € 1,257,500; in 2014: € 1,750,704; in 2009: not applicable
[6] in 2019: € 2,689,662; in 2014: € 958,722; in 2009: € 1,190,958
[7] in 2019: 58%

EVENTS

2020

218

OVERNIGHT STAYS [1]

The number of overnight stays in Ostend by people visiting the InnovOcean site or attending events organised by the InnovOcean partners in Ostend.

15

INTERNATIONAL VISITS [2]

The number of meetings and events with an international character that took place in Ostend, attended by 320 participants in total.

1,101

NUMBER OF PARTICIPANTS IN ORGANISED EVENTS [3]

The number of participants in 22 events (co)organised by VLIZ.

53

MISSIONS [4]

The number of missions to 14 countries.

[1] in 2019: 1,137
[2] in 2019: 41 visits with 2,358 participants
[3] in 2019: 13,722 participants in 42 events
[4] in 2019: 181 missions to 26 countries

753

VLIZ MEMBERS [1]

The total number of VLIZ members, including 477 individual members, 154 partner members, 33 institutional members, 21 students, 15 honorary members, 19 members of the Board of Directors, 7 members of the General Assembly and 27 members of the Scientific Committee.
In 2020, VLIZ was joined by 111 new members and 44 members resigned their membership.

9

VLIZ AWARDS [2]

Awards were granted by VLIZ, including 2 for master students, 4 for PhD students, 2 for post-doctoral researchers and 1 for master students, PhD students and post-doctoral researchers.

REQUESTS FOR INFORMATION

2020

245

QUESTIONS ANSWERED [3]

Total number of requests for information granted across all VLIZ divisions via info@vliz.be.

1,986

LITERATURE REQUESTS [4]

Total number of literature requests (incl. requests for information) to the library via library@VLIZ.be

17

QUESTIONS COMPENDIUM [5]

Total number of requests for information with regard to the Compendium.

[1] total number of members in 2019: 684; 2018: 573; 2017: 517; 2016: 430; 2015: 328
[2] in 2019: 12 awards

[3] in 2019: 196
[4] in 2019: 1,724
[5] in 2019: 13

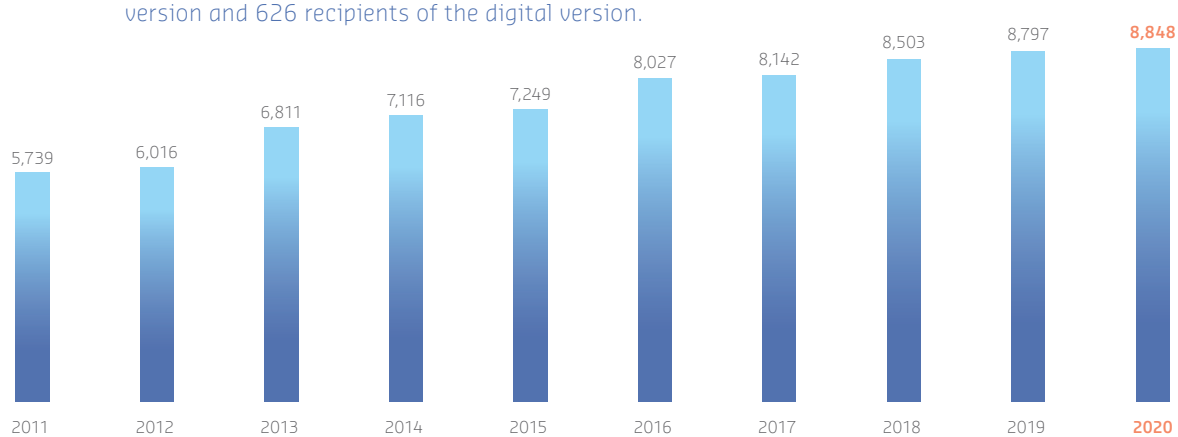
SUBSCRIBERS

2020

8,848

SUBSCRIBERS TO DE GROTE REDE

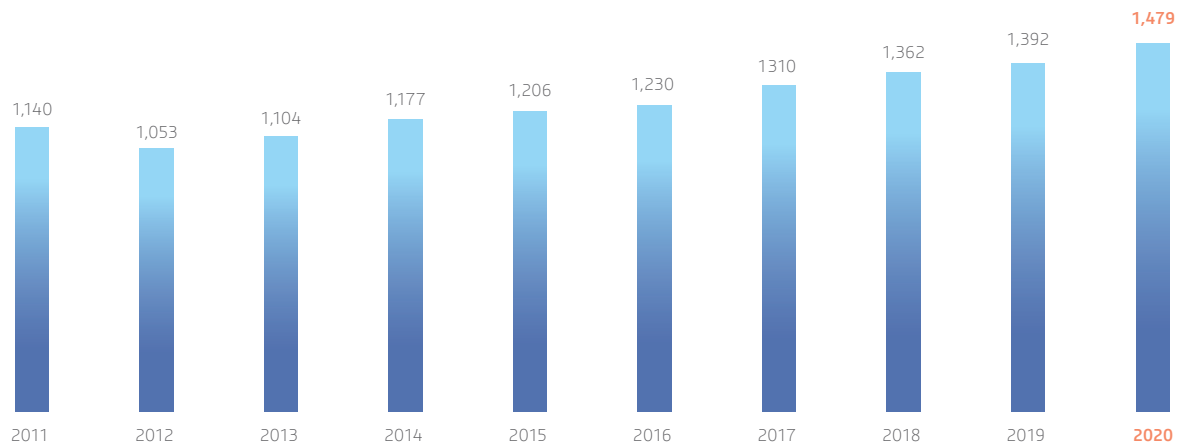
The number of subscribers to De Grote Rede (since 1999), including 8,222 recipients of the paper version and 626 recipients of the digital version.



1,479

SUBSCRIBERS TO VLIZINE/TESTEREP MAGAZINE[1]

The number of subscribers to VLIZINE/Testerep Magazine (since 1999).



[1] Since September 2020 'Testerep Magazine' replaces the newsletter VLIZINE. Subscribers receive the newsletter every month and no longer at a daily or weekly basis.

LECTURES

2020

3,242

GENERAL PUBLIC REACHED BY INFORMATIVE LECTURES[1]

Members of the general public reached by means of 25 informative lectures on the VLIZ premises and elsewhere.

SOCIAL MEDIA REACH

2020

TWITTER[2]
(@jmeesvliz)

FOLLOWERS	TWEETS
4,496	10,264

YOUTUBE[3]

FOLLOWERS	POSTS
298	497

FACEBOOK

VLIZ (@VLIZnieuws)[4]		RV Simon Stevin[5] (@rvsimonstevin)	
FOLLOWERS	POSTS	FOLLOWERS	POSTS
2,471	658	1,841	790

LINKEDIN[6]

FOLLOWERS	POSTS
2,531	236

INSTAGRAM[7]

FOLLOWERS	POSTS
797	69

[1] in 2019: 2,224 members of the general public reached by means of 49 informative lectures

[2] in 2019: 3,980 followers; 8,971 tweets

[3] in 2019: 206 followers; 453 posts

[4] In 2019: 2,079 followers; 513 posts

[5] in 2019: 1,792 followers; 774 posts

[6] in 2019: 1,400 followers; 130 posts

[7] in 2019: 607 followers; 50 posts

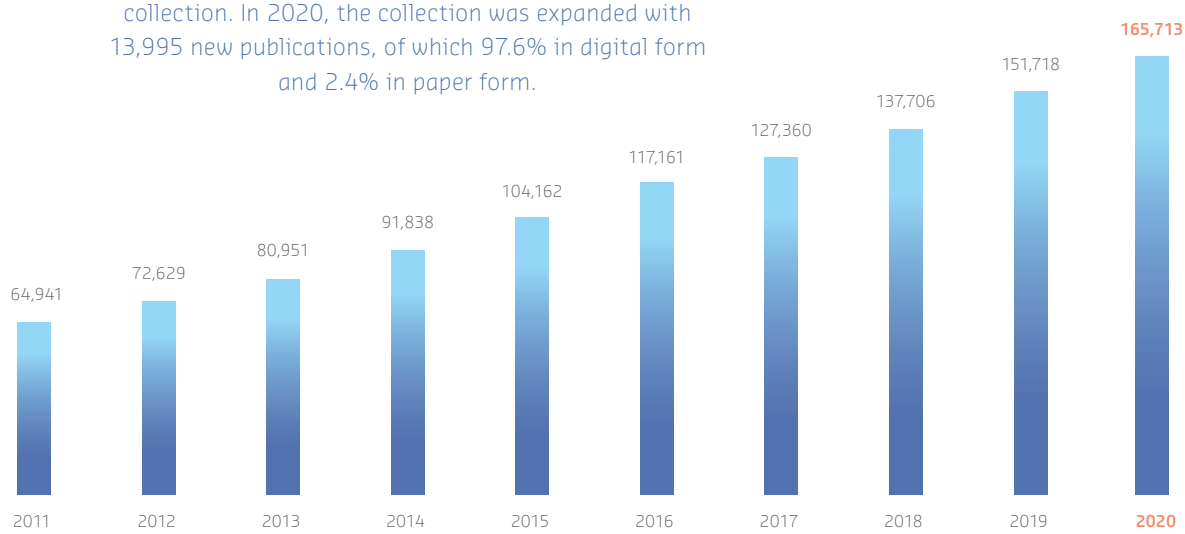
GROWTH OF THE LIBRARY COLLECTION

2020

165,713

PUBLICATIES

The total number of (paper and digital) publications in the library, i.e. the cumulative growth of the paper and digital collection. In 2020, the collection was expanded with 13,995 new publications, of which 97.6% in digital form and 2.4% in paper form.



VLIZ PUBLICATIONS

2020

86

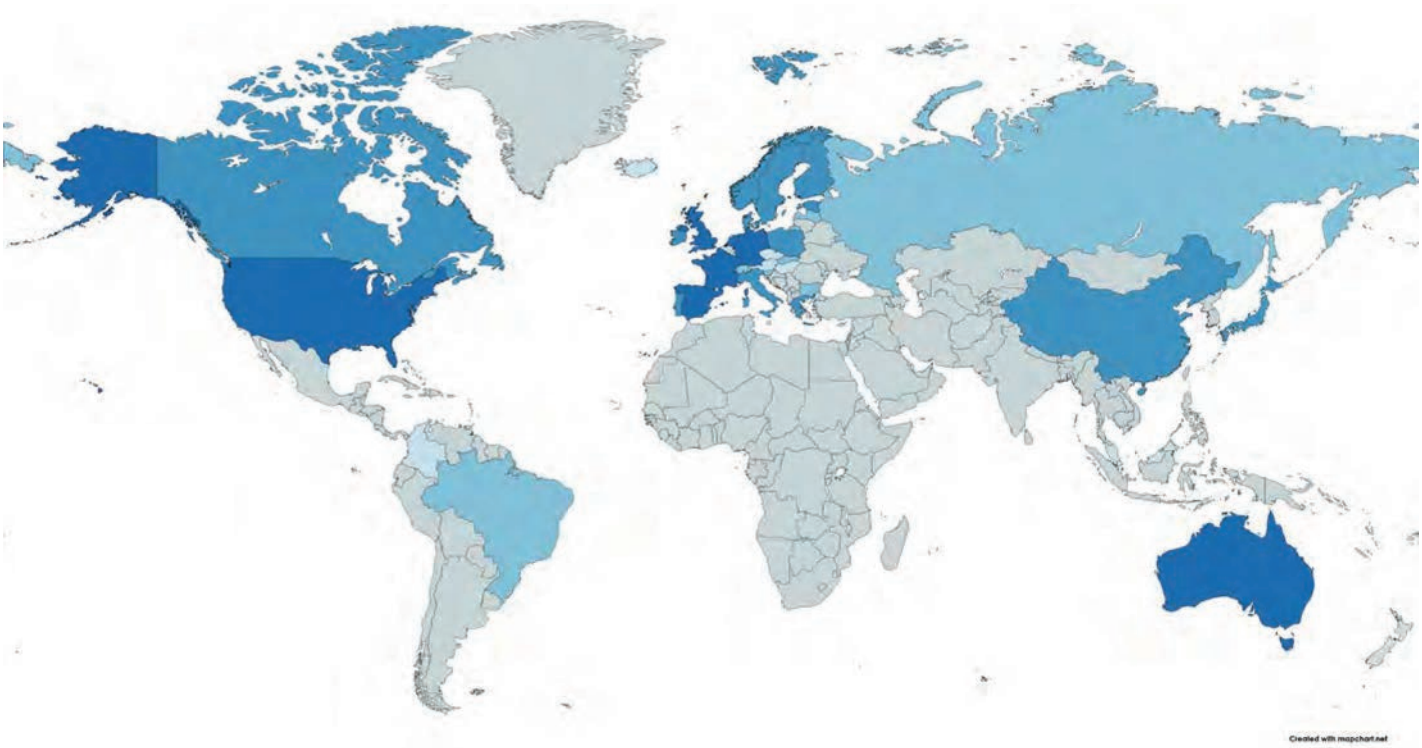
PUBLICATIONS [1]

with at least one author affiliated to VLIZ or published by VLIZ.

[1] in 2019: 110

RESEARCHERS AND RESEARCH GROUPS IN A1 PUBLICATIONS

2020



Distribution of the 356 international researchers across all A1 publications authored by a VLIZ employee from 2020 (KPI1 p. 42) per country.

>20
5-20
2-4
1

436

RESEARCHERS IN A1 PUBLICATIONS [1]

The number of researchers in all A1 publications authored by a VLIZ employee (KPI 1 p.42), including 80 Belgian and 356 international researchers (see world map).

294

RESEARCH GROUPS IN A1 PUBLICATIONS [2]

The number of research groups in A1 publications authored by a VLIZ employee, including 35 Belgian and 259 international research groups.

[1] in 2019: 290 researchers incl. 74 Belgian and 220 international researchers
[2] in 2019: 179 research groups, incl. 29 Belgian and 150 international research groups

CITATIONS

2020

1,552

CITATIONS [1]

The number of citations of A1 publications authored by a VLIZ employee.

PUBLICATIONS ON VLIZ RESEARCH FACILITIES

SINCE 2001

729

PUBLICATIONS ON VLIZ RESEARCH FACILITIES [2]

A total of 52 new publications on VLIZ research facilities appeared in 2020, including 31 on RV Simon Stevin, 14 on the VLIZ equipment, 4 on the Marine Station Ostend, 1 on the greenhouses at De Haan, 1 on the ICOS research infrastructure and 1 on the EMBRC research infrastructure.

RV SIMON STEVIN

315

RV ZEE-LEEUW

306

VLIZ EQUIPMENT

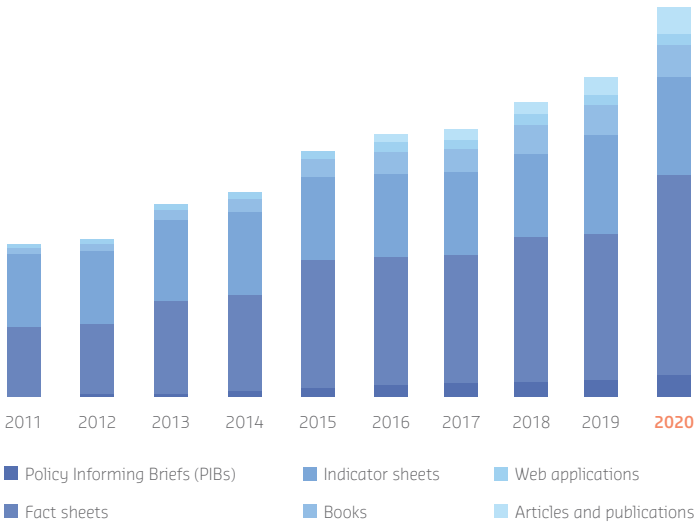
43

[1] iIn 2019: 1,061 citations

[2] the number of publications on VLIZ research facilities that have appeared since 2001 includes 315 publications on RV Simon Stevin, 306 publications on RV Zeeleeuw, 43 publications on VLIZ equipment, 34 publications on the greenhouses at De Haan, 16 publications on ROV Zonnebloem (formerly called 'Genesis'), 7 publications on the Marine Station Ostend, 1 publication on the ICOS research infrastructure an 1 publication on the EMBRC research infrastructure.

INFORMATION PRODUCTS

SINCE 1999



In 2020, there were 124 new information products, including 8 policy informing briefs (PIBs), 97 fact sheets, 16 articles and publications, and 3 books.

686

INFORMATION PRODUCTS

The number of information products since 1999.

NEW COMPENDIUM FOR COAST AND SEA INFORMATION PRODUCTS

2020

18

COMPENDIUM FOR COAST AND SEA [1]

New Compendium for Coast and Sea information products in 2020, of which 18 (updated) thematic chapters.

[1] in 2019: 0 new information products.

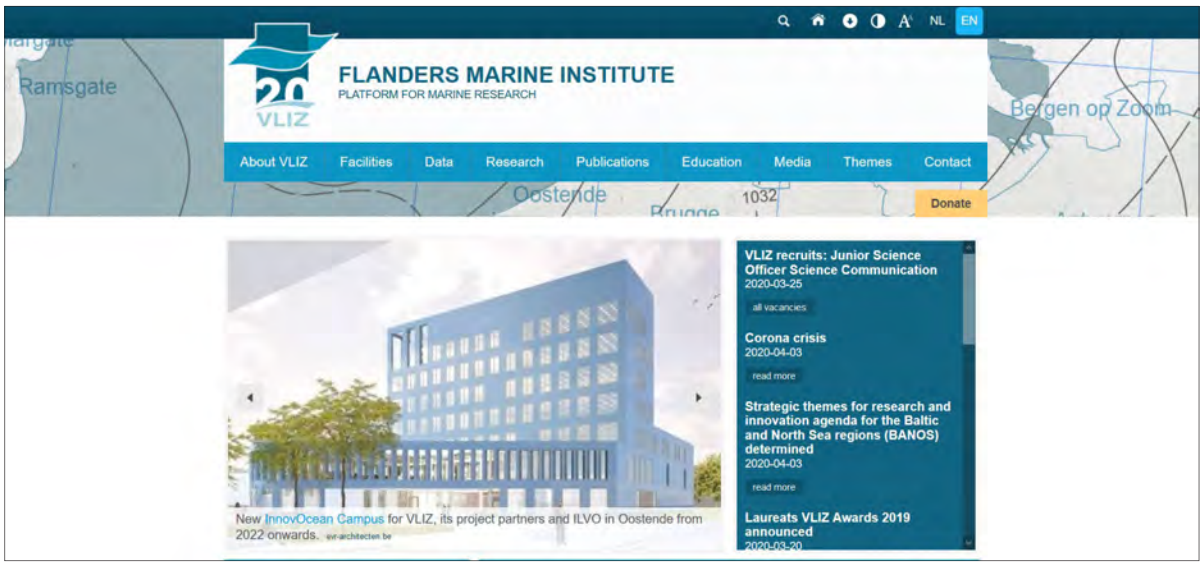
VISITORS TO THE VLIZ WEBSITES

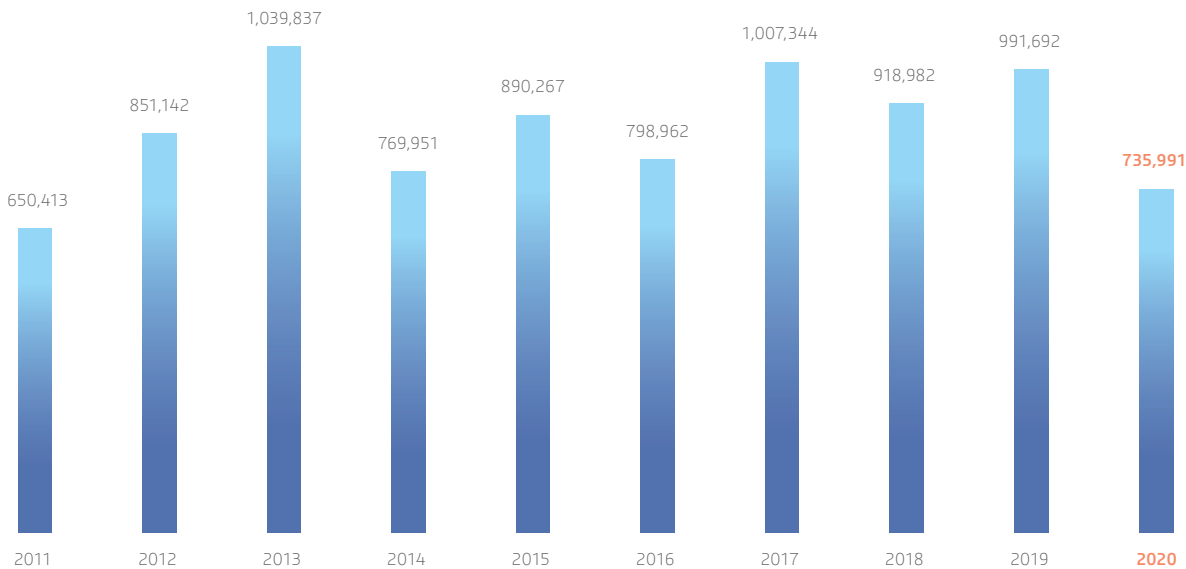
2020

735,991

UNIQUE VISITORS

The number of unique visitors to the informative websites managed by VLIZ (url: www.vliz.be).





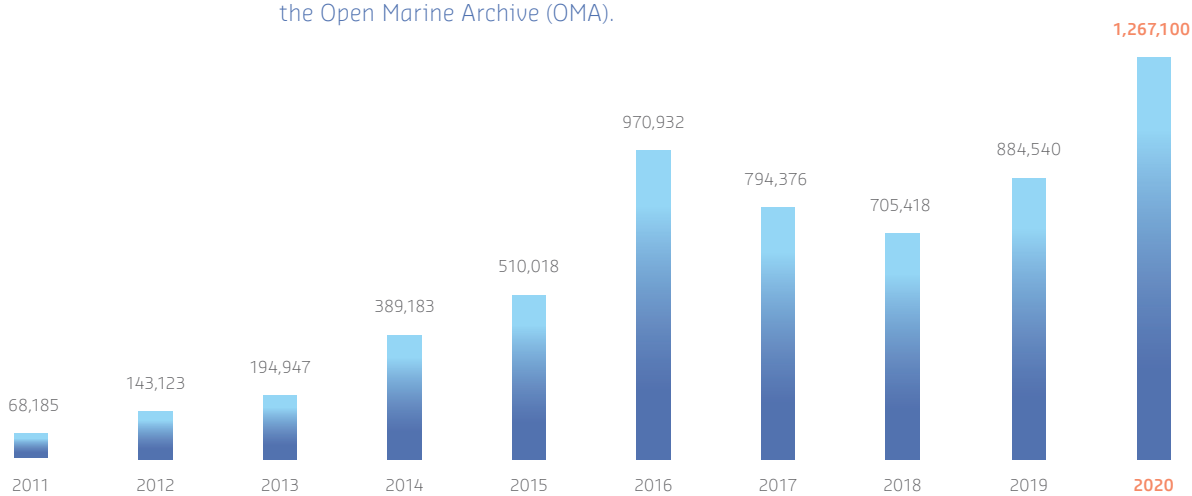
DOWNLOADS

2020

1,267,100

DOWNLOADS OPEN MARINE ARCHIVE

Total number of downloads from the Open Marine Archive (OMA).



30,099

UNIQUE TITLES DOWNLOADED [1]

Unique titles downloaded from the Open Marine Archive.

46,685

UNIQUE OPEN ACCESS TITLES [2]

Number of unique Open Access titles downloaded from the library collection.

1,989,131

OPEN ACCESS TITELS [3]

Total number of Open Access titles downloaded from the library collection.

[1] in 2019: 26,513; [2] in 2019: 39,982; [3] in 2019: 1,298,274

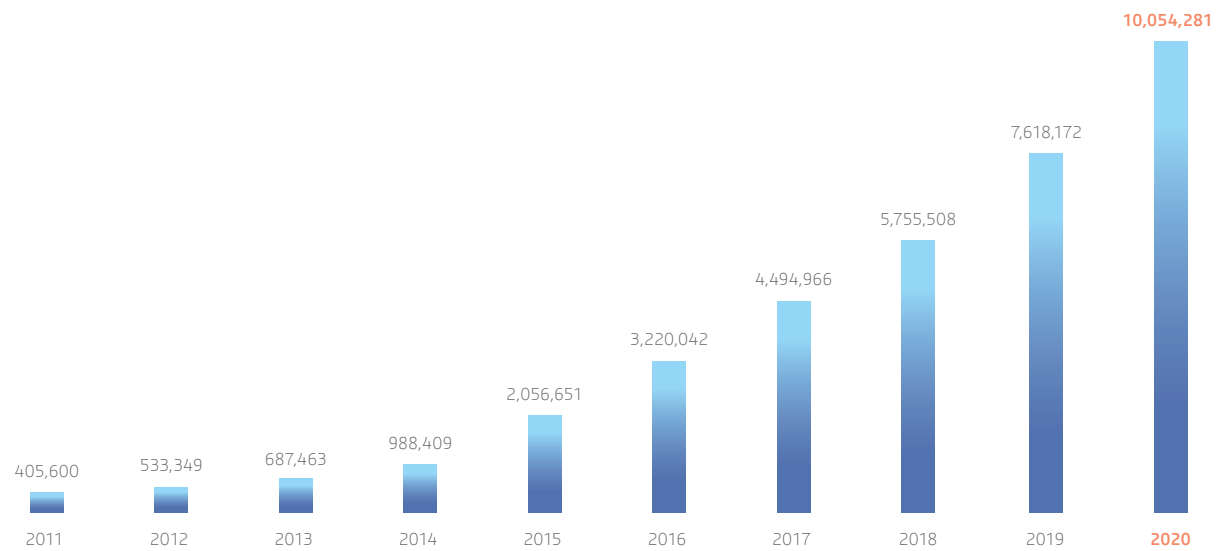
DATA DOWNLOADS

2020

10,054,281

NUMBER OF DATA DOWNLOADS SINCE 2006

In 2020, the number of data downloads was 2,331,287.



Cumulative figures

DATA DOWNLOADS

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Flemish Banks Monitoring Network	21,508	18,858	12,820	1,623	262	230	220	73	43	40
Sluice Dock	10,387	9,381	12,550	4,240	4,414	3,979	5,336	5,014	1,676	1,011
IOC Sealevel monitoring facility	85,538	92,516	119,348	284,518	1,052,948	1,145,428	1,248,812	1,237,284	1,839158	2,222,396
Marine Regions	4,339	6,291	7,944	9,087	9,628	12,743	16,633	19,715	20,706	24,100
WoRMS	75	121	183	224	53	118	129	106	230	222
EMODnet	210	373	700	780	797	776	831	1,052	644	1,309
ScheldeMonitor	249	209	569	474	140	159	87	174	165	603
MIDAS	NA	NA	NA	NA	NA	NA	54,533	39,580	10,709	81,606
TOTAL	**122,306**	**127,749**	**154,114**	**300,946**	**1,068,242**	**1,163,433**	**1,272,048**	**1,263,418**	**1,873,331**	**2,331,287**

DOWNLOADS OF INFORMATIVE PRODUCTS

2020

TEACHING PACKAGES

221
downloads in 2020 [1]

DE GROTE REDE

76,396
downloads in 2020 [2]

ZEEKRANT

1,736
downloads in 2020 [3]

VIDEOS

837,754
downloads since 2005

PHOTOGRAPHS

36,877,325
downloads since 2005

COMPENDIUM PRODUCTS

5,291
downloads since 2015

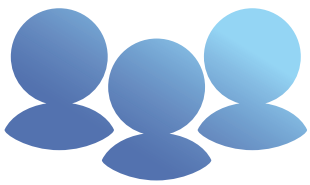
[1] in 2019: 320, 2014: 3,421, 2009: NA
Since mid-2018, visitors have no longer been required to log in so as to download educational packages, which may explain the decrease in the number of downloads since 2019.

[2] in 2019: 63,930; 2014: 55,329; 2009: 27,563

[3] in 2019: 1,319; 2014: 1,026; 2009: 937

REGISTERED USERS OF VLIZ DATABASES

2020



4,759

REGISTERED USERS[1]

The number of registered users of databases managed by VLIZ.

SUPPLIED DATA

2020

352

DATA REQUESTS[2]

The number of data requests (via data@vliz.be) in 2020.

SCIENTIFIC PROJECTS

SINCE 1999

187

SCIENTIFIC PROJECTS[3]

which have made use of RV Simon Stevin / RV Zeeleeuw since 1999.

See page 56 for a list of the research projects which made use of RV Simon Stevin in 2020.

(1) in 2019: 4,305
(2) in 2019: 336
(3) in 2019: 178

MASTER THESES, PHDs AND INTERNSHIPS

2020

45

MASTER THESES, PHDs AND WORK PLACEMENTS[1]

The number of master theses (8), PhDs (16) and internships (21) of which VLIZ is the (co-)supervisor.

See p. 53 for an overview of the master theses and internships in 2020.

ABSTRACTS AND LECTURES BY INVITATION

2020

27

ABSTRACTS AND LECTURES BY INVITATION[2]

The number of abstracts and lectures by invitation on research.

[1] in 2019: 36 incl. nine master theses, four PhDs and 23 work placement

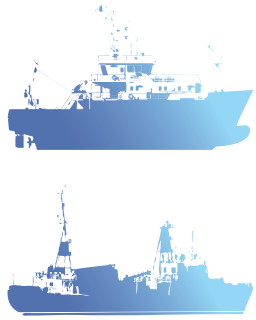
[2] in 2019: 31

NUMBER OF DAYS SPENT AT SEA

2020

243

SAILING DAYS



NUMBER OF DAYS SPENT AT SEA

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RV Simon Stevin	NVT	100	147	183	176	184	168	169	182	137
RV Zeeleeuw	152	57	NVT	NVT	NVT	NVT	NVT	NVT	NVT	NVT
RIB Zeekat	40	37	5	17	21	18	12	28	28	64
ROV Zonnebloem (ex. Genesis)	NVT	6	26	20	4	3	11	10	11	0
Third-party vessels	73	110	42	48	50	36	43	63	34	42
TOTAL	**265**	**310**	**220**	**268**	**251**	**241**	**234**	**270**	**255**	**243**

SAILING DAYS WITH INTERNATIONAL PARTICIPATION

2020

0

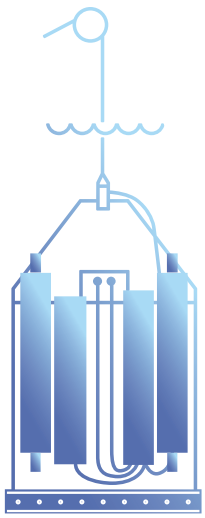
SAILING DAYS[1]

The number of days spent at sea in foreign waters and/or with the participation of international research groups.

[1] in 2019: 20

BORROWING OF VLIZ EQUIPMENT

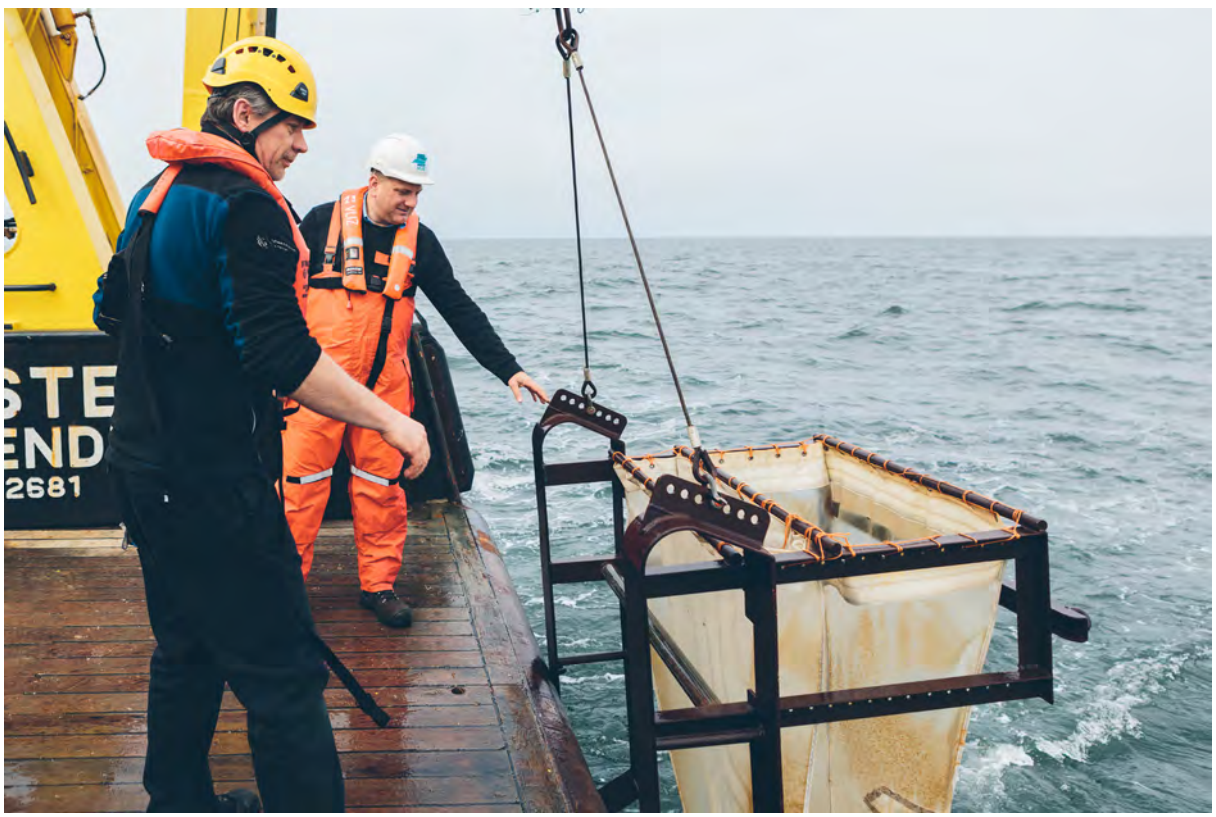
2020



17

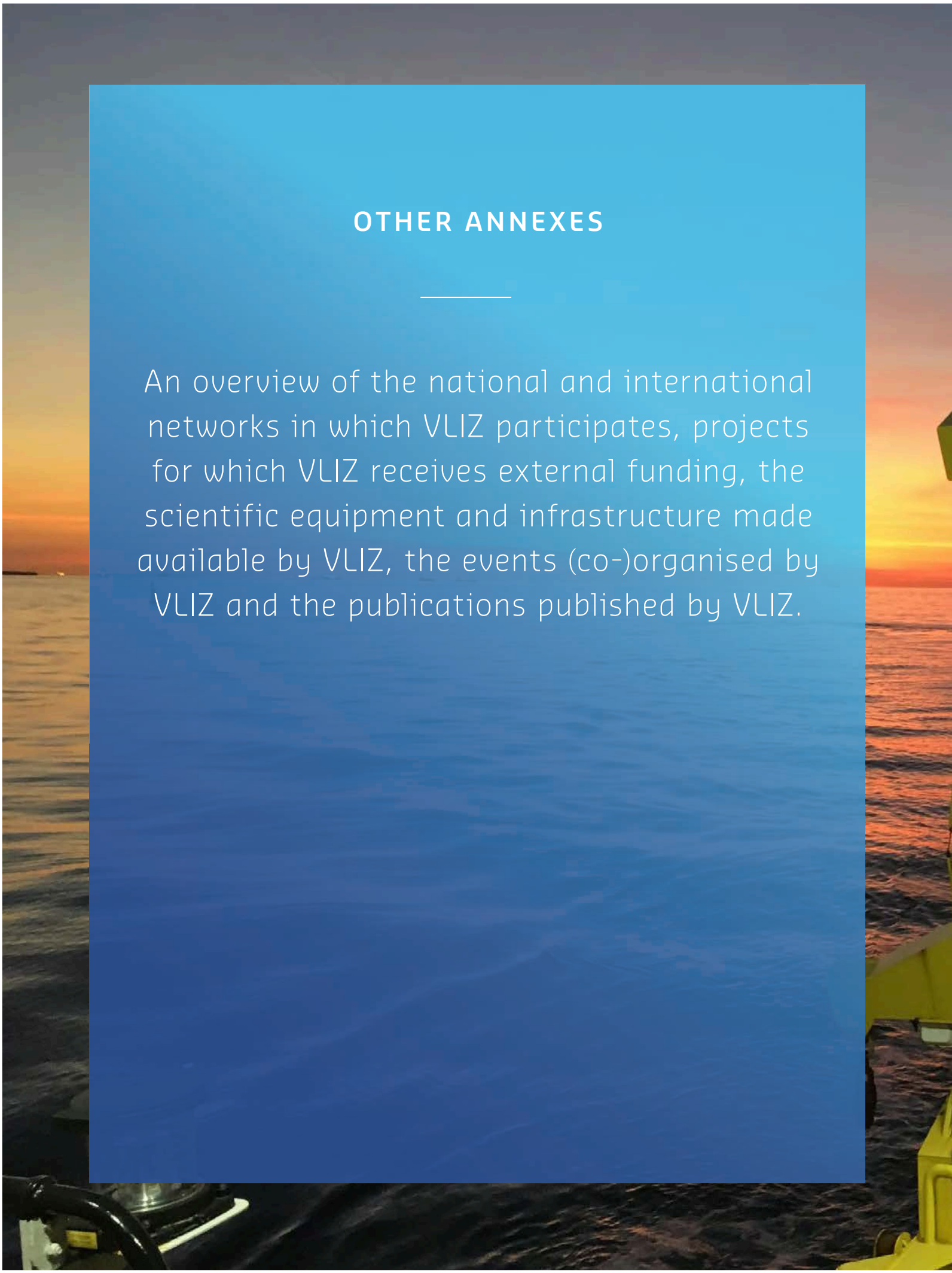
BORROWS [1]

The number of times that VLIZ equipment was borrowed.



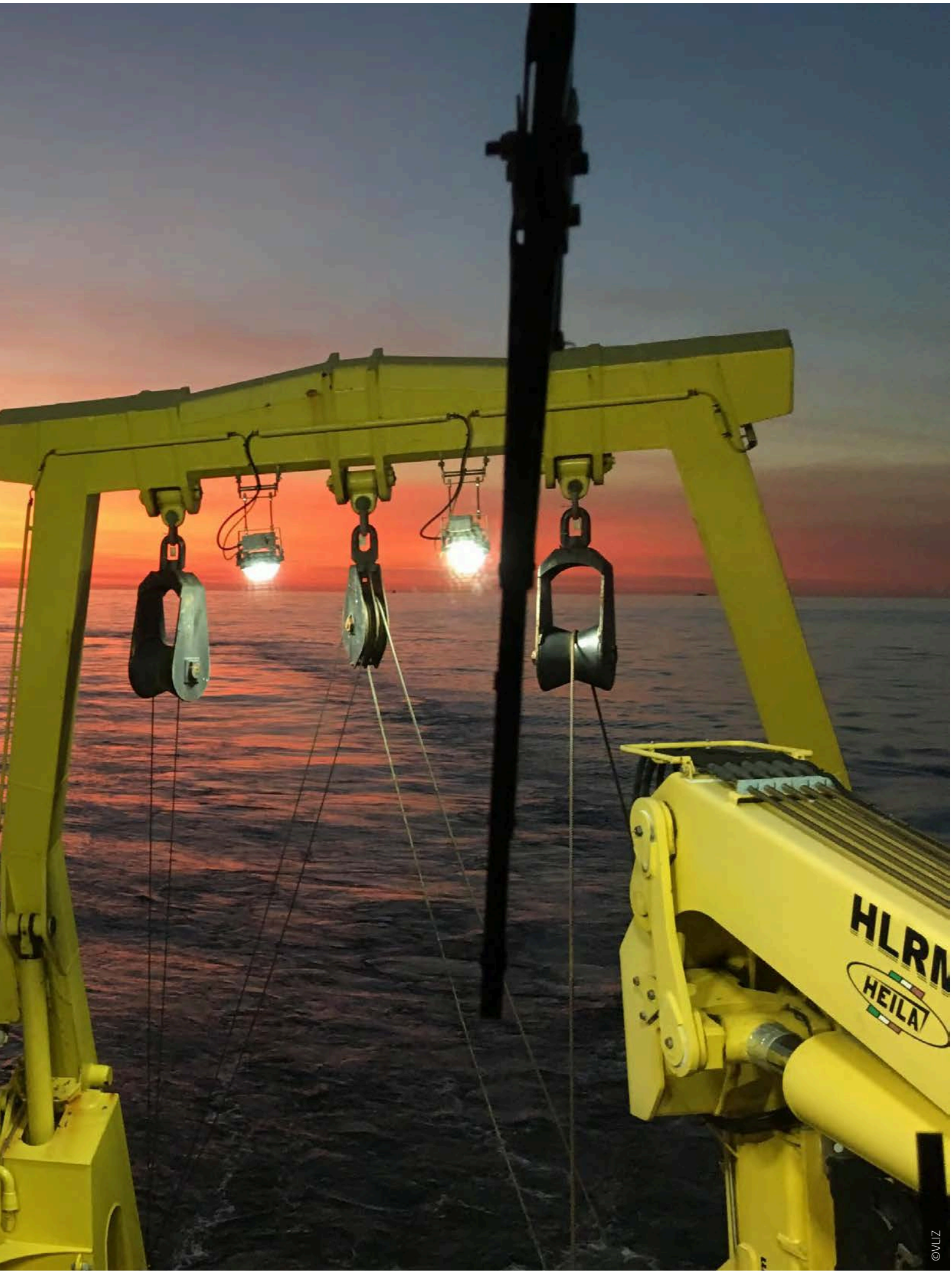
The hyperbenthic sledge deployed from the RV Simon Stevin. © VLIZ (Decombel)

[1] in 2019: 33



OTHER ANNEXES

An overview of the national and international networks in which VLIZ participates, projects for which VLIZ receives external funding, the scientific equipment and infrastructure made available by VLIZ, the events (co-)organised by VLIZ and the publications published by VLIZ.



NETWORKS

2020

NATIONAL NETWORKS AND ADVISORY AND CONSULTATIVE COMMITTEES

This list of national networks and (temporary or project-related) advisory and consultative committees in which VLIZ participates is not exhaustive.

- Advisory Committee PIO Paardenmarkt
- Advisory Committee of VNR Knokke-Heist & Westkust (ANB)
- Complex Project Coastal Vision: member of the Policy Committee and reporter of the Technical-Scientific Committee (TWC)
- Covenant for Sustainable Fisheries – WG Coast – SWG Education and Training
- The Blue Cluster: acting member of the Board of Directors, member of the steering committee and chairman of the scientific advisory board (WAR)
- Infrastructure expert group – TUA West
- Federal Council for Sustainable Development Belgium (FRDO-FCSS)
- Flanders Environmental Library Network (FELNET)
- Port of Ostend: Board of Directors
- KULeuven Industrial Advisory Board (KULeuven)
- IkHebEenVraag.be consortium (RBINS)
- KVAB science communication awards (KVAB)
- Program of measures for the Marine Strategy Framework Directive of the Marine Environment Service
- Marine Spatial Plan long-term vision 2050
- Marine Biotechnology Platform Flanders (MBPV)
- Monumentenwacht
- National and Flemish working group on Marine Litter
- NAVIGO scientific advisory group (NAVIGO)
- Network of the Liaison Agency Flanders-Europe (VLEVA)
- North Sea and Oceans Steering Committee (MNZ)
- Surveillance, early warning and rapid response – Invasive Alien Species steering committee
- Strategic steering committee of the Flemish Aquaculture Platform (SSAQ)
- Think Tank North Sea (TTNS)
- Flemish Europe Platform (VEP) including Working Groups on Horizon Europe (WG1), Pan-European initiatives and collaborations (WG2), Open Science (WG4), Digitalisation (WG5)
- Association of Geography Teachers (VLA)
- Association for Education in Biology (VOB)
- Flemish FWO-NCP: European Liaison Officers network (ELO)
- Flemish Supercomputer Centrum - User Committee (VSC)
- Flemish Knowledge Center for Citizen Science (SCIVIL)
- Flemish Unesco Commission (VUC
- Flemish Association for Libraries, Archives and Documentation Centres (VVBAD)
- VLIR Learning network
- Coast Working Group
- Science Information Network of the Flemish government (WIN)
- ZEEBteam Province of West Flanders

INTERNATIONAL NETWORKS AND ADVISORY AND CONSULTATIVE COMMITTEES

This list of international networks and advisory and consultative committees in which VLIZ participates is non-exhaustive and alphabetically ordered and does not include any steering committees and working groups linked to the implementation and management of project activities.

- Catalogue of Life Global Team, Editorial Board, Board of Directors (Catalogue of Life)
- Coastal Wiki Editorial Board (Coastal Wiki)
- Editorial board of Global Ocean Science Report van IOC-UNESCO (GOSR)
- European Association of Aquatic Sciences Libraries and Information Centres (EURASLIC)
- European Census of Marine Life (EuroCoML)
- European Centre for Information on Marine Science and Technology (EurOcean)
- European Marine Biodiversity Observatory System (EMBOS)
- European Marine Board (representative of the Research Foundation – Flanders) (EMB)
- European Marine Board Communications Panel (EMBCP)
- European Marine Science Educators Association (EMSEA)
- EU MSP network, Ocean Governance network
- European network of Marine Biodiversity and Ecosystem Functioning (MARBEF+)
- European Network of Marine Research Institutes and Stations (MARS)
- European Parliament InterGroup on Climate Change and Biodiversity (CCBD)
- European Parliament InterGroup on Seas and Ocean (SEARICA)
- European Regions Research and Innovation Network (ERRIN): active member in WG Blue Growth and WG BioEconomy
- European Research Vessel Organisation (ERVO)
- Executive Committee of the European Register of Marine Species (ERMS)
- Executive Council and General Assembly of the Intergovernmental Oceanographic Commission (IOC) of UNESCO
- Global Ocean Science Report-II: co-author, reviewer and member of the editorial board
- Global Sea Level Observing System Network (GLOSS)
- Group of European Data Experts in Research Data Alliance (GEDE-RDA)
- ICES Data and Information Group (ICES - DIG)
- ICES Working Group on Biodiversity Science (ICES - WGBIODIV)
- ICES working group on Marine Litter & Microplastics (WGML)
- ICES Working Group on Recreational Fisheries Surveys (ICES – WGRFS)
- ICES Working Group on the History of Fish and Fisheries (ICES - WGHIST)
- INSPIRE Thematic Working Group on Biogeographical Regions, Habitats and Biotopes and Species Distributions (INSPIRE)
- Integrated Carbon Observation System Marine Station Assembly (ICOS)
- Integrated Carbon Observation System Oceanographic Thematic Centre meeting (ICOS)
- International Coastal Atlas Network (ICAN)
- International Research Ship Operators (IRSO)
- IOC Expert Group on Ocean Capacity Development: and chair of Task Team on Clearinghouse Mechanism for the Transfer of Marine Knowledge
- IODE Group of Experts on Biological and Chemical Data Management and Exchange Practices (IODE - GE-BICH)
- IODE Network of National Oceanographic Data Centres (IODE NODC)
- Joint IAMSLIC/IODE Group of Experts on Marine Information Management (IAMSLIC/ IODE GE-MIM)
- Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans)
- JPI Oceans reference expert group on marine spatial planning (JPI Oceans) Working Groups: MSP/ICZM
- LifeWatch National Centers netwerk (LifeWatch - LiNC)
- Marine Knowledge Expert Group within the European Marine Observation and Data Network (EMODnet)
- National Marine Educators Association US (NMEA)
- News & Information Group of the Partnership for Observation of the Global Oceans (POGO - News & Information Group)
- Ocean Biogeographic Information System (OBIS)
- Ocean Communicators United (OCU)
- Ocean Economy Working Group events and network (OECD)

- Ocean Tracking Network (OTN)
- Oceans Past Initiative (OPI)
- Partnership for Observation of the Global Oceans (POGO)
- Sea Data Network (SeaDataNet II)
- SeaWeb Europe – Jury concours Olivier Roelinger (SeaWeb)
- Species 2000 (Species 2000)
- Steering Committee of the European Marine Biological Resource Centre (EMBRC)
- Steering Committee of the Flemish UNESCO Trust Fund (FUST)
- Steering Committee of the World Register of Marine Species (WoRMS)
- UN Decade of Ocean Science for Sustainable Development: global planning meeting, implementation plan, science plan
- Vlaams-Nederlandse Scheldecommissie m.e.r. (VNSC)
- Working Group on Invasive Alien Species (WGIAS)
- World Data System of the International Council for Science (ICSU - WDS)

VLIZ participates in steering committees of (research) projects in interface with the blue economy, such as SCAPE – Shaping Climate Change Adaptive Places (pilot sites for developments on the Flemish coast, Interreg V 2 Seas, 2016-2020), SARCC – Sustainable and Resilient Coastal Cities (pilot sites for development of dunes as seawalls on the Flemish coast, Interreg V 2 Seas, 2019-2022), TOPSOIL – salinification of the coastal zone (Interreg North Sea Region, 2015-2020), Socorro project (offshore corrosion, Interreg V 2 Seas, 2020-2022), Internet of Water Flanders (VLAIO, 2019-2023) and study Coastal Ecosystem Services (Department of Environment).

PROJECTS EXTERNAL FINANCING

VLIZ RECEIVED EXTERNAL FINANCING FOR COORDINATION, COMMUNICATION AND/OR DATA MANAGEMENT WITHIN THE SCOPE OF 60 PROJECTS IN 2020. MOST OF THESE PROJECTS WERE CARRIED OUT IN COOPERATION WITH RESEARCH GROUPS.

EU

AQUA-LIT – *Preventive measures for averting the discarding of litter in the marine environment from the aquaculture industry*
Duration: 01.01.2019 – 31.12.2020
https://aqua-lit.eu/
AQUA-LIT aims to provide the aquaculture sector with a sustainable toolbox to limit marine littering in 3 ways: prevention and reduction; monitoring and quantification; and removal and recycling. In addition, AQUA-LIT will evaluate the current policies and make policy recommendations to improve the decision-making process in the aquaculture sector.

ASSEMBLE Plus – *Association of European Marine Biological Laboratories Expanded*
Duration: 01.09.2017 – 30.09.2021
www.assembleplus.eu/
ASSEMBLE Plus operates under the umbrella of the European Marine Biological Resource Centre (EMBRC) and integrates 32 marine biological research stations worldwide. It provides scientists from academia, industry and policy with a high-quality programme of transnational and virtual access to marine biological research facilities, historical observation data and advanced training opportunities. VLIZ provides transnational access to the infrastructure offered within EMBRC and manages a work package concerning the improvement of virtual access to marine biological data, information and knowledge. UGent acts as a subcontractor of VLIZ for specific activities.

BANOS CSA – *'Towards a Baltic and North Sea research and innovation programme'*
Duration: 01.11.2018 – 30.04.2021
The general aim of BANOS CSA is to develop the necessary conditions for long-term coordination of joint research and innovation efforts in the countries surrounding the Baltic Sea and the North Sea through the setup of a joint research and innovation framework programme. BANOS CSA is coordinated by BONUS EEIG (TFEU Art 185) and represents the leading research and innovation funders of the states surrounding the Baltic Sea and the North Sea.

BASTA – *Boost Applied munition detection through Smart data inTegration and AI workflows*
Duration: 01.12.2019 – 30.11.2022
The focus of this proposal is on cost-efficient detection and identification of sea-dumped munition (whether buried below the seabed or not), both for regional scale reconnaissance (typical size of several km2) and for local scale surveys of known dump sites (verification of munition). The project is a collaboration between 2 research institutes and 2 industrial partners with a view to maximising the value of the research results.

Blue-Cloud – *Piloting innovative services for Marine Research & the Blue Economy*
Duration: 01.10.2019 – 30.09.2022
The project implements a practical approach to address the potential of cloud based open science to develop a set of services that demonstrate the potential of the Pilot Blue Cloud as a thematic EOSC cloud to support ocean research through a set of five pilot Blue-Cloud demonstrators.

COASTAL – *Collaborative land sea integration platform*
Duration: 01.05.2018 – 30.04.2022
https://h2020-coastal.eu/
COASTAL is a multi-actor project involving stakeholders in the development of business roadmaps and policy solutions for enhancing coastal and rural collaboration and synergies by combining local knowledge and scientific expertise in a co-creation process.

COST-ETN – *The European Aquatic Animal Tracking Network*
Duration: 05.01.2019 – 30.04.2020
This COST Action is aimed at integrating all independent regional telemetry initiatives into a pan-European biotelemetry network embedded in the international context of existing initiatives.

EMODnet – *European Marine Observation and Data Network*
Duration: continually since 2014
www.emodnet.eu
The European Marine Observation and Data Network (EMODnet) develops a data infrastructure to make marine data available so as to support scientists, policy makers and other end users within the scope of the new European maritime policy. VLIZ is responsible for the biological pilot project (www.emodnet-biology.eu). It will use the existing European atlas with distribution data of marine species (EurOBIS) as a basis and complete it. VLIZ is also involved in the chemical project of EMODnet and the Data Ingestion initiative. In addition, VLIZ is expanding the EMODnet Central Portal (www.emodnet.eu), which is intended to provide access to the data products and data collected within the EMODnet thematic networks. The EMODnet Secretariat is located at the InnovOcean site in Ostend.

EMOD-PACE – *EMODnet China – EMODnet PArtnership for China and Europe*
Duration: 19.02.2020 - 30.06.2022
Strengthening international ocean data through the EU's ocean diplomacy with China.

ENVRI FAIR – *ENVironmental Research Infrastructures building Fair services Accessible for society, Innovation and Research*
Duration: 01.01.2019 – 31.12.2022
http://envri.eu/envri-fair/
ENVRI-FAIR is the connection of the Cluster of Environmental Research Infrastructures (ENVRI) to the European Open Science Cloud (EOSC). Participating research infrastructures (RI) cover the subdomains Atmosphere, Marine, Solid Earth and Biodiversity/Ecosystems. The overarching goal is that at the end of the proposed project, all participating RIs have built a set of FAIR data services which enhances the efficiency and productivity of researchers, supports innovation and enables data- and knowledge-based decisions.

EOSC-LIFE – *Providing an open collaborative space for digital biology in Europe*
Duration: 01.03.2019 – 28.02.2023
EOSC-Life brings together the 13 Biological and Medical ESFRI research infrastructures (BMS RIs) to create an open collaborative space for digital biology. The projects aims to respond to the challenge of analysing and reusing the prodigious amounts of data produced by life-science. By publishing data and tools in a Europe-wide cloud, EOSC-Life aims to bring the capabilities of big science projects to the wider research community.

Eurofleets+
Duration: 01.02.2019 – 31.01.2023
Coordinated by IM (Ireland), the Eurofleets+ project brings together over 20 scientific institutions to take the first steps towards a coordinated European research fleet and associated infrastructure. Through the Eurofleets+ call we hope to get funding for a two week campaign on board of the RV Sanna in Nuuk, Greenland. We would like to use the VPR in two fjord systems (Godhabsfjord and Ameralik) and the shelf connecting these areas, to research the zooplankton distribution. This project would fit within the PhD of Anouk Ollevier (Understanding and optimizing zooplankton imaging observations).

GEANS – *Genetic tool for Ecosystem health Assessment in the North Sea region*
Duration: 01.03.2019 – 28.02.2022
GEANS is aimed at harmonising and consolidating existing DNA-based methods to ensure their application for assessing ecosystem health in the North Sea environment. A DNA sequence reference library will be compiled, current methods will be optimised and standardised, genetic indicators will be developed and a roadmap for management implementation will be provided.

IJI – *Common Facility and Distributed Notes Internal Joint Initiative*
Duration: 01.03.2020 – 28.02.2022
With this project LifeWatch ERIC aims to boost its construction and engages users in developing their research activities into the Virtual Research Environments of the e-Science Infrastructures. This demonstration project will work on the topic of non-indigenous and invasive species (NIS).

IP Booster *(service pack 1 & 5)*
Intellectual Property Booster (IP Booster) is a specialised professional IP service for public research organisations looking to realise value from their research results.
VLIZ has submitted a grant request for service pack 1 (initial ip audit) & service pack 5 (negotiating technology transfer).

JERICO-S3 – *Joint European Research Infrastructure of Coastal Observatories: Science, Service, Sustainability*
Duration: 01.02.2020 – 31.01.2024
JERICO-S3 will provide a state-of-the-art, fit-for-purpose and visionary observational RI, expertise and highquality data on European coastal and shelf seas, supporting world-class research, high-impact innovation and a window of European excellence worldwide.

Marine Regions – *Towards a standard for georeferenced marine names*
Duration: since 2011
www.marineregions.org
Marine Regions is a standardised geographic data system which makes geographic information on marine place names and maps freely available. It integrates geographic information on seas, oceans and undersea features, and indicates the boundaries of various marine areas throughout the world. 'Marine Regions' integrates the data and information from the VLIMAR Gazetteer (place name register) and the MARBOUND database (EEZ boundaries). Both global data systems have been developed by the Flanders Marine Institute and have demonstrated their added value for many users over the past few years. The combination of both databases is intended to benefit the different target groups.

Mission Atlantic
Duration: 01.09.2020 – 31.08.2025
The 'mission' of Mission Atlantic is to investigate how multiple pressures within and across important sub-areas affect the resilience of the Atlantic Ocean to future climate and societal changes. The project will tackle this question by advancing knowledge on ecosystem processes as well as applying new observation technology and state-of-the-art predictive capacity to develop an operational regional and basin-scale Integrated Ecosystem Assessment (IEA).

North Sea Wrecks – *an opportunity for blue growth (NSW)*
Duration: 01.11.2018 – 31.10.2022
The project will provide the tools required by planners, response organisations, economic actors and other stakeholders to assess the risks posed by shipwrecks and ammunition in the North Sea and propose risk mitigation solutions.

SeaBioComp – *Development and demonstrators of durable biobased composites for a marine environment*
Duration: 01.05.2019 – 01.08.2022
SeaBioComp will develop demonstrators using innovative bio-based thermoplastic composite materials with the following characteristics: (1) mechanical properties that are at least equivalent to the ones of conventional oil-based composites, (2) tailored durability according to the specific application (2 to >20 years), (3) reduced CO2 emission (30%) and reduced ecotoxic impact (due to microplastics).

SEA(A)BASS – *Data gathering of habitat specific biological and socio-economic information for the management of seabass*
Duration: 01.03.2020 – 28.02.2022
Data collection of habitat specific biological and socio-economic data for informed seabass management.

SeaDataCloud – *Further developing the pan-European infrastructure for marine and ocean data management*
Duration: 01.11.2016 - 30.04.2021
SeaDataCloud is a continuation of SeaDataNet, where professional data centres from 35 countries collaborate to make the data sets collected by the pan-European oceanographic research fleet and the new automated observation systems available within one efficiently distributed data system. SeaDataCloud aims at considerably advancing SeaDataNet services and increasing their usage, adopting cloud and HPC technology for better performance. SeaDataCloud is developing a Virtual Research Environment (VRE) to provide researchers with various functionalities to calculate oceanographic data products on the basis of in situ observations and remote sensing data.

WECANET – *A pan-European Network for Marine Renewable Energy*
Duration: 12.09.2018 – 11.09.2022
www.wecanet.eu
This pan-European network focuses on an interdisciplinary approach to marine wave energy that will contribute to large-scale WEC Array deployment by addressing the current bottlenecks.

FLEMISH GOVERNMENT, FLEMISH EGOVERNMENT COORDINATION UNIT (CORVE) AND EWI

EOSC ESFRI RDM – *Implementing EOSC: ESFRI driven Open Science*
Duration: 01.04.2019 – 30.07.2020
This project will make it possible to build expertise and knowledge across ESFRIs, expedite adoption of the VSC cloud resources by other scientific domains and allow ESFRIs to provide services to their communities within the context of the European Open Science Cloud (EOSC). It combines two ESFRI coordinating institutes (VIB and VLIZ) which did not collaborate at a Flemish level before. The project explores synergies in research infrastructures and possible collaborations.

Survival of coronaviruses in aquatic environment
Duration: 01.06.2020 – 01.10.2020
VLIZ can conduct policy-driven research and will investigate whether coronaviruses are resilient enough to transit from wastewater through rivers and into the North Sea. We aim to provide policy-relevant information on the survival of coronaviruses within the next 6 weeks, with an ultimate deadline for full reporting set in November.

FLEMISH GOVERNMENT, WATERWEGEN EN ZEEKANAAL (W&Z)

OMES – *Research on the environmental effects of the SIGMA plan*

Phase III: 16.07.2008-15.10.2009	Phase VIII: 01.02.2014 -30.04.2015
Phase IV: 01.10.2009-01.10.2010	Phase IX: 01.02.2016-30.04.2017
Phase V: 01.02.2011-30.04.2012	Phase X: 01.02.2017-30.04.2018
Phase VI: 01.02.2012-30.04.2013	Phase XI: 01.02.2018-30.04.2019
Phase VII: 01.02.2013-30.04.2014	Phase XII: 01.02.2020-30.04.2021

www.omes-monitoring.be/en
The OMES consortium has implemented this multidisciplinary monitoring programme, which was commissioned by Waterwegen en Zeekanaal, since 1995. Various components of the ecosystem are sampled: water quality, carbon cycle, phytoplankton, zooplankton, microphytobenthos, primary productivity and sediment characteristics. VLIZ is responsible for the integrated OMES database and ensures its dissemination through the OMES website (www.vliz.be/projects/omes).

FLEMISH GOVERNMENT, MARITIME ACCESS DIVISION

ScheldeMonitor – *Flemish-Dutch knowledge platform for research and monitoring of the Scheldt estuary*
Duration of current phase: 01.01.2015 - 31.12.2020; started in 2010
www.scheldemonitor.org
ScheldeMonitor is a Flemish-Dutch knowledge and information system for research and monitoring of the Scheldt estuary. This portal provides an overview of publications, institutions, projects, datasets, etc. related to research and monitoring in the Scheldt estuary as well as access to measurements and data products such as maps, charts and indicators.

ERDF FLANDERS

Blue Accelerator
Duration: 01.05.2018 – 30.40.2021
The Blue Accelerator project is aimed at creating so-called living labs where testing is possible under real marine conditions. The principal focus is on the development of an offshore test location (incl. platform) off the coast of Ostend.

FEDERAL GOVERNMENT, BELSPO

ANDROMEDA – *Analysis techniques for quantifying nano-and microplastic particles and their degradation in the marine environment*
Duration: 01.04.2020 – 31.03.2023
Within ANDROMEDA, in situ detection, efficient sampling and cost-effective laboratory methods will be developed and optimized to analyze microplastics. Approaches will be based on hyperspectral imaging, chemical markers and fluorometric detection techniques. Advanced analysis techniques making use of μFTIR, Raman imaging and SEM-EDX (amongst others) will be applied to quantify and characterize micro and nanoplastics.

AQUALOOKS – *Improving atmospheric correction and aquatic particle retrieval with bidirectional remote sensing data*
Duration: 01.06.2019 – 01.12.2021
This project mainly has remote sensing objectives (development of algorithms and validation of in situ data for multi-look satellite missions), but is also aimed at refining and further developing the autonomous radiometry platform PANTHYR, which was developed by VLIZ in the course of the HYEPRMAQ project.

HyperMaq – *Hyperspectral and multi-mission high resolution optical remote sensing of aquatic environments*
Duration: 01.12.2016 – 30.11.2020
In the HyperMaq project, hyperspectral satellite images will be calibrated. In partnership with the Directorate Natural Environment (OD Nature), VLIZ will conduct field measurements during regular and project campaigns. In addition, VLIZ ensures the development of a rotating platform to remotely position spectroradiometer systems for the calibration of light measurements during satellite passages.

NewSTHEPS – *New Strategies for monitoring and risk assessment of Hazardous chemicals in the marine environment with passive samplers*
Duration: 01.12.2014 – 03.08.2020
www.belspo.be/belspo/brain-be/projects/NEWSTHEPS_en.pdf
In this project, novel and integrated passive sampling techniques will be developed in marine waters. The focus is on the quantification of micropollutants and metals. VLIZ acts as subcontractor for the creation of a website and the data management activities relating to the further development of the INRAM and ENDIS-RISKS database.

PERSUADE – *ExPERimental approaches towards Future Sustainable Use of North Sea Artificial HarD SubstratEs*
Duration: 01.01.2018 – 15.04.2020
The project is aimed at the construction of an in-situ underwater hard-substrate garden where organisms will be collected for mesocosm experiments. The marine food chain near offshore artificial hard substrates will be imitated in the seawater tanks of the Marine Station Ostend (MSO). VLIZ supports the development of the underwater garden and provides technical assistance for the setup of the experiments.

TIMBERS – *3D Turbidity assessment through Integration of MultiBeam Echo-sounding and optical Remote Sensing*
Duration: 01.01.2019 – 31.12.2021
The goal of this project is to produce 3D turbidity profiles for seawater by combining remote sensing with multi-beam echo-sounding (MBES). A method will be developed to deduce vertical turbidity profiles from measured MBES backscatter values and combine them with turbidity data from the top layer of the water column on the basis of satellite observations.

TrIAS – *Tracking Invasive Alien Species: Building a data-driven framework to inform policy*
Duration: 01.01.2017 – 31.12.2020
www.belspo.be/belspo/brain-be/projects/TrIAS_en.pdf
TrIAS is primarily aimed at the establishment of a data mobilisation framework for alien species on the basis of different data sources. The combination of these data with a Belgian checklist of alien species will feed indicators for the identification of emerging species, their level of invasion in Belgium, changes in their invasion status and the identification of areas and species of concern that could be negatively impacted. The second objective is to develop data-driven procedures for risk evaluation based on risk modelling, risk mapping and risk assessment.

FEDERAL GOVERNMENT, MARINE ENVIRONMENT DIVISION

Drawing up an inventory of 100-year-old shipwrecks
Duration: 01.01.2020 – 01.04.2020
The present assignment concerns the drawing up and completion of an inventory of shipwrecks recognised as heritage and located at the bottom of the Belgian part of the North Sea. The inventory must contain the necessary information to determine for which wrecks protective and clean-up measures must be taken as a matter of priority in order to safeguard the conservation. In addition, recommendations must be made regarding necessary and useful protection measures for the shipwrecks.

RecVis – *Marine recreational fisheries monitoring*
Duration: 01.05.2016 – 31.12.2021
www.recreatievezeevisserij.be
Development and implementation of a protocol for systematic monitoring of the recreational fishing sector (fishing effort, location, catches, etc.).

PROVINCE

Book Pierre-Joseph Van Beneden
Duration: 01.01.2020 – 31.12.2020
This project revives the figure of this 19th-century Belgian professor / biologist Pierre-Joseph van Beneden, with intensive ties to the city of Ostend, through a romanticized life story written by author Doris Klausing.

STEM4sea
Duration: 01.09.2019 – 30.06.2021
In partnership with the St.Lodewijkscollege primary school in Bruges, VLIZ is developing a set of STEM activities on ocean topics for teachers in primary education. With the support of the province of West Flanders.

Zeekrant
Duration: Since June 2007
Annual publication of VLIZ in partnership with the province of West Flanders with all sorts of facts on the sea and beach.

FWO (FORMER HERCULES FOUNDATION)

LifeWatch – *Flemish contribution to LifeWatch.eu*
Duration: continually since 01.04.2012
www.lifewatch.be
The Flemish contributions to the LifeWatch infrastructure are coordinated by the Research Institute for Nature and Forest (INBO) and, as far as the marine component is concerned, by the Flanders Marine Institute (VLIZ). Flanders contributes to the central LifeWatch infrastructure with a taxonomic backbone which is developed through various projects, including the World Register of Marine Species or WoRMS (www.marinespecies.org) and EurOBIS (www.eurobis.org). WoRMS aims to provide an authoritative and comprehensive list of names of marine organisms, including information on synonyms. EurOBIS is a distributed system which makes it possible to simultaneously search for biogeographic information on marine organisms in various data sets. EurOBIS has been developed within the MarBEF network and serves as the European node of OBIS. As part of LifeWatch, Marine Regions is a standardised geographic data system which makes geographic information on marine place names and maps freely available. It integrates geographic information on seas, oceans and undersea features, and indicates the boundaries of various marine areas throughout the world. Marine, freshwater and terrestrial observatories are developed regionally within LifeWatch, as are different biodiversity data systems, web services and models.

DISARM – *Dumpsites of Munitions: Integrated Science Approach for Risk and Management*
Duration: 01.01.2020 – 31.12.2023
www.disarm.be
The Paardenmarkt is one of the many munition dumpsites in our oceans. A few m below the seafloor, ca. 35.000 tons of WW1 chemical munition are buried. The present scientific knowledge is insufficient to make any reliable judgement on the state of the site. The DISARM project aims to address the knowledge gaps, but will go an important step further to develop an integrated scientific approach to support risk assessment and management of marine chemical munition dumpsites worldwide.

EMBRC – *European Marine Biological Resource Centre*
Duration: 1 January 2015 – 31 December 2020
www.embrc.eu
EMBRC will be a distributed infrastructure for research and training at leading marine research stations in Europe. It constitutes a virtual network of marine stations for the study of marine species, biodiversity and ecosystem functioning, developmental biology and evolution, biogeochemistry, global change, biomedical sciences and marine products. EMBRC will provide end users from SMEs, academia and industry with access to marine biodiversity, associated metadata and extractable products. Services include access to marine species (model species), biobanks, dedicated 'omics' platforms, structural biological facilities and imaging (microscopy, cytometry, etc.). The Flemish contribution is coordinated by the Marine Biology Laboratory (Ghent University) and VLIZ, with VLIZ making seagoing and land-based facilities available and providing technical support.

FOSB – *Flemish Open Science Board*
Duration: 01.09.2020 – 30.06.2021
The Flemish Open Science Board (FOSB) holds the mandate to outline the Open Science Policy in Flanders. This board unites all Flemish stakeholders in a shared vision for the future with regard to Open Science and EOSC, and, supported by technical working groups, advises the policy on steps to be taken to fully integrate Flanders into the international Open Science landscape.

ICOS – *Integrated Carbon Observing System*
Duration: 01.01.2012 – 31.12.2020
www.icos-infrastructure.eu
ICOS provides the long-term observations required to understand the present state and predict future behaviour of the global carbon cycle and greenhouse gas emissions. VLIZ performs the oceanographic measurements which Flanders will transfer to ICOS through the University of Antwerp. VLIZ performs measurements aboard RV Simon Stevin to this end. Within the scope of ICOS, VLIZ collaborates with NIOZ-Yerseke and the University of Liège (Alberto Borges).

INTERTIDE – *INTERcomparison of TIDal Estuaries in NW Europe*
Duration: 01.01.2018 – 31.12.2020
INTERTIDE focuses on an inter-estuarine comparison of both abiotic and biotic parameters to get insight into fundamental relations underlying the development of these systems.

Marine Robotics Centre
Duration: as from 01.01.2018
VLIZ develops a Marine Robotics Centre to promote innovative marine research activities by means of autonomous platforms. The construction of a seawater pipeline to the Marine Station Ostend is also being realized.

Creating negative CO_2 emissions via enhanced silicate weathering (ESW)
Duration: 01.02.2019 – 31.12.2022
This SBO project will tackle the problem of climate stabilisation by examining the feasibility of an innovative negative emission technology called 'Enhanced Silicate Weathering' (ESW) integrated into coastal zone management. The goal is to perform fundamental research into efficiency, mutual benefits and environmental impact of the technique in order to examine if and how it can be developed into a sustainable and cost-effective approach to the evaluation of negative emissions.

UNESCO

GLOSS – *Sea Level Station Monitoring Facility*
Duration: continually since 2008
www.ioc-sealevelmonitoring.org
A worldwide service for real-time sea level monitoring by means of measuring stations in cooperation with GLOSS (Global Sea Level Observing System) and IOC (Intergovernmental Oceanographic Commission).

VLAIO (FORMER IWT – STRATEGIC BASIC RESEARCH)

Coastbusters 2.0
Duration: 01.02.2020 – 31.01.2023
An innovative collaboration between public and private parties, Coastbusters 2.0 will implement various reef facilitating systems to induce the formation of a biogenic mussel bed in an early stage and to achieve a nature inspired design (NID) for coastal defence.

PLUXIN – *Plastic Flux for Innovation and Business Opportunities in Flanders*
Duration: 01.09.2020 – 31.08.2023
A first prerequisite to take effective plastic remediation measures is to know where and when action should be taken. A central objective in this project is to develop a two-dimensional-horizontal (2DH) plastic dispersal model. The model will be calibrated and validated with experiments and field sampling data. Plastics will be identified from remote sensing reflectance data through image recognition algorithms ('Machine Learning'), hence resulting in an automated plastic detection method.

PROBIO – *PROspection for BIOactive compounds in the North Sea*
Duration: 01.11.2019 – 30.04.2022
Marine environments offer a wide variety of bioresources containing potential bioactive compounds. This project wants to unravel the underexplored potential of a selection of local organisms by screening their bioactive compounds. This project will generate an essential knowledge base to identify possible uses in commercial applications, which will trigger further research to foster new commercial developments in various sectors.

SUMES – *Sustainable Marine Ecosystem Services*
Duration: 01.09.2020 – 31.08.2023
The SUMES project aims to develop a model to assess the impact of human-induced changes on the ecosystem, its structure (e.g. biodiversity) and function (e.g. food chains, biogeochemistry), its capacity to provide marine ecosystems goods and services (e.g. sequestration of carbon) and subsequent consequences.

TOERISME VLAANDEREN

Operation North Sea 1944-45 exhibition
Duration: 20.09.2018 – 03.01.2021
This exhibition, held at Seafront Zeebrugge, deals with the liberation of Walcheren on 1 November 1944 by Canadian, Polish, British, French, Norwegian, Dutch and Belgian troops. This project is conducted in collaboration with the War Heritage Institute, Westtoer, the Flemish government and Nationale Loterij/Loterie Nationale.

FUST – FLANDERS UNESCO TRUST FUND FOR SCIENCE

Ocean InfoHub – Ocean Teacher Global Academy
Duration: 01.05.2020 – 01.05.2022
The IOC Ocean InfoHub Project (OIH) aims to streamline access to ocean science data and information for management and sustainable development.

OTGA – *Ocean Teacher Global Academy*
Duration: since 2005
The OceanTeacher Global Academy (OTGA) project aims at building equitable capacity related to ocean research, observations and services in all IOC Member States. UNESCO/IOC's International Oceanographic Data and Information Exchange (IODE) programme has built a comprehensive Learning Management System (OceanTeacher) that, in combination with classroom training, has trained nearly 2000 students from 120 countries since 2005. This success demonstrates the expertise within IODE and its potential to expand the use of this methodology to other IOC programmes. The OTGA project will complement other existing training programmes of the IOC.

PacMAN – *Pacific Islands Marine bioinvasions Alert Network*
Duration: 01.05.2020 – 01.05.2022
The project will develop a national invasive species monitoring system as well as an early-warning decision-support tool for Pacific SIDS, offering a user-friendly dashboard indicating the potential presence of invasive species (including pathogens and pest species) or risk of invasions to support local management.

OTHERS

Microfish – *Microplastic biomonitoring in fish: Assessing the feasibility and conducting a pilot field study*
Duration: 01.08.2020 – 31.05.2021
Financing: CEFIC-ICCA (the European Chemical Industry Council & the International Council of Chemical Associations).
In this project microplastics in the digestive system of commercial fish species will be identified and quantified. VLIZ supports by performing a statistical power analysis and characterizing the plastics (μFTIR).

Baseline meadurement plastic flux
Duration: 01.05.2020 – 31.12.2020
Financing: OVAM/Fostplus.
On behalf of OVAM/FostPlus, VLIZ will coordinate and report a plastic baseline measurement in the context of the Flemish Integrated Marine Litter Action Plan. UGent, KULeuven, UAntwerpen perform tasks as a subcontractor of VLIZ.

The Rich North Sea
Duration: 15.10.2020 – 30.06.2021
Financing: programme 'The Rich North Sea' - TRNS (The Netherlands).
A TRNS project set up in collaboration with Cefas wants to investigate the influence of windmill parks at sea on the marine biodiversity, by creating biotope and habitat maps of the North Sea. The focus is on macrobenthic data. They do not limit themselves to data from within windmill parks, but also data collected in the wider North Sea area, including those regions from before the windmill parks were actually there. From EurOBIS, we will provide relevant data and information for this project.

TRAINEES, MASTER STUDENTS AND STUDENT EMPLOYEES

2020

TRAINEES AND MASTER STUDENTS SUPERVISED BY VLIZ IN 2020

NAME	DIVISION	SCHOOL/UNIVERSITY
Bakeev Dias	Trainee IT	Howest, Bruges
Bilsen Anton	MSc student Research	KU Leuven
Brackx Aran	Trainee Research	Vesaliusinstituut, Ostend
Bruil Femke	Trainee Research	Van Hall Larenstein Hogeschool
Budzynska Iga	Trainee Research	Ghent University
de Hemptinne Matthieu	Trainee Marine Robotics Centre	ECAM Brussels engineering school
Deblaere Filip	Trainee Science Communication	Artevelde hogeschool, Ghent
Depestel Fabian	Trainee Research	Howest, Bruges
D'Hurlaborde Alice	Trainee Data Centre	Ghent University
Esselens Lore	Trainee Research	Wageningen University
Eugenio Raymond Alfonso	Trainee Research	Ghent University
Fojtek Christian	MSc student Research	Ghent University
Goedefroo Nanou	MSc student Research	Ghent University
Henkens Symine	MSc student Research	Vrij Universiteit Brussel
Lagaisse Rune	MSc student Research	Ghent University
Loop Harold	Trainee Marine Robotics Centre	ECAM Brussels engineering school
Katz Lea	Trainee Data Centre	University of Liège
Mathy Kim	Trainee Research	University of Liège
Melita Bianca	Trainee Research	University of Liège
Miserque Noémie	MSc student Research	UC Louvain/Université of Namur
Muhammad Iqram	Trainee Research	Vrij Universiteit Brussel
Özmeriç Semih	MSc student Research	KU Leuven
Pena Vanessa	Trainee Data Centre	University of Antwerp
Robbe Terryn	Trainee Research, Science Communication, Policy information	KU Leuven
Savineau Eloise	Trainee Research	University of Southampton
Schmitt Tristan	Trainee Research	Vesaliusinstituut, Ostend
Sorigué Pol	Trainee Research	Ghent University
Uvin Karel	MSc student Research	Ghent University
Van de Vloet Antoine	Trainee Research	Ghent University

STUDENT EMPLOYEES ACTIVE AT VLIZ IN 2020

NAME			
Burgoa Javier	Del Castillo Moro Cecilia	Goedefroo Nanou	Sorigue Pol
Callewaert Celine	Devos Eli	Lagaisse Rune	Stubbe Liesje
d'Hondt Guillaume	Dewaegemaeker Benito	Lescroart Celie	Yang Chenrui

SCIENTIFIC EQUIPMENT AND INFRASTRUCTURE

2020

OVERVIEW OF SCIENTIFIC EQUIPMENT AND INFRASTRUCTURE FOR SCIENTIFIC RESEARCH MADE AVAILABLE BY VLIZ

WATER SAMPLING AND CHARACTERISATION EQUIPMENT

- Acoustic current meter (ADCP) and speed log
- Dissolved inorganic carbon analysis system
- System for oxygen analysis by means of Winkler titration
- Seawater acidity analysis system
- Aquadopp current profiler (ADCP)
- Signature 1000 ADCP (profiling, wave measurements & turbulence)
- Acoustic node with 1 subseanode and one topside node
- Broadband acoustic recorders
- Carrousel 6 x 4 litre Niskin bottles
- CTD equipped with sensors for:
  - Photosynthetically active radiation (PAR)
  - Dissolved oxygen and redox potential (ORP)
  - Turbidity
  - Chlorophyll a
- Aeolian sand transport monitoring network
- Fluorometer
- 10 litre GO-FLO bottle
- Methane sensor
- Multibeam sonar
- 5 litre Niskin bottle
- Nutrient analysis system
- Underway data acquisition system on board RV Simon Stevin with:
  - Thermosalinograph
  - Fluorometer
  - Atmospheric pCO_2 analysis system
  - Oxygen sensor
  - Turbidity sensor
- Secchi disk
- Total alkalinity sensor
- LISST-100X and LISST-200X turbidity meter

BENTHIC SAMPLING AND SEAFLOOR MAPPING EQUIPMENT

- Bowers & Connelly multi-corer
- Cohesive Strength Meter (CSM)
- Hamon grab
- Multibeam sonar
- Multibeam sonar system for shallow areas
- Multi-transducer sub-bottom echosounder
- Reineck Box Corer
- Sediment Profile Imaging (SPI)
- Singlebeam sonar
- Van Veen grab
- Sparker
- Gilson dredge
- Vibrocorer

BIOLOGICAL SAMPLING EQUIPMENT

- Bat recorder
- Bongo net
- Beam trawl
- Otter trawl
- Pelagic otter trawl
- Bowers and Connelly multi-corer
- Porpoise detectors – C-PODs
- Fast repetition rate Fluorometer (FrrF)
- FlowCam
- Flow cytometer
- Fluorometer
- Gilson dredge
- Hamon grab
- Hydrophone
- Hyperbenthic sledge
- MIK net
- Neuston net
- Sieving table
- Apstein plankton net
- CalCoFi plankton net
- Vertical plankton net – WP2
- Plankton pump
- Reineck Box Corer
- Sediment Profile Imaging (SPI) system
- Sensor network for large birds
- Van Veen grab
- VEMCO fish acoustic receiver network in the Western Scheldt and coastal waters
- Video plankton recorder
- Wilson auto-siever
- Zooscan

MISCELLANEA

- Augmented reality sandbox
- Biological laboratory
- Bird tracking camera
- Chemical laboratory
- Compressor for filling diving cylinders
- Core repository – cold store for drill cores
- DGPS hand-held unit
- Freezers
- Weather station on board RV Simon Stevin:
  - Atmospheric pCO_2
  - Wind speed
  - Wind direction
  - Temperature
  - Atmospheric pressure
- Microscopes
- Mini ROV
- Multi-sensor mooring with acoustic release
- Underwater camera
- RIB Zeekat
- ROV 'Zonnebloem' (former 'Genesis')
- AUV 'Barabas'
- USV 'Adhemar'
- Video frame
- Water tanks for marine organisms
- Web cameras

RESEARCH PROJECTS

2020

RESEARCH PROJECTS WHICH MADE USE OF RV SIMON STEVIN IN 2020

MARINE RESEARCH GROUP	PROJECT
Antwerp University	Electrified sediment ecosystems
Directorate Natural Environment & UGent - Marine biology	Marine environment and installation of windmill farms
Directorate Natural Environment & UGent - Marine biology	PERSUADE
FPS Economy – Continental Shelf Service	Monitoring of sand and gravel extraction
ILVO -Fisheries	Combituig
ILVO -Fisheries	Demersal Young Fish Survey (DYFS)
ILVO -Fisheries	Flatfish in windmill farms
INBO	Monitoring of seabirds
RBINS	Monitoring in windmill farms
Ugent - GhEnToxLab	Temora metabolism
Ugent - Marine biology	Sea bass
Ugent - Marine biology	HOTMIC
Ugent - Marine biology	Hyperbenthos in windmill farms
VLIZ	DISARM
VLIZ	North Sea Wracks
VLIZ	Fish migration in coastal areas
VLIZ	Acoustice habitats
VLIZ	Metatranscriptomics of plankton
VLIZ	ICOS
VLIZ	LifeWatch measurement campaigns
VLIZ	PROBIO
VLIZ	PLUXIN
VLIZ	Microplume
VLIZ	TIMBERS

In 2020, RV Simon Stevin was used for 24 projects (including 9 new ones), amounting to a total of 137 days at sea.
A total of 187 unique projects have made use of RV Simon Stevin since 2000.

RESEARCH PROJECTS WHICH MADE USE OF THE MARINE STATION OSTEND IN 2020

MSO INFRASTRUCTURE USED	REASON	MARINE RESEARCH GROUP
Water tanks for marine organisms	Experiments PERSUADE	Directorate Natural Environment & Ghent University - Marine biology
Climate room and LifeWatch (Biology) lab	Assemble+ project - collection of phytoplankton specimens	University of Montpellier
e-DNA and microscopy lab	Assemble+ project – collection of sediment bacteria strains	University of Naples
Water tanks for marine organisms	Project UNITED - colonization of flat oyster & sugar kelp	Ghent University, ILVO, Colruyt
Water tanks for marine organisms	Project Seabass	Ghent University - Marine biology
Courtyard	Investigate weather impact on concrete	Ghent University - Lab Magnel-Vandepitte
Courtyard	North Sea Wrecks -setup of corrosion experiments	Antwerp Maritime Academy
Mesocosms	Enhanced Silicate Weathering	VLIZ, Antwerp University
Lab infrastructure	ICOS	VLIZ
Lab infrastructure	LifeWatch	VLIZ

The Marine Station Ostend was used for marine scientific projects, educational purposes, visits, meetings and open house days for 139 days in 2020.

EVENTS

IN 2020

EVENTS (CO)ORGANISED BY VLIZ IN 2020

DATE	TITLE	LOCATION	ROLE OF VLIZ	NUMBER OF PARTICIPANTS	KPI12 EVENT
20-21.01.2020	NIOZ - Departments EDS & COS	InnovOcean site, Ostend	organiser	42	
23.01.2020	LifeWatch Maritime Industry Workshop	InnovOcean site, Ostend	organiser	25	
29.01.2020	Kick-Off meeting DISARM	InnovOcean site, Ostend	organiser	21	
03-07.02.2020	LifeWatch-WoRMS MolluscaBase Workshop	InnovOcean site, Ostend	organiser	23	
24-28.02.2020	LifeWatch-WoRMS Thecostraca Editor Workshop	InnovOcean site, Ostend	organiser	11	
28.02.2020	Advancing data stewardship: insights from environmental and life science research infrastructures	InnovOcean site, Ostend	co-organiser	33	
14.03.2020	Big Shell Counting Day	10 Flemish coastal municipalities	co-organiser	80	✔
27.05.2020	Webinar: Virtual walk on the beach – spring (World Ocean Day)	Online	organiser	150	✔
10.06.2020	Meeting 'Maritiem Informatie Kruispunt'	InnovOcean site, Ostend	organiser	18	
24.06.2020	Webinar: Virtual walk on the beach – summer	Online	organiser	103	✔
30.06.2020	Foundation-stone laying ceremony – InnovOcean Campus	InnovOcean Campus – ILVO	co-organiser	59	✔
07.07.2020	CB2 Workshop on optimal anchor and reef design	InnovOcean Campus – ILVO	co-organiser	10	
19.08.2020	Press conference Book Doris Klausing 'Oesters en Walvissen'	MSO – Warehouse 5, Ostend	co-organiser	25	
13.09.2020	Heritage Day 2020 – Oosteroever	MSO – Warehouse 5, Ostend	co-organiser	60	✔
18.09.2020	VLIZ members' day	InnovOcean site, Ostend	organiser	85	
25.09.2020	LifeWatch Maritime Industry Advisory Board Meeting	Online	co-organiser	25	
30.09.2020	Webinar : Virtual walk on the beach – autumn	Online	organiser	56	✔
06.10.2020	Signing Ceremony MoU VLIZ-DIGEIM	Official residence Governor	co-organiser	7	
15-16.10.2020	LifeWatch.be Users & Stakeholders Meeting	Online	organiser	89	
22.10.2020	Science Day 2020	Online	organiser	64	
09.11.2020	Pluxin Kick-Off Meeting	Online + InnovOcean Site	co-organiser	20	
21.12.2020	Webinar : Virtual walk on the beach – winter	Online	organiser	95	✔

VLIZ (co)organised 22 events with a total of 1,101 participants.

PUBLICATIONS

2020

DE GROTE REDE

- Issue 51 (May 2020) with leading articles on: Something is moving at sea: the Marine Spatial Plan 2020-2026; The Southern Netherlands Prize Papers; Do fish feel pain? Number of copies: 9,000 **(KPI12 publication)**
- Issue 52 (November 2020) with leading articles on: Coastal breeding birds; Recreational fishing at sea; The sea sacred from De Panne to Doel. Number of copies: 9,000 **(KPI12 publication)**

VLIZINE/TESTEREP MAGAZINE

A total of 12 issues of the e-newsletter VLIZINE/Testerep magazine appeared in 2020, including a total of 188 articles. **(KPI12 publication)**

VLIZ LIBRARY ACQUISITIONS

A total of 41 Library Acquisitions lists were forwarded by e-mail in 2020.

ZEEKRANT

Seys, J.; Bogaert, K.; Maelfait, H.; De Smet, B.; Tavernier, I. (Ed.) (2020). Zeekrant 2020: annual publication of the Flanders Marine Institute and the province of West Flanders, Ostend. 8 p. Number of copies: 60,000. **(KPI12 publication)**

BOOKS

A selection of books (co-)written or contributed to by VLIZ employees:

- Klausing, D. (2020). Oesters en walvissen: De queeste van professor Pierre-Joseph Van Beneden, stamvader van het zeeonderzoek. Flanders Marine Institute (VLIZ): Ostend. ISBN 978 9492 043 986. 156 pp. **(KPI12 publication)**
- Public Space; De Bruyn, J.; Troch, S.; Mabilde, J.; Vanderheiden, S. (2020). Kust en klimaat: gids voor een gebiedsgerichte aanpak. Department of Environment: Brusselss. ISBN 9789040304156. 161 pp.
- Bacchi, A.; Berqué, F.; Fockedey, N.; Hruszczak, S.; Torreele, E.; Trigos, S.; Vallet, E. (2020). Guide des espèces à l'usage des professionnels: Pour un marché des produits de la mer durables. Édition 2020. Ethic Ocean: Paris. ISBN 978-2-9565028-1-4. 214 pp. **(KPI12 publication)**

VLIZ SPECIAL PUBLICATIONS

- Nr. 84: Mees, J.; Seys, J. (Ed.) (2020). Book of abstracts – VLIZ Marine Science Day. Ostend, Belgium, 18 March 2020. *VLIZ Special Publication,* 84. Flanders Marine Institute (VLIZ): Ostend. Viii + 95 pp.
- Nr. 85: Monbaliu, J.; Mertens, T.; Bolle, A.; Verwaest, T.; Rauwoens, P.; Toorman, E.; Troch, P.; Gruwez, V. (Ed.) (2020). CREST Final scientific report: Take home messages and project results. *VLIZ Special Publication,* 85. Flanders Marine Institute (VLIZ): Ostend. ISBN 978-94-920439-0-0. 145 pp.
- Nr. 86: Verleye, T.; De Raedemaecker, F.; Vandepitte, L.; Fockedey, N.; Lescrauwaet, A.-K.; De Pooter, D.; Mees, J. (2020). Niet-inheemse soorten in het Belgisch deel van de Noordzee en aanpalende estuaria. *VLIZ Special Publication,* 86. Flanders Marine Institute (VLIZ): Ostend. ISBN 9789464206005. 623 pp.

PUBLICATIONS

2020 (CONTINUATION)

VIDEO AND AUDIO

- De Smet, B.; Seys, J. (2020). Video series 'VLIZ boekentip'. Series of book reviews by VLIZ employees. Flanders Marine Institute (VLIZ): Ostend. www.vliz.be/nl/multimedia/videogalerij?album=5392 **(KPI12 publication)**
- De Smet, B.; Fockedey, N.; Wittoeck, J.; Seys, J. (2020). Video series 'VLIZ Achter de Schermen'. Flanders Marine Institute (VLIZ): Ostend www.vliz.be/nl/multimedia/videogalerij?album=5334. **(KPI12 publication)**
- De Smet, B.; Tavernier, I.; Seys, J. (2020). Video series 'Slow Television'. Flanders Marine Institute (VLIZ): Ostend www.vliz.be/nl/multimedia/videogalerij?album=5394. **(KPI12 publication)**
- De Smet, B.; Fockedey, N.; Roobrouck, L.; Lips, J.; Seys, J. (2020). Audio series 'VLIZ factcheck'. Series of 5 audio fragments (Dutch spoken). Flanders Marine Institute (VLIZ): Ostend www.vliz.be/nl/audioreeks-vliz-factcheck. **(KPI12 publication)**
- Chaerle, P.; Copejans, E.; Seys, J. (Ed.) (2020). Algal blooms. Animation movie (NL + EN). Flanders Marine Institute (VLIZ): Ostend. 2:58 min. http://www.vliz.be/nl/multimedia/videogalerij?album=5420&pic=143491 **(KPI12 publication)**
- Chaerle, P.; Copejans, E.; Seys, J. (Ed.) (2020). Algae: The Start of a New Beginning. Animation movie (NL + EN). Flanders Marine Institute (VLIZ): Ostend. 4:06 min. http://www.vliz.be/nl/multimedia/videogalerij?album=5420&pic=143493 **(KPI12 publication)**
- Chaerle, P.; Copejans, E.; Seys, J. (Ed.) (2020). The Diversity of Algae. Animation movie (NL + EN). Flanders Marine Institute (VLIZ): Ostend. 3:52 min. http://www.vliz.be/nl/multimedia/videogalerij?album=5420&pic=143495 **(KPI12 publication)**

A1 PUBLICATIONS BY VLIZ EMPLOYEES (KPI1)

- **Amadei Martínez, L.; Mortelmans, J.; Dillen, N.; Debusschere, E.; Deneudt, K.** (2020). LifeWatch observatory data: phytoplankton observations in the Belgian Part of the North Sea. *Biodiversity Data Journal 8*: e57236. https://hdl.handle.net/10.3897/bdj.8.e57236
- Boyen, J.; Fink, P.; Mensens, C.; **Hablützel, P.I.**; De Troch, M. (2020). Fatty acid bioconversion in harpacticoid copepods in a changing environment: a transcriptomic approach. *Phil. Trans. R. Soc. Lond. (B Biol. Sci.)* 375(1804): 20190645. https://hdl.handle.net/10.1098/rstb.2019.0645
- Boyle, D.; **Catarino, A.I.**; Clark, N.J.; Henry, T.B. (2020). Polyvinyl chloride (PVC) plastic fragments release Pb additives that are bioavailable in zebrafish. *Environ. Pollut.* 263(Part A): 114422. https://hdl.handle.net/10.1016/j.envpol.2020.114422
- Bruneel, S.; Verhelst, P.; **Reubens, J.**; Baetens, J.M.; Coeck, J.; Moens, T.; Goethals, P. (2020). Quantifying and reducing epistemic uncertainty of passive acoustic telemetry data from longitudinal aquatic systems. *Ecological Informatics* 59: 101133. https://hdl.handle.net/10.1016/j.ecoinf.2020.101133
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Flanders Marine Institute
InnovOcean site
Wandelaarkaai 7
8400 Ostend, Belgium

Tel.: +32 [0]59 34 21 30
E-mail: info@vliz.be
www.vliz.be