

EMBRC: 2020 annual report



EMBRC

EUROPEAN
MARINE
BIOLOGICAL
RESOURCE
CENTRE



EMBRC-HQ, Paris

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Letter from the Executive Director

Dear reader,

I am pleased to present EMBRC's 2020 annual report. Over the following pages you will discover our activities and progress throughout 2020. This was of course a very complicated year with the onset of the COVID-19 pandemic, bringing many unexpected and unforeseen challenges. Despite the various obstacles, I am proud of how our team dealt with the situation, always bringing a smile and optimism, and meeting for impromptu picnics and *vin chaud!*

As a 'distributed research infrastructure' (RI), perhaps the biggest challenge we faced was the inability to meet and discuss in-person the many issues we deal with in operating a complex and diverse organisation. We had to learn how to rely on new communication tools and fit meaningful conversation into two-hour video-conference slots! Nonetheless, we have all long bemoaned our constant travel, the lost time and environmental footprint, and we have now finally weaned ourselves off our jet-set lifestyles, flying around Europe attending meetings. We now have a much better understanding of what a meeting really requires and what can be dealt with as efficiently online.

But it was not just EMBRC management that faced challenges from COVID. Our users and operators encountered overnight closures of facilities, services and travel bans, bringing all research in EMBRC to a halt. Our Operators had to move fast to ensure the maintenance of cultures, experiments, and the living organisms in our facilities. Yet we still managed to provide services to nearly 200 users through EMBRC. We were able to provide services remotely to limited extent and have consequently started looking into which services can be offered remotely, as well as on-site.

In 2020, we continued to work to improve the process by which researchers use our



services, to make this as seamless as possible for them as well as for our Operators. To make it easier for users to identify relevant services, we completely redid our online service catalogue, as part of our website redesign. All nine of our member countries updated their available services, resulting in a new online catalogue - which, as of end 2020, counted 443 services.

We also continued our participation in ongoing and new H2020 projects. I am particularly excited about joining the AtlantECOⁱ project, which will better coordinate research in the Atlantic Ocean between Europe, Africa, Latin America, and North America, and apply a novel, unifying framework to enable a better understanding and management of its ecosystem services. We will also be part of a project named DOORSⁱⁱ, which will kick off in 2021. It will strive to harmonise research on and enhance understanding of the Black Sea, and enable EMBRC to start interacting with stakeholders in this very interesting and diverse region.

The EU-funded projects are significant in that they they represent EMBRC's involvement in the European, RI community (life science and environmental RIs), as well as its commitment to contributing to collaborative, innovative science with partners in Europe and beyond.

The EMBRC team saw several exciting

additions at headquarters (HQ) level, with the hiring of a new Communications Officer, Sabrina Gaber, and Access and Benefit Sharing (ABS) Compliance Officer, Arnaud Laroquette, in April and May, respectively. Ioulia Santi also joined the team from EMBRC Greece in the capacity of Observation, Data and Service Development Officer.

With COVID reducing travel and other activities, we were able to spend significant time and effort on implementing the EMBRC Science Strategy. In 2020, EMBRC saw the initiation of two new EMBRC flagship projects, one of which is the European Marine Omics Biodiversity Observation Network (EMO BON). EMO BON aims to build a coordinated European contribution to global genomic observation efforts. This will link to the second EMBRC flagship project to bring together our bioprospecting capabilities into a biodiversity pipeline, helping researchers and companies develop new tools, products, medicines and treatments from the sea. These additional flagships will open a new chapter for EMBRC in the services and capabilities we can offer our user communities in Europe and beyond.

Finally, it has been fantastic to see EMBRC communications finally take off. This year has seen a step change in our communications capabilities, with a brand new website focussed on clearly explaining EMBRC and making applications to our services much simpler and easier for our users. The huge work of completely redesigning our website has enabled us to revisit and clarify many of our key messages. In addition, we reinvigorated our social media platforms, regularly updating them with new and exciting content allowing people to discover the importance of the oceans and the huge potential of their biodiversity.

As we head into the United Nations (UN) Decade for Ocean Science (2021-2030), as a European RI, we have the responsibility to support our research communities in all of their activities. This means adapting to changing needs and demands of researchers, as well as looking to the future to identify the

main challenges and how we can help our user community to tackle them. This is reflected in our continuous drive to improve and facilitate access to our facilities and services, delivering high-quality and innovative services; it can also be seen in our continuous effort to develop our existing marine organism expertise through new flagship projects, increasing collection and model organism diversity. We will also continue to work as ambassadors for marine biological research, generating visibility for our community and acting as an enabler in collaborations between large initiatives and projects, in Europe and abroad.

Finally, I would like to thank everyone who supports EMBRC: our members, committees, and technicians. Their continued investment and involvement are what allows us to enable exciting, relevant and impactful science. You are the heart of our RI.

I hope you enjoy reading the report and discovering the world of EMBRC in 2020.

Sincerely,



Nicolas Pade, Executive Director

Mission, vision, values

Our mission is to:

- Provide access to marine biological organisms and their habitats for experimental purposes and applied research;
- Promote the sustainable use of marine resources;
- Deepen fundamental knowledge on marine organisms and their role in the environment, pushing the frontiers of science;
- Explore marine biodiversity for new products, inspiration, and innovation;
- Promote the use of marine experimental models in mainstream science

Our vision is to:

Advance the understanding of life in the oceans and to sustainably harness its potential for the benefit of humankind.

What we value:

EMBRC values quality and reproducibility in science, and holds itself to the highest ethical standards for working with living organisms, while promoting 'FAIR' (Findable, Accessible, Interoperable and Reusable) data principles.

We value the democratisation of science and support equal access to marine biological resources and experimental facilities.



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2020 in numbers



¹ Includes projects that started in 2020 and which received a positive funding decision and will start in 2021.

² Includes EMBRC-related publications, (co-)authored by EMBRC and/or related to an EMBRC-coordinated project or resulting from EMBRC services. Publications not explicitly acknowledging EMBRC are not reported.

Highlights from 2020

Initial collaboration with the European Molecular Biology Laboratory (EMBL), setting the stage for the future MoU

Final meeting of the CORBEL project (2 Mar.), featuring presentations by researchers who used EMBRC services (among others)

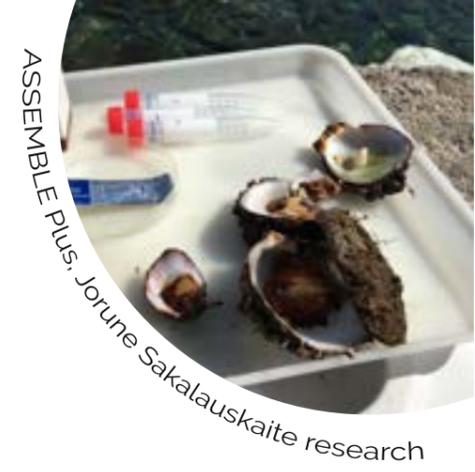
EMBRC ABS Officer joins the team;
6th General Assembly (GA) meeting;
Signed a collaboration agreement with EuroBioImaging



Production of new EMBRC video, featured on EMBRC's new YouTube channel (filming pictured above)

EMBRC 2021 work programme developed;
ASSEMBLE Plus GA;
EBB (European Marine Biological Resource Centre Biobank) GA

7th EMBRC GA voted to launch a 2-year pilot project to support the European Marine Omics Biodiversity Observation Network (EMO BON);
Conclusion of OSD 2020



ASSEMBLE Plus. Jorune Sakalauskaite research



Participation in the 'EMSO Conference - preparing for UN Decade of Ocean Science' (12-14 Feb. 2020);
Publication of the RI-VIS Communications Toolkit, targeted at enhancing RI communications³

First meeting of the EMBRC Omics Observatory Group;
EMBRC Communications Officer joins the team

ASSEMBLE Plus Ocean Sampling Day, OSD (starting 21 June) - a campaign where marine biologists around the globe participate in sampling surface waters of the world's coastal areas;
Creation of Bioprospecting Working Group

Start of the AtlantECO project involving EMBRC



Ibon Cancio, Ocean Sampling Day 2020

New website launched!
EuroSea Workshop on 'European Regional Genomic Observatories: operationalising omics & eDNA in regional ocean observation'

³RI-VIS toolkit lead author: Rita Costa Abecasis from EMBRC-PT partner CCMAR

About EMBRC

The European Marine Biological Resource Centre (EMBRC) was established in 2013 to advance fundamental and applied marine biology and ecology research - while promoting the development of blue biotechnologies. In 2018, the European Commission awarded EMBRC the status of a European Research Infrastructure Consortium (ERIC). That same year, EMBRC was also designated an 'ESFRI Landmark' on the 2018 European Strategy Forum on Research Infrastructures (ESFRI) Roadmap.

Today, EMBRC enables access to services, facilities and technology platforms in its 45 sites in 9 European countries in support of robust, cost-effective and efficient research.

We work across a wide range of research areas and with diverse stakeholders, including academia, industry, technology and education.



Why EMBRC?

Marine biodiversity constitutes a major resource for fundamental science, especially with the onset of genomics and related post-genomics experimental approaches. Today, with the application of new genomic tools to marine organisms, marine biology is becoming as sophisticated as terrestrial biology. This fundamental shift, which brings marine life to the forefront of biology, widens the scientific scope of marine model organisms. Marine biodiversity is an increasingly important resource for food, energy and industrial applications.

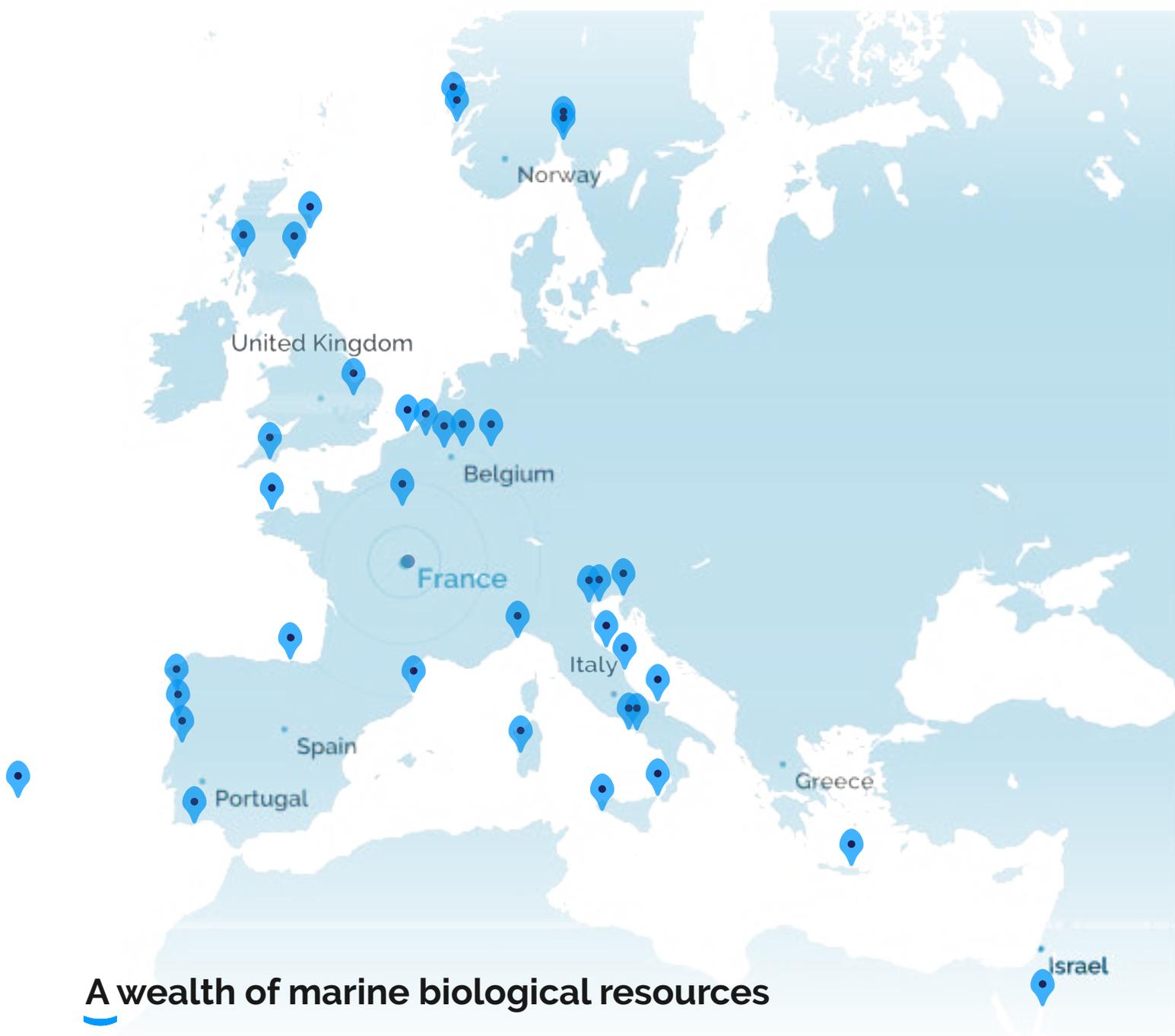
EMBRC plays an important role in today's marine research landscape by supporting users internationally to pursue cutting-edge, high-impact research to tackle today's pressing issues.

What's a research infrastructure (RI)?

RIs are 'facilities that provide resources and services for research communities to conduct research and foster innovation'. There are several RIs in Europe working across different scientific areas. EMBRC is part of the life science RI community (<https://lifescience-ri.eu>) and the ENVRI community of environmental RIs (<https://envri.eu>).

EMBRC members

EMBRC has nine member countries encompassing approximately 45 marine stations. Our members include: Belgium, France, Greece, Israel, Italy, Norway, Portugal, Spain, and the United Kingdom. For the full list of EMBRC sites and operators (indicated in the map below), see the Annex.



A wealth of marine biological resources

Our member countries offer a wealth of marine biological diversity and ecosystems for research and innovation purposes, as well as laboratories and facilities dedicated to their study. By making their services, resources, and expertise available to European and international research/innovation communities, we hope to push the frontiers of marine biological science and promote marine solutions to address societal issues (eg global warming, food shortages) and develop novel products, including drugs and food supplements.

EMBRC services

EMBRC services offer researchers extensive possibilities to enhance their marine biology and ecology research. In particular, we offer:

- Access to a broad range of wild and cultured marine organisms;
- Broad geographic coverage: our services span from the Arctic to the Antarctic, offering a wide variety of marine habitats and the ability to study them *in situ* and *ex situ* using our experimental facilities;
- A highly flexible infrastructure, able to accommodate most research needs and experimental set-ups, *in* and *ex situ*;
- Experienced technical staff and broad experience in marine organisms and research methods;
- Research and development in new tools, techniques, and experimental platforms for marine biological and ecological research.

The provision of services is our primary activity. We make it easier for users to conduct innovative marine biology and ecology research by providing access to cutting-edge services, facilities, resources, knowledge and more at our 45 marine stations and institutes across Europe. Our service categories include:



Ecosystem access



Biological resources



Experimental facilities



Technology platforms



E-services



Training & library services



Accommodation & catering

To find out which services are available and where, potential users can explore our service catalogue (www.embrc.eu/services/service-catalogue) and contact us to see how we can meet their research needs (access@embrc.eu).

Within these service categories, we support different kinds of research, as detailed below.

Research areas

We support both fundamental and applied research. Fundamental research areas include: environmental science, conservation, taxonomy, ecology, physiology, evolution and development, microplastics, climate change impact, and microbiome.

Applied research areas include husbandry, culturing of commercially important species, algae biomass production, aquaculture, biomedical research, pharmaceutical research, cosmetics, nutraceutical research, agronomy, and biotechnology.

Services in 2020

The COVID-19 pandemic outbreak had a significant impact on the number of users hosted by EMBRC stations, and overall access to EMBRC services. EMBRC users traditionally prefer physically accessing the platforms, ecosystems, and organisms. As such, many planned visits were postponed until travel is again possible.

In 2020, we continued to coordinate the H2020-funded 'ASSEMBLE Plus'ⁱⁱⁱ project, which brings together 36 marine stations and institutes (including many of EMBRC's own stations) to provide research and networking opportunities to scientists in Europe and beyond. The statistics listed below include services used through ASSEMBLE Plus, as well as all additional EMBRC-provided services⁴. For more information on ASSEMBLE Plus, see the box below and the Projects section.

About ASSEMBLE Plus

ASSEMBLE Plus (Association of European Marine Biological Laboratories Expanded) provides scientists from academia, industry and policy with a quality-assured programme of Transnational Access (TNA) and Virtual Access (VA) to EMBRC services. The goal is to stimulate European excellence in fundamental and applied research in marine biology and ecology, thereby improving our knowledge- and technology-base for the blue economy, policy and education purposes.

Learn more: www.assembleplus.eu



Service requests and geographic distribution of users

In 2020, EMBRC received a total of 319 access requests, with 290 being approved. This represents an increase from 2019, where 267 access requests were submitted and 227 were approved (Fig.1). A total of 92 access requests, or a total of 188 users, were postponed due to COVID-19 (note: an access request can involve more than one user).

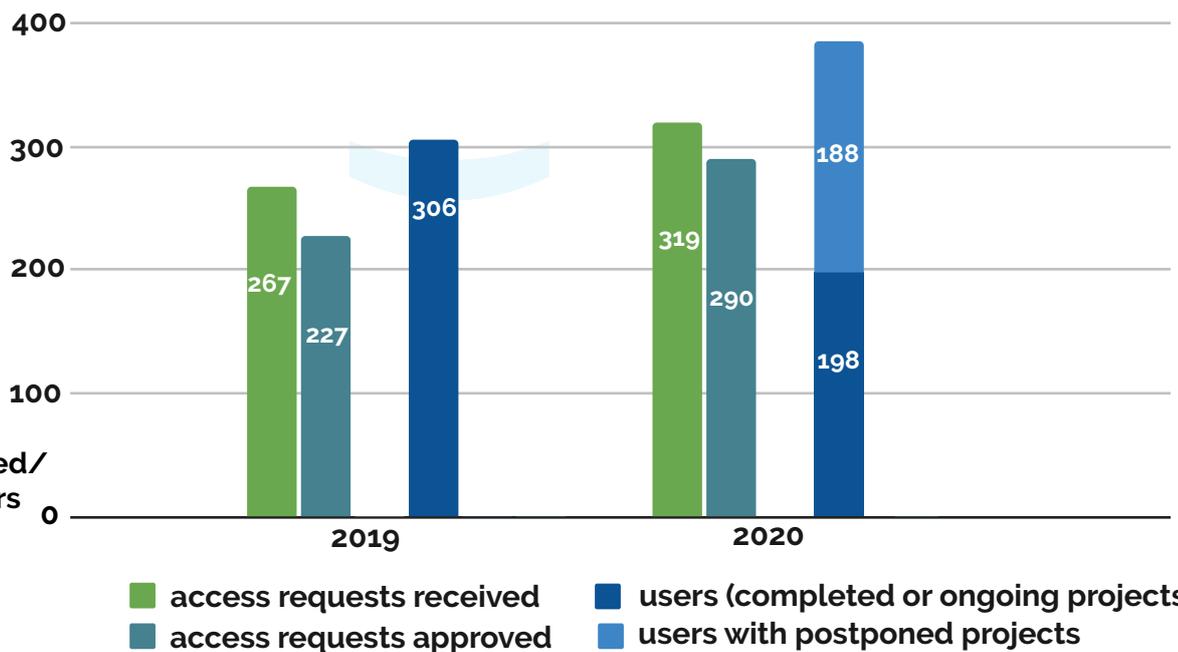


Figure 1: Access requests received/ approved & users (2019-2020)

For a breakdown of applications to EMBRC member countries versus applicant home country, see the Annex.

⁴In 2020, 50.8% of EMBRC services came through the ASSEMBLE Plus programme, with the remaining 49.2% being requested/provided through other national or international, institutional, and/or training programmes, as well as researchers' own funding.

Service requests and geographic distribution of users

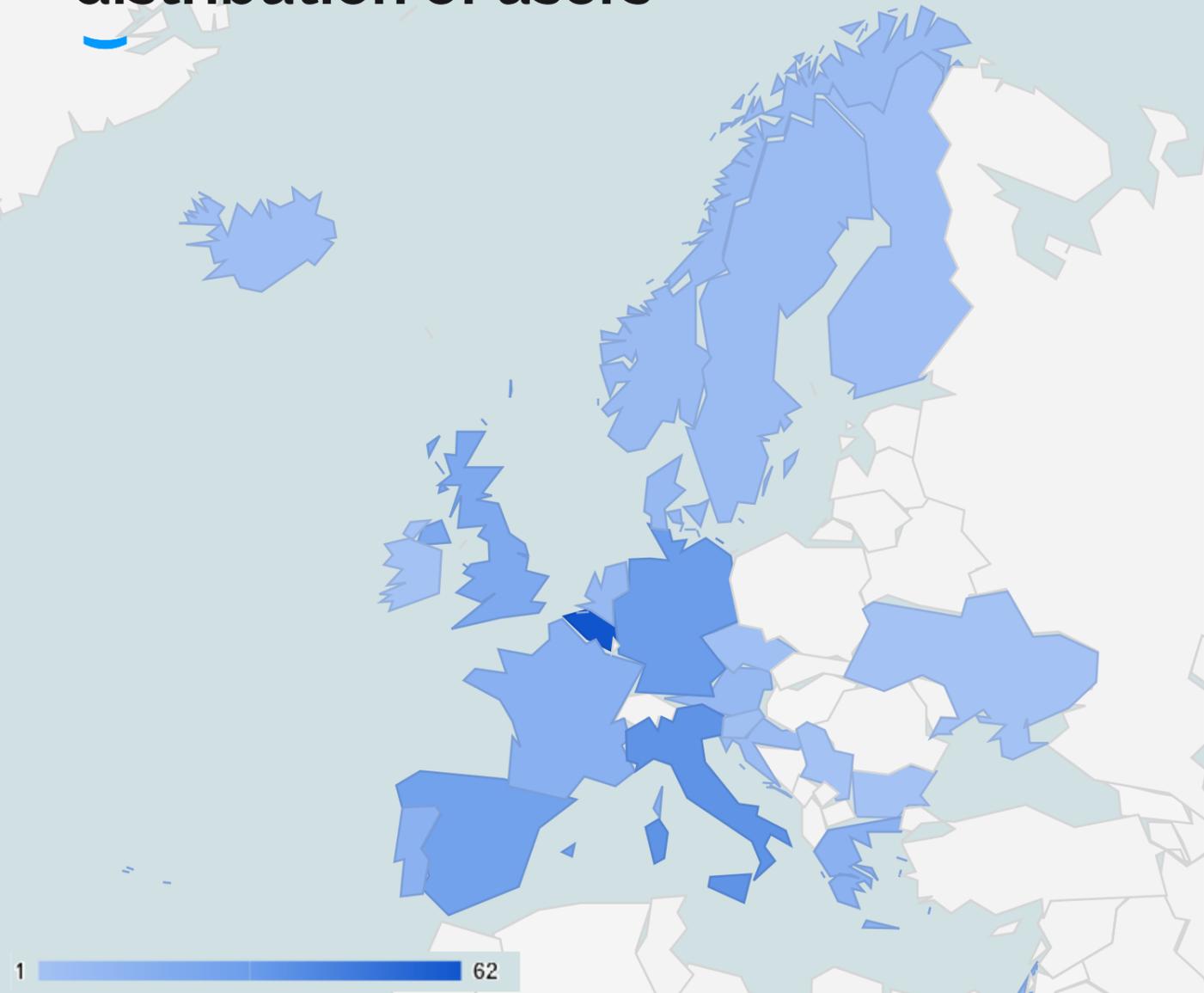


Figure 2: Distribution of European users in 2020

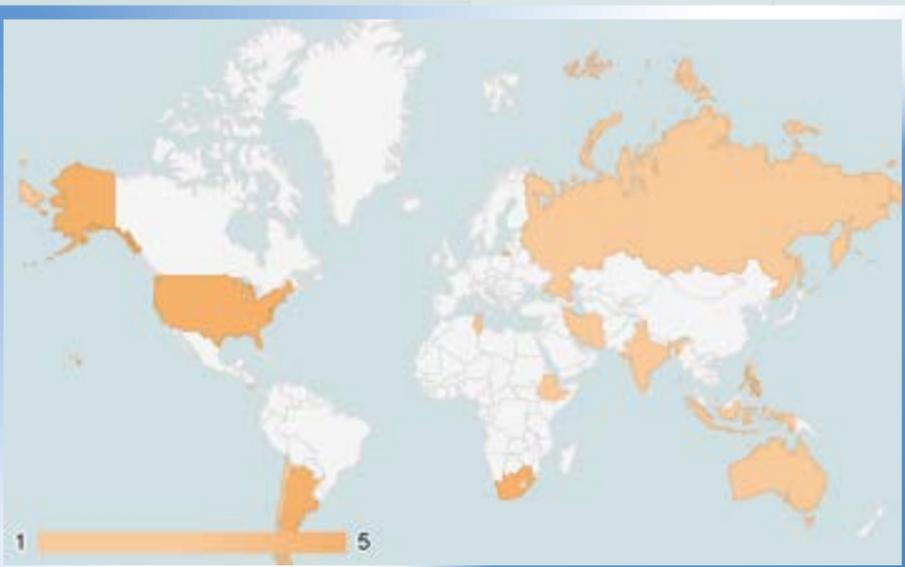


Figure 3: Distribution of non-European users in 2020

In terms of geographic distribution, the majority of access requests in 2020 came from researchers from institutes in European countries: Belgium, Italy, Germany and Spain (Fig.2). Requests from researchers from non-European countries came from Argentina, South Africa, United States and the Philippines (Fig.3).

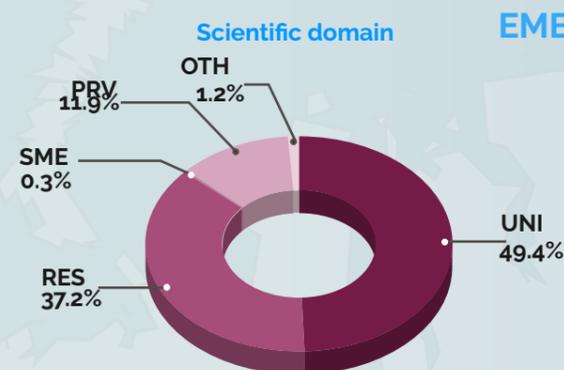


Figure 4: User profile: academia, industry. University (UNI), Research organisation (RES), Small and medium enterprise (SME), Private (PRV), Other (OTH)

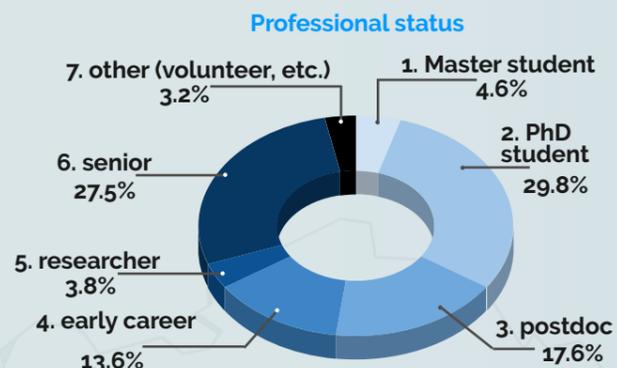


Figure 6: User professional status in 2020

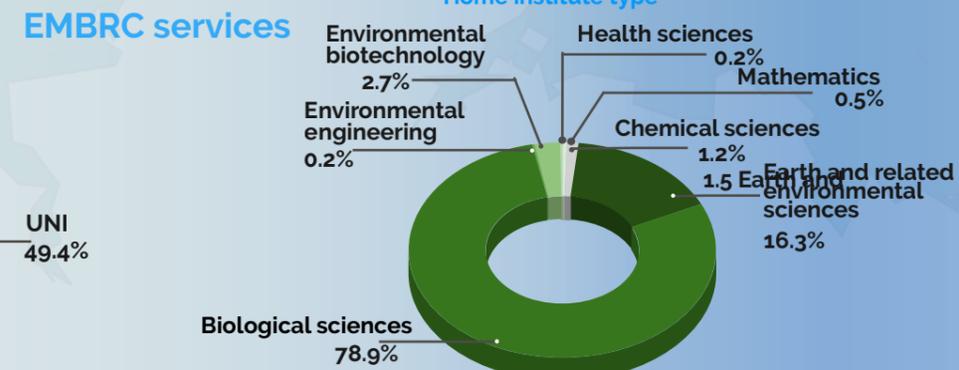


Figure 5: User disciplines (EOSC disciplines) in 2020

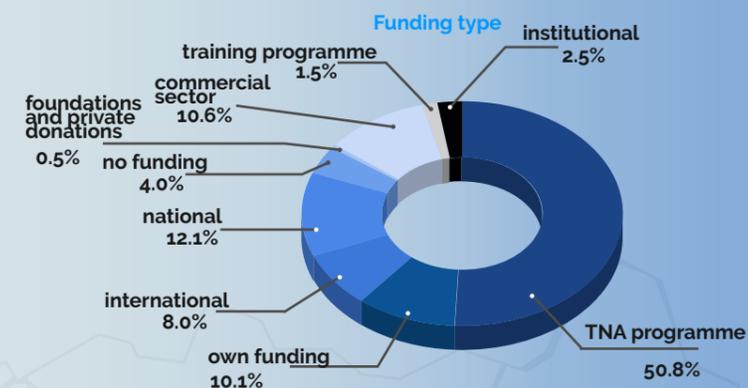


Figure 7: User funding type in 2020

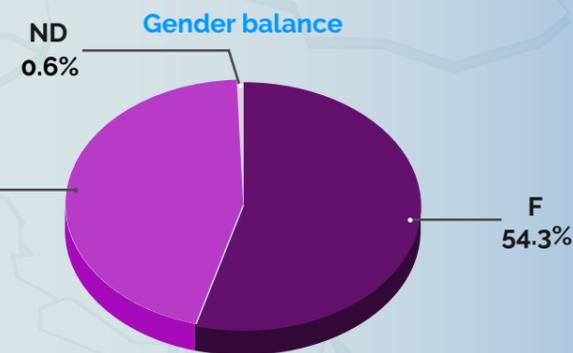


Figure 8: On-site and remote access in 2020

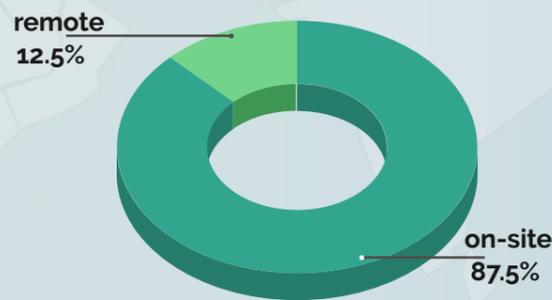


Figure 8: On-site and remote access in 2020

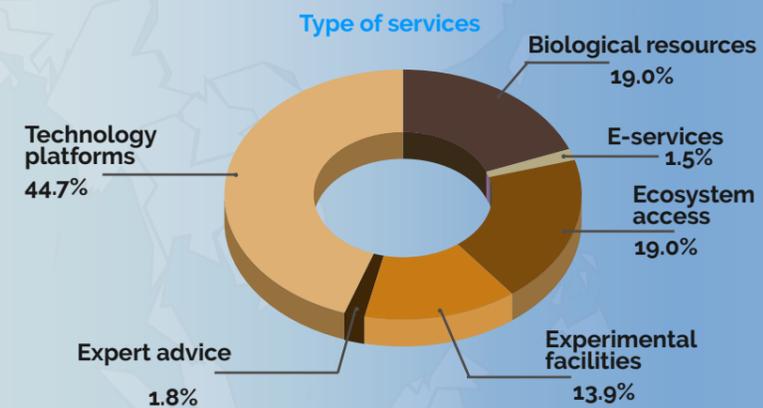


Figure 9: Type of services provided in 2020

User profile and scientific domain

In terms of user profile, requests were submitted mostly from researchers based in academic institutions (universities and research institutes, 86.7%). The industrial sector (private, SMEs) and other types of institutes accounted for the remaining 13.3% (Fig. 4).

Undoubtedly, there is room for improvement in terms of communication with and access for the industrial sector. Generally, the academic sector finds it difficult to identify the appropriate channels, language, and tone to appear attractive to companies. Also, transnational and other international funding opportunities (representing the majority of access funding routes to EMBRC) are ill-suited to companies, which prefer interactions at a local or national level.



HCMR dissection



CCAP cultures at SAMS

A change in approach is required to convince industry to use the services of marine stations and related research institutes. Communication will need to take into account factors that are important to the industrial sector such as discretion, full retention of intellectual property (IP), flexibility, cost effectiveness, competitive advantage, and tailored approaches, accompanied by a concerted strategy for industrial engagement.

The scientific domain of applicants in 2020 was constituted in large part by researchers in biological sciences and Earth and related environmental sciences. A minority of applicants work in the environmental biotechnology and chemical sciences. This diversity of disciplines is shown in Figure 5, which shows users' scientific fields according to the European Open Science Cloud (EOSC) disciplines.

Services were provided to researchers at different career stages (Fig. 6). Users accessing EMBRC services took advantage in large part of the competitive funding opportunity of the ASSEMBLE Plus 'transnational access' (TNA) programme to cover facility costs (Fig. 7), accounting for half of the services provided. The remaining portion of users had other types of funding to cover expenses.

Despite international travel restrictions and the

User stories

In this section we share stories from some of the ASSEMBLE Plus users who used services at EMBRC stations in 2020.



Paola Cardenas (University of Concepción, Chile)

Benthic diatoms of the Gulf of Naples: morphology and molecular approaches

Access provider: Stazione Zoologica Anton Dohrn (SZN)

'I applied to ASSEMBLE Plus because it was an excellent opportunity to expand my research on the study of benthic diatoms with morphological and molecular approaches.

The microphytobenthos is a poorly explored component of marine life despite the evidence of their contribution to primary production, regulation of nutrients, and oxygen fluxes, their function as sediment consolidators, and their role in the trophic web. Benthic diatoms are the major component of benthic microalgal communities and can reflect the environmental status and alterations of a given ecosystem. Therefore, I wanted to explore the isolation, culturing, and characterisation of benthic diatoms and the taxonomy of this group, using electron microscopy to observe the ultrastructure of the cells.

The information acquired contributes to the generation of a benthic diatom database. The ASSEMBLE project allowed me to gain experience in various topics, especially in developing skills in the study of modern taxa, and procedures and techniques ... The team of researchers from SZN gave me all their support'.



Daniel Wangpraseurt (University of Cambridge, United Kingdom)

Photobiology of mesophotic corals

Access provider: Interuniversity Institute for Marine Sciences (IUI)

'I applied to ASSEMBLE Plus because I wanted to study the coral reefs of the Red Sea and collaborate with a leading Israeli coral research group. Specifically, I was looking forward to accessing the field research station at the Interuniversity Institute for Marine Sciences (IUI) in Eilat, Israel⁵. The field station allows for easy access to a range of corals from shallow water down to a depth of 50 m. I have a specific interest in studying the photophysiology of corals and how corals respond to differences in ambient light regimes. At the IUI, we were able to access deep sea corals and study their light harvesting capacities in comparison to their shallow water counterparts. This allows us to understand the life and functioning of these mesophotic ecosystems and also sheds light on the evolutionary adaptations that allow corals to thrive under dim light conditions, which also has potential biotechnological implications.

The research performed in the ASSEMBLE Plus scheme has led to important collaborations and excellent networking opportunities. Overall, my experience was excellent and I am looking forward to further exchanging with other European research stations'.



Imke Lang (University of Applied Sciences Bremerhaven, Germany)

Cell Banking of Marine Red Microalgae

Access provider: Culture Collection of Algae and Protozoa (CCAP)
at the Scottish Association for Marine Science (SAMS)

'We, Insa Mannott and Imke Lang, applied to ASSEMBLE Plus for two good reasons: first, we were interested in learning more about cryopreservation of marine microalgae and the CCAP Team at SAMS offered us access to excellent know-how and infrastructure. The second reason was to deepen our collaborations with colleagues at SAMS and to get the opportunity for a scientific exchange on-site.

Our research is related to microalgae biotechnology and we would like to establish a cell bank for our production strains which allows for a high viability after thawing. This is important in order to ensure a high productivity and quality of microalgae strains and their products in the fermentation process. At CCAP/SAMS, we got the opportunity to test different cryopreservation protocols for various strains of red microalgae. We also learned new cultivation techniques for strain maintenance and purification.

The results obtained helped us a lot to proceed with the establishment of standardised cryo protocols. Visiting CCAP/SAMS in Oban was just excellent. The hosts were wonderful and very supportive and we made friends and very much benefited from this great experience.'



Jorune Sakalauskaite (University of Turin, Italy)

Spondylus multiomics: bridging biomineralization and archaeology

Access provider: Hellenic Centre for Marine Research, Greece
(HCMR-IMBBC)

'I applied to ASSEMBLE Plus because I was searching for a way to collect live specimens of *Spondylus gaederopus* molluscs and to obtain their genomics data. My research focuses on studying mollusc shell proteins which are inside the mineral skeleton for dual purposes: to better understand the molecular aspects of biomineralisation and also use them as molecular barcodes to identify the biological origin of prehistoric shell artifacts. *Spondylus* is particularly interesting because it was one of the most widely used Mediterranean shells in European prehistory, reshaped and worked into elaborate jewels. The data obtained via ASSEMBLE Plus will enable me to have a full identification of *Spondylus* proteome and use it in future projects.

Thanks to ASSEMBLE Plus I was able to access marine resources and molecular biology labs simultaneously. More importantly it was an incredible experience to work in a highly stimulating environment and the HCMR staff were incredibly helpful. The work had a great impact in shaping my PhD research and will likely end up with future collaborations.'

As for the impact of COVID on her research? Jorune noted that she was indeed directly affected by the pandemic, but that 'in the end, everything was okay'. During the last week of her research (early March 2020), HCMR was closed (and her flight was cancelled!). 'The project got delayed quite a bit as we could not finish doing molecular analyses and I had to wait until summer so that the institute would re-open and my colleague there could finalise some of the experiments and send the samples to me. (Of course the following analyses were also slightly delayed.) I am positive that I will manage to finalise the whole project soon as this is something that I am working on now', she concluded.



Belén Gonzalez-Gaya (Plentzia Marine Station, University of the Basque Country, Spain)

Application of Effect Directed Analysis (EDA) to hospital effluents

Access provider: Interdisciplinary Centre for Marine and Environmental Research, Portugal (CIIMAR)

'Thanks to ASSEMBLE Plus, we, Dr Belén González-Gaya and PhD student Naroa Lopez-Herguedas, enjoyed a one-month internship at the *Centro Interdisciplinar de Investigação Marinha e Ambiental* (CIIMAR) in March 2020. We belong to the Analytical Chemistry department at Plentzia Marine Station (University of the Basque Country). Our research explores the presence and behaviour of pollutants in aquatic ecosystems.

We were hosted by Dr Miguel Santos, Principal Investigator of the Endocrine Disruptors and Emergent Contaminants research team. The objective of the internship was to test the obesity potential of the estrogenic compounds present in Basque hospital effluent waters with an in-vitro transactivation bioassay developed at CIIMAR. The combination between our expertise in chemistry and wastewater xenobiotics identification perfectly matched the biological and effects-oriented approach from the hosting group. The experience enriched our study and helped us to apply new techniques that we do not have in our research centre. ASSEMBLE Plus was definitely a great opportunity for us!

As for the impact of COVID on their research? Belén said that 'The first two weeks were absolutely normal, running the programmed bioassays as scheduled. However, the third week, we (all CIIMAR staff, indeed) were advised to quit non-essential activities and cell lines reproduction for biotesting was stopped, although we could perform a few more bioassays during those critical days. The last week, confinement was also recommended, and as we didn't have more lab work to do without cell lines, we just kept our tasks of data treatment and interpretation from home there. We were in any case supported and assisted by CIIMAR collaborating and organising staff, and we were funded for extra expenses such as the use of a private car to avoid public transport (recommended at that time) during the third and last week. And also, we were allowed to fund our way back to the Basque country with a private car as our flights were cancelled. We still need a week of work to finish up the experimental part of the collaboration, and even if our hosts offered to do it themselves, there are still a few bioassays to perform'.

Service developments

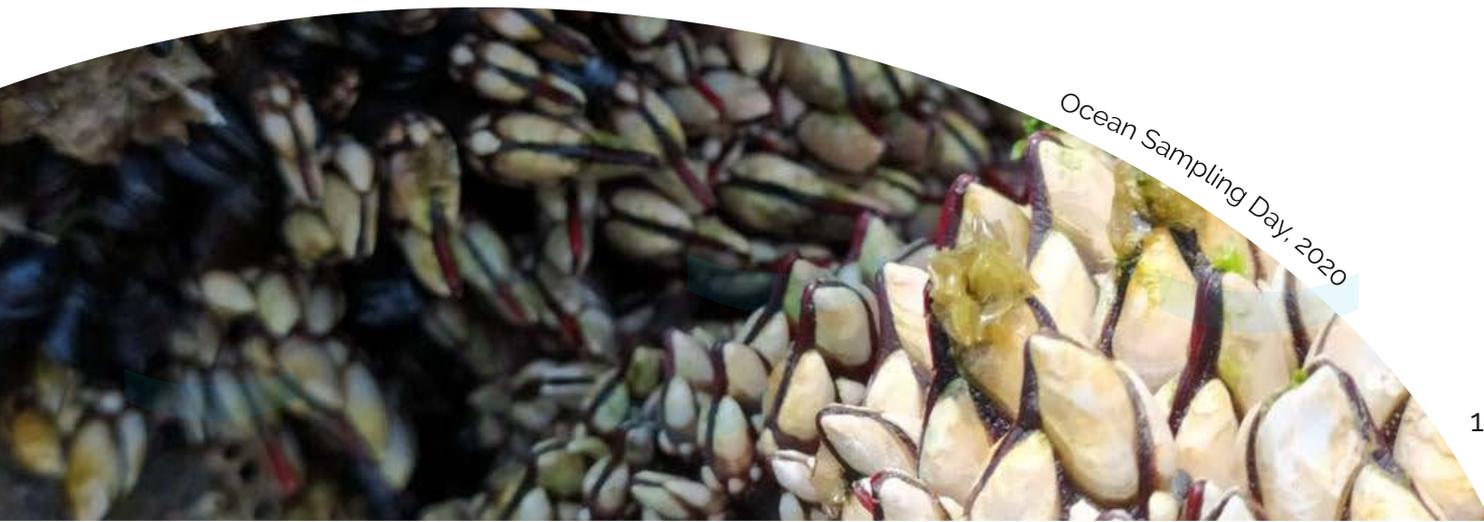
EMBRC strives to develop its service offer and to ensure that it is scientifically pertinent, and this continued to be the case in 2020. In accordance with the EMBRC Science Strategy, we embarked in 2020 on the preparation of an 'omics observatory' (European Marine Omics Biodiversity Observation Network, EMO BON) and a new bioprospecting service.

European Marine Omics Biodiversity Observation Network (EMO BON)

Marine biodiversity is becoming an increasing concern with climate change and marine pollution, and, as a result, is of high relevance in the forthcoming UN Decade of the Ocean and Europe's Green Deal. One of EMBRC's principal activities is the provision of access to marine biodiversity, in all its forms. EMBRC Operators include some of the oldest marine institutes in the world and operate long-term observations, host biodiversity monitoring activities, and conduct research. In order to provide holistic information on biodiversity composition at these sites, EMBRC will establish EMO BON, a coordinated European Marine Omics Biodiversity Observation Network across its partners. This will constitute a new approach for EMBRC, and a step in a new direction, toward data generation and long-term observation. EMO BON presents an important need for the EMBRC user community and the opportunity to start filling the void in biological observation that we currently face in regard to physical and chemical observation. This is also an exciting opportunity to generate data for the marine microbiome studies currently in progress, and support Atlantic strategies, such as the Atlantic Ocean Research Alliance (AORA).

Knowledge-based management of our blue planet is only possible by unified global monitoring using comparable data, which, in the case of biodiversity, cannot currently be assessed by remote sensing. In this context, EMBRC wishes to contribute to the global coordination of marine biodiversity by -omics approaches, integrating forthcoming technologies as appropriate. We aim to reach and interact with other relevant initiatives, offering the advantages of a sustainable RI that can support active research and underpin the development and optimisation of new methods.

The primary aim of EMO BON is to ensure a steady and continuous generation of 'baseline' data on biodiversity at our sites following FAIR data principles. The observation network must fit into the global context of genomics observation, providing the European component of such a network. On top of a commitment to specific activities, EMBRC very much believes and counts on dialogue and joint work with other initiatives and infrastructures to make EMO BON a success. EMO BON will ultimately provide Europe with a means to monitor its marine biodiversity, understand it, and devise new products and services for society.



Ocean Sampling Day, 2020

In 2020, EMBRC invited internal and external experts to join a working group to establish the principles and a strategy for EMO BON. The working group includes:

- Pier Luigi Buttigieg, Alfred Wegener Institute
- Raffaella Casotti, Stazione Zoologica Anton Dohrn
- Michael Cunliffe, Marine Biological Association of the UK
- Neil Davies, Gump South Pacific Research Station, University of California Berkeley
- Georgios Kotoulas, Hellenic Centre for Marine Research
- Fabrice Not, CNRS & Sorbonne University
- Matthias Obst, University of Gothenburg
- Jan Vanaverbeke, Royal Belgian Institute for Natural Sciences

Dr Ioulia Santi joined EMBRC from EMBRC-GR in 2020 to establish and implement EMO BON.

Building on the protocols established in the Ocean Sampling Day (OSD) initiative in the ASSEMBLE Plus project (see Projects below), EMBRC laid the groundwork for protocols to be used in EMO BON in 2021. In particular, we developed three sampling protocols on water column, soft sediment, and hard substrates, covering the three major coastal zones surrounding marine stations. In December 2020, the EMBRC General Assembly (GA) voted to launch a two-year pilot project to support EMO BON, aiming to:

- Implement, test, and optimise the sampling strategy and protocols
- Develop mock communities as controls for the sequencing of EMO BON samples
- Develop a thorough Data Management Plan
- Develop the necessary data workflows to quality control the generated data
- Obtain further funding and support for the initiative

It is envisaged that EMO BON will launch in the first semester of 2021.



Bioprospecting

Marine biodiversity is recognised as a source of particular interest for identifying novel compounds, bioactive substances, medical treatments, and biotechnologies. Consequently, bioprospecting is a strategically important activity for EMBRC and its Operators, tying into the blue bioeconomy strategy and Europe's Green Deal.

While EMBRC has, on numerous occasions, supported bioprospecting activities, both to individual researchers and through H2020 projects (e.g. European Marine Biological Research Infrastructure Cluster, EMBRIC^{iv}), a clear bioprospecting offer is not currently available in EMBRC, despite considerable capabilities. In order to capitalise on this strategically important activity, EMBRC must get organised and prepare a course of action to support it.

During 2020, a Bioprospecting Working Group was created with experts from relevant EMBRC partners:

- Deborah M Power (CCMAR, EMBRC-PT)
- Jana Asselman (UGENT, EMBRC-BE)
- Shanna Vanblaere (UGENT, EMBRC-BE)
- Raphael Lami (OOB, EMBRC-FR)
- François-Yves Bouget (OOB, EMBRC-FR)
- Donatella De Pascale (SZN, EMBRC-IT)
- Matt Davey (SAMS, EMBRC-UK)
- Micha Ilan (TAU, EMBRC-IL)



The group set out to brainstorm the necessary steps to make a biodiscovery pipeline a reality. For this purpose, they conducted a strengths, weaknesses, opportunities, and threats (SWOT) analysis.

It is clear that EMBRC partners possess the necessary tools and skills to create a biodiscovery workflow. More importantly, however, EMBRC offers a uniqueness in the organisms that are being studied (isolated from the environment or existing as an isolate in a collection) by its partners, and the custom-designed and optimised platforms these partners have for handling and investigating very specific types of marine organisms. To implement and exploit a bioprospecting strategy, the first step will be to map the capabilities of EMBRC members to identify the scope of activities possible, and to identify EMBRC nodes (ie member countries) that want to opt in.

Plentzia Marine Station, 2020



To develop a bioprospecting service within EMBRC, the following actions will be carried out:

Action 1: Initiate a pilot project involving several platforms to develop interconnectivity across EMBRC biodiscovery pipelines and identify 'weak points' and potential areas of improvements to offer a better service

Action 2: Develop a directory of bioprospecting expertise providing visibility of EMBRC competencies

Action 3: Develop EMBRC bioprospecting training actions to provide a unique service to the community, and provide training resources that can be used to introduce a new generation of scientists to blue bioprospecting as well as EMBRC's position on the topic

EMBRC & Access and benefit-sharing (ABS)

EMBRC is involved in a process to align its activities with Access and benefit-sharing (ABS) principles⁶. An ABS Compliance Officer was recruited in May 2020 to help the EMBRC culture collections and biological resource centres adapt current tools and procedures to adhere to ABS rules and regulations. By making these changes, EMBRC will be able to facilitate access to marine genetic resources for its users, further research and encourage companies to carry out their work with the confidence that they are operating with respect to the law.

In 2020, an assessment of EMBRC's compliance regarding ABS was initiated. The first step undertaken was the identification of countries in which genetic resources have been collected. To do so, the audit of the Atlantic Area EMBRC members' collections started in the INTERREG Atlantic project EBB (see Project section below for further details) was extended to all EMBRC collections. A dozen origin countries were added to the 114 countries identified in EBB. In parallel, a study of origin country ABS frameworks was initiated in 2020 and will continue in 2021.

To aid the EMBRC culture collections and biological resource centres, the EMBRC guide to ABS compliance—'Recommendations to marine biological resources collections' and users' institutions'—was finalised in 2020. This document will be disseminated in early 2021 for its implementation and to ensure that all EMBRC biological resources are supplied according to the legal framework. Furthermore, the document will be freely available to any provider of biological resources for research and innovation, to facilitate compliance with ABS regulations, particularly in the marine domain.

⁶ ABS refers to the way in which biological resources may be accessed, and how the benefits that result from their utilisation in research and development are shared with the country of origin. Since the date of entry into force of the Nagoya Protocol (NP), users of biological resources have the obligation to comply with ABS requirements when obtaining samples from countries that have ratified the NP and adopted 'access legislation'.

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Training: supporting the next generation of marine biologists

EMBRC facilitates access to marine-related research opportunities and supports the education of the next generation of marine biologists. This is achieved through two initiatives:

The Marine Training Network

A web-based platform developed by EMBRC to offer an overview of current marine and maritime education opportunities, while providing a supporting framework to foster new training initiatives and exchange best practices. It aims to train the next generation of 'blue workers' and re-train the current generation, and provide answers to trainees in search of training and trainers looking for support (eg. on how to organise training initiatives).

The IMBRSea Masters Programme

The International Master in Marine Biological Resources (IMBRSea), is a joint Master programme organised by eight leading European universities in the field of marine sciences; Ghent University (BE), Sorbonne University (FR), University of the Algarve (PT), University of Oviedo (ES), Galway-Mayo Institute of Technology (IE), University of the Basque Country (ES), Polytechnic University of Marche (IT), and University of Bergen (NO), University of Western Brittany - UBO (FR) and University of Gothenburg - UGOT (SE), supported by 14 EMBRC operators.

EMBRC sites also offer training services such as conference room rental and on-site / remote access to library services.

2020 highlights

2020 saw major progress for both the Marine Training Network and IMBRSea. Achievements are listed below for both projects in their respective 'work area'. The same team, based at Ghent University (UGhent), manages both programmes.

Marine Training website

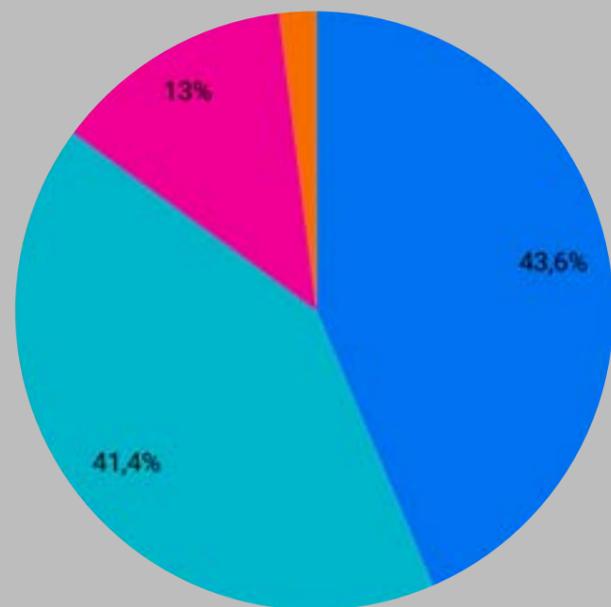
In June 2020, the second edition of the Marine Training portal was launched. This new version has a multilingual interface as well as functionalities to host thematic and regional sub-portals. Organisations or regions can manage their trainings in a sub-section of the portal, which has its own look and feel. All functionalities of the portal become automatically available for the projects. User and data management is now completely in the hands of the 'owners' of the dedicated sub-portal. In 2020, this feature was implemented for the Caribbean Large Marine Ecosystem area and also for the Marine@UGent community (<https://clmeplus.marinetraining.org/> / <https://marineatugent.marinetraining.eu/>). Note that a sub-portal for EMBRC has also been initiated and will hopefully be published in 2021.



Training

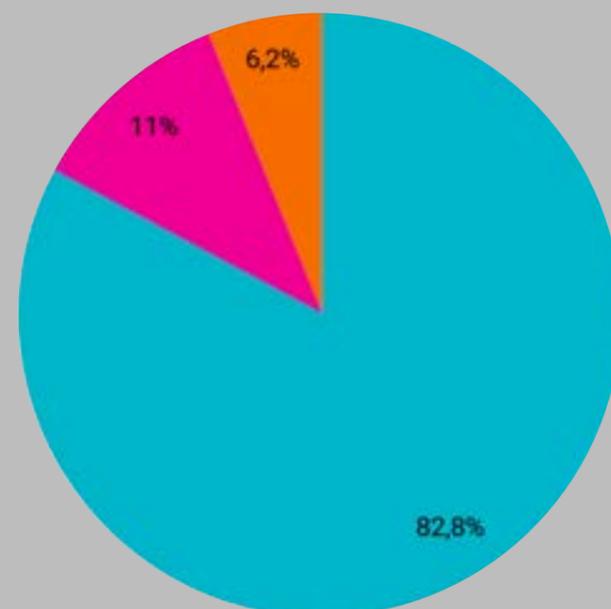
Between February and December 2020, an extensive effort was made to shift the scope of data in the portal from a regional EU level to a global level. In all, over 60 people performed data entry for this purpose. Trainings were organised to facilitate this action and mechanisms for data quality control were established.

The graphics, right and below, provide a good overview of the current data availability on MarineTraining.eu.



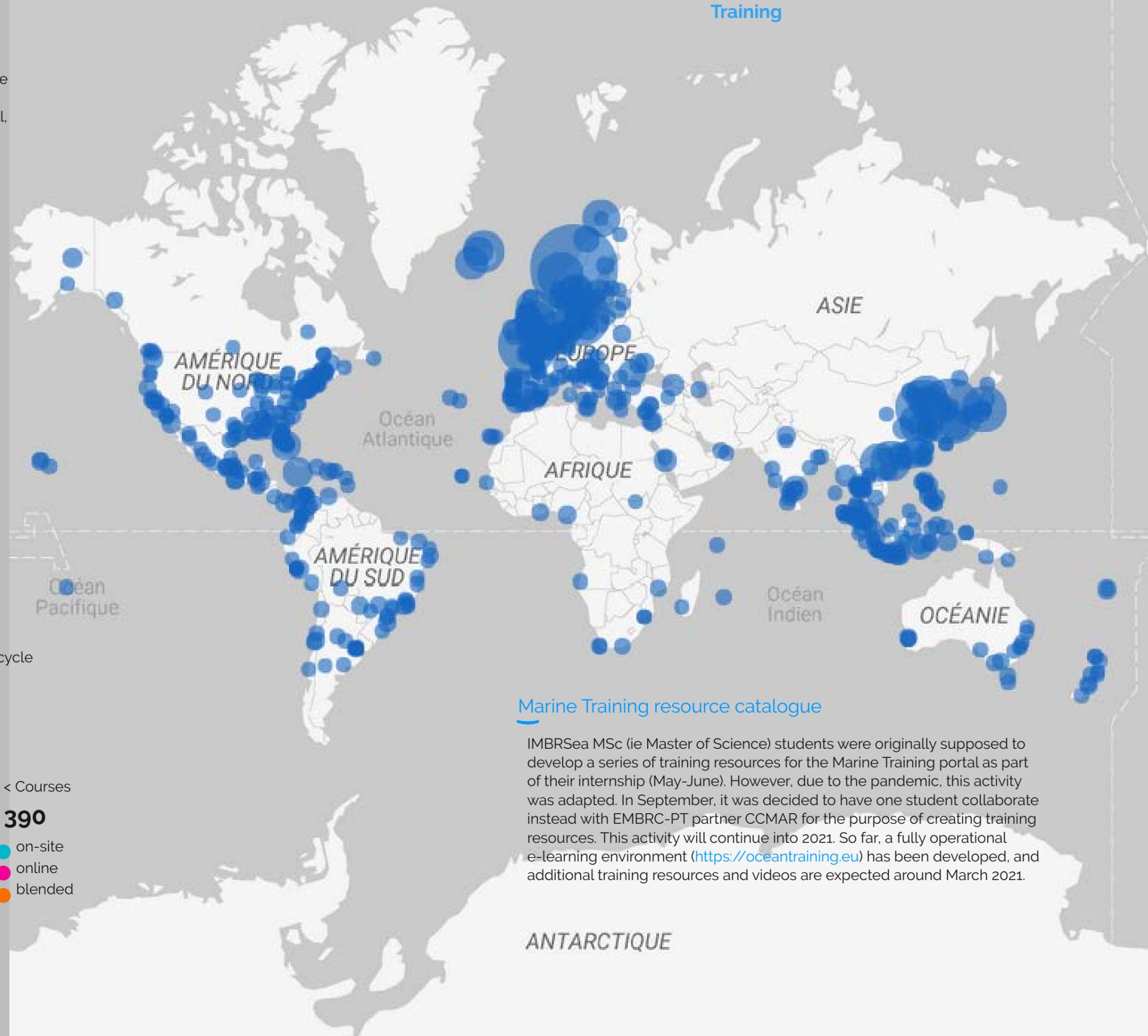
Programmes ^

2,851



< Courses

390



Training

[Marine Training resource catalogue](https://oceantraining.eu)

IMBRSea MSc (ie Master of Science) students were originally supposed to develop a series of training resources for the Marine Training portal as part of their internship (May-June). However, due to the pandemic, this activity was adapted. In September, it was decided to have one student collaborate instead with EMBRC-PT partner CCMAR for the purpose of creating training resources. This activity will continue into 2021. So far, a fully operational e-learning environment (<https://oceantraining.eu>) has been developed, and additional training resources and videos are expected around March 2021.

Setup and running of online courses

Another development in 2020 was the launch of an E-learning platform. The service, available through www.oceantraining.eu, and based on Moodle technology, offers training organisers the possibility to host online courses in optimal conditions. In 2020 a total of 12 E-learning courses were developed. Several new ones, ranging from mini-moocs to full accredited online courses will be launched and hosted in the first half of 2021. By the end of 2020, around 300 learners had used the portal as students. The portal will also be used in the near future for several projects in which the Marine Training team is involved.

Establishment of IMBRSea 2.0

The second version of the IMBRSea master's programme was launched in September 2020 with a cohort of 86 students. An application at Erasmus Mundus for funding was approved which means that from September 2021 onwards, scholarships will again be available for students of this flagship EMBRC MSc programme.

Project development

In 2020, the following projects were submitted by the MarineTraining team:

- Erasmus Mundus Joint Master degree IMBRSea 2.0 – submitted and approved – 4,442,000 euro – 4 years duration – EMBRC operators involved: UGent (coordinator), Sorbonne University, University of the Basque Country, Polytechnic University of Marche, University of the Algarve, Bergen University
- Erasmus+ Knowledge alliance proposal – Ocean Knowledge Hub – EMBRC partners involved: UGENT (coordinator), IUEM, Universidade do Algarve, University of Palermo, EMBRC (HQ), submitted 02/2020 – not approved but on reserve list – resubmission planned in 2021
- Strategic Partnership project - Marine Research Teach Hub - EMBRC operators involved: UGent, University of the Algarve – submitted 05/2020 – not approved but on reserve list – resubmission planned in 2021
- Strategic Partnership project – BLUE SCHOOLS - EMBRC operators involved: UGENT – secondary schools) – submitted 05/2020 – not approved but on reserve list – resubmission planned in 2021
- Strategic Partnership project on digital education readiness – Oceantraining.eu – EMBRC operators involved: UGENT, Sorbonne University and Polytechnic University of Marche – submitted 10/2020 and approved – 180,000 euro – 2-year duration

The following projects were also initiated in 2020:

- Faust Fund proposal: Ocean Info Hub (partner – coordination IODE)
- Faust Fund proposal: Ocean Teacher Global Academy (partner – coordination IODE)
- VLAIO COOCK project Smart-WaterUse (partner – Blauwe Cluster)



Projects

In addition to providing various services, EMBRC contributes to European and international projects. Diverse in scope and country involvement, these projects aim to enhance EMBRC activities and/or services, strengthen collaboration with similar European organisations ('research infrastructures', RIs), structure the research community, provide services to support research, and support innovative science through Trans-national Access (TA) programmes.

These projects provide an opportunity to develop joint services, tools and activities, as well as to enhance knowledge-sharing in view of optimising research in Europe and beyond.

New projects

Project development was also affected by the pandemic. Building consortia and conceptualising projects using only remote means was a challenge to adapt to. Nonetheless, in 2020, EMBRC participated in several aspiring Horizon 2020 consortia, with two being accepted: AtlantECO and DOORS (see below). AtlantECO will involve EMBRC in Atlantic-wide research on biodiversity, and capacity building amongst Europe, Africa, Latin America, and North America. DOORS is centred around strengthening research capacity in the Black Sea region, and opens up new opportunities for EMBRC in a new part of Europe.

Summaries of projects funded in 2020 can be found below, followed by information on projects that were ongoing or which ended in 2020.

AtlantECO

EMBRC partners in the project include EMBRC HQ, EMBRC-GR (HCMR), EMBRC-ES (ECIMAT-UVIGO) & Marine Training.



One of the projects which received a positive funding decision in 2020 is AtlantECO. The project provides a holistic and innovative approach to assess and predict changes in the state and dynamics of Atlantic ecosystems and services at multiple spatio-temporal scales. It assembles the first comprehensive and most extensive knowledge base of genomics, imaging and carbon flux at the scale of the whole Atlantic Ocean, integrating a decade of innovative scientific knowledge about microbiomes that support water column and seabed ecosystems. AtlantECO uses its knowledge base as well as multi-decadal time series to assess the status and dynamics of Atlantic ecosystems and to identify regime shifts and tipping points in response to drivers of short- and long-term changes. It further works to improve the sustainability of Atlantic ecosystem services and will enhance blue growth. The active involvement of private and public stakeholders as well as of policy makers and institutions allow for addressing the socio-economic challenges of Blue Growth while reducing knowledge gaps.

AtlantECO held its kick-off meeting (virtually) at the end of 2020. The week-long event included breakout sessions for the different work packages. EMBRC is part of WP4 and WP9 where it will lead biobanking protocols, organise the Atlantic Ocean Sampling Day, and organise trainings on sampling and research protocols.

Project budget: €10,925,660.13 **EMBRC budget:** €17 614.80

Project website: www.atlanteco.eu **Project dates:** 1 September 2020 - 31 August 2024

DOORS

EMBRC partners in the project include: EMBRC HQ.

DOORS (Developing an Optimal and Open Research Support system to unlock the potential for blue growth in the Black Sea) plans to harmonise research and provide the infrastructure to better understand the Black Sea, particularly its ecosystem characteristics. The project will also develop the framework to support Blue Growth and early development of start-ups, and provide evidence to inform policy and behavioural change. To reach its ambitious objectives, the project team will work closely with stakeholders from the start to develop an open research system and establish a framework to support continuous stakeholder dialogue.

DOORS will implement three Work Programmes: a System of Systems to harmonise approaches and provide an accessible data repository, a Blue Growth Accelerator to support enterprise, and Knowledge Transfer and Training to share best practice and build capacity. EMBRC is mainly involved in WP2 and WP7 on capacity building where it will support formal and informal learning, education, training and use of knowledge and technologies for established and emerging maritime sectors.

The project will kick off in the first semester of 2021.

Project budget: €9,000,000.00 **EMBRC budget:** €100,000.00

Project website: n/a **Project dates:** 2021-2025

Ongoing projects

In 2020, EMBRC continued to provide support to six EU-funded projects, listed below: ASSEMBLE Plus, CORBEL, EBB, EOSC-Life, ERIC Forum, RI-VIS (see endnotes for project funding information).

ASSEMBLE Plus



EMBRC partners in the project include: EMBRC HQ; EMBRC-FR (SU); EMBRC-ES (PiE-UPV/EHU, ECIMAT-UVIGO); EMBRC-GR (HCMR); EMBRC-IL (HUJI); EMBRC-IT (SZN); EMBRC-PT (CCMAR); EMBRC-BE (VLIZ); and EMBRC-UK (SAMS, MBA, USTAN, NERC-BAS, MSS).

ASSEMBLE Plus (Association of European Marine Biological Laboratories Expanded) brings together 32 marine stations and institutes from 14 European and associated countries under the leadership of EMBRC. The project develops new tools for marine biological research, through Joint Research Activities (JRA), and provides scientists from academia, industry and policy with a quality-assured programme of Transnational Access (TNA) and Virtual Access (VA) to marine biological stations. The partners offer a wide variety of marine ecosystems, unique marine biological resources, state-of-the-art experimental and analytical facilities with integrated workflows, historical observation data, and advanced training opportunities.

Projects

The goal is to stimulate European excellence in fundamental and applied research in marine biology and ecology, thereby improving our knowledge- and technology-base for the blue economy, policy and education purposes. This project is an opportunity to increase the visibility of EMBRC as well as community engagement with the organisation.

ASSEMBLE Plus funds a global campaign called Ocean Sampling Day (OSD)⁷ as one of its JRAs. Scientists worldwide take samples from the ocean to identify the microorganisms present in the seawater. Launched in 2014, OSD normally takes place during the northern hemisphere's summer solstice (21st June). However, in this very particular 'pandemic year', OSD continued until the end of December, with 146 participants in all. See the Service developments section to see how OSD fits into EMBRC's planned flagship projects.

Project budget: €9,999,911.48

EMBRC budget: €280,162,13

Project website: www.assembleplus.eu

Project dates: 1 October 2017 to 30 September 2021

CORBEL

EMBRC partners in the project included: EMBRC HQ; EMBRC-FR (CNRS); EMBRC-IT (SZN); and EMBRC-UK (USTAN).



The CORBEL (COordinated Research Infrastructures Building Enduring Life-science Services)⁹ project was established as a collaborative framework of shared services between the ESFRI Biological and Medical Research Infrastructures (now referred to as the 'Life Science Research Infrastructures' or LS RIs) that transform the European research community from discovery of basic biological mechanisms to applied medical translation – through the provision of a unified interface, aligned services and coordinated user access to a range of advanced technology platforms.

Wrapping up in 2020, CORBEL was a key consortium for the RIs as it encouraged increased cooperation for the harmonisation of researchers' access to their cutting-edge technologies and services. This was achieved through the establishment of a sustainable platform of aligned services, enabling faster admission to a wider portfolio of technologies and services to boost research projects.

CORBEL held its final meeting in March 2020 where it shared its successes in harmonising user access, unifying data management, creating common ethical and legal services, and offering joint innovation support.

Total requested Grant by Consortium: € 14,000,000.00

Total requested Grant by EMBRC partners: € 792,195

Project website: www.corbel-project.eu **Project dates:** 1 September 2015 to 31 May 2020

⁷ EMBRC Greece partner Hellenic Centre for Marine Research (HCMR) in Heraklion, Crete coordinates OSD. OSD produces DNA metabarcoding, shotgun metagenomics and environmental data following international standards. OSD also works to improve the process of making data 'FAIR', i.e. Findable, Accessible, Interoperable and Reusable. Moreover, OSD promotes the collection of biodiversity data and collaboration using shared standards, optimised methodologies, and protocols for good practices. Finally, OSD encourages a global community of researchers committed to increasing biodiversity monitoring and observation to enhance knowledge of the biosphere and support decision-making.

EOSC-Life

EMBRC partners in the project include: EMBRC HQ; EMBRC-ES (ECIMAT-UVIGO, PiE-UPV/EHU); EMBRC-FR (SU); EMBRC-PT (CCMAR); EMBRC-BE (UGent, VLIZ).



EOSC-Life^{vi} brings together the 13 LS RIs to create an open collaborative space for digital biology. The project works to transform European life science by providing a continent-scale, collaborative and interdisciplinary environment for data science with a goal of enabling life scientists to find, access and integrate life-science data for analysis and reuse in academic and industrial research.

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. Through EOSC, scientists are able to gain direct access to FAIR data and tools in a cloud environment available throughout the European Research Area and make LS RI data resources FAIR. Scientists can further publish their data in the EOSC following guidelines and standards, which in turn may help to increase the availability and use of data generated by the RIs.

Following its kick-off in 2019, EOSC-Life made considerable progress in 2020 in various domains. The project hosted its first annual general meeting (AGM) and developed a plan for project translators. These translators, from each partner of the project, were identified as resources for each WP to relay information and provide input on the activities of each WP for seamless collaboration within the project. At the end of the year, the project also successfully completed its first periodic review by the European Commission.

In 2020, EMBRC-PT developed a demonstrator project on Marine Eukaryote Genomics, with a genome annotation software tool and a workflow which is now deployed in the European Open Science Cloud (EOSC). EMBRC HQ co-led the general Open Call to develop solutions for the EOSC for life sciences, as well as delivering generic guidelines for the organisation of topic-specific Open Calls to be launched later in the project. In WP4, EMBRC-ES postponed the thematic workshop on Intellectual Property (IP) and the Nagoya Protocol, planned for 2020, to 2021 due to COVID. Finally, a document on FAIR requirements was completed and published by EMBRC-BE.

Project budget: €23,745,996.25 **EMBRC budget:** €408,750.00

Project website: www.eosc-life.eu **Project dates:** 1 March 2019 to 28 February 2023

EBB

EMBRC-ES partner, University of Vigo (UVIGO), is the project coordinator. Additional participants include: EMBRC-FR (SU), EMBRC-PT (CCMAR, CIIMAR), EMBRC-UK (MBA and SAMS, which is an associated partner without funding), EMBRC-NO (IMR) and EMBRC-ES's other partner, PiE-UPV/EHU.



The EBB (European Marine Biological Resource Centre Biobank)^{vii} project aims to contribute to ensuring the practical long-term transnational coordination of marine biobanks. This initiative, the first of its kind worldwide, will increase the diversity and quality of marine biological

Projects

resources made available to user communities, facilitating their biotechnological valorisation.

The EBB sets the standard for harmonised operation of its distributed marine biobanking facilities, by developing new technological tools and common procedures for the *ex-situ* maintenance of diverse groups of marine biological resources. Furthermore, the project will harmonise the trans-regional application of the regulations on access to genetic resources and sharing the benefits of their use (ie ABS regulations).

The project partnership, primarily located in the Atlantic Area, is formed by a multidisciplinary team that comprises some of the world's most important marine biobanks located in Norway, Ireland, United Kingdom, France, Spain and Portugal.

In 2020, the project was granted a six-month extension due to COVID-19, moving the end date to 15 April 2021. Despite travel restrictions, EBB organised and participated in a number of online events. It organised a technical workshop to raise awareness of the existing obligations to access and use genetic resources derived from the Nagoya Protocol (2010) (<https://bit.ly/3aKQFqb>). Moreover, EBB contributed to the Business2Sea 2020 online event with an awareness workshop entitled 'Do not be a biopirate' (<https://bit.ly/3aEStB6>), and it also organised a virtual Quality Management Systems (QMS) workshop.

Other achievements included the development of the TRACE database (<http://ebb.scrol.net/>), a searchable catalogue of the full range of marine biological resources (from animals to macroalgae, protists, prokaryotes and viruses) that will be rolled out to EMBRC partners. The project also developed the 'The EMBRC guide to ABS compliance. Recommendations to institutions with collections and users of marine biological resources' which will form the cornerstone of EMBRC ABS compliance.

Project budget: €1,499,908.35 (INTERREG Atlantic Area programme); €500,000 from project partners

Project website: www.bluebiobank.eu **Project dates:** 16 October 2017 to 15 April 2021

ERIC Forum

EMBRC partners in the project include:
EMBRC HQ; EMBRC-ES (ECIMAT-UVIGO,
PiE-UPV/EHU); EMBRC-FR (SU).



The ERIC Forum^{viii} project aims to advance operations of organisations (like EMBRC) with the status of a 'European Research Infrastructure Consortium' (ERIC) and to strategically contribute to the development of ERIC-related policies. This project involves all existing organisations with ERIC status and consortia. In particular, the project's objectives are to:

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- Strengthen coordination and networking amongst ERICs;
- Support the organisation of specific meetings, targeted thematic workshops focusing on shared challenges;
- Support organisations that wish to apply for ERIC status;
- Support common communication and outreach activities, and strengthen external representation of ERICs as a stakeholder in consultations and other policy actions that could affect them.

The ERIC Forum had its AGM in Brussels early in 2020. EMBRC took part in multiple exercises including surveys to better understand ERIC financial practices.

EMBRC contributed to the first policy brief on funding models by leading the section on regional funding. EMBRC passed on the role it had in WP4 on Elements of Sustainability Plans to the SME ERAMARIS.

Project budget: €1,495,281.25

EMBRC budget: €34,100.00

Project website: www.eric-forum.eu

Project dates: 1 January 2019 to 31 December 2022

RI-VIS

Partners in the project include:
EMBRC HQ and EMBRC-PT (CCMAR).



The RI-VIS^{ix} project aims to increase the visibility of European RIs to broader scientific communities, industry and strategic partners in third countries. RI-VIS targets communities and stakeholders with current and precise information and matches them with RIs to facilitate the development of new collaborations, user accessibility, collaborative and innovative actions, funding opportunities, knowledge transfer and training opportunities.

Project activities include a mapping of RI services to target new communities and identify routes to maximise the exchange of information and bases for new partnerships, a component of the project that EMBRC will strongly benefit from.

In 2020, EMBRC held the last workshop of a series of three events aimed at developing a communications toolkit, which was shared with the European RI community. As a project heavily focussed on building collaborations and raising awareness, the travel bans imposed by COVID required a significant rewrite of project activities. For WP5, EMBRC has rewritten its activities to focus on online communication training on social media and marketing; the development of region-specific communications guidelines; and a call for activities raising awareness of RIs or building partnerships (to replace the previously planned staff exchange programme).

Project budget: €1,500,000.00 **EMBRC budget:** €125,375.00

Project website: <https://ri-vis.eu> **Project dates:** 1 February 2019 to 31 July 2021

Communications and dissemination

Communications was a major focus in 2020. The hiring of a Communications Officer greatly enhanced the organisation's communications activities. Communications goals in 2020 were to professionalise and enhance external communications. Internally, a goal was to strengthen communication between HQ and its member countries.

Strategy development and social media

A primary task was the development of a communications strategy, in view of increasing our online presence and overall visibility to attract more users, and support greater inclusion of EMBRC in the European research community. Additional accomplishments were a social media audit and an inventory of all HQ-level and country-level communications channels (including channels for individual marine stations and operators). This in turn paved the way for the Communications Officer to enhance EMBRC's social media activity, focusing on Twitter and LinkedIn in particular.

EMBRC's increased and more strategic use of Twitter translated into a large boost in 'engagement', 'impressions' and followers.⁸ This can be seen by comparing equal periods before and after the Communication Officer's start. For example, for the three-month period from 19 January to 19 April 2020, the EMBRC Twitter account had 34.9K impressions (383/day, or about 30% of 1,265 followers), with .9% engagement. For the three-month period from 23 August to 18 November 2020, EMBRC's Twitter account had 104.6k impressions (1.2k/day), with 1.5% engagement, and 1,559 followers (approximately a 25% increase in followers compared to the January-April period).⁹ This was achieved through regular posting, retweeting with comments,

The Sea and Me

How do oceans and seas affect my daily life and the world around me, and how do I affect them? Click on the boxes below to find out interesting facts about the world below, and how it interacts with the world above - and why furthering our knowledge of the oceans and seas is so important.



THE SEA AND ME

Why did the octopus punch the fish?

Marine biologists filmed octopuses throwing punches at fish in the Red Sea. Could be a way to show them who's boss!

28 Dec 2020



THE SEA AND ME

Horseshoe crab blood

Did you know that horseshoe crabs' milky-blue blood is key to making COVID-19 vaccine?!

25 Dec 2020

more strategic use of hashtags, following new accounts, tagging, using images, and novel content creation, for example the Twitter campaign called #SeaAndMe. This campaign, implemented from July to December, featured weekly posts (every Monday) to increase awareness of the relationship between the sea and our daily lives, while increasing visibility of EMBRC and creating excitement. These posts in particular had high levels of user engagement (2-3% on average).

⁸ Engagement is when users interact with social media content (eg. they 'like' it, share it, or comment on it). Most would consider 0.5% to be a good engagement rate for Twitter, with anything above 1% great. Impressions are the number of times that users see social media content (ie a Tweet or LinkedIn post) on the given social media platform. Twitter considers that 20% is a good number. Learn more: <https://blog.hubspot.com/marketing/twitter-analytics>

⁹ Source: https://analytics.twitter.com/user/EMBRC_EU/tweets

Communication and dissemination

As for LinkedIn, the decision was made to merge EMBRC's two accounts, to avoid redundancy and to focus our energy on the company page. The 'personal' EMBRC account page was closed on 1 December 2020, after users had been notified throughout the previous month. In 2021 we intend to turn our focus to LinkedIn to see how to optimise the use of the company page. Finally, on the social front, in 2020, EMBRC created a YouTube channel, which was ideal to host the two-minute video that we created about EMBRC in August 2020. Moving forward, we plan to feature additional videos from EMBRC sites including virtual tours, as well as any webinars that we host.

Website

Also in 2020, a new and more user-friendly website was launched in November. Emphasis was placed on ensuring users can find information about who we are, how we are organised, what we do, the services we provide, and who our nine member countries are.



Screenshot of the EMBRC website homepage.

The website features a clean design and improved menu structure to direct readers to the most relevant information for their needs. It is also fully responsive on mobile devices, and the website pages are easy to navigate using a wide range of web browsers and portable devices. Content has been rewritten making it easier to read and digest the information. While respecting our original brand and colour scheme, we developed a more modern and visually pleasing look and feel, featuring in particular vivid images of marine organisms.

The new website also has a searchable service catalogue (<https://www.embrc.eu/services/service-catalogue>) where users can browse over 430 services. They can select the country, institute and category, or enter their own keywords. Each service has contact information so that potential users can get in touch with relevant individuals at our sites. We also developed a plan to link the service catalogue to an online application system using the 'ARIA' platform. Users will be able to easily apply to one or more services simultaneously and email directly with platform technicians. The launch / rollout is scheduled for early 2021.

The EMBRC website was developed in collaboration with multiple dedicated internal and external stakeholders. We would like to give a special thanks to Magdalena Brus, senior communications manager at Integrated Carbon Observation System (ICOS, <https://www.icos-cp.eu>) and co-founder of Yugen (<https://www.yugen.solutions/>), who provided the guiding vision and



High-quality services

EMBRC aims to enable broad and varied research on marine biological organisms and ecosystems with our flexible and modular facilities. Please explore our [catalogue of services](#) and contact us to see what we can do for your project.

Important COVID-19 information

The ongoing COVID-19 pandemic may have an impact on the availability and delivery of services in certain EMBRC countries. During this time, you may still apply to services. Please consult our [service catalogue](#), where you will find local contact

[Learn how to apply to EMBRC services](#) →

[See what our users are saying](#) →

[Browse our service catalogue](#) →

[Contact our Access Officer](#) →

Screenshot of the EMBRC website Services page 

designs, working in collaboration with Trust-IT agency.

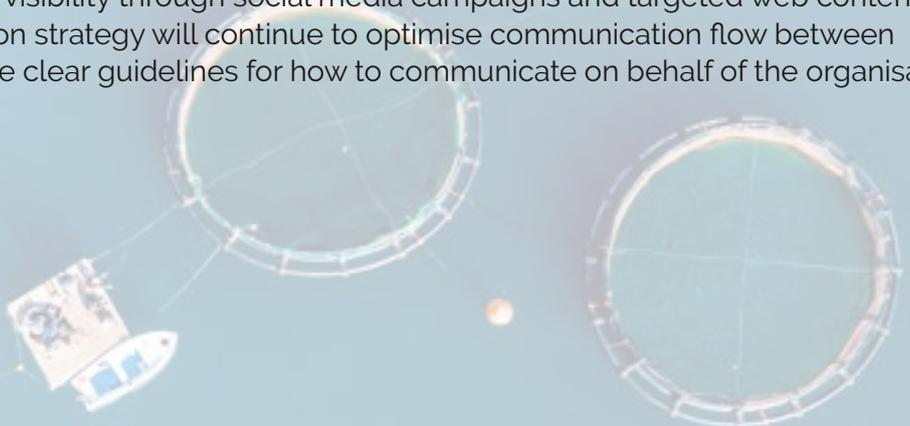
In 2021, the website will be a continued focus, with regular updating and developments to enhance the user experience, draw traffic to the website, and make information and digital content readily available/accessible. Once the online application platform is up and running, this will be actively communicated to current and future potential users.

Internal communications

Another major accomplishment in 2020 was the creation of an internal Communications Working Group (WG). The WG is composed of one or more representatives from each EMBRC member country. The group met virtually five times, from May to December 2020. The WG has been instrumental in providing HQ with input on how to enhance and align communications throughout the organisation, particularly between the country members ('nodes') and HQ.

Other activities to enhance and professionalise communications included the redesign of templates and visual identity guidelines, the creation of a glossary/style guide for internal use, guidelines for enhancing communication between countries and HQ, and more.

Moving forward, EMBRC communications will continue to focus on strengthening its online/digital presence and increasing visibility through social media campaigns and targeted web content. Internally, the communication strategy will continue to optimise communication flow between HQ and the stations and give clear guidelines for how to communicate on behalf of the organisation.

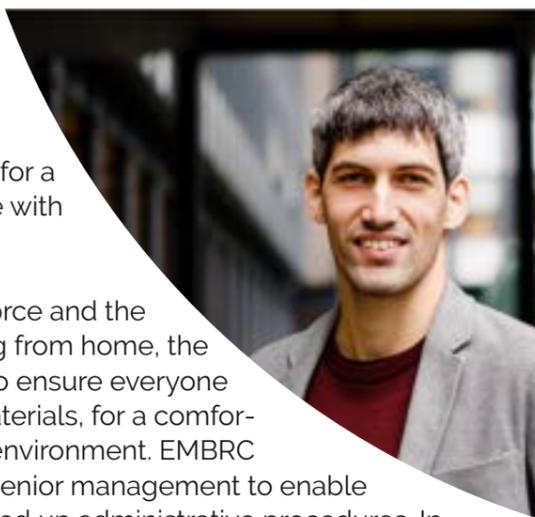
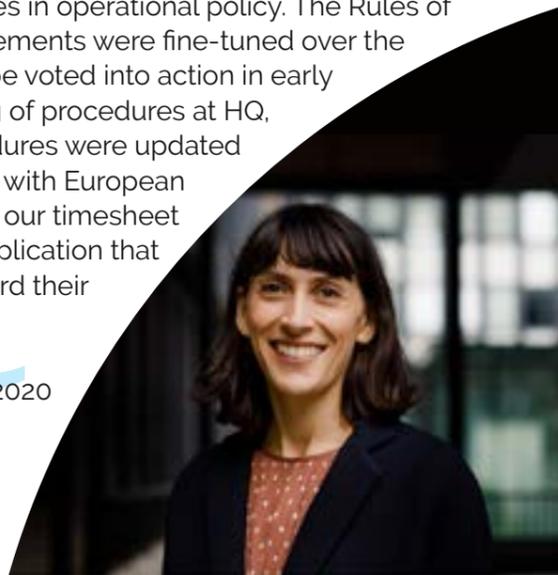


EMBRC team

Streamlining and improving the functioning of EMBRC HQ was the focus of 2020. This involved considerable advances in operational policy. The Rules of Operations and Service Level Agreements were fine-tuned over the course of the year, and are due to be voted into action in early 2021. To ensure the smooth running of procedures at HQ, existing Standard Operating Procedures were updated and new ones implemented. In line with European project requirements, we improved our timesheet system by introducing an online application that makes it easier for our team to record their hours.

With regards to human resources, 2020 saw the formal introduction of an annual performance review for all members of the HQ team, creating an opportunity to provide feedback and to discuss topics like career progression within the organisation. Furthermore, interviews were held and recruitments made for a Communications Officer (Sabrina Gaber) and an Access and Benefit-Sharing Officer (Arnaud Laroquette). An agreement was signed with the *Observatoire océanologique de Banyuls-sur-Mer* to enable Arnaud Laroquette to work from the marine station. In addition, a service contract was signed with HCMR for the employment of Dr Ioulia Santi, whose main mission will be to ensure delivery of the EMBRC Genomics Observatory, from concept to pilot study. In March, EMBRC HQ welcomed an intern in human resources and administration for a few days, gaining valuable assistance with administration and finance.

As COVID-19 restrictions came into force and the team was obliged to move to working from home, the HR team made a coordinated effort to ensure everyone was equipped with the necessary materials, for a comfortable and efficient at-home working environment. EMBRC invested in electronic signatures for senior management to enable them to work independently and speed up administrative procedures. In



Photos ©Annie Gozard

spite of the lack of in-person contact, EMBRC nevertheless managed to finalise several contracts, including a Memorandum of Understanding with CCMAR and a contract with UGent to contribute to MarineTraining study grants. A cooperation agreement was signed with EuroMarine to organise a joint call for scientific proposals, under which EMBRC would finance access to services of its infrastructures of ten young researchers affiliated to the EuroMarine Consortium. Unfortunately, due to COVID-19, these projects are on hold until travel is again possible.

Financial developments included the first visit from our independent accounts auditor in March. The aim of the visit was to meet the team and acquire an understanding of the activities and purpose of EMBRC. The Financial Officer participated in a number of meetings to gain further expertise in RI finances, including ERIC Forum meetings in Brussels (February) and a Policy Seminar in September (online). EMBRC also assisted LifeWatch ERIC as a member of the interview panel for the recruitment of a Financial and Administrative Officer. In November, EMBRC participated in the 'Journée aspects financiers' in the context of the Horizon 2020 programme. EMBRC HQ also established contracts with Sorbonne University, to be renewed on an annual basis, to settle any outstanding balance from the Host Premium.

Thanks to skills gained by members of staff, EMBRC saw its need for external legal assistance drop in 2020, resulting in the decision to reduce by half the amount of time required by external legal services. Legal assistance contributed to the establishment of the single professional risk assessment document (DUERP in French), finalised in June. Internal legal developments included an update of the Privacy Policy and Data Protection Agreement, as well as an Image Sharing Policy.

One of the advantages of ERIC structure is a value-added tax (VAT) exemption for purchases. However, due to differing interpretations of ERIC status by host countries, the process for claiming VAT exemption may vary. Through engagement with our fellow RIs based in France in 2020, EMBRC mastered the procedures for benefiting fully from this significant advantage.

Country member updates

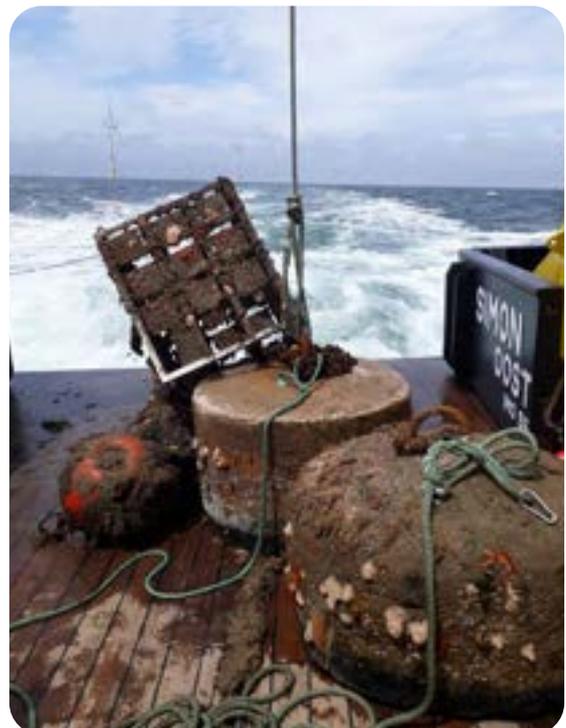
EMBRC Belgium

EMBRC Belgium (or EMBRC-BE) provides access to estuarine and marine habitats (water column, soft sediments and artificial hard substrates) through research vessels and a scientific diving team. It offers a wide range of experimental facilities for ecological research including in situ installations, climate rooms, micro- and mesocosms and equipment for climate-change related research. Integrated omics platforms for biodiscovery, microalgae culturing facilities and platforms for histological sectioning and staining techniques are available as well.

EMBRC-BE maintains a collection with well-characterised strains of diatoms, including new model species for molecular and biotechnological research, a bacteria collection with >25000 strains and a living culture collection of marine macroalgae and diverse invertebrates.

2020 EMBRC-BE highlights

- Launched a new EMBRC-BE website
- Launched an updated Marine Training website
- Sent 2 newsletters to 79 stakeholders
- Organised a stakeholder meeting in April with the Blue Cluster, with a total of 23 participants from industry
- Participated in ASSEMBLE Plus and 6 research projects in collaboration with industry approved for funding initiated in 2020



The fully colonised Artificial Hard Substrate Garden on board of RV

EMBRC France

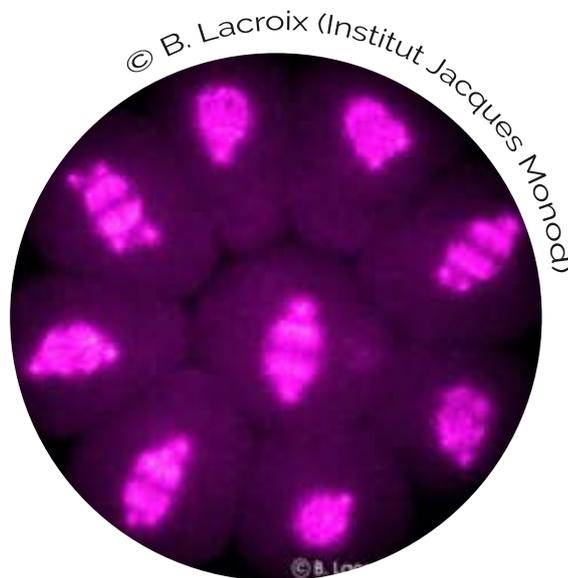
EMBRC France (or EMBRC-FR) is a French national research infrastructure distributed across three marine stations operated by Sorbonne University (SU) and the French National Centre for Scientific Research (*Centre National de pour la Recherche Scientifique*, CNRS). It has been funded by the French programme 'Investment for the future' (*Programme d'investissement d'avenir*, PIA) implemented by the French National Research Agency (*Agence Nationale nationale de la Recherche recherche*, ANR) since 2012.

Through the facilities at *Station Biologique de Roscoff* (SBR), *Observatoire Océanologique de Banyuls-sur-mer* (OOB) and *Institut de la Mer de Villefranche* (IMEV), EMBRC-FR provides access to Channel, Atlantic and Mediterranean ecosystems and their exceptional marine biodiversity, alongside state-of-the-art analytical platforms and experimental facilities. Biological resources can be supplied on-site or remotely from a range of cultured marine models or collected from wild stocks, and a wide range of microbiological strains (bacteria and microalgae; more than 5 000 strains), including mutant strains. Office space, accommodation and catering for on-site access visiting scientists, conferences, workshops, and summer schools are also available. Lifelong training in the marine sciences is offered by an SU specialised service, which can design tailored training on-demand.



2020 EMBRC-FR highlights

- The ANR (*Agence Nationale de la Recherche*, i.e. a French institution tasked with funding scientific research) approved major funding for 2020–2025 for recruiting the operational team. Additionally, EMBRC-FR participated in two Equipex+¹⁰ funded projects : 1) AO-EMBRC, 6.5M€ for 5 years, led by SU and for which the EMBRC-FR Director, Bernard Kloareg, is one of the two principal investigators (PIs); and 2) MuDiS4LS, coordinated by the French Bioinformatics Institute, IFB. IMEV is involved in another Equipex+ project, ARGO-2030, led by IFREMER.
- The administrative structure of EMBRC-FR, a 'research support unit (*Unité d'appui à la recherche*) between SU and CNRS, was approved
- The pilot project MyEMBRCImage concluded. The project, which was awarded by the CNRS 'Crystal collective'¹¹, developed an image database based on OMERO technology for users working in life sciences. The database is the foundation for a new service shared with IFB co-funded through the MuDiS4LS project.
- EMBRC Talks, online seminars where EMBRC-FR users present their research activity sustained by the different services and platforms offered by EMBRC-FR, were launched on 10 April. In 2020 there were 10 talks with a total of 388 participants.
- EMBRC-FR approved the funding for 8 projects within the call 'EMBRC-France Appel à Projets Découverte'.
- EMBRC-France participated in ASSEMBLE Plus, CORBEL, EBB, and AtlantECO projects



¹⁰ Equipex 'equipped with excellence' projects are initiatives that have been awarded funding through the French government's 'Investing in the Future' programme. Equipex+ funding seeks to equip France with top-of-the-line, internationally compliant scientific equipment and has become an essential factor in boosting France's international competitiveness in several fields of science.

¹¹ The CNRS Crystal Collective rewards teams of men and women in support functions who have carried out projects with remarkable technical mastery, collective dimension, applications, innovation and reach. This award is handed out in two categories: 'direct support for research' and 'research backup'.

EMBRC Greece

EMBRC-GR consists of one institution, the Institute of Marine Biology, Biotechnology and Aquaculture (IMBBC) of the Hellenic Centre for Marine Research (HCMR) and it is based on the premises of HCMR in Crete. It provides access to marine habitats (water column, soft and hard substrates and seaweed and algal meadows) of the oligotrophic ecosystems of the Eastern Mediterranean Sea, an area at the forefront of climate change and biological invasions, through a scientific diving team and small boats.

It also offers a wide range of experimental facilities for ecological, aquaculture and genetic research including: dry labs for molecular biology and ecology and taxonomy, aquaria and tanks for experiments on aquafeed testing, fish reproduction and pathology of aquacultured fishes, technology platforms for molecular biology and omics (DNA sequencing facility), micro-CT imaging and targeted analysis of biomolecules and metabolites.

In addition, EMBRC-GR offers e-services (data analysis tools and software for next generation sequencing, NGS, data) on its high-performance computing cluster and expertise in bioinformatics analysis. Finally, it also provides expert advice on Mediterranean aquaculture (aquaculture, nutrition, diet formulation, reproduction, pathogens, aquaculture genomics) and biological sample identification.

2020 EMBRC-GR highlights

- Dr Antonios Magoulas, head of EMBRC-GR, was elected Director of HCMR in December 2020. His mandate starts in February 2021.
- Dr A. Magoulas was appointed member of the Advisory Working Group of the Greek General Secretariat for Research and Innovation (GSRI) in the Sector of 'Environment, Sustainable Development and Circular Economy'
- EMBRC-GR actively supported EMBRC's Genomics Observatory actions within the ASSEMBLE Plus project: it coordinated the 2020 OSD sampling events, performed the sample processing, and finalised the major part of data production on OSD and ARMS samples collected since 2018
- In the context of the National Research Infrastructure project CMBR, based on the participation of IMBBC in EMBRC: i) the infrastructure of EMBRC-GR was upgraded and ii) marine microbial bioprospecting was established as a main activity, by expanding microbial research beyond bacteria, to marine fungi and diatoms, using -omics approaches and bioinformatics
- The Liaison Officer of EMBRC-GR, Dr P. Kasapidis, visited EMBRC-FR (Roscoff) and EMBRC HQ as part of the ASSEMBLE Plus staff exchange programme for knowledge transfer
- Dr Constantinos Mylonas, a leading figure in European aquaculture and especially fish reproduction, was established as the new director of IMBBC
- Dr C. Mylonas was assigned the role of director of the national advisory committee on Agrotechnology and Nutrition, as part of the National Council for Research, Technology and Innovation

Selected publications

Obst Matthias, ARMS-MBON community, Pavludi Christina, 2020. Marine Biodiversity Observation Network for Genetic Monitoring of Hard-Bottom Communities (ARMS-MBON). *Frontiers in Marine Science*, 7: 1031. <https://doi.org/10.3389/fmars.2020.572680>

EMBRC Israel

EMBRC-IL consists of one institution: the Interuniversity Institute for Marine Sciences in Eilat (IUI), a national research/teaching/training infrastructure, focusing on the tropical Red Sea ecosystem. IUI serves as the hub for marine researchers from all Israeli universities to promote marine biology and oceanography. It takes advantage of the Gulf of Aqaba's unique marine features including an unusually deep winter mixing, a substantial spring plankton bloom, warm waters (>20.6°C) at depth, and lush, diverse coral reefs at a distance of only a few meters from the Institute, allowing extraordinary conditions for *in situ* observations and experiments. The open sea is deep (750 m) and calm, conveniently located merely 15 minutes away from the IUI pier aboard the Institute's research vessel.

2020 EMBRC-IL highlights

- The IUI moved into its new 1400 m² lab building
- A new academic staff position at EMBRC-IL was advertised in 2020, which is the third new staff position in the last two years
- A United States Agency for International Development (US-AID) Middle-East Regional Cooperation grant began in 2020 between IUI and its counterpart Marine Science Station Institute in Jordan. The project focuses on measuring the response of engineering species (coral and sea grass) to the combined effect of global and local environmental change in the Gulf of Aqaba.



EMBRC Italy

EMBRC Italy provides access to a wide array of unique ecosystems such as the volcanic CO₂ cold vents in the Gulf of Naples, which constitute natural experimental sites for ocean acidification studies, the lagoon systems of Venice and Lesina, and the salt marshes in Sicily and Sardinia, for example.

Access to these ecosystems is integrated with a complete set of modern technological platforms, such as an advanced centre for molecular biology, bioinformatics and microscopy at various partners, and the Aqua Alta experimental tower in the North Adriatic Sea. All partners provide access to model organisms for experimentation or data collection.

2020 EMBRC-IT highlights

- The partners in the EMBRC-IT Joint Research Unit (JRU) have defined what services are available to be offered to the EMBRC user community
- The existing JRU agreement between EMBRC-Italy and the Ministry of the Universities and Research (MUR) ended on 31 December 2020. A new JRU has been produced by SZN and has been approved by the MUR.
- SZN sent invitations to all major marine research institutes and universities with marine biological departments in Italy to express their interest in joining the new JRU
- A screening and evaluation of the services to be offered by EMBRC (and by which JRU partners) will be performed in 2021. The JRU will be signed by all these partners and the kick-off meeting is expected early spring of 2021.



Offshore Aqua Alta experimental tower, Venezia

Most of the partners in the original JRU already requested to be part of the new JRU. Once in place, EMBRC Italy will offer access to a variety of Mediterranean ecosystems and a spectrum of research services including ecosystem access, taxonomy, monitoring, aquaculture, ecotoxicology, HTS sequencing and bioinformatics. The highlights of the new offer will include access to the high Arctic (CNR-ISP), the Venetian lagoon (CNR-ISMAR), deep water upwelling in the Strait of Messina (CNR-IRBIM), coral reefs in the Indian Ocean (U. Bicocca), and an extensive culture collection of marine fungi (U.Torino).

EMBRC Norway

EMBRC-Norway offers access to diverse marine ecosystems and organisms and to a broad range of research facilities spread along the Norwegian coast, including Arctic and fjord environments. The focus of the infrastructure is on facilities and equipment that allow experimental studies under controlled or semi-controlled conditions. Upgrades and development are ongoing in order to accommodate testing on organism responses to change under close-to-nature conditions. The node also provides optimised facilities for basic and applied research on fish and invertebrates species relevant for aquaculture and fisheries.

2020 EMBRC-NO highlights

- EMBRC-NO appointed a new director: Henrik Glenner
- Participated in the Genomic Observatories initiative-UiT & UiB
- New website for the Norwegian Culture Collection of Algae (NORCCA)
- NTNU facility became ready for access
- IMR-Austervoll became ready for for access



The *Oikopleura dioica* facility at the Sars International Centre for Marine Molecular Biology © Sars-UiB





©Carmen B de los Santos

EMBRC Portugal

EMBRC Portugal is composed of four operators, the Interdisciplinary Centre for Marine and Environmental Research (CIIMAR, Porto), the Institute of Marine Research (IMAR, Azores), the Coimbra Algal Collection (CAOL, Coimbra), coordinated by the Algarve Centre of Marine Sciences (CCMAR, Faro) and provides access to marine ecosystems in the Atlantic (marshes and estuaries, sandy and rocky shores, sea mounts and deep sea) using boats, diving and remote operation. A variety of research can be supported through systems to maintain marine organisms, bioinformatics, chemical and structural platforms, biodiscovery pipelines, imaging, cell culture, bioreactor and other facilities.

2020 EMBRC-PT highlights

- Completed major upgrade of facilities and equipment
- Held first formal General Assembly of the Portuguese node
- Participated in ASSEMBLE Plus, RI-VIS, EOSC-life and AQUAEXCEL2020 Horizon 2020 projects
- Had a total of 17 international visitors in 13 transnational access projects and 16 articles



©Jorge Assis

EMBRC Spain

EMBRC Spain (or EMBRC-ES) provides access to estuarine and marine habitats (water column, soft sediment, rocky shores and artificial hard substrates) and to marine biological resources in the collections and environmental specimen biobanks in its operator stations. It offers a wide range of experimental facilities for ecological and aquaculture research, including climate rooms, micro- and mesocosms for invertebrate, fish, and microalgae culture. Spanish operators offer equipment and service to study climate-change related and (eco)toxicological issues. Integrated omics platforms for biodiscovery, analytical chemistry, invertebrate, and platforms for histological sectioning and staining techniques as well as advanced microscopy and image analysis are available as well.

EMBRC-ES has two operators in the North of the Iberian Peninsula providing access to Galician rias (ECIMAT-UVIGO) and pristine and anthropogenised estuaries in the southern Bay of Biscay (PIE-UPV/EHU). At present, EMBRC-ES is negotiating the incorporation of another operator, the University of Las Palmas de Gran Canaria (ULPGC), providing access to tropical ecosystems in the Canary Islands and to bioresources at the Spanish Bank of Microalgae. Both Spanish operators are active partners in fostering the creation of active and dynamic Regional Blue Innovation ecosystems in their respective regions in Galicia and Basque Country.

2020 EMBRC-ES highlights

- Participated in the H2020 projects ASSEMBLE Plus, EOSC-Life, ERIC Forum, AtlantECO and Interreg project EBB
- Participated in the networking project of the Spanish Ministry of Research and Education EMBRedES together with ULPGC towards its incorporation in EMBRC-ES
- Actively participated EMBRC ABS Working Group activities towards the endorsement of the EMBRC 'ABS Best Practice Guidelines' (produced in the framework of the EBB project)
- Participated in writing a white paper on digital sequence information (DSI) and ABS
https://www.dsmz.de/fileadmin/user_upload/Presse/WILDSI/Final_WILDSI_White_Paper_Oct7_2020.pdf



Country member updates

- The operator ECIMAT-UVIGO incorporated new equipment and services in its offer:
 - A land-based mesocosm system (pelagic and benthic)
 - Supply of the model fish *Cyprinodon variegatus*, deposit and maintenance of microbiological strains
 - Radioactive chamber for α and β radiation for oceanography studies
- The operator ECIMAT-UVIGO raised funds for installing sensors to monitor, control and manipulate seawater conditions in aquarium facilities and an automatic fish feeder (open call for equipment). The operator PiE-UPV/EHU raised funds for the substitution of its field sampling mobile laboratory (open call for technology transfer).



Land-based mesocosm facilities incorporated into ECIMAT-UVIGO services in 2020.

EMBRC United Kingdom

EMBRC-UK consists of six institutions: Marine Scotland Science (Scottish Government Agency); Scottish Association for Marine Science (independent marine science institute); Scottish Oceans Institute (University of St. Andrews); Marine Biological Association (independent marine research institute); British Antarctic Survey (UK research & Innovation – Natural Environment Research Council); and MASTS (Marine Alliance for Science & Technology for Scotland).

Through its partners, EMBRC UK can provide access to a multitude of ecosystems, habitats and species around the UK – from the English Channel to the southern and northern parts of the North Sea as well as to the west coast of Scotland, into the north east Atlantic Ocean. It can also provide remote sampling support from polar regions. The partnership provides access to expertise and specialist facilities for marine biological research including microbial collections, a seal pool, flying and diving robots, boat access, well-equipped laboratories and aquaria, long-term datasets and more.

2020 EMBRC-UK highlights

- Participated in ASSEMBLE Plus programme (SAMS, BAS)
- Three 'Visiting TA' projects in 2020, Angel Meca, Lang and Proeschold [BAS]
- Participated in ASSEMBLE Plus via two remote access requests, with preserved Antarctic samples successfully delivered to applicants in Italy and Germany [BAS]
- Concluded WP8 Cryobanking of Marine Organisms [SAMS, MBA]
- Participated in Ocean Sampling Day [BAS]
- Currently participating in GO ARMS programme, although retrieval of ARMS not possible this year due to COVID restrictions [BAS]
- Developed a new, noteworthy service: Cryomar Protocol toolbox:
http://www.assembleplus.eu/sites/assembleplus.eu/files/public/Deliverables/WP8-Deliverable8.2_2020.pdf [SAMS, MBA]
- Gave a notable conference talk: Campbell CN et al Cryopreservation to sustain long term maintenance of algae and protozoa in the Culture Collection of Algae and Protozoa (CCAP) Cryo2020 Online Conference July 21-23, 2020 [SAMS]

Selected publications

Obst M et al. including Clark MS. A marine biodiversity observation network for genetic monitoring of hard bottom communities (ARMS-MBON). *Frontiers in Marine Science* doi: 10.3389/fmars.2020.572680

E. Paredes, A. Ward, I. Probert, L. Gouhier, & C.N. Campbell 2020 Cryopreservation of Algae in Cryopreservation and Freeze-Drying Protocols, Fourth Edition Ed Wolkers and Oldenhof Published by Springer [Book Chapter]

The Culture Collection of Algae and Protozoa, SAMS



Partnerships

EMBRC values partnerships and working together with its scientific partners in its member countries, including its fellow 'research infrastructures' (RIs).

In 2020, EMBRC fostered its partnerships in many ways, signing for example a collaboration agreement with EuroBioImaging on 14 May 2020 to enhance communication about their respective services, to promote the development of joint services, and to encourage best-practice sharing and staff exchanges. We also joined the advisory board of our 'sister RI', the European Multidisciplinary Seafloor and water column Observatory, EMSO-ERIC.

In addition, EMBRC laid the foundation for the development of a memorandum of understanding (MoU) with the European Molecular Biology Laboratory (EMBL), which would foster collaboration across marine and molecular biology fields and offer unprecedented opportunities for innovative research.

With EMBRC's foray into the world of ocean observation and monitoring with the Ocean Sampling Day (OSD) initiative and the set-up of EMO BON, we were invited to join the newly formed Operational Committee of the European Ocean Observing System (EOOS). In this role, we will work with many other actors to help with the long-term sustainability of the ocean observing efforts in Europe and the progressive implementation of EOOS. We will do our best to improve the development and integration of biological aspects in EOOS, and bring the views and concerns of our community to the discussions. Life in the oceans is one of the most important factors to understand if we want to be able to predict and forecast the seas.

Another exciting development in 2020 was the inclusion and participation of EMBRC in three UN Decade of the Ocean Programmes, uniting hundreds of research institutions across the world: Biomolecular Ocean Observing Network (BOON), Marine Life 2030, and Ocean Practices. All three aim to build, improve and coordinate global efforts in marine biological research, management, and observation capabilities, with each one concentrating on different approaches. BOON is focused on applying molecular tools to biological observation, enabling a global genomic observation network. Marine Life 2030 takes a much broader approach, linking technical, management and policy stakeholders to build capacity for advancing society's 'grand challenges' of managing activities for a healthy and resilient ocean – which a vibrant and healthy society depends on. Finally, Ocean Practices is an attempt to bring harmonisation and agreement on techniques and tools used in various aspects of research and observation. This project will enhance our ability to make data interoperable and comparable across the world, creating a step change in our ability to carry out global marine biological research. The decade proposals all work towards achieving the UN Sustainable Development Goals (SDGs), particularly SDG 14 ('Life Below Water'), as well as others.



EMBRC membership

The expansion of EMBRC membership remains a priority, yet due to the exceptional circumstances of the pandemic, progress on recruiting new members was hampered in 2020. However, several countries have expressed interest in joining EMBRC. We will continue to pursue these opportunities in 2021 and beyond.

RI community

EMBRC is part of a vibrant European community of RIs, including the life science RI (LS-RI) community and the environment RI (or ENVRI) community. In 2020 we continued to participate in meetings with these groups, aiming to develop common strategies, to pool resources, and to enhance our collective communications, among others.

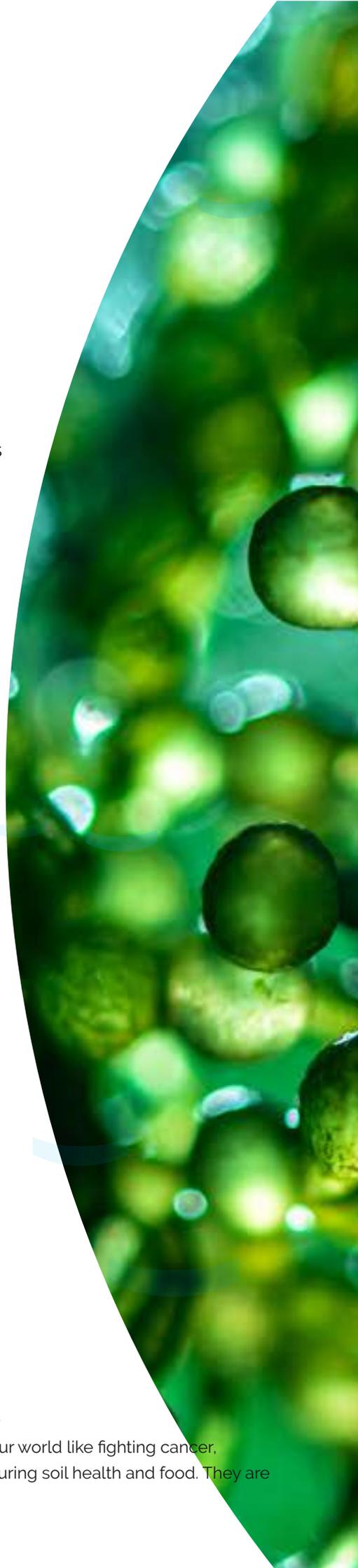
In 2020, LS RI started to translate the successes of the CORBEL project to ensure its legacy. To this end, the LS RI community undertook the development of a new website (www.lifescience-ri.eu) explaining what RIs do, and more specifically what the LS RI community can provide. An excellent prospectus providing an overview of the different LS RI members was developed as a dissemination tool along with a short video. Finally, the website provides a catalogue, helping users identify the right RI for their needs.

Beyond these visibility and communication activities, the LS RI group prepared new projects, engaging with the European Commission for the preparation of Horizon Europe, the European Union's (EU's) research and innovation framework programme running from 2021-2027. In particular, the group explained what LS RIs can offer and how they can support Horizon Europe's planned activities and goals.

The ENVRI community was also busy in 2020, engaging with the Commission, particularly regarding the planned missions in the Horizon Europe programme.¹² Moreover, the community started to develop an MoU for the establishment of an ENVRI entity to support the environmental RIs in a representation capacity. Within this community, a strong alliance is being built around the marine environment, particularly with EMSO-ERIC and LifeWatch ERIC, which share our interest in supporting and strengthening biological observation capabilities.

The LS RI and ENVRI communities are highly valuable fora, allowing EMBRC to engage, coordinate, and collaborate with its related RIs. Given the growing interest and need for multidisciplinary research, these communities are also essential to identify areas of joint efforts to enable new research and innovation.

¹² EU missions are commitments to solve some of the greatest challenges facing our world like fighting cancer, adapting to climate change, protecting our oceans, living in greener cities and ensuring soil health and food. They are an integral part of the Horizon Europe framework programme beginning in 2021.



Governance

General Assembly

EMBRC is governed by the GA, which includes two representatives from each EMBRC member country. The GA makes decisions regarding EMBRC's strategy, governance, and scientific development. In 2020, the GA was chaired by Prof David M. Paterson (Marine Alliance for Science and Technology for Scotland, MASTS, UK) with Adelino Canário (Centre of Marine Science, CCMAR, Portugal) and Eric Guittet (*Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation*, MESRI, France) acting as Vice-chairs.



In 2020, the GA met twice virtually, once from 14-15 May and the second time from 2-3 December. It approved the 2019 annual and financial reports and the Work Plan for 2021, including a pilot initiative for the establishment of EMO BON, the European Marine Omics Biodiversity Observatory Network.

EMBRC General Assembly members

	Koen Lefever Gert Verreet	Belgian Science Policy Office Department Economie, Wetenschap en Innovatie	BELSP0 EWI
	Bertrand Meyer Eric Guittet (Vice-chair)	Sorbonne Université Ministry of Higher Education, Research and Innovation	SU MESR
	Stylios Kastrinakis Antonis Magoulas	Hellenic Centre for Marine Research	HCMR
	Moshe Ben-Sasson Simon Berkowicz	Ministry of Science, Technology and Space Interuniversity Institute for Marine Sciences	MOST IUI
	Roberto Danovaro Grazia Pavoncello	Stazione Zoologica Anton Dohrn Ministry of Scientific Research and Education	SZN MIUR
	Christine Daae Olsen Amund Maage	Research Council of Norway University of Bergen	RCN UiB
	Marta Abrantes Adelino Canário (Vice-chair)	Foundation for Science and Technology Centre of Marine Sciences	FCT CCMAR
	Immaculada Figueroa Rojas José Manuel Garcia Estevez	Ministry of Economy and Competitiveness University of Vigo	MINECO UVIGO
	Ian Davies David Paterson (Chair)	Marine Scotland Marine Alliance for Science and Technology for Scotland	Marine Scotland MASTS

Committee of Nodes

This committee serves as a link between EMBRC HQ and the national partners, ensuring that decisions made by the GA are implemented at national level. It also provides advice on development and technical issues.

In 2020, the Committee of Nodes increased the frequency of its meetings, convening virtually on a monthly basis. The increased frequency enabled the group to address a single topic during each meeting. In-person meetings, which had originally been scheduled for the spring and autumn, were cancelled due to COVID.

Major activities and accomplishments included:

- The planning of EMBRC Community Days, a week-long team-building event bringing together stakeholders from across EMBRC. Originally planned for June 2020 in Banyuls-sur-Mer, France, the event was postponed until June 2021 due to the pandemic.
- The organisation of the Bioprospecting and Genomics Observatories Working Groups
- The establishment of two collaborations: a memorandum of understanding (MoU) with the ENVRI community and a collaboration agreement with Euro-BioImaging

EMBRC Committee of Nodes members

	Jan Vanaverbeke	Royal Belgian Institute of Natural Sciences	RBINS
	Sidonie Gras Nicolas Pade Gemma Gimenez Papiol Bernard Kloareg	European Marine Biological Resource Centre EMBRC France Station Biologique de Roscoff	EMBRC EMBRC-FR SBR
	Georgios Kotoulas Antonis Magoulas Melanthia Stavroulaki	Institute of Marine Biology, Biotechnology and Aquaculture	HCMR-IMBBC
	Jaap van Rijn	The Hebrew University of Jerusalem - Interuniversity Institute for Marine Sciences	HUJI
	Marco Borra Weibe Kooistra	Stazione Zoologica Anton Dohrn	SZN
	Tatiana Tsagaraki	University of Bergen	UIB
	Daniela Fazenda Deborah Power	Centro de Ciências do Mar	CCMAR
	Ibon Cancio Belén Martin Miguez	Plentzia Marine Station Toralla Marine Science Station	PIE ECIMAT-UVIGO
	Axel Miller	Scottish Association for Marine Science	SAMS

Financial report for 2020

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Income

The EMBRC-ERIC budget is financed by nine member countries that contribute in two different ways: through cash contributions and In-Kind contributions. In 2020, according to the budget voted by the General Assembly, the contributions from the member countries amount to:

Membership contributions	2020
Membership fees (amounts in Euros)	
France	€103,492
UK	€106,985
Italy	€91,484
Spain	€79,279
Israel	€69,517
Belgium	€74,777
Norway	€93,602
Greece	€60,988
Portugal	€61,068
Host Premium contribution	
Host Premium cash - France	€300,000
Host Premium In-Kind - France	€260,000
Project income	€92,683
Other	€506
Total contributions	€1,394,381

Expenses

Financial statements: EMBRC-ERIC's finances are audited every year according to French law, where the headquarters has its statutory seat.

The operational costs for the year 2020 were distributed as follows:

Type of costs	2020
Human resources	€507,457
Travels	€12,793
Consumables	€43,876
Services	€70,538
Support/sponsorship of external projects	€83,158
Other	€1,120
Host Premium Contribution	
Host Premium In-kind HR - France	€120,000
Host Premium In-kind functioning - France	€140,000
Total expenses	€978,942



External funding sources

European project funding is only used to fund projects in which EMBRC is involved:

Project	2020
ERIC Forum	
Direct personnel costs	€2,565
Other direct costs	€1,186
Total	€3,751
RI-VIS	
Direct personnel costs	€3,872
Other direct costs	€2,274
Total	€6,146
EOSC-Life	
Direct personnel costs	€37,540
Other direct costs	€3,967
Total	€41,507
ASSEMBLE Plus	
Direct personnel costs	€39,621
Other direct costs	€402
Total	€40,023
AtlantECO	
Direct personnel costs	€1,255
Other direct costs	€0
Total	€1,255
For all projects	
Direct personnel costs	€84,853
Other direct costs	€7,830
Total	€92,683

Acronyms

Acronym	Meaning
ABS	Access and Benefit-Sharing
ACOI	Coimbra Collection of Algae
AGM	Annual general meeting
ANR	<i>Agence nationale de la recherche</i>
AORA	Atlantic Ocean Research Alliance
ASSEMBLE Plus	Association of European Marine Biological Laboratories Expanded
AUN-TARS	UiT - The Arctic University of Norway - Tromsø Aquaculture Research Station
BOON	Biomolecular Ocean Observing Network (BOON)
CBD	Convention on Biological Diversity
CCAP	Culture Collection of Algae and Protozoa
CCMAR	Centre for Marine Sciences
CCMAR-Ramalhete	Centre for Marine Sciences - Ramalhete marine station
CIIMAR	Interdisciplinary Centre of Marine and Environmental Research
CNR-IAS-CG	<i>Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino - Capo Granitola</i>
CNR-IAS-O	<i>Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino - Oristano</i>
CNR-IRBIM-L	<i>Istituto per le Risorse Biologiche e le Biotecnologie Marine - Lesina</i>
CNR-IRBIM-M	<i>Istituto per le Risorse Biologiche e le Biotecnologie Marine - Messina</i>
CNR-ISMAR	<i>Istituto di Scienze Marine - Venezia</i>
CNRS	<i>Centre National de pour la Recherche Scientifique</i>
CoN	(EMBRC) Committee of Nodes
CONISMA-Camerino	<i>Università di Camerino - URDIS (San Benedetto del Tronto)</i>
CONISMA-Chioggia	<i>Università di Padova - Hydrobiological Station "U. D'Ancona" (Chioggia)</i>
CONISMA-Urbino	<i>Università di Urbino</i>
CORBEL	Coordinated Research Infrastructures Building Enduring Life-science
DOORS	Developing an Optimal and Open Research Support system to unlock the potential for blue growth in the Black Sea (BS)
ECIMAT-UVIGO	Toralla Marine Science Station - University of Vigo
EDA	Effect Directed Analysis
EMBRC	European Marine Biological Resource Centre
EMO BON	European Marine Omics Biodiversity Observation Network

Acronyms

Acronym	Meaning
EMSO (ERIC)	European Multidisciplinary Seafloor and water column
ENVRI	Environmental Research Infrastructures
EOSC	European Open Science Cloud
ERC	European Research Council
ERIC	European Research Infrastructure Consortium
FAIR	Findable, Accessible, Interoperable and Reusable
Fig.	Figure
GA	(EMBRC) General Assembly
GLOMICON	Global Omics Observatory Network
H2020	Horizon 2020
HCMR-IMBBC	Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research
HQ	(EMBRC) Headquarters
HR	Human resources
HUJI	Hebrew University of Jerusalem
IMAR	Institute of Marine Research
IMEV	<i>Institut de la Mer de Villefranche</i>
IMR-ARS	Institute of Marine Research - Austevoll Research Station
IMR-M	Institute of Marine Research - Marbank
IUI	Interuniversity Institute for Marine Sciences
JRA	Joint Research Activity
JRU	(EMBRC Italy) Joint Research Unit
KULeuven	<i>Katholieke Universiteit Leuven</i>
LS RI	Life Science Research Infrastructure
MASTS	Marine Alliance for Science and Technology for Scotland
MBA	The Marine Biological Association
MSc	Master of Science
MSS	Marine Scotland Science
MUR	(Italian) Ministry of the Universities and Research
NERC-BAS	Natural Environment Research Council – British Antarctic Survey
NFH	UiT - The Arctic University of Norway - Bioprospecting
NGS	Next generation sequencing (data)
NIVA	Norwegian Institute for Water Research
Nofima	Nofima

Acronyms

Acronym	Meaning
NORCCA	Norwegian Culture Collection of Algae
NP	Nagoya Protocol
NTNU	Norwegian University of Science and Technology
OGS	National Institute of Oceanography and Experimental Geophysics
OOB	<i>Observatoire Océanologique de Banyuls sur Mer</i>
OSD	Ocean Sampling Day
PIA	<i>Programme d'investissement d'avenir</i> (Investment for the future)
PIE-UPV/EHU	Plentzia Marine Station - University of the Basque Country
RBINS	Royal Belgian Institute of Natural Sciences
RI	Research Infrastructure
SAMS	Scottish Association for Marine Science
SBR	<i>Station Biologique de Roscoff</i>
SDG	Sustainable Development Goal
SOI	Scottish Oceans Institute
SU	Sorbonne University (Paris)
SWOT	Strengths, weaknesses, opportunities, and threats
SZN	<i>Stazione Zoologica Anton Dohrn</i>
SZN-BEC	SZN - Benthic Ecology Centre
SZN-MTRC	SZN - Marine Turtles Research Centre
TNA	Transnational access
UGENT	Ghent University
UHasselt	University of Hasselt
UIB-MBSE	UIB - Marine Biological Station Espeland
UIB-SICMMB	UIB - Sars International Centre for Marine Molecular Biology
UIB-SLRC	UIB - Sea Lice Research Centre
ULPGC	University of Las Palmas de Gran Canaria
UN	United Nations
UO	University of Oslo
US-AID	United States Agency for International Development
VA	Virtual access
VAT	Value-added tax
VLIZ	Flanders Marine Institute (Marine Station Ostend)

Publications

The role of EMBRC as a research 'powerhouse' continues to be demonstrated throughout the years with an increasing number of publications which acknowledge the RI (78 publications in 2020) and EMBRC-coordinated H2020 projects (overall, 38 publications). Even after their conclusion, the projects ASSEMBLE Marine (WP7, ended in 2014) and EMBRIC (H2020, ended in 2019), are still creating an impact in the scientific community (see Figure 10 below).

The ASSEMBLE Plus project (started in 2018, follow-up of the WP7 ASSEMBLE Marine project) is building up scientific outcomes from its Joint Research Activities and from its TNA users (16 publications). Other outcomes are expected in the future from users accessing EMBRC through TNA funding.

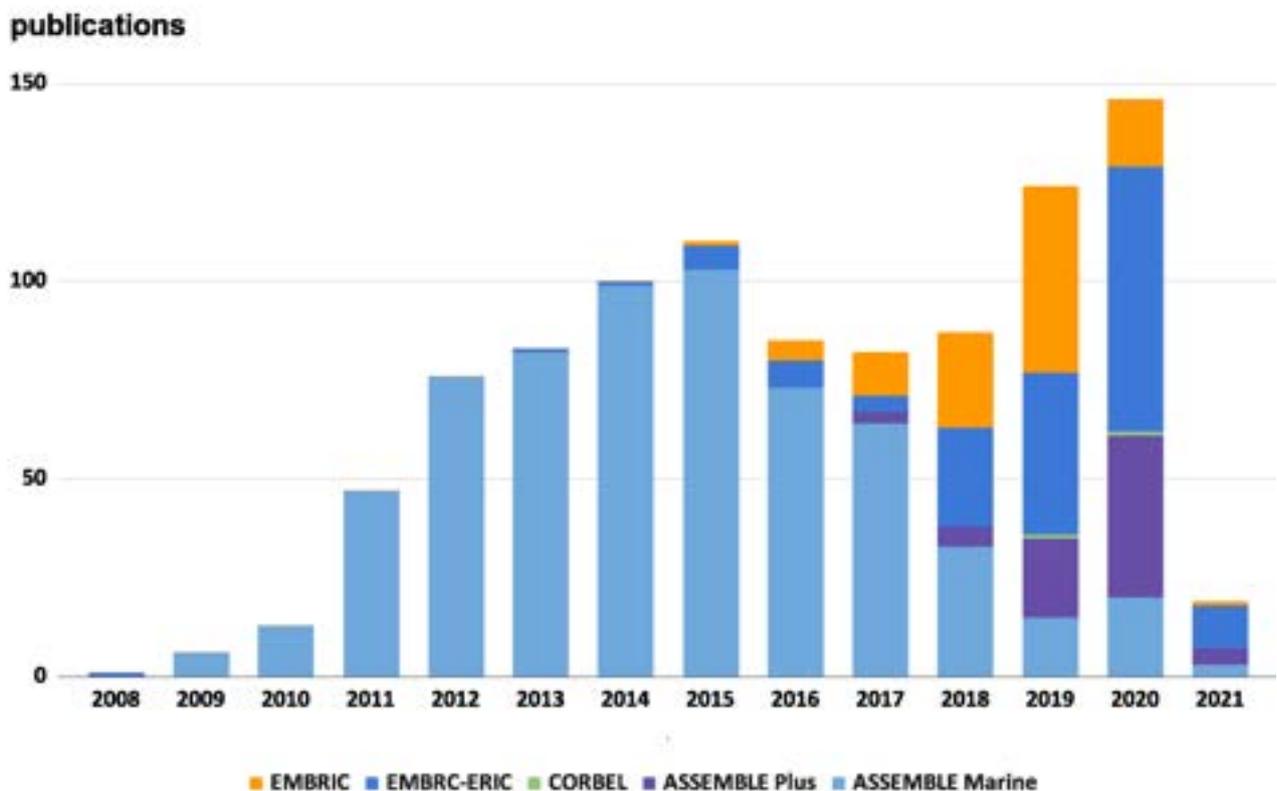


Figure 10: Number of publications from EMBRC and other EMBRC-coordinated H2020

Note: the overall number of publications may include outcomes generated in institutes which are not part of the EMBRC network.

List of publications

This section includes EMBRC-related publications, (co-)authored by EMBRC and/or related to an EMBRC-coordinated project or resulting from EMBRC services (and acknowledging EMBRC). Note: this list only concerns publications in 2020, and does not include all articles published by researchers at EMBRC's marine stations.

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Annex: List of EMBRC sites/ operators

The table below lists all EMBRC participating institutions ('operators'¹³ and 'sites', ie marine stations/institutes).

Site	Site abbreviation	Operator	Member country
Ghent University	UGENT	UGENT	Belgium
Flanders Marine Institute (Marine Station Ostend)	VLIZ	VLIZ	
Royal Belgian Institute of Natural Sciences	RBINS	RBINS	
University of Hasselt	UHasselt	UHasselt	
Katholieke Universiteit Leuven	KULeuven	KULeuven	
Toralla Marine Science Station - University of Vigo	ECIMAT-UVIGO	UVIGO	Spain
Plentzia Marine Station -University of the Basque Country	PIE-UPV/EHU	UPV/EHU	
Institut de la Mer de Villefranche	IMEV	SU, CNRS	France
Observatoire Océanologique de Banyuls sur Mer	OOB	SU, CNRS	
Station Biologique de Roscoff	SBR	SU, CNRS	
Institute of Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research	HCMR-IMBBC	HCMR	Greece
Interuniversity Institute for Marine Sciences	IUI	Hebrew University of Jerusalem (HUJI)	Israel
Stazione Zoologica Anton Dohrn	SZN	SZN	Italy
Benthic Ecology Centre	SZN-BEC	SZN	
Marine Turtles Research Center	SZN-MTRC	SZN	
Università di Padova - Hydrobiological Station 'U. D'Ancona'	CONISMA-Chioggia	CONISMA	
Università di Camerino – URDIS	CONISMA-Camerino	CONISMA	
Università di Urbino	CoNISMa-Urbino	CoNISMa	
Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino - Oristano	CNR-IAS-O	CNR-IAS	
Istituto per lo studio degli impatti Antropici e Sostenibilità in ambiente marino - Capo	CNR-IAS-CG	CNR-IAS	

¹³ EMBRC 'operators' are the legal entities that make up each of our country members. These operators are typically universities and research organisations.

List of EMBRC sites/operators

Site	Site abbreviation	Operator	Member country
Istituto per le Risorse Biologiche e le Biotecnologie Marine - Messina	CNR-IRBIM-M	CNR-IRBIM	Italy
Istituto per le Risorse Biologiche e le Biotecnologie Marine - Lesina	CNR-IRBIM-L	CNR-IRBIM	
Istituto di Scienze Marine - Venezia	CNR-ISMAR	CNR-ISMAR	
National Institute of Oceanography and Experimental Geophysics	OGS	OGS	
Institute of Marine Research - Austevoll Research Station	IMR-ARS	IMR	Norway
Institute of Marine Research - Marbank	IMR-M	IMR	
Norwegian Institute for Water Research	NIVA	NIVA	
Nofima	Nofima	Nofima	
Norwegian University of Science and Technology	NTNU	NTNU	
Sars International Centre for Marine Molecular Biology	UIB-SICMMB	UIB	
Marine Biological Station Espeland	UIB-MBSE	UIB	
Sea Lice Research Centre	UIB-SLRC	UIB	
The Arctic University of Norway - Tromsø Aquaculture Research Station	AUN-TARS	UIT	
The Arctic University of Norway - Bioprospecting	NFH	UIT	
University of Oslo	UO	UO	
Ramalhete marine station	CCMAR- Ramalhete	CCMAR	
Centre for Marine Sciences	CCMAR	CCMAR	
Interdisciplinary Centre of Marine and Environmental Research	CIIMAR	CIIMAR	
Institute of Marine Research	IMAR	IMAR	
Coimbra Collection of Algae	ACOI	ACOI	
The Marine Biological Association	MBA	MBA	United Kingdom
Marine Alliance for Science and Technology for Scotland	MASTS	MASTS	
Marine Scotland Science	MSS	MSS	
Natural Environment Research Council – British Antarctic Survey	NERC-BAS	NERC	
Scottish Association for Marine Science	SAMS	SAMS	
Scottish Oceans Institute	SOI	SOI	



Annex: Applications to EMBRC services by country

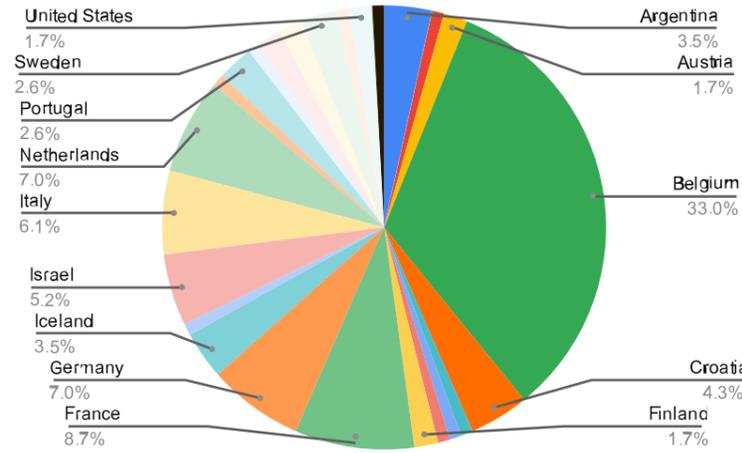
SUM of access request: no. of team members		Node									Grand total
home institution: ESFRI	home institution: country	EMBRC -BE	EMBRC -ES	EMBRC -FR	EMBRC -GR	EMBRC -IL	EMBRC -IT	EMBRC -NO	EMBRC -PT	EMBRC -UK	
ESFRI	Austria	2		6			1			2	11
	Belgium	38		2		3	3			1	47
	Bulgaria					1					1
	Croatia	5			1		2				8
	Czech Republic	1				2					3
	Denmark	1	1	4		1			1		8
	Finland	2		1						1	4
	France	10	2	5		3	1	1			22
	Germany	8		15		4	5	2		7	41
	Greece		1	7		1	3			12	24
	Ireland			1							1
	Italy	7	3	10	5	3			5	9	42
	Netherlands	8							2		10
	Poland							2			2
	Portugal	3	11	1	2			2			19
	Slovenia	1						2			3
	Spain	2		4	3			13	10	2	34
	Sweden	3		4				2			9
	UK	1	11	4			3	10			29
ESFRI-associated	Iceland	4									4
	Israel	6		2	3		5				16
	Norway	1	2	1						2	6
	Serbia					1					1
	Ukraine		2								2
not ESFRI	Argentina	4							2		6
	Aruba	1									1
	Australia					5					5
	Brazil						1		1		2
	Chile						2				2
	Costa Rica		1								1
	Ethiopia	1									1
	India								2		2
	Indonesia	1									1
	Iran								1		1
	Japan							3			3
	Philippines		2	2				2		2	8
	Russia							6			6
	South Africa	2							1		3
	Tunisia			1							1
	United States	2		1			3	2			8
Vietnam	1									1	
Grand total		115	36	71	14	30	67	7	21	38	399

Annex: Applications to EMBRC services by country

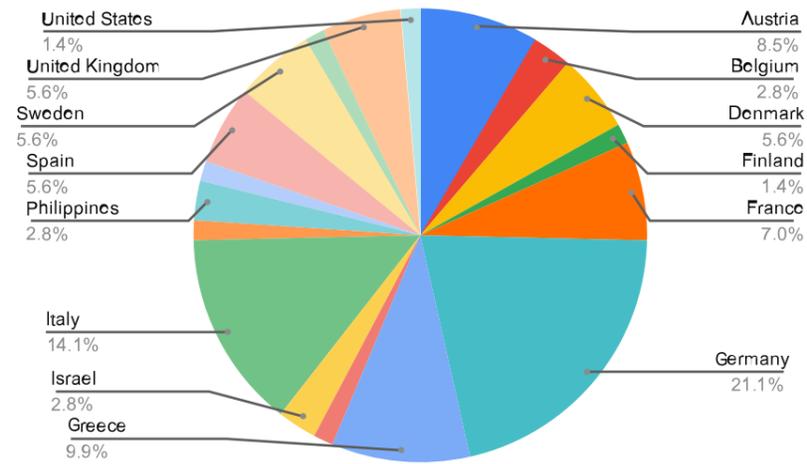
The pie charts reflect the number of applicants by EMBRC member country and home country; note that each application may involve more than one applicant.

Annex: Applications to EMBRC services by country

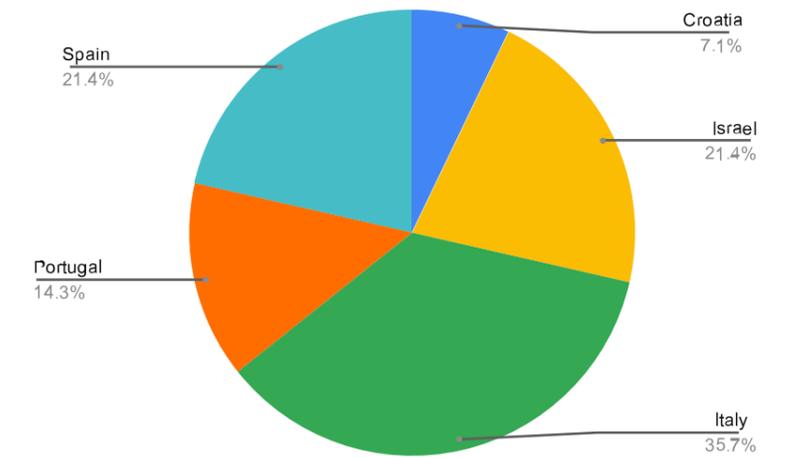
EMBRC Belgium



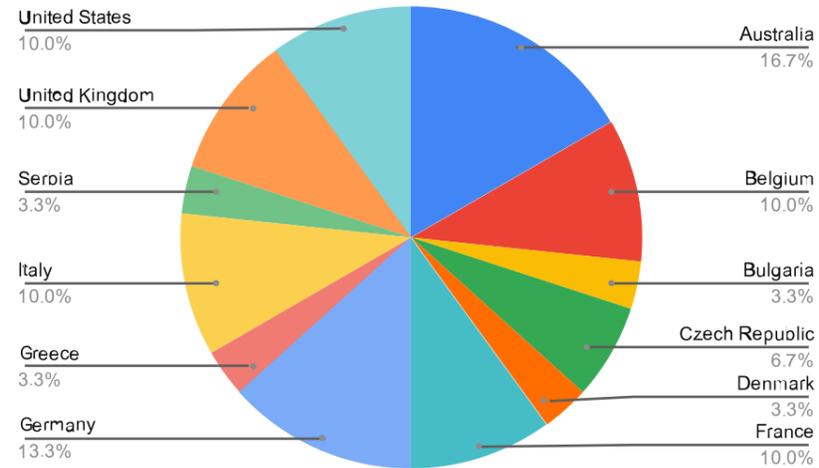
EMBRC France



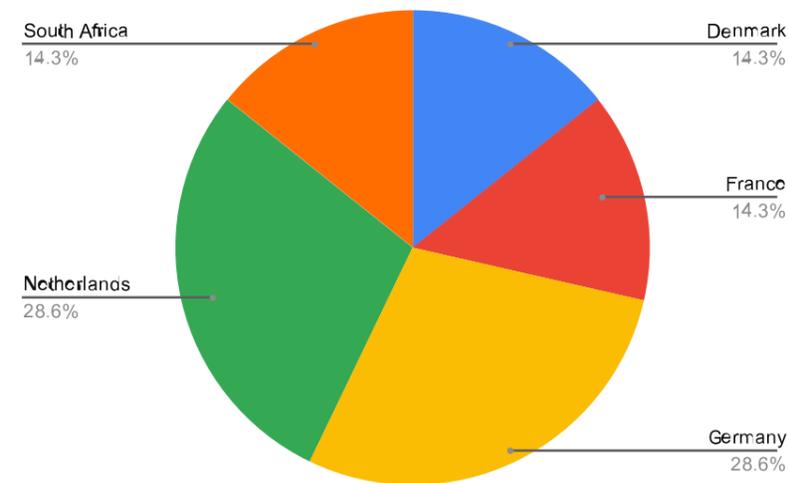
EMBRC Greece



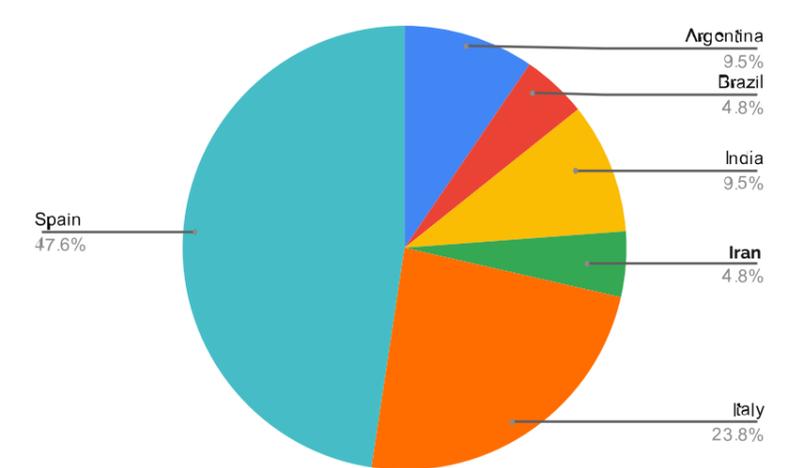
EMBRC Israel



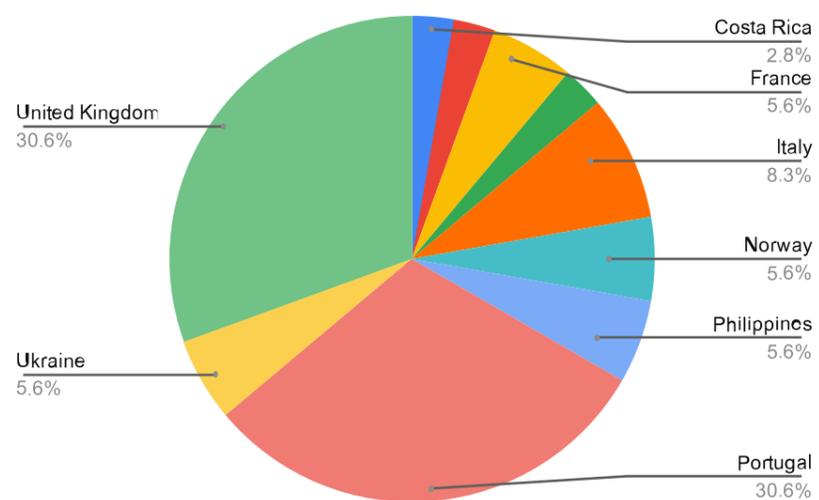
EMBRC Norway



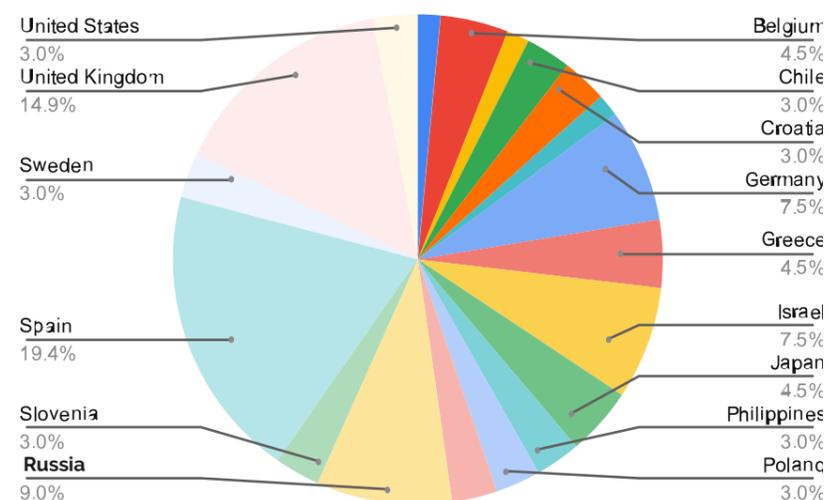
EMBRC Portugal



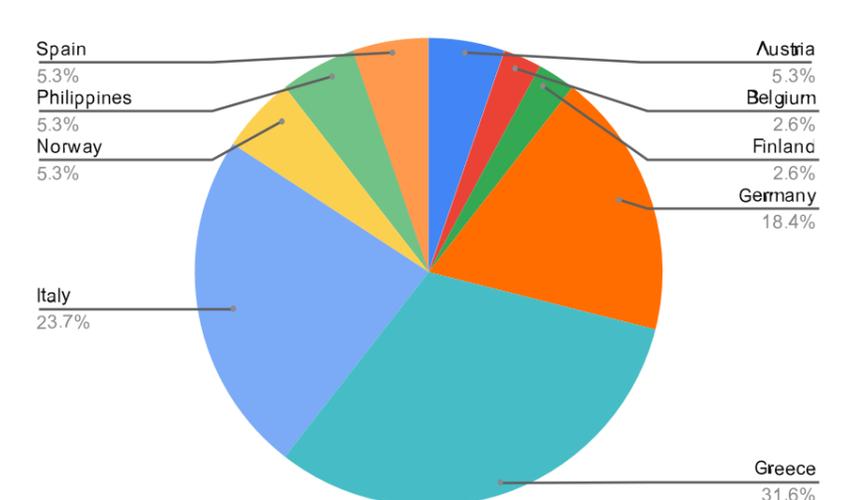
EMBRC Spain



EMBRC Italy



EMBRC United Kingdom



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References: Project funding information

- ⁱ AtlantECO is funded by H2020 under grant agreement (GA) number 862923.
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