

Annual Report 2021

EUROPEAN MARINE BOARD

The European Marine Board provides a pan-European platform for its Member organizations to develop common priorities, to advance marine research, and to bridge the gap between science and policy, in order to meet future marine science and societal challenges and opportunities.

The European Marine Board is an independent and self-sustaining science policy interface organization that currently represents 35 Member organizations from 18 European countries. It was established in 1995 to facilitate enhanced cooperation between European marine science organizations towards the development of a common vision on the strategic research priorities for marine science in Europe.

The EMB promotes and supports knowledge transfer for improved leadership in marine research in Europe. The EMBs membership includes major national marine or oceanographic institutes, research funding agencies and national consortia of universities with a strong marine research focus. Adopting a strategic role, the EMB serves its Member organizations by providing a forum within which marine research policy advice is developed and conveyed to national agencies and to the European Commission, with the objective of promoting the need for, and quality of, European Marine Research.

www.marineboard.eu



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Highlights 2021



Message from the Chair



In 2021, we had to continue to live with the COVID-19 pandemic, and every country in Europe tried to build its reality around it. The struggle to understand and stop this pandemic is not over and scientists from all over the world continue their effort to find solutions. They have already worked hard, alongside policy-makers, to create a vaccine that allowed us to go back to a new normal. Humans did what they are well known for, which was being flexible and adaptable to new situations as they arose. Teleworking became part of the daily work regime; virtual meetings continued to hold teams together and online events kept us all involved and focused with a broader perspective. This was also the case for the European Marine Board (EMB). Our Spring Plenary 2021 meeting was held fully online, but our Autumn Plenary 2021 meeting became our first internal hybrid event, ably hosted by the Norwegian Marine University Consortium (NMUC) and the Institute of Marine Research (IMR) in Bergen and online. My thanks go to **Susanna Pakkasmaa** and **Henning Wehde** for all their work in making this possible. Thanks also to the EMB members for their continued engagement and enthusiasm throughout these difficult times.

However, 2021 was the year of so much more than adapting to a new reality. January 2021 marked the start of the UN Decade of Ocean Science for Sustainable Development. It was also in this year that EMB proudly became the first Implementing Partner of the Ocean Decade. The Ocean Decade aims to put Ocean science in the spotlight and place it firmly on the radar of policy-makers. EMB is joining forces with the Intergovernmental Oceanographic Commission (IOC) to engage and support Europe to achieve the visions and objectives of the Ocean Decade.

In light of this wonderful news, EMB's 8th Forum was held on the topic of Supporting the Ocean Decade in Europe. The 8th Forum took place as a hybrid event at Bluepoint, Brussels and online. Thanks to the engagement and creativity of the Secretariat, EMB's very first external hybrid event turned out to be a big success, where many interesting perspectives and angles were discussed and brought together for an audience of Ocean stakeholders.

Regardless of where they were working from, the EMB Secretariat continued to facilitate the different ongoing EMB Working Groups. Although some groups were never able to meet in person, this did not interfere with their productivity; EMB successfully published three new foresight documents over the course of the year. As it was sadly unattainable to organize any in-person launch events, the Secretariat focussed their efforts on online communication through different platforms.

To mark two years since the publication of EMB's flagship publication, Position Paper 24 'Navigating the Future V', EMB launched their very first impact video. EMB was able to unify different voices from the Ocean science policy landscape to highlight the crucial role of the Ocean within our society, and the role that the Navigating the Future publication series has played in research programming.

The working circumstances during 2021 forced us to take a few steps backwards, but they also allowed us to take some big leaps forward. EMB will continue to adapt and grow to suit changing circumstances, and innovate in how it communicates to and reaches new audiences. This pandemic has forced us all to slow down, and it has made many people, whether they work in environmental sectors or not, more aware and appreciative of the world that we live in. This was the opportunity we needed to introduce the Ocean and what it can offer to wider society. Let us build on this opportunity and work together to make sure that the Ocean and its importance reaches everyone's awareness.

Dr. Gilles Lericolais, EMB Chair

Executive Director's report



Nearly two years on from our first cancelled meeting due to COVID-19 we are still in our home-offices and “working from home” has become a much loved and much hated state of being. For some of us it has been easier than others, but for the European Marine Board Secretariat it has meant welcoming new staff and saying goodbye to others virtually. A very unsatisfactory state of being. During 2021 we employed a new Science Officer, **Ana Rodriguez**, to help with the new Horizon 2020 project, EcoScope. Interviews for her post and her first day in the office all had to happen virtually. Sadly, **Joke Coopman** also left us in June, and interviews for her replacement, **Jana Van Elslander**, also had to take place online. Although we were at least allowed back in the office by her first day in August. The two new EMB Young Ambassadors, **Anjali Gopakumar** and **Rebecca Zitoun**, also had to meet the Secretariat and other Young Ambassadors online. At least we got to meet some of our Young Ambassadors in real life this year: **Alessandro Cresci** and **Rebecca Zitoun** joined us at our hybrid Autumn Plenary in Bergen, and **Natalija Dunić** was able to attend the 8th Forum, which we hosted as a hybrid event in Brussels. In 2021 we also had our first cohort of **Young Ambassador Alumni**, and we look forward to getting updates from our Alumni at future Autumn Plenary meetings. COVID-19 notwithstanding, we were able to put together a video on Navigating the Future V¹, for which I could travel to Brussels to interview Director John Bell, and to Paris to interview Vladimir Ryabinin from the IOC. Our videographer was also able to meet up with Sigi Gruber and our other Young Ambassador, **Anjali Gopakumar**, at a meeting in Italy, before the COVID-19 doors were shut again.

The COVID-19 situation did not stop the EMB outputs in 2021. During 2021 we started our Working Group on Sustained Funding for Ocean Observations. I decided to lead this process myself, and with help from **Ángel Muñoz Piniella** we published the Policy Brief in June. I now have a very good idea of the hard work that goes into leading this process, and can only thank the Science Officers for their hard work to make these publications possible. For instance, **Paula Kellett** made sure that we published our Future Science Brief on Underwater Noise in October, and in November we launched the Position Paper on Marine Geohazards, with the perseverance of **Ángel Muñoz Piniella** and significant help from our intern **Rebecca van den Brand**. In 2021 the Working Group on Coastal Resilience, supported by **Britt Alexander**, got going, and we kicked off the Working Groups on Marine Renewable Energy, supported by **Paula Kellett**, and Marine Habitat Mapping, supported by **Britt Alexander**. The Terms of Reference for a Working Group on Ocean Oxygen was approved at the Autumn Plenary, and will be supported by **Ana Rodriguez**.

In 2021 **Britt Alexander** finalized the Proceedings for our 7th Forum on Big Data in Marine Science², and **Paula Kellett** and **Rebecca van den Brand** worked very hard to organize an amazing 8th Forum on the Contribution of Europe to the Ocean Decade. At the 8th Forum we could announce that we became the first Implementing Partner for the UN Decade of Ocean Science for Sustainable Development³, and we also launched our new Artist-in-Residence⁴ programme.

In 2021 we also finalized the International Ocean Governance Forum project, where **Britt Alexander** ensured that Ocean science and knowledge production is incorporated in the new International Ocean Governance Agenda. The Secretariat, with the help of **Ángel Muñoz Piniella** is still supporting EOOS through our co-chairing of the EOOS Steering Group and Chairing the EOOS Advisory Committee, and with the help of the EMODnet tender and the EuroSea project. **Ángel Muñoz Piniella** is also working on the EU4Ocean Ocean Literacy project.

Finally, I hope there is a light at the end of this COVID-19 tunnel. In 2021, we were able to have some in person meetings, notably our Autumn Plenary, where we had about 20 delegates present, and the 8th Forum, which had to be much more hybrid than planned due to the new Omicron variant. I suspect for 2022 and the foreseeable future, online and hybrid meetings will be the natural state of play, but I truly hope that we will see all our delegates again in person soon.

Prof. Sheila J. J. Heymans, EMB Executive Director

¹ <https://www.marineboard.eu/publications/navigating-future-v-recomendations-ocean-decade>

² <https://www.marineboard.eu/7th-marine-board-forum>

³ <https://www.marineboard.eu/emb-and-ocean-decade>

⁴ <https://www.marineboard.eu/embracing-ocean>

EMB mission, structure and governance

MISSION

The European Marine Board (EMB) provides an independent platform for its Member organizations to promote common positions on research priorities and strategies in Europe, and to bridge the gap between science and policy in order to meet future marine science challenges and opportunities.

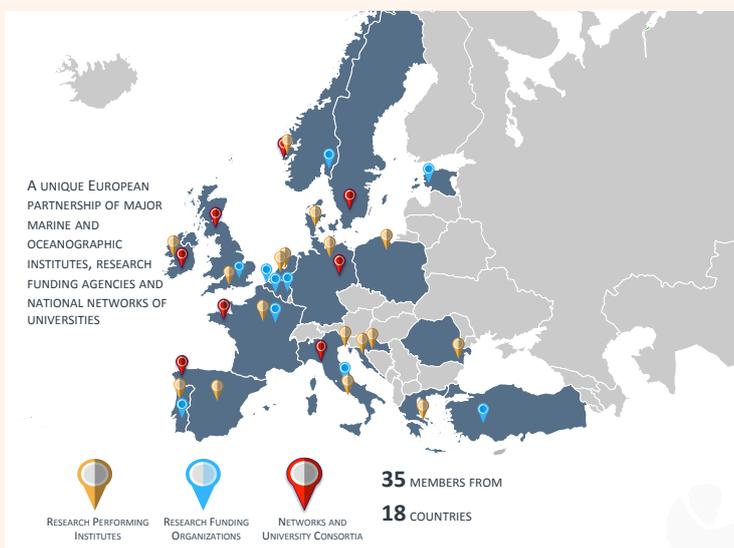
Topics of strategic interest identified by the EMB form the basis for new publications and events. These target European and national research programme managers, strategy developers, policymakers and the marine research community to drive future European and national marine research agendas, and supporting strategies and policies.

EMB acts as an independent science-policy interface, transferring and translating scientific knowledge to policy makers, and channelling policy needs back to the research community.

STRUCTURE AND GOVERNANCE

The European Marine Board (EMB) was established in 1995 to facilitate enhanced cooperation between European marine science organizations. Members are either major

national marine or oceanographic institutes, research funding agencies, or national consortia of universities with a strong marine research focus. In 2021, the EMB represented 35 Member organizations from 18 countries.



EMB DELEGATES

EMB Delegates are representatives of EMB Member organizations. Together they form “the Board”, which is the highest decision-making organ of the EMB. EMB Delegates meet twice a year at Plenary meetings to share knowledge, define common priorities, and agree on activities and outputs. Observers and guests are invited to attend EMB Plenary meetings on an *ad hoc* basis. These include the European Commission (EC), the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO), and other international and European marine science networks.

The EMB’s mixed membership of research performing organizations, research funding organizations, and national university consortia, ensures its unique capacity to deliver science policy advice on issues of identified strategic importance and to influence European marine research agendas.

EXECUTIVE COMMITTEE

EMB operations are overseen by the Executive Committee (ExCom). The ExCom meets three times per year to ensure the implementation of the actions agreed by the Board at Plenary meetings, make operational and financial decisions, and give strategic guidance to the Board and Secretariat. The EMB Executive Director is ex-officio member of the ExCom.

ExCom mandates in 2021:



Gilles Lericolais – Chair
French Research Institute for the
Exploration of the Sea (Ifremer),
France
Spring 2019 – 2022



Carlos García Soto – vice-Chair
Spanish Oceanographic Institute
(IEO), Spain
Spring 2017 - 2022



Jeremy Gault – vice-Chair
Irish Marine Universities
Consortium (IMUC), Ireland
Autumn 2018 - 2023



Fiona Grant – vice-Chair
Marine Institute (MI), Ireland
Spring 2020 - 2023



Alan Evans – vice-Chair
Natural Environment Research
Council (NERC), UK
Spring 2020 - 2023



Katrin Schroeder – vice-Chair
National Research Council (CNR),
Italy
Spring 2020 - 2023

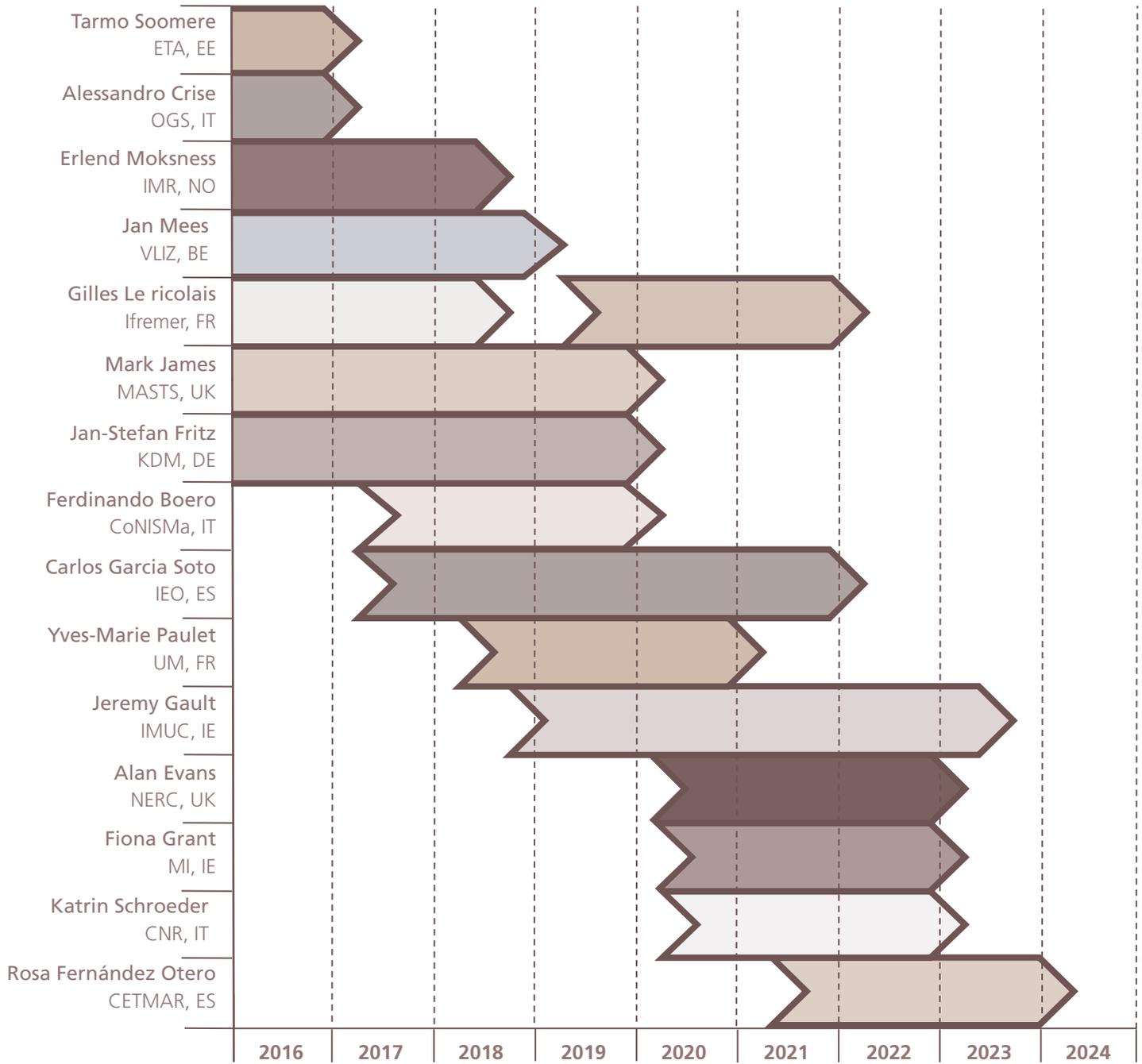


**Rosa Fernández Otero – vice-
Chair**
Technological Centre of The Sea
(CETMAR), Spain
Spring 2021 - 2024



**Sheila JJ Heymans – Ex-officio
Member**
EMB Executive Director

OVERVIEW OF EXCOM MEMBER MANDATES SINCE EMB IVZW INDEPENDENCE FROM ESF IN 2016



EMB SECRETARIAT

The EMB Secretariat implements the strategic and operational decisions and activities proposed by the Board and ExCom. The Secretariat is based in Ostend, Belgium. EMB activities and the operation of its Secretariat are funded through annual Member contributions, EMB external contracts and generous support from the Flemish Government of Belgium.

In May 2021 the Secretariat grew with the addition of **Ana Rodriguez**, who was employed to mostly work on a Horizon 2020 project, in addition to other Science Officer tasks.

After four and a half years of support and commitment, Executive and Finance Officer **Joke Coopman** left the EMB Secretariat in June 2021 and was replaced by **Jana Van Elslander** in August 2021.

From September 2021 - January 2022, the EMB Secretariat was reinforced by Intern **Rebecca van den Brand**, a Masters student from the University of Gothenburg, Sweden. Rebecca's insights and motivation provided valuable contributions to the team.



Credit: Sheila Heymans

The EMB Secretariat at the Autumn Plenary meeting in Bergen, Norway, October 2021.

From left to right: Ángel Muñoz Piniella (Science Officer), Ana Rodriguez (Science Officer), Rebecca van den Brand (Intern Junior Science Officer), Jana Van Elslander (Executive and Finance Officer), and Paula Kellett (Science Officer).

Not present: Britt Alexander (Science Officer) and Sheila JJ Heymans (Executive Director).



Credit: Michael Chia

The EMB Secretariat at the 8th EMB Forum in Brussels, Belgium, December 2021.

Top from left to right: Britt Alexander (Science Officer), Rebecca van den Brand (Intern Junior Science Officer) and Ana Rodriguez (Science Officer).

Bottom from left to right: Ángel Muñoz Piniella (Science Officer), Paula Kellett (Science Officer) and Sheila JJ Heymans (Executive Director).

Not present: Jana Van Elslander (Executive and Finance Officer).

EMB YOUNG AMBASSADORS

In March 2019, the EMB launched its Young Ambassador Programme in order to strengthen collaboration with, and engagement from, early career researchers. The EMB Young Ambassadors play an important role in advocating and promoting the relevance of marine science and the Ocean to their peers and wider networks. They are EMB's soundboard to a vast group of early career researchers and ensures that the voices and ideas of young researchers are reflected within the EMB's work. The Young Ambassadors engage with EMB for a two-year period after which they join the Young Ambassador Alumni Group.

In 2021, EMB had four active Young Ambassadors: **Natalija Dunić**, a postdoctoral researcher from the Institute of Oceanography and Fisheries (IOF) in Split, Croatia; **Alessandro Cresci**, a postdoctoral researcher at the Institute of Marine Research (IMR) in Norway; **Rebecca Zitoun**, a postdoctoral researcher from the Royal Netherlands Institute for Sea Research (NIOZ) and subsequently at the Helmholtz Centre for Ocean Research Kiel (GEOMAR) in Germany; and **Anjali Gopakumar**, a PhD student at the University of Bologna, part of the Universities Consortium (CoNISMa) in Italy.



Anjali Gopakumar



Rebecca Zitoun

The four Ambassadors all joined the programme under the ongoing COVID-19 pandemic in Europe, therefore contact has been almost exclusively limited to online meetings. However, they have still been very engaged in EMB activities, including attending EMB Plenary meetings. Alessandro has been engaged in the Working Group on Underwater Noise (see p23), Rebecca and Anjali feature in the Navigating the Future series video (see p36), and all four Ambassadors spoke at the 8th EMB Forum in December 2021 (see p18). They have also been active in external activities, including a communications workshop at the International Conference for Young Marine Researchers (ICYMARE) conference in September 2021, participation in the Virtual Early Career Ocean Professional (V.ECOP) Day in June 2021, and presentations to their own colleagues and institutes.



Alessandro Cresci



Natalija Dunić

You can find out more about the EMB Young Ambassadors, see all of their activities, and read their blog articles on the EMB website: <https://www.marineboard.eu/emb-young-ambassador-programme>

COVID-19 IMPACT ON MARINE SCIENCE

For the past two years, the global COVID-19 pandemic has caused lockdowns, travel bans and other strict regulations in countries across the world. This ongoing situation forced everyone to reschedule their work routines and interactions. During the summer of 2020, the EMB Secretariat conducted a survey to ask EMB member organizations about the impact and implications (both positive and negative) that the COVID-19 pandemic and associated lockdowns had on the EMB Member organizations. In February 2021, the survey was re-launched to find out what had changed. These are some of the key results:

NEGATIVE IMPACTS

RESEARCH IMPACTS	TEACHING AND INTERNS	IMPACTS ON DATA
>70%  had to cancel or postpone research cruises, field work, workshops, interviews.	60%  noticed a negative impact on teaching and the ability to take on interns or students.	50%  experienced impacts on data availability, including from long-term monitoring.

MOVING ONLINE

89%  agreed that they had an increased ability to attend events now that they were online; 50% noted increased audiences.	50%  had been motivated to try new virtual initiatives such as webinar or podcast series.
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INEQUALITY AWARENESS

44%  were not aware of disparity in impact of COVID-19 based on gender, race or age.	33%  noted that their institute had established additional procedures or resources to tackle inequality in impact from COVID-19.
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FUTURE IMPACTS

83%  Expected that there would be less international travel for meetings in the future.	>30%  stated that their institute has released a policy for future events, or had engaged in discussions on this.
28%  expected future reductions in ability to employ new staff.	22%  expected there to be a redirection of funding away from marine science in the future.

Plenary meetings 2021

EMB Plenary meetings, hosted by a Member organization, are held twice a year in spring and autumn. During these meetings EMB Member organizations share knowledge, define common priorities and agree on activities and outputs that will drive and/or impact European and national marine research and policy agendas. At these meetings, EMB Delegates have the opportunity to interact with invited speakers, guests, and observers from the European Commission, UNESCO's Intergovernmental Oceanographic Commission (IOC-UNESCO) and other stakeholders.

SPRING PLENARY MEETING | 26-27 MAY 2021, ONLINE

The EMB Spring Plenary meeting was held online due to the ongoing COVID-19 pandemic. In total, 38 EMB Delegates, three EMB Young Ambassadors and five observers attended the meeting. Some highlights from the meeting are listed here.

New Secretariat Member

The new EMB Secretariat Member, Science Officer **Ana Rodriguez**, was introduced to the Board. Ana will spend most of her time working on the new H2020 project EcoScope (see pg 32).

New composition of the EMB ExCom

The Board elected **Rosa Fernández Otero** (CETMAR, Spain) as the new ExCom Member. She replaced the outgoing ExCom Member **Yves-Marie Paulet** (UM, France) who had served with active and valuable contributions over the past three years.

New EMB Working Groups

The Board agreed on the new topic of Ocean Oxygen for a EMB Working Group, for which a Terms of Reference was agreed to be prepared by the EMB Autumn Plenary 2021 meeting. The Board agreed to launch the call for nominations for the Marine Habitat Mapping Working Group during summer 2021, with the aim to bring out a publication in 2022 or 2023.

Virtual Open Session

A virtual open session was hosted by EMB Member University of Gothenburg, Sweden. The session included presentations and breakout discussions on genetic monitoring, mariculture and coastal habitat restoration, and was closed by **Per Åberg**, Vice Dean of the Faculty of Science.



Credit: EMB

AUTUMN PLENARY MEETING | 28-29 OCTOBER 2021, BERGEN, NORWAY AND ONLINE

EMB Delegates and invited guests met in Bergen, Norway, and online on 28-29 October 2021 for the EMB Autumn Plenary Meeting, hosted by EMB Members NMUC and IMR. The meeting was attended by 39 EMB Delegates, three Young Ambassadors and five other guests. Some highlights from the meeting are listed here.

New EMB Secretariat Member

The new EMB Secretariat Member, Executive and Finance Officer **Jana Van Elslander**, was introduced to the Board.

New EMB Working Groups

The Board agreed to launch a new Working Group on Deep Sea and Ocean Health, and approved the Terms of Reference for the new Working Group on Ocean Oxygen.

Supporting the Ocean Decade

The EMB Secretariat officially submitted their application to become an Implementing Partner for the Ocean Decade, and the EMB's new artist-in-residence programme, dedicated to the Ocean Decade, was approved by the Board. This programme would be launched at the 8th EMB Forum, which was about supporting the Ocean Decade (see pg 18).

Hybrid Open Session

A hybrid open session was held on the topic of the deep sea and deep-sea mining. The Members were welcomed by the Director of the University of Bergen **Amund Måge**. Several fascinating presentations were then given, followed by questions from the attendees.



Photo of all attendees in Bergen, Norway during the hybrid Autumn Plenary 2021 meeting.

Credit: EMB



EMB science-policy interactions & events

The EMB is an independent organization funded by its Members. We provide an interface between science and policy and engage with a wide range of stakeholders in the marine science-policy field, including the European Commission, European Parliament and Intergovernmental Organizations, to advance marine science in Europe and beyond. We strongly believe in two-way communication, and welcome the input from policymakers to provide the best available scientific advice at the right time. We stimulate this by organizing a variety of interactive events ranging from small-scale discussions on a specific topic (e.g. Brown Bag Lunches) to large-scale overarching events (e.g. the EurOCEAN conference and EMB Forum).

8th EMB Forum

Supporting the Ocean Decade in Europe

1 December 2021, BluePoint Brussels and Online



2021
2030 United Nations Decade of Ocean Science for Sustainable Development

European
MARINE BOARD
Advancing Seas & Ocean Science



8TH EMB FORUM 'SUPPORTING THE OCEAN DECADE IN EUROPE'

1 December 2021, Online & Brussels

The 8th EMB Forum was held online and in Brussels on 1 December 2021 to discuss how to deliver a successful Ocean Decade. Over 100 participants from Europe and beyond were present either in person or online, representing academia, government, industry, and NGOs.

The Opening Session began with a welcome from the EMB Chair, **Gilles Lericolais**, followed by **Charlina Vitcheva** (Director-General, DG MARE, European Commission) who elaborated on the ongoing activities by the European Commission in support of the Ocean Decade.



Jasmine Harrison, the record holder for the youngest woman to row solo across the Atlantic Ocean, spoke about her experiences at sea, how the Ocean inspires her, about the Ocean she wants and how the Ocean Decade could gain more visibility.

The EMB Young Ambassadors **Alessandro Cresci**, **Anjali Gopakumar**, **Rebecca Zitoun** and **Natalija Dunić** then gave their perspectives on science communication and the inclusion of Early Career Ocean Professionals in the Ocean Decade.



The following session highlighted EMB activities in support of the Ocean Decade. **Gilles Lericolais** presented the artist-in-residence programme and announced EMB as the first Ocean Decade Implementing Partner. **Frank Thomsen** (DHI, Denmark) presented Future Science Brief 7 on Addressing Underwater Noise in Europe, and **Heidrun Kopp** (GEOMAR, Germany) presented Position Paper 26 on Marine Geohazards, both highlighting the documents' relevance for the Ocean Decade Outcomes and Challenges.

In the third session, **María del Carmen García-Martínez** (IEO, Spain & Chair of the EMBCP), **Romulus-Marian Paiu** (Mare Nostrum, Romania), **Peer Fietzek** (Kongsberg Maritime, Germany) and **Elisabetta Balzi** (DG RTD, European Commission) presented their views on communicating about the Ocean Decade and engaging a wider community with the Ocean.



Vladimir Ryabinin (IOC-UNESCO) spoke about the ambitions for the Ocean Decade and stated that the Ocean Decade has the power to start a renaissance in Ocean science and technology, but that moving forward requires co-design looking at the different elements from different viewpoints.

In the last session, **Zoi Konstantinou** (DG MARE, European Commission), **Niall McDonough** (Marine Institute, Ireland & Chair of JPI Oceans), **Gesine Meißner** (German National Committee for the Ocean Decade), **Colin Stedmon** (Technical University of Denmark & Ocean Decade Arctic Action Plan) and **Annemie Rose Janssen** (Royal Belgian Institute for Natural Sciences & Ocean Decade Southern Ocean Task Force) shared their views on bridging science and policy at different levels to support the Ocean Decade in Europe.

The Forum was closed by **Jean-Eric Paquet** (Director-General, DG RTD, European Commission) reiterating key messages that had been raised throughout the event, and especially the work that the European Commission's Directorate-General Research and Innovation is supporting.



You can find out more about this event here: <https://www.marineboard.eu/8th-marine-board-forum>



Credit: Michael Chia

EMB SCIENCE WEBINARS

The EMB webinars underpin the marine science behind EMB publications, research that is done at EMB's Member institutes, and science with relevance to EMB publications. The webinars take place on the third Thursday of every month from 13:00-14:00 CET. The format of the webinars includes a short opening by the EMB moderator and up to 30 minutes of presentation by one or two speakers, with an opportunity for the audience to ask questions. All the presentations are available on the EMB website⁵ and on the EMB YouTube channel⁶. The following webinars took place in 2021:



January 2021: Case studies on marine ecosystem service valuation – Future Science Brief 5 on Valuing Marine Ecosystem Services

Gregg Verutes, a PhD student from the University of Santiago de Compostela, Spain introduced valuing nature's contribution to people with the marine InVEST toolbox. **Gill Ainsworth**, a social scientist the University of Santiago de Compostela, discussed how cultural values of Marine Ecosystem Services can be accounted for.

February 2021: Disclosing the truth: Are models better than observations? – Future Science Brief 4 on Marine Ecosystem Modelling and Observations

Morten D. Skogen, Chair of the EMB's Working Group on Ecosystem Modelling and a senior scientist at the Institute of Marine Research (IMR) in Bergen, Norway, presented a new paper on 'Disclosing the truth: Are models better than observations?'.



March 2021: Submerged volcanoes, and coral reefs under climate change: Early career perspectives from EMB Young Ambassadors

This edition focussed on the research and experiences of the outgoing EMB Ambassadors. **Alba González Vega**, a PhD student at the Spanish Institute of Oceanography (IEO) presented her work focusing on a multidisciplinary study of the submarine volcano Tagoro (Canary Islands, Spain). **Liam Lachs**, a PhD student at the University of Newcastle, UK, presented his research on the effect of climate change on corals and coral reefs in partnership with the National Oceanic and Atmospheric Administration (NOAA, USA).

April 2021: Marine Citizen Science: Trends and Frontier Issues – Position Paper 23 on Marine Citizen Science

In this webinar, **Jane Delaney**, a Senior Lecturer in marine ecology at Newcastle University in the UK, was joined by **Christine Domegan**, a senior lecturer in marketing, with input from **Patricia McHugh**, a lecturer in marketing, both from NUI Galway in Ireland. They discussed the current landscape of Marine Citizen Science across Europe with particular reference to the UK and Ireland, and how the field has evolved since the 2017 EMB publication on Citizen Science.



May 2021: The value chain of Ocean CO₂ measurements – Future Science Brief 6 on Big Data in Marine Science

Dorothee Bakker, Associate Professor at the University of East Anglia, UK, presented on the science behind the 'Climate and marine biogeochemistry' chapter of EMB's Future Science Brief 6 on Big Data in Marine Science. This focused on the value chain of Ocean CO₂ measurements including SOCAT and GLODAP data products. She was joined by co-author of the Future Science Brief, **Jerry Tjiputra**, Research Professor at NORCE, Norway.

June 2021 : Sustaining *in situ* Ocean observations for the age of the digital Ocean – Policy Brief 9 on Ocean Observations

Edward Hill, Chief Executive of NOC, UK, presented the main messages of the new EMB Policy Brief on Ocean Observations including their benefits, funding and governance challenges, and the investment needed for their transformation and sustainability. He was joined by co-authors of the Policy Brief during the discussion session.



⁵ <https://www.marineboard.eu/science-webinars>

⁶ <https://www.youtube.com/channel/UCcBGY9lckBVRijeW-0a1CsQ>



July 2021: Biological Time Series for Science and Marine Status Assessment – Future Science Brief 3 on Biological Observation

Adriana Zingone, Associated Senior Scientist at Anton Dohrn Marine Station, Naples, Italy, presented on technological developments in long-term biological time series. She focused particularly on plankton time-series in the Mediterranean Sea.



August 2021: Navigating the Future V (NFV) as inspiration and direction for marine science in the Ocean Decade – Position Paper 24 Navigating the Future V

Michiel Vandegheuchte, Research Director at VLIZ, Belgium, discussed how NFV had inspired Ocean research in Flanders and at VLIZ since the publication of the 2019 Position Paper. He highlighted science-policy research programmes and strategies, as well as projects that resonate with the messages of NFV.



September 2021: Involving stakeholders in co-creation of ecosystem services research – Future Science Brief 5 on Valuing Ecosystem Services and Position Paper 24 Navigating the Future V

Tara Hooper, Principal Specialist at Natural England, presented case-studies of co-creation of natural capital and ecosystem service assessments, and lessons learnt from her experiences. **Linwood Pendleton**, Executive Director of the Ocean Knowledge Action Network, presented broad perspectives on how to involve stakeholders in the co-creation of science.



October 2021: Are we delving any deeper? – Position Paper 22 on Deep Sea Research

Alex Rogers, Scientific Director for REV Ocean, presented an update on deep-sea research activities since publication of the 2015 Position Paper, for which he Chaired the Working Group. He also presented future deep-sea research priorities considering developments in the European maritime economy.



November 2021: Addressing Underwater Noise in Europe – Future Science Brief 7 on Underwater Noise

The Chair and Co-Chair of the WG on Underwater Noise, **Frank Thomsen**, Director and Senior Scientist of Market Development for Sound and Marine Life at the Danish Hydraulic Institute (DHI A/S), and **Sónia Mendes**, Scientific Adviser to the UK Government at JNCC, presented the key messages and recommendations of this new EMB Future Science Brief.

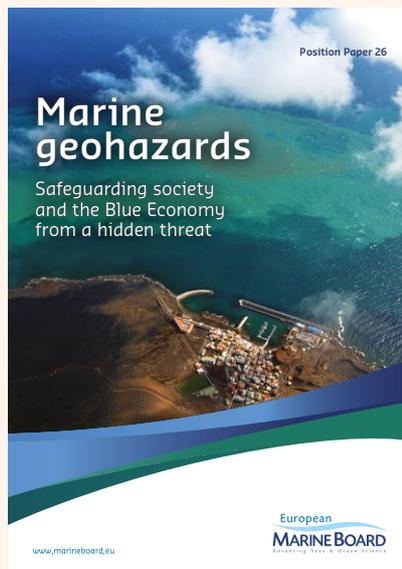
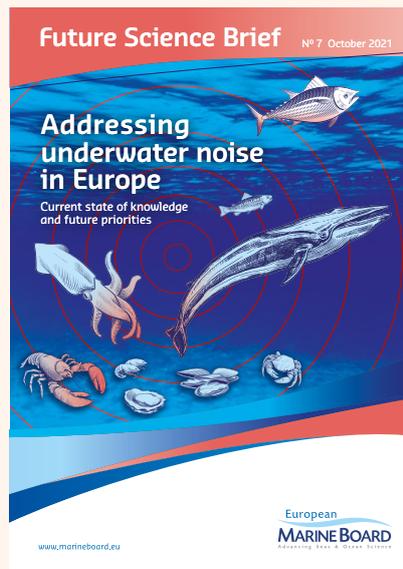
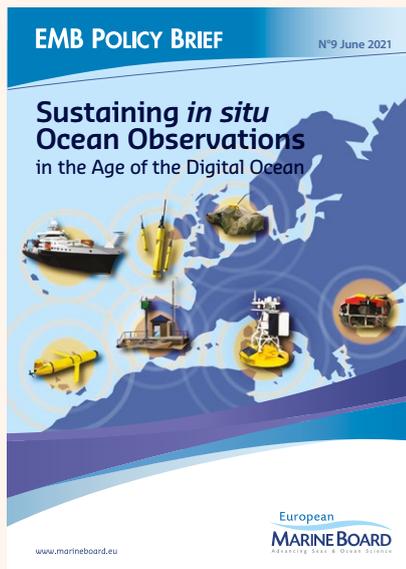
December 2021: Marine Geohazards in Europe: A Hidden Threat to Coastal Settlements and the Blue Economy – Position Paper 26 on Marine Geohazards

Heidrun Kopp, Department Head at GEOMAR in Germany, and **Francesco Latino Chiocci**, Professor at University of Rome Sapienza in Italy, presented the main messages and recommendations of the new EMB Position Paper on Marine Geohazards, which they co-chaired.



EMB PUBLICATIONS IN 2021

Download at:
www.marineboard.eu



Ongoing thematic activities

UNDERWATER NOISE

The EMB Working Group on Underwater Noise kicked off its activities during an online meeting on 8 June 2020. The Working Group was comprised of 13 members and was led by **Frank Thomsen** (Chair, DHI, Denmark) and **Sónia Mendes** (Co-Chair, JNCC, UK). The group was supported by EMB Secretariat Member **Paula Kellett**.

Future Science Brief 7 'Addressing Underwater Noise in Europe: Current state of knowledge and future priorities' was published on 20 October 2021 to coincide with the EMSO Time Series Conference 2021 'Observing Ocean Sound'. This publication presents the state-of-the-art in our understanding of underwater sound sources and the impacts of sound on marine organisms. It describes current underwater noise management and mitigation approaches, highlighting the progress made since the publication of EMB Position Paper 13 on 'The effects of anthropogenic sound on marine mammals' in 2008. The publication highlights the priority areas for further research addressing the remaining knowledge gaps about the effects of anthropogenic noise. Furthermore, it points out the relevant actions needed to take in order to ensure ecosystem-based and precautionary legislation.

The publication was featured in the November 2021 edition of the EMB Third Thursday Science webinar series (see p20), where the Chair and Co-Chair, **Frank Thomsen** and **Sónia Mendes**, presented the document and its main messages. **Frank Thomsen** also presented the publication and its links to the UN Decade of Ocean Science for Sustainable Development at the 8th EMB Forum (see p18), in a session on EMB activities to support the Ocean Decade.



Infographic showing today's Ocean soundscape including anthropogenic and natural sound sources, labelled anti-clockwise, developed in a collaboration between EMB and the JONAS project, and initiated via the EMBCP. © EMB and JONAS Project / Amy Dozier

More information on this Working Group and the publication is available on the EMB website: <https://www.marineboard.eu/underwater-noise>

MARINE GEOHAZARDS

The EMB Working Group on Marine Geohazards kicked-off its activities with a meeting on 10-11 February 2020 in Rome, Italy. The Working Group was comprised by 12 experts, chaired by **Heidrun Kopp** from GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany and co-chaired by **Francesco Chiocci**, University of Rome 'Sapienza', Italy. This group was supported by EMB Secretariat Member **Ángel Muñiz Piniella** and Young Ambassador alumni **Alba González Vega** contributed to the document.

In December 2021, on the occasion of the 8th EMB Forum, the Working Group launched a Position Paper presenting an overview of the type, distribution and impact of marine geohazards in European coastal regions and on several Blue Economy sectors. The document highlights novel scientific approaches that broaden our understanding of these hazards. The recommendations point towards relevant actions that would ensure the development of effective risk-mitigation and science-based management practices and policies, such as mapping of the seabed and including geohazards in maritime spatial planning policies, thereby contributing to protect coastal populations and economic activities at sea.

The publication was presented in the December 2021 edition of the EMB Third Thursday Science webinar series (see p20), where **Heidrun Kopp** and **Francesco Chiocci** presented the document and its main messages. **Heidrun Kopp** officially launched the publication and highlighted its links to the UN Decade of Ocean Science for Sustainable Development at the 8th EMB Forum (see p18), in a session on EMB activities to support the Ocean Decade.

More information on this Working Group and the publication is available on the EMB website: <https://www.marineboard.eu/marine-geohazards-blue-economy>



Infographic illustrating the difference between hazard and risk, developed in partnership with students from the Artevelde University of Applied Sciences.

MARINE SCIENCE COMMUNICATION

The European Marine Board Communications Panel (EMBCP, see also p34) decided in 2019 to write a policy document on Marine Science Communication, under the auspices and with the support of the European Marine Board (EMB). They form a *de facto* Working Group that is supported by EMB Secretariat Member **Ángel Muñiz Piniella**. They aim to produce a Future Science Brief and to shed light on the state of the art, impact, visibility and future of ‘marine science communication actions’ in Europe.

Instead of trying to make a full and comprehensive overview of this vast and very scattered landscape, the EMBCP carried out three surveys aimed at different groups. Two extensive surveys targeted both experts (Ocean scientists, marine policy-makers, industry representatives, media professionals, Ocean communication experts, education experts) and secondary-school students (17-18 years old) from all over Europe. A smaller, third survey looked at the current state-of-play relating to marine science communication staff working at EMB Member institutions.

This Future Science Brief will be published in 2022, and will look at lessons learnt by communicators during the process of communication and at the role of different stakeholders, as well as at the challenges and opportunities that arise. Finally, specific recommendations on how to recognize, support and improve marine science communication in Europe will be included.

More information on this Working Group is available on: <https://www.marineboard.eu/marine-science-communication-europe>



Videos can be a useful way to share information in an interactive and accessible way.

COASTAL RESILIENCE

The Coastal Resilience Working Group kick-off meeting was held online on 29 January-1 February 2021. The meeting was attended by the Chair, **Sebastian Villasante**, and Co-Chair, **Kristin Richter**, along with the 12 Working Group members. The group has worked throughout 2021 on drafting a Position Paper, and met online monthly to discuss progress and to develop ideas.

The Position Paper will take a holistic approach, and will provide recommendations for policy-makers, communities, and scientists on achieving socio-ecological resilience of European coasts. The document will consist of chapters on frameworks for coastal resilience, pressures on coasts, as well as barriers and enablers to coastal resilience. The document is expected to be published in the second half of 2022. This Working Group is supported by EMB Secretariat Member **Britt Alexander**.

More information on this Working Group is available at: <https://www.marineboard.eu/coastal-resilience>



Photo of the coast in Ostend, Belgium.

Credit: Joke Coopman

OCEAN OBSERVING



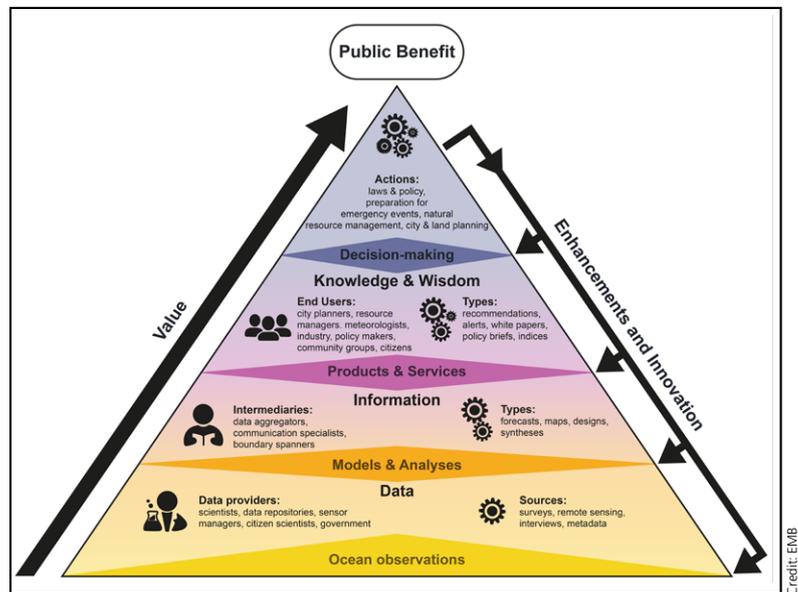
European
Ocean
Observing
System

Since 2015, EMB and EuroGOOS have been working together to promote and facilitate the establishment of EOOS⁷. Both networks Co-Chair the EOOS Steering Committee, which oversees the strategic planning of EOOS. After the launch

of the EOOS Strategy and Implementation Plan at the EOOS conference⁸ in November 2018, the EOOS Steering Committee worked to implement actions to foster the development of the EOOS vision, this included changes to the governance which included the constitution of a permanent Advisory Committee, Operations Committee and Resource Forum.

In 2021, the activities of the EOOS Steering Group focused on strengthening the other EOOS governance bodies and the position of EOOS in the Ocean observing landscape, including its contribution to the development of the EC initiative on 'Ocean observation – sharing responsibility'⁹. The third meeting of the EOOS Advisory Committee took place in September 2021, when the EMB Executive Director was re-elected as Chair of this committee which is run with support from the EMB Secretariat. Initial thoughts for the update of the EOOS Strategy and Implementation Plan were discussed. In 2021 the EOOS Operations Committee, facilitated by the EuroGOOS Secretariat, published a report on the funding and coordination across Ocean observing and marine monitoring in Europe¹⁰, and the first EOOS Resource Forum meeting, facilitated by the JPI Oceans Secretariat, took place in November 2021. This was the first formal exchange of national funding agencies and ministries as well as General Directorates of the EC, and set the scene for topics to be discussed in more detail in the follow-up meetings of the Forum.

At the EMB Autumn Plenary 2020, the Board agreed to a Working Group on Sustained Funding for Ocean Observations. Due to the time-critical nature of this issue, an *ad hoc* Working Group was constituted to create a Policy Brief. The Working Group consisted of seven experts, chaired by the EMB Executive Director, **Sheila Heymans**, and supported by EMB Science Officer **Ángel Muñiz Piniella**. The final output for this Working Group was EMB Policy Brief 9 'Sustaining in situ Ocean Observations in the Age of the Digital Ocean' which was launched at the EMODnet Open Conference 2021 on 16 June 2021. The outcomes of this Policy Brief were then presented at the 10th EMB Third Thursday Science webinar by co-author **Edward Hill** (see p20). All the authors of the document were present and several made short videos discussing the key messages in the document.



The Ocean observation value chain, adapted from Virapongse et al., 2020. Ten Rules to Increase the Societal Value of Earth Observations. Earth Science Informatics 13(2): 233-47.

You can view these on the EMB YouTube Channel: https://www.youtube.com/playlist?list=PLXKTm_QGiR-hNNTWYwRpdPtTenQBuv0

More information on this Working Group and the publication is available on the EMB website: <https://www.marineboard.eu/sustainable-funding-ocean-observations>

⁷ www.eoos-ocean.eu

⁸ <https://www.emodnet.eu/conference/eoos2018/index.html>

⁹ https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12539-Ocean-observation-sharing-responsibility_en

¹⁰ <https://www.eoos-ocean.eu/download/eoos-survey-of-goos-national-focal-points/?wpdmml=1150&refresh=61dc2860d33561641818208>

MARINE RENEWABLE ENERGY

The negative impacts of climate change, and the role played by carbon emissions as human-made drivers of that change, are high on political agendas. There is an urgent and immediate need to significantly reduce carbon emissions and to move towards a carbon neutral society. Renewable energy sources hold the potential to supply energy to a world with ever-growing populations and increasing industrialization. The marine research community needs to provide a solid knowledge base and evidence to support sustainable and responsible growth in the marine renewable energy sector.

Within this context, in autumn 2020, the EMB Board approved the Terms of Reference for a EMB activity on Marine Renewable Energy. In early 2021, a call for nominations was launched, which resulted in 31 nominations from eight EMB Member countries.

The EMB Working Group on Marine Renewable Energy kicked off its activities during an online meeting on 4 June 2021. The Working Group comprises of 12 members and is being led by **Takvor Soukissian** (Chair, HCMR, Greece) and **Anne Marie O'Hagan** (Co-Chair, UCC, Ireland). The group is supported by EMB Secretariat Member **Paula Kellett**. This Working Group will provide an update on the status and recommendations related to this topic since the 2010 EMB Vision Document 2, to highlight the current knowledge and research gaps in marine science, including in relation to the impact of marine renewable energy systems on marine ecosystems, and to consider future implications as this sector continues to mature.

More information on this Working Group and the publication is available on the EMB website: <https://marineboard.eu/marine-renewable-energy-WG>



Wind turbine piles and blades being loaded onto an installation vessel, Ostend, Belgium.

European projects

The EMB participates in externally funded projects and tenders, when these contribute to our Mission and future strategic objectives.



A tourist boat in Thessaloniki, Greece. Photo taken at the Kick-off meeting of the EcoScope project.

Credit: Stella Heymans



EuroSea, a project on 'Improving and Integrating European Ocean Observing and Forecasting Systems for Sustainable use of the Oceans', is a €12.6m project funded under the EU Horizon 2020 programme. It is coordinated by GEOMAR Helmholtz Centre for Ocean Research in Kiel, Germany, and

involves 55 partners from 16 countries, including partners in Brazil and Canada. The project aims to provide a truly interdisciplinary Ocean observing system that delivers the essential Ocean information needed for the wellbeing, blue growth, and sustainable management of the Ocean. EuroSea will strengthen the European and Global Ocean Observing System (EOOS and GOOS) and will increase the technology readiness levels (TRL) of critical components of Ocean observations systems and tools: in particular the TRL of the integrated Ocean observing system.

EMB is leading the task on Foresight on Ocean Observations in Work Package 1, in collaboration with EuroGOOS, IOC-UNESCO and GEOMAR. The EMB Secretariat participated at the 2nd EuroSea Annual Meeting and General Assembly in January 2021, and at the 2nd EuroSea Anniversary Webinar in November 2021. In addition, the EMB Secretariat moderated and made a presentation in a meeting in October dedicated to EuroSea policy outcomes with representatives from different units of the EC.

More information about the EuroSea project can be found at: <https://eurosea.eu/>



EuroSea in a nutshell.

Credit: EuroSea



EMB is participating in the BRIDGE-BS H2020 project (2021-2025), which aims to enhance the science-based policy in the Black Sea region to develop blue growth while maintaining and protecting resilient ecosystems. As a critical contribution to the science-based policy needed to preserve the Black Sea ecosystems, BRIDGE-BS is a multidisciplinary, multisectoral program building on regional and international initiatives. The project will develop predictive tools and capabilities necessary to understand and predict the impacts of climate-driven and anthropogenic multi-stressors on the services stemming from Black Sea ecosystems. These services and their responses to stressors will be mapped, monitored

and modelled in order to identify a safe operating space within which a sustainable blue economy can flourish.

EMB contributes to Work Package (WP) 8 'Science-based policy making for Blue Growth' led by the International Center for Black Sea Studies (ICBSS) and the Technological Centre of the Sea (CETMAR). The objectives of WP8 are to ensure the uptake of the science developed within BRIDGE-BS by engaging the different groups of policy stakeholders from the outset, to strengthen the science-policy nexus, and to contribute to science-based policy making for blue growth in the Black Sea. At the end of the project the EMB Secretariat will lead on the development of a Policy Brief for BRIDGE-BS on 'Reinforcing the implementation of marine EU and international policies in the Black Sea Region'. This will build on the outputs of the project, such as the status of the Black Sea ecosystems, stressors affecting the ecosystem and the services, needs to maintain the resilience of the ecosystem and the thresholds, risk-based analysis on Black Sea core ecosystem services, the value of the ecosystem services, and business models for healthy and resilient Black Sea ecosystem.

The EMB Secretariat attended the BRIDGE kick-off meeting online on 12-13 July 2021, and engaged in initial discussions with Work Package 8 leads on the steps needed to develop the Policy Brief, which will be published at the end of the project.

More information about BRIDGE can be found here: <http://bridgeblacksea.org/>



ECOScope

EcoScope (Eco-centric management for sustainable fisheries and healthy marine ecosystems) is a Horizon 2020 project that started in September 2021 and will run until August 2025, with a budget of 7.9 million Euros. The project is coordinated by Aristotle University of Thessaloniki, Greece

and involves 24 partners from 17 countries. The aim of EcoScope is to promote effective ecosystem-based fisheries management by developing e-tools that will allow to explore different management options and their consequences in the full ecosystem context. The e-tools will be easy to use and they will include an interoperable EcoScope Platform and a robust decision-making EcoScope Toolbox, available through a single public portal.

EMB is the leader of Work Package (WP) 8 'Interaction with stakeholders and capacity building'. The main tasks involve stakeholder mapping, stakeholder management planning, and identifying the needs of policy makers and stakeholders through three strategic workshops and targeted surveys. A Stakeholder Knowledge Exchange Forum will be created, which will co-design the tools with the EcoScope team and will give feedback on the implementation and effectiveness of the tools.

EMB also participates in WP7 'Assessing societal expectations and economic values', where it will lead a task on writing a Policy brief on community preferences, in WP5 'Assessing the ecosystem and its components', in WP1 'Project management' and WP10 'Dissemination and visibility'.

More information about EcoScope can be found at: <https://ecoscopium.eu/>

EMFF TENDERS

EMODnet tender in support of EOOS

Since September 2017, the EMB Secretariat has worked as a partner in the EMODnet Phase III contract, led by Seascope Belgium. This tender is directly linked to EMB's work on EOOS as it involves contributing to the design, content planning and follow-up of EOOS activities (such as the EOOS Forum and Conference in 2018), and led to the set-up of the EOOS Advisory Committee, now chaired by EMB. The initial period of the tender ran until September 2019, and was extended for an additional two-year term in October 2019.



The EMB Secretariat continued to support EOOS and its links with EMODnet during 2021, by participating in and helping with the organization and reporting of the EMODnet Open Conference¹¹ in June 2021. This online conference set the basis to co-design EMODnet's next phase to 2030 and beyond. The EMB Policy Brief 9 'Sustaining *in situ* Ocean Observations in the Age of the Digital Ocean' (see p22) was officially launched during this conference and the EMB Secretariat helped to organize a dedicated EC Ocean Observation event¹² on 18 June 2021. This event was organised by the EC Directorate-General for Maritime Affairs and Fisheries and co-organised by the EMODnet, EMB and EuroGOOS Secretariats as well as Copernicus Marine Service. It consisted of two sessions: the first session aimed at identifying how to accelerate deployment of more efficient and effective Ocean observation technology, and the second session looked into gaps and requirements in Ocean observation.

¹¹ <http://www.emodnetconference2021.eu/>

¹² <https://webgate.ec.europa.eu/maritimeforum/en/node/6188>



International Ocean Governance

From 2019-2021 the EMB Secretariat participated in the EASME/EMFF tender to establish an 'International Ocean Governance Stakeholder Forum' (IOG Forum) in support of the further development of the International Ocean Governance Agenda for the Future of our Ocean. The aim of the project was to enable the EU and its Member States to act more strongly together and lead globally in International Ocean Governance. In 2021, the EMB Secretariat contributed to drafting the final recommendation document from the IOG Forum 'Setting the Course for a Sustainable Blue Planet: Recommendations for Enhancing EU Action'¹³, which was launched on 20 April 2021 during the 3rd IOG Forum¹⁴ virtual event.

The consortium received a contract extension to identify gaps in the issues covered by the IOG Forum, to develop recommendations on how to address these in the updated IOG Agenda, and how these could be translated into action. On 9 November 2021 the EMB Secretariat led a workshop on 'transdisciplinary science for international ocean governance' attended by around 30 international experts to develop ideas for establishing a new forum for transdisciplinary science in support of international ocean governance. The recommendations were submitted to the EC as an internal report. The EMB Secretariat also developed short internal documents with recommended actions on the topics of Ocean Acidification and Underwater Noise.

More information on the IOG Forum is available at: <https://www.marineboard.eu/international-ocean-governance-forum>



Ocean Literacy

Since December 2019, EMB has participated in a project to implement the European Ocean Literacy Coalition (EU4Ocean). The coalition is made up of three components: a Platform¹⁵ for organizations and individuals engaged in Ocean Literacy initiatives, a European Youth Forum for the Ocean¹⁶ for young Ocean changemakers between 16 and 30 years old, and a Network of European Blue Schools¹⁷, with teachers and staff of education services bringing the Ocean into the classrooms. The EMB Secretariat facilitates the thematic Working Groups to operationalize the EU4Ocean Platform, to help develop joint partnerships, concrete actions and co-design new Ocean literacy actions. The three Working Groups on Climate and Ocean, Food from the Ocean, and Healthy and Clean Ocean met in December 2021. These meetings were organized and facilitated by the EMB Secretariat in collaboration with the Chairs of the Working Groups and other coalition partners. The main aim of these meetings was to find synergies between the Members and explore possibilities to co-develop joint Ocean Literacy activities. In addition, the EMB Secretariat was involved in several internal meetings discussing the operations and communication of the Platform, engagement with new members, and the organization of the several meetings and events taking place. The 2021 activities of the EU4Ocean Coalition mainly focused on the organization of the different European sea basin Ocean Literacy events and the development and promotion of the 'Make Europe Blue'¹⁸ advocacy campaign.

More information about the EU4Ocean Coalition is available at: www.eu-oceanliteracy.eu

¹³ <https://www.marineboard.eu/publication-eu-international-ocean-governance-iog-forum-recommendations>

¹⁴ <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1646>

¹⁵ <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1483>

¹⁶ <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1484>

¹⁷ <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1485>

¹⁸ <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1647>

EMB panels

UNIVERSITY CONSORTIUM PANEL

Due to the growing membership of Higher Education Institution (HEIs) consortia within the EMB, the University Consortium Panel (EMB UCP) was created to explore areas of mutual interest with regards to both research and education in the broadest sense. In 2021, the Panel met on 7 May 2021 to discuss its future. It was decided that the Panel would continue under updated Terms of Reference that would better reflect its intended activities. The updated key objectives of the Panel include: establishing a forum for HEI consortia that exist or are in development to meet; helping to identify and share best practice with respect to the governance and operation of these consortia; identifying and sharing opportunities for HEI consortia to collaborate across the EU or internationally; promoting each other's consortiums both nationally and internationally; identifying where the respective resources and networks that exist within these consortia can add value to existing and future EMB activities; and providing a common voice from the Consortium Members at EMB Board meetings. At this meeting the Panel elected **Jeremy Gault** as Panel Chair for a one-year term. This Panel also met on 18 November 2021, ahead of the EMB Autumn Plenary 2021 meeting, to discuss the agenda and identify areas where presenting a common voice would be relevant.

You can find out more about this Panel on the EMB website: <https://www.marineboard.eu/ucp>

EUROPEAN MARINE BOARD COMMUNICATION PANEL

The EMB Communications Panel (EMBCP) provides a pan-European platform for marine science communicators to promote EMB activities, to synergize outreach activities, and to advocate Ocean Literacy. In 2021, 18 members from 12 countries were part of EMBCP.

In 2021, the main activities of the EMBCP focussed on the launch of the conference proceedings and session recordings of the CommOCEAN 2020 conference, preparations for the CommOCEAN 2022 conference, and the drafting of the policy document on Marine Science Communication in Europe (see p25). The EMBCP met twice in 2021: online in March, and in hybrid format in Fuengirola, Spain in October. Agenda points included the election of new Steering Group Members, the collaboration with EMB Working Groups, and promotion of the EMB publications, among others. In addition, on the occasion of the start of the Ocean Decade in 2021, and as a contribution to it, the EMBCP decided to dedicate an agenda point to the Ocean Decade in their bi-annual meetings, to discuss communication issues and opportunities.

You can find out more about this Panel on the EMB website: <https://www.marineboard.eu/embcp>

Communication and outreach

The EMB uses a variety of channels to reach its stakeholders, including disseminating publications at conferences, media campaigns for EMB events, and online outlets including Twitter, Facebook, LinkedIn, Instagram, YouTube, an online newsletter, and the EMB website.

EMB website

The EMB website is regularly updated with information on the expert Working Groups, EMB strategic areas and activities, and the EU projects that EMB is involved in. All of EMB's publications are also available to download from the website free of charge.

In 2021, the website was visited 41,721 times, with visitors from 151 countries. There were 8,293 downloads of EMB documents from the EMB website, of which the top four were: EMB Future Science Brief 7 on 'Underwater Noise in Europe', EMB Policy Brief 9 on 'Sustaining Ocean Observations', EMB Future Science Brief 6 on 'Big Data in Marine Science' and Position Paper 24 'Navigating the Future V'.

EMB newsletter

At the end of 2021, there were 1,618 subscribers to the EMB newsletter, which gives updates on EMB activities, news, job postings and events. You can subscribe to the EMB newsletter via the EMB website: <https://www.marineboard.eu/emb-newsletter>.

Twitter

The European Marine Board Twitter account (@EMarineBoard) gained ca. 1,000 new followers in 2021, leading to a total number of 8,361 followers as of January 2022. The Twitter account is used to announce and promote EMB activities, and to highlight relevant news and events from the marine science and policy communities. The Twitter account is also successfully used to communicate with other networks and individual stakeholders. The account has allowed EMB to instantly update Member organizations and stakeholders on the events the Secretariat were attending.

Instagram

The EMB Instagram account (@emarineboard) predominately aims to reach the marine science youth community and has 624 followers as of January 2022. EMB Young Ambassador, **Alba González Vega**, initiated the account in 2019 and the Secretariat has since posted regularly on EMB activities and initiatives as well as marine science in general to increase visibility of EMB and enhance Ocean literacy. The account was taken over by the EMB Intern, **Rebecca van den Brand**, from September 2021 – January 2022 who provided targeted posts on new EMB publications and activities on a regular basis, also using the stories function to generate a wider audience, leading to a 50% increase in followers.



YouTube

The Secretariat has expanded the content of the EMB YouTube Channel significantly due to the increase in online events. All public EMB events (i.e. Science webinars, Open Forum) are live-streamed and available for re-play on the EMB YouTube Channel, along with various other outputs. In 2021, the EMB YouTube channel has gained 100 new subscribers, with a total of 328 subscribers and 3,610 views as of January 2022. The Secretariat has started to make subtitles available for videos on YouTube, with the aim to have English subtitles for all videos in 2023. Where appropriate, the Secretariat will also investigate the possibility to provide subtitles in other languages.

Follow EMB on YouTube at <https://www.youtube.com/channel/UCcBGY9IckBVRijeW-0a1CsQ>

IMPACT FROM EMB PUBLICATIONS

The EMB Secretariat tracks the dissemination and impact of all of its documents for a period up to two years after publication. The highlights are presented in a two-page infographic format with easily accessible statistics. Below is an overview of the impact reports that were published in 2021.



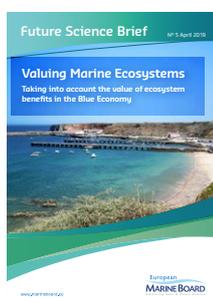
Position Paper 25 on 'Next Generation European Research Vessels: Current Status and Foreseeable Evolution'

The EMB Position Paper and accompanying Policy Brief on European Research Vessels drew attention to the status and needs for this fleet to ensure ongoing support to marine science in Europe. The documents received significant attention from industry, with feature articles in a number of industry publications. They were also discussed at a dedicated workshop held with research vessels builders and stakeholders in Vigo, Spain, in collaboration with EMB Member CETMAR and the EU MATES project.



Position Paper 24 'Navigating the Future V'

The EMB Position Paper Navigating the Future V (NFV), and associated Policy Brief on Recommendations for the Ocean Decade, described the marine science needed for a sustainable future. The documents have contributed to the implementation plan of the UN Ocean Decade, planning of Horizon Europe, and is reflected strongly in the themes of the JPI Oceans 2021 – 2025 Strategy and the BANOS Strategic Research and Innovation Agenda. The Position Paper was referred to at international science-policy events in 2019 including the UN Open-ended Informal Consultative Process on Oceans and Law of the Sea, UNESCO Ocean Science day, and EU-China Blue Partnership for the Ocean meeting. The documents have also been referred to in national-level research funding applications. A short video on the impact of NFV and the Navigating the Future series was developed in summer 2019 by the EMB Secretariat. You can view the video here: <https://www.youtube.com/watch?v=JRbwnudpXw4&t=119s>



Future Science Brief 5 on 'Valuing Marine Ecosystem Services'

The EMB Future Science Brief on Valuing Marine Ecosystems highlighted current thinking in ecosystem service valuation for the marine environment and provided recommendations on how to incorporate outputs from valuation studies into management and decision making. This document was presented at several events, including the prestigious British Irish Parliamentary Assembly. The document had a high relevance to policy and management: it was referenced in the 'EU guidance on integrating ecosystems and their services into decision making' and the recommendations of the report were published verbatim in The Blue Economy Report 2020.

For the full impact reports, consult: <https://www.marineboard.eu/publications/impact-reports>

Finances

The EMB annual budget is based on Member organization contributions and external contracts, e.g. EU framework projects. The Flemish Government of Belgium, through the Flanders Marine Institute (VLIZ), provides an in-kind contribution to the EMB through the provision of office space, running costs and equipment at the InnovOcean site in Ostend, as well as the employment cost of one Secretariat staff member. Member organizations also provide in-kind contribution through support for participation of national experts in EMB activities, i.e. travel and subsistence to attend meetings.

AVAILABLE FUNDS 2021

	EUR
Member Contributions	434,000
FP drawdown on employment costs Staff time related to the external projects	78,084
Other income	2,331
In-kind contribution from Flemish Government through the Flanders Marine Institute (VLIZ)	129,441
Total available funds	643,857

EXPENDITURE 2021

	EUR
Secretariat employment costs	311,639
Meetings, Travel & Ambassador Programme	24,200
Project costs (Staff time & direct costs)	72,326
Publications & dissemination	15,580
Navigating the Future V video	9,497
Running expenses and other costs	24,817
Costs covered by the Flanders Marine Institute (VLIZ)	129,441
Total expenditure	587,501

RESERVE FUND

	EUR
Available funds 2021	643,857
Expenditure 2021	587,501
Total 2021 balance	56,356
2020 carry over	576,409
Total	632,765

Annexes

ANNEX 1:

Marine Board Member organizations, Delegates and Alternates

BELGIUM

Belgian Science Policy Office (BELSPO)
Koen Lefever

Fonds National de la Recherche Scientifique (FNRS)
National Fund for Scientific Research
Jean-Marie Beckers

Fonds voor Wetenschappelijk Onderzoek -
Vlaanderen (FWO)
The Research Foundation - Flanders
Jan Mees
Tina Mertens

CROATIA

Institut za oceanografiju i ribarstvo (IZOR)
Institute of Oceanography and Fisheries
Melita Peharda Uljevic

Institut Ruđer Bošković (IRB)
Ruđer Bošković Institute
Martin Pfannkuchen
Daniela Marić Pfannkuchen

DENMARK

Institut for Akvatiske Ressourcer (DTU Aqua)
National Institute for Aquatic Resources
Patrizio Mariani
Kirsten Thomsen

ESTONIA

Eesti Teaduste Akadeemia
Estonian Academy of Sciences
Tarmo Soomere
Kalle Olli

FRANCE

Centre National de la Recherche Scientifique
(CNRS)
National Centre for Scientific Research
Jean-Marie Flaud
Jean-François Doussin

Institut Français de Recherche pour l'Exploitation
de la Mer (IFREMER)
French Research Institute for Exploitation of the Sea
Gilles Lericolais (Chair)
Natalia Martín Palenzuela

Universités Marines
Marine Universities of France
Yves-Marie Paulet
François Lallier

GERMANY

Konsortium Deutsche Meeresforschung (KDM)
German Marine Research Institute
Jan-Stefan Fritz
Ralph Schneider

Helmholtz-Zentrum für Ozeanforschung Kiel
(GEOMAR)
Helmholtz Centre for Ocean Research Kiel
Katja Matthes
Alexandra Drossou Berendes

GREECE

Ελληνικό Κέντρο Θαλάσσιων Ερευνών (HCMR)
Hellenic Centre for Marine Research
Aris Karagiorgis
George Petihakis

IRELAND

Marine Institute
Fiona Grant (vice-Chair)
Niall McDonough

Irish Marine Universities Consortium
Jeremy Gault (vice-Chair)
Anthony Grehan
Colin Brown

ITALY

Consiglio Nazionale delle Ricerche (CNR)
National Research Council
Fabio Trincardi
Katrin Schroeder (vice-Chair)

Istituto Nazionale di Oceanografia e di Geofisica
Sperimentale (OGS)
National Institute of Oceanography and Applied
Geophysics
Cosimo Solidoro

Consorzio Nazionale Interuniversitario per le
Scienze del Mare (CoNISMa)
National Inter-University Consortium for Marine
Sciences
Ferdinando Boero
Lisandro Benedetti-Cecchi

Stazione Zoologica Anton Dohrn (SZN)
Anton Dohrn Marine Station
Roberto Danovaro
Adriana Zingone

THE NETHERLANDS

Koninklijk Nederlands Instituut voor Onderzoek
der Zee

Royal Netherlands Institute for Sea Research (NIOZ)

Han Dolman

Gert-Jan Reichart

Deltares

Myra van der Meulen

Sharon Tatman

NORWAY

Havforskningsinstituttet

Institute of Marine Research (IMR)

Henning Wehde

Karin Kroon Boxaspen

Norges forskningsrad

The Research Council of Norway (RCN)

Christina Abildgaard

Norsk Marint Universitetskonsortium

Norwegian Marine University Consortium

Susanna Pakkasmaa

Nils Gunnar Kvamstø

POLAND

Instytut Oceanologii Polskiej Akademii Nauk
(IO-PAN)

Institute of Oceanology of the Polish Academy of
Sciences

Sławomir Sagan

Monika Kedra

PORTUGAL

Centro de Investigação Marinha e Ambiental
(CIMAR)

Centre of Marine and Environmental Research

Vitor Vasconcelos

Adelino Canario

Fundação para a Ciência e a Tecnologia (FCT)

Foundation for Science and Technology

Sofia Cordeiro

Teresa Courinha

ROMANIA

Romanian Black Sea Research Consortium
(RBRC)

Elena Stoica

SPAIN

Instituto Espanol de Oceanografia (IEO)

Spanish Institute of Oceanography

Carlos Garcia Soto (vice-Chair)

María del Carmen García Martínez

Centro Tecnológico del Mar (CETMAR)

Technological Center of the Sea

Rosa Fernández Otero (vice-Chair)

SWEDEN

Göteborgs universitet

University of Gothenburg (UGOT)

Per Åberg

Lena Gipperth

TURKEY

Türkiye Bilimsel ve Teknik Arastirma Kurumu
(TÜBİTAK)

Scientific and Technological Research Council of
Turkey

Leyla Tolun

UNITED KINGDOM

Marine Alliance for Science and Technology
Scotland (MASTS)

Mark James

David Paterson

National Oceanography Centre (NOC)

Edward Hill

Natural Environment Research Council (NERC)

Mike Webb

Alan Evans (vice-Chair)

ANNEX 2:

Participants of EMB plenary meetings 2021

Spring Plenary Meeting, 26-27 May 2021, Online

EMB DELEGATES

Representative	Member Organization
ADRIANA ZINGONE	Anton Dohrn Marine Station (SZN)
ALAN EVANS	Natural Environment Research Council (NERC)
ALEXANDRA DROSSOU-BERENDES	Helmholtz Centre for Ocean Research Kiel (GEOMAR)
AMUND MÅGE	Norwegian Marine University Consortium (NMUC)
ARIS KARAGEORGIS	Hellenic Centre for Marine Research (HCMR)
BIANCA PETERS	DELTARES
CARLOS GARCIA-SOTO	Spanish Institute of Oceanography (IEO)
COSIMO SOLIDORO	National Institute of Oceanography and Experimental Geophysics (OGS)
DANIELA HENKEL	German Marine Research Consortium (KDM)
DOMINIQUE SIMON	Marine Universities Consortium of France (UM)
ED HILL	National Oceanography Centre (NOC)
FERDINANDO BOERO	National Inter-University Consortium for Marine Sciences (CoNISMa)
FIONA GRANT	Marine Institute (MI)
FRANÇOIS LALLIER	Marine Universities Consortium France (UM)
GEORGE PETIHAKIS	Hellenic Centre for Marine Research (HCMR)
GERT-JAN REICHART	Royal Netherlands Institute for Sea Research (NIOZ)
GILLES LERICOLAIS (CHAIR)	French Institute for the Exploitation of the Sea (IFREMER)
HENK BRINKHUIS	Royal Netherlands Institute for Sea Research (NIOZ)
IVICA VILIBIĆ	Ruđer Bošković Institute (IRB)
JAN MEES	Flanders Marine Institute (VLIZ)
JEREMY GAULT	Irish Marine Universities Consortium (IMUC)
KATRIN SCHROEDER	National Research Council Italy (CNR)
KIRSTEN THOMSEN	National Institute for Aquatic Resources (DTU AQUA)
KJERSTI FJALESTAD	The Research Council of Norway (RCN)
LENA GIPPERTH	University of Gothenburg (UGOT)
LEYLA TOLUN	Scientific and Technological Research Council of Turkey (TÜBİTAK)
LISANDRO BENEDETTI-CECCHI	National Inter-University Consortium for Marine Sciences (CoNISMa)
MARK JAMES	Marine Alliance for Science and Technology Scotland (MASTS)
MONIKA KĘDRA	Institute of Oceanology of The Polish Academy of Sciences (IO-PAN)
PATRIZIO MARIANI	National Institute for Aquatic Resources (DTU AQUA)
PER ABERG	University of Gothenburg (UGOT)
RALPH SCHNEIDER	German Marine Research Consortium (KDM)
ROBERTO DANOVARO	Anton Dohrn Marine Station (SZN)
ROSA FERNÁNDEZ	Technological Centre of The Sea (CETMAR)
SLAWOMIR SAGAN	Institute of Oceanology of The Polish Academy of Sciences (IO-PAN)
SUSANNA PAKKASMAA	Norwegian Marine University Consortium (NMUC)
TARMO SOOMERE	Estonian Academy of Sciences (ETA)
YVES-MARIE PAULET	Marine Universities Consortium of France (UM)

OBSERVERS, SPEAKERS AND GUESTS

Representative	Organization
ANJALI GOPAKUMAR	EMB Young Ambassador
NATALIJA DUNIC	EMB Young Ambassador
REBECCA ZITOUN	EMB Young Ambassador
BART BOSMAN	Company Revisor
THORSTEN KIEFER	JPI Oceans
ELISABETTA BALZI	DG RTD
KIRSTEN ISENSEE	IOC-UNESCO
ALISON CLAUSEN	IOC-UNESCO

Autumn Plenary Meeting | 28-29 October 2021, Bergen, Norway and Online

EMB DELEGATES

Representative	Member Organization
ADRIANA ZINGONE	Anton Dohrn Marine Station (SZN)
ALEXANDRA DROSSOU-BERENDES	Helmholtz Centre for Ocean Research Kiel (GEOMAR)
ARIS KARAGEORGIS	Hellenic Centre for Marine Research (HCMR)
CARLOS GARCIA-SOTO	Spanish Institute of Oceanography (IEO)
COSIMO SOLIDORO	National Institute of Oceanography and Experimental Geophysics (OGS)
DANIELA HENKEL	German Marine Research Consortium (KDM)
DANIELLA PFANNKUCHEN	Ruđer Bošković Institute (IRB)
DOMINIQUE SIMON	Marine Universities Consortium of France (UM)
ELENA STOICA	Romanian Black Sea Research Consortium (RBRC)
FIONA GRANT	Marine Institute (MI)
FRANÇOIS LALLIER	Marine Universities Consortium France (UM)
GEORGE PETIHAKIS	Hellenic Centre for Marine Research (HCMR)
GERT-JAN REICHART	Royal Netherlands Institute for Sea Research (NIOZ)
ISABEL SOUSA PINTO	Centre of Marine and Environmental Research (CIMAR)
JEREMY GAULT	Irish Marine Universities Consortium (IMUC)
KATRIN SCHROEDER	National Research Council Italy (CNR)
LENA GIPPERTH	University of Gothenburg (UGOT)
LEYLA TOLUN	Scientific and Technological Research Council of Turkey (TÜBİTAK)
LISANDRO BENEDETTI-CECCHI	National Inter-University Consortium for Marine Sciences (CoNISMa)
MARK JAMES	Marine Alliance for Science and Technology Scotland (MASTS)
MARTIN PFANNKUCHEN	Ruđer Bošković Institute (IRB)
MELITA PERHARDA ULJEVIC	Institute of Oceanography and Fisheries (IOF)
MONIKA K DRA	Institute of Oceanology of The Polish Academy of Sciences (IO-PAN)
NATALIA MARTIN PALENZUELA	French Institute for the Exploitation of the Sea (IFREMER)
RALPH SCHNEIDER	German Marine Research Consortium (KDM)
SHARON TATMAN	DELTARES
TERESA COURINHA	Science and Technology Foundation (FCT)
AMUND MÅGE	Norwegian Marine University Consortium (NMUC)
CHRISTINA ABILDGAARD	The Research Council of Norway (RCN)
FERDINANDO BOERO	National Inter-University Consortium for Marine Sciences (CoNISMa)
GILLES LERICOLAIS (CHAIR)	French Institute for the Exploitation of the Sea (IFREMER)
HENNING WEHDE	Institute of Marine Research (IMR)
JAN MEES	Flanders Marine Institute (VLIZ)
JEAN-MARIE FLAUD	National Centre for Scientific Research (CNRS)
OYVIND FIKSEN	Norwegian Marine University Consortium (NMUC)
PATRIZIO MARIANI	National Institute for Aquatic Resources (DTU AQUA)
PER ABERG	University of Gothenburg (UGOT)
SLAWOMIR SAGAN	Institute of Oceanology of The Polish Academy of Sciences (IO-PAN)
SUSANNA PAKKASMAA	Norwegian Marine University Consortium (NMUC)

OBSERVERS, SPEAKERS AND GUESTS

Representative	Organization
ALESSANDRO CRESCI	EMB Young Ambassador
NATALIJA DUNIC	EMB Young Ambassador
REBECCA ZITOUN	EMB Young Ambassador
ALEX DAMIANOS	Fluid Knowledge Project
ZOI KONSTANTINO	DG MARE
ANDREEA STRACHINESCU	DG MARE
MARCIN SADOWSKI	DG RTD
VLADIMIR RYABININ	IOC-UNESCO

ANNEX 3: **WORKING GROUP MEMBERS 2021**

Working Group Marine Geohazards

Working Group Members:

- Heidrun Kopp, GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany – WG Chair
- Francesco Chiocci, University of Rome 'Sapienza', Italy – WG Co-Chair
- Nabil Sultan, Ifremer, France
- Christian Berndt, GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany
- Mathilde B. Sørensen, Department of Earth Science, University of Bergen, Norway
- Teresa Ferreira, University of the Azores, Portugal
- Conceição Fortes, LNEC - National Laboratory for Civil Engineering, Portugal
- Eulàlia Gràcia, ICM-CSIC, Spain
- M. Namik Çağatay, Istanbul Technical University, Turkey
- Isobel Yeo, National Oceanographic Centre (NOC), UK
- Achim Kopf, MARUM, Germany
- Alba González Vega, IEO, Spain and EMB Young Ambassador Alumna

EMB Secretariat Support:

Ángel Muñoz Piniella

Working Group Underwater Noise

Working Group Members:

- Frank Thomsen, DHI, Denmark – WG Chair
- Sónia Mendes, JNCC, UK – WG Co-Chair
- Carina Juretzek, Federal Maritime and Hydrographic Agency of Germany (BSH), Germany
- Cecile Ducatel, Ifremer, France
- Elena Ciappi, Italian National Research Council (CNR), Italy
- Elisabeth Debusschere, Flanders Marine Institute (VLIZ), Belgium
- Frans-Peter Lam, TNO, Netherlands
- Frederic Bertucci, Laboratoire BOREA, France
- Joanne O'Brien, Galway-Mayo Institute of Technology (GMIT), Ireland
- Manuel dos Santos, ISPA, Portugal
- Monika Breitzke, Germany
- Thomas Folegot, Quiet-Ocean, France
- Alessandro Cresci, Institute of Marine Research, Norway and EMB Young Ambassador

EMB Secretariat Support:

Paula Kellett

Working Group Coastal Resilience

Working Group Members:

- Sebastian Villasante, University of Santiago de Compostella, Spain – WG Chair
- Kristin Richter, NORCE, Norway – WG Co-Chair
- Andres Payo, British Geological Survey, UK
- Donata Melaku Canu, OGS, Italy
- Eugene Farrell, National University Ireland Galway, Ireland
- Frederic Bouchette, Université de Montpellier, France
- Isabel Sousa Pinto, University of Porto, Portugal
- Jennifer Bailey, NTNU, Norway
- Karen Timmermann, DTU Aqua, Denmark
- Margaret Chen, Vrije Universiteit Brussels, Belgium
- Remi Mongruel, Ifremer, France
- Thorsten Blenckner, Stockholm Resilience Center, Sweden
- Tjeerd Bouma, NIOZ, The Netherlands
- Liam Lachs, Newcastle University, UK and EMB Young Ambassador

EMB Secretariat Support:

Britt Alexander

Working Group Marine Renewable Energy

Working Group Members:

- Takvor Soukissian, HCMR, Greece – WG Chair
- Anne Marie O'Hagan, UCC, Ireland – WG Co-Chair
- Arianna Azzellino, Polytechnic University of Milan, Italy
- Ferdinando Boero, University of Naples, Italy
- Ana Brito e Melo, WavEC, Portugal
- Patricia Comiskey, Simply Blue Group, Ireland
- Zhen Gao, Norwegian University of Science and Technology, Norway
- Dickon Howell, Howell Marine Consulting, UK
- Marc Le Boulluec, Ifremer, France
- Christophe Maisondieu, Ifremer, France
- Beth Scott, University of Aberdeen, UK
- Elisabetta Tedeschi, NTNU, Norway and University of Trento, Italy

EMB Secretariat Support:

Paula Kellett

ANNEX 4: Panel Members 2021

European Marine Board Communications Panel (EMBCP)

Panel Members:

- Chair - M. Carmen García Martínez - Spanish Institute of Oceanography (IEO), Spain
- Co-Chair - Géraldine Guillevic - French Institute for the Exploitation of the Sea (IFREMER), France
- Ferdinando Boero - National Inter-University Consortium for Marine Sciences (CoNISMa), Italy
- Sheila Byrnes - Marine Institute (MI), Ireland
- Daria Ezgeta Balic - Institute of Oceanography and Fisheries (IOF), Croatia
- Francesca Garaventa - National Research Council, Institute of Marine Research (IAS, CNR), Italy
- Kathrin Kopke - University College Cork (UCC), Ireland
- Kelle Moreau - Royal Belgian Institute of Natural Sciences (RBINS), Belgium
- Kjartan Mæstad - Institute of Marine Research (IMR), Norway
- Mette Mila - Research Council of Norway (RCN), Norway
- Maike Nicolai - Helmholtz Centre for Ocean Research Kiel (GEOMAR), Germany
- Francesca Petrer - National Institute of Oceanography and Experimental Geophysics (OGS), Italy
- Peter Ryde - National Oceanography Centre (NOC), United Kingdom
- Kim Sauter - Royal Netherlands Institute for Sea Research (NIOZ), The Netherlands
- Jan Seys, Flanders Marine Institute (VLIZ), Belgium
- Dominique Simon - Marine Universities Consortium France (UM), France
- José Teixeira - Centre of Marine and Environmental Research (CIMAR), Portugal
- Tymon Zielinski - Institute of Oceanology of The Polish Academy of Sciences (IO-PAN), Poland

EMB Secretariat Support:

Ángel Muñoz Piniella

University Consortiums Panel

Panel Members:

- Jeremy Gault, Irish Marine Universities Consortium (IMUC), Ireland - Panel Chair
- Mark James, Marine Alliance for Science and Technology for Scotland (MASTS), United Kingdom
- Yves-Marie Paulet, Marine Universities Consortium France (UM), France
- Dominique Simon, Marine Universities Consortium France (UM), France
- François Lallier, Marine Universities Consortium France (UM), France
- Lisandro Benedetti-Cecchi, National Inter-University Consortium for Marine Sciences (CoNISMa), Italy
- Ferdinando Boero, National Inter-University Consortium for Marine Sciences (CoNISMa), Italy
- Anthony Grehan, Irish Marine Universities Consortium (IMUC), Ireland
- Louise Allcock, Irish Marine Universities Consortium (IMUC), Ireland
- Carlos Pereira, Technological Centre of the Sea (CETMAR), Spain
- Daniel Rey, Technological Centre of the Sea (CETMAR), Spain
- Sonia Zaragoza, Technological Centre of the Sea (CETMAR), Spain
- Susanna Pakkasmaa, Norwegian Marine University Consortium (NMUC), Norway
- Lena Gipperth, University of Gothenburg (UGOT), Sweden
- Elena Stoica, Romanian Black Sea Research Consortium (RBRC), Romania
- Ralph Schneider, German Marine Research Consortium (KDM), Germany

EMB Secretariat Support:

Paula Kellett

ANNEX 5: MEETINGS AND EVENTS (JOINTLY) ORGANIZED IN 2021

Date	Event and Venue
5/01/2021	EMB Working Group Sustainable funding for OO Meeting, Online
12/01/2021	EMB Working Group Underwater Noise Meeting, Online
13/01/2021	EU4Ocean Platform Meeting, Online
14/01/2021	EMBCP Steering Group Meeting, Online
15/01/2021	EMB Working Group Coastal Resilience Chairs Meeting, Online
18/01/2021	EMB Working Group Marine Geohazards Meeting, Online
21/01/2021	EMB Science Webinar on Valuing Marine Ecosystems, Online
26/01/2021	EMB Working Group Marine Geohazards Meeting, Online
29/01/2021	EMB Working Group Coastal Resilience Kick off Meeting, Online
29/01/2021	EMB Working Group Sustainable funding for OO Meeting, Online
1/02/2021	EMB Working Group Coastal Resilience Kick off Meeting, Online
2/02/2021	EOOS Meeting, Online
8/02/2021	EMB Working Group Marine Geohazards Meeting, Online
11/02/2021	EMB ExCom Meeting, Online
18/02/2021	EMB Working Group Marine Geohazards Meeting, Online
18/02/2021	EMB Science Webinar on Marine Ecosystem Modelling, Online
1/03/2021	EMB Working Group Sustainable funding for OO Meeting, Online
1/03/2021	EMB Working Group Coastal Resilience Meeting, Online
3/03/2021	IOG workshop, Online
11/03/2021	EMB Working Group Underwater Noise Meeting, Online
16/03/2021	EMB Working Group Coastal Resilience Meeting, Online
17/03/2021	EMBCP Steering Group Meeting, Online
18/03/2021	Internal workshop on IOG Forum recommendations, Online
18/03/2021	EurOCEAN 2023 Meeting, Online
18/03/2021	EOOS - JPI Oceans Meeting, Online
18/03/2021	EMB Science Webinar on Submerged volcanoes and coral reefs, Online
19/03/2021	EOOS Steering Group Meeting, Online
19/03/2021	CommOCEAN 2022 Meeting, Online
22/03/2021	EMB Working Group Sustained funding for OO Meeting, Online
23/03/2021	EMB Working Group Underwater Noise Meeting, Online
25/03/2021	EMBCP Meeting, Online
31/03/2021	Meeting with IOC on Decade Implementing Partner, Online
13/04/2021	Meeting with JPI-Oceans, Online
14/04/2021	EMB Young Ambassador Training workshop, Online
15/04/2021	EMB Science webinar on Marine Citizen Science, Online
16/04/2021	EMB Working Group Habitat Mapping Chair Meeting, Online

Date	Event and Venue
19/04/2021	CommOCEAN 2022 Brainstorm Meeting, Online
20/04/2021	3 rd IOG Forum, Online
22-23/04/2021	EMB Working Group Underwater Noise Meeting, Online
29/04/2021	EMB Working Group Underwater Noise Meeting, Online
3/05/2021	EMB Ambassadors Meeting on ICYMARE, Online
7/05/2021	EMB University Consortium Panel Meeting, Online
7/05/2021	EMB Working Group Coastal Resilience Meeting, Online
7/05/2021	EMB Working Group Underwater Noise Meeting, Online
17/05/2021	EMBCP Steering Group Meeting, Online
18/05/2021	EMB Working Group Geohazards Meeting, Online
19/05/2021	EMB Working Group Underwater Noise Meeting, Online
20/05/2021	EMB Science Webinar on Big Data, Online
25/05/2021	EMB ExCom Meeting, Online
26-27/05/2021	EMB Spring Plenary Meeting 2021, Online
27/05/2021	EMB Working Group Marine Renewable Energy Chairs' Meeting, Online
4/06/2021	EMB Working Group Marine Renewable Energy Kick-Off Meeting, Online
8/06/2021	EMB Working Group Marine Renewable Energy Meeting, Online
8/06/2021	EOOS Steering Group Meeting, Online
9/06/2021	EMB Young Ambassador Meeting, Online
9/06/2021	EOOS AC Meeting with ECRA, Online
10/06/2021	EMB Working Group Geohazards Meetings, Online
14-16/06/2021	EMODnet Open Conference, Online
17/06/2021	EMB Science Webinar on Ocean Observing, Online
18/06/2021	Ocean Observing Workshop, Online
24/06/2021	EMBCP Steering Group Meeting, Online
29/06/2021	EMB Young Ambassadors Meeting with CETMAR, Online
30/06/2021	EMB Working Group Coastal Resilience Meeting, Online
2/07/2021	Extra ExCom Meeting on EMB finances, Online
5/07/2021	Extra ExCom Meeting on EMB finances, Online
6/07/2021	EMB Young Ambassadors Meeting, Online
8/07/2021	EMB Working Group Marine Renewable Energy Meeting, Online
15/07/2021	EMB Science Webinar on Biological Observation, Online
20/07/2021	EMB Working Group Coastal Resilience Chair Meeting, Online
28/07/2021	Extra ExCom Meeting on EMB finances, Online
18/08/2021	EMB Young Ambassadors Meeting, Online
19/08/2021	EMB Science Webinar on NFV, Online

Date	Event and Venue
31/08/2021	EMB Working Group Marine Renewable Energy Meeting, Online
1/09/2021	EOOS Biological Observing exchange Meeting, Online
7/09/2021	EMB Working Group Coastal Resilience Chairs Meeting, Online
10/09/2021	EMB Working Group Coastal Resilience Meeting, Online
14/09/2021	EOOS AC Meeting, Online
16/09/2021	EMB Science Webinar on Involving Stakeholders in Co-creation Ecosystem Services Research, Online
20/09/2021	EMB Secretariat training in facilitation, Ostend, Belgium
23/09/2021	Ambassador workshop at ICYMARE Conference, Online
23/09/2021	EMBCP Steering Group Meeting, Online
24/09/2021	EOOS Steering Group Meeting, Online
30/09/2021	EMB Working Group Underwater Noise Meeting, Online
1/10/2021	EMB Working Group Marine Geohazards Chair Meeting, Online
14/10/2021	EurOCEAN 2023, Online
18/10/2021	University Consortium Panel Pre-Plenary Meeting, Online
19/10/2021	Visit FNRS, Liège, Belgium
19/10/2021	EMBCP Meeting, Fuengirola, Spain and Online
21/10/2021	EMB Science Webinar on Deep Sea, Online
25/10/2021	EMB Working Group Habitat Mapping Chair Meeting, Online
27/10/2021	EMB ExCom Meeting, Bergen, Norway and Online
28 - 29/10/2021	EMB Autumn Plenary Meeting 2021 Bergen, Norway and Online
2/11/2021	EMB Working Group Habitat Mapping Chair Meeting, Online
5/11/2021	EMB Working Group Coastal Resilience Meeting, Online
8/11/2021	EOOS Bio Observation Exchange Meeting, Online
9/11/2021	IOG Transdisciplinary Science Workshop, Online
10/11/2021	EMB Working Group Renewable Energy Meeting, Online
18/11/2021	EMB Science Webinar on Underwater Noise, Online
26/11/2021	EMBCP Steering Group Meeting, Online
1/12/2021	EMB 8 th Forum on Supporting the Ocean Decade, Brussels, Belgium and Online
6/12/2021	EMB Working Group Coastal Resilience Meeting, Online
13/12/2021	CommOCEAN 2022 Prep Meeting, Online
16/12/2021	EMB Science Webinar on Marine Geohazards, Online

ANNEX 6: PRESENTATIONS AT MEETINGS BY THE EMB SECRETARIAT IN 2021

Date	Event and Venue	Speaker(s)
19/01/2021	Assemble Plus Meeting, Online	Sheila Heymans
11/02/2021	Annual SDG Bergen conference, Online	Sheila Heymans
17/02/2021	EOOS - EuroSea Meeting, Online	Sheila Heymans, Ángel Muñiz Piniella
22-24/02/2021	BlueMed CSA Final Conference	Sheila Heymans
8/03/2021	IOC Women in Science, Online	Sheila Heymans
10/03/2021	EOOS Operations Committee, Online	Sheila Heymans, Ángel Muñiz Piniella
12/03/2021	EuroSea: Covid impact on observing networks, Online	Ángel Muñiz Piniella, Paula Kellett
22/03/2021	World Water Day - Dublin City, Online	Sheila Heymans
23/03/2021	Monaco Ocean Science Meeting, Online	Sheila Heymans
2/04/2021	InnovOcean seminar, Online	Paula Kellett
16/04/2021	34 th SCAR-Fish Plenary Meeting, Online	Sheila Heymans
5/05/2021	9 th EuroGOOS International Conference, Online	Sheila Heymans
11-12/05/2021	NOC Association General Meeting, Online	Sheila Heymans
1/06/2021	VECOPS Day, Online	Britt Alexander
2/06/2021	Atlantic pole-to-pole side event, Online	Sheila Heymans
2/06/2021	EU Marine Robots Research Infrastructures event, Online	Paula Kellett
3/06/2021	Surfrider Europe Healthy Waters event	Paula Kellett
14/07/2021	AMEMR conference, Online	Sheila Heymans
9/09/2021	Sciaena webinar on OHH, Online	Sheila Heymans
14/09/2021	Mediterranean Hub Session of GOA-ON's Ocean Acidification Week 2021, Online	Ana Rodriguez, Sheila Heymans
16/09/2021	Ocean Decade event on Deep Sea, Online	Sheila Heymans
17/09/2021	CoastGIS 2021, Online	Sheila Heymans
22/09/2021	36 th SCAR-Fish Meeting, Online	Sheila Heymans
27/09/2021	Ocean Predict Ocean Decade Meeting, Online	Sheila Heymans
28/09/2021	International Coastal Atlas Network workshop, Online	Britt Alexander
1/10/2021	InnovOcean Seminar, Ostend, Belgium	Ángel Muñiz Piniella
5-7/10/2021	MASTS 11 th Annual Seminar, Online	Jana Van Elslander
20-22/10/2021	EMSO-ERIC Underwater Noise event, Online	Paula Kellett
17-19/11/2021	Sealogy, Ferrara, Italy	Sheila Heymans
19/11/2021	SICA Delegation, Ostend, Belgium	Britt Alexander, Ana Rodriguez

ANNEX 7:

EMB MEMBER CONTRIBUTIONS 2021

Marine Board Member	Country	Contribution 2021
Research Foundation - Flanders (FWO)	Belgium	€ 12,000
National Fund for Scientific Research (FNRS)	Belgium	€ 12,000
Belgian Science Policy Office (BELSPO)	Belgium	€ 12,000
Institute of Oceanography and Fisheries (IOF)	Croatia	€ 3,000
Ruđer Bošković Institute (IRB)	Croatia	€ 3,000
National Institute for Aquatic Resources (DTU AQUA)	Denmark	€ 12,000
Estonian Academy of Sciences (ETA)	Estonia	€ 8,000
French Institute for the Exploitation of the Sea (IFREMER)	France	€ 17,000
Marine Universities Consortium France (UM)	France	€ 17,000
National Centre for Scientific Research (CNRS)	France	€ 17,000
German Marine Research Consortium (KDM)	Germany	€ 17,000
Helmholtz Centre for Ocean Research Kiel (GEOMAR)	Germany	€ 17,000
Hellenic Centre for Marine Research (HCMR)	Greece	€ 8,000
Marine Institute (MI)	Ireland	€ 12,000
Irish Marine Universities Consortium (IMUC)	Ireland	€ 12,000
National Inter-University Consortium for Marine Sciences (CoNISMa)	Italy	€ 17,000
National Research Council Italy (CNR)	Italy	€ 17,000
Anton Dohrn Marine Station (SZN)	Italy	€ 17,000
National Institute of Oceanography and Experimental Geophysics (OGS)	Italy	€ 17,000
Royal Netherlands Institute for Sea Research (NIOZ)	Netherlands	€ 12,000
DELTA RES	Netherlands	€ 12,000
Norwegian Marine University Consortium (NMUC)	Norway	€ 12,000
The Research Council of Norway (RCN)	Norway	€ 12,000
Institute of Marine Research (IMR) ¹	Norway	€ 12,000
Institute of Oceanology of The Polish Academy of Sciences (IO-PAN)	Poland	€ 8,000
Science and Technology Foundation (FCT)	Portugal	€ 8,000
Centre of Marine and Environmental Research (CIMAR)	Portugal	€ 8,000
Romanian Black Sea Research Consortium (RBRC)	Romania	€ 8,000
Spanish Institute of Oceanography (IEO)	Spain	€ 12,000
Technological Centre of The Sea (CETMAR)	Spain	€ 12,000
University of Gothenburg (UGOT)	Sweden	€ 12,000
Scientific and Technological Research Council of Turkey (TÜBİTAK)	Turkey	€ 8,000
Marine Alliance for Science and Technology Scotland (MASTS)	UK	€ 17,000
Natural Environment Research Council (NERC)	UK	€ 17,000
National Oceanography Centre (NOC) ²	UK	€ 17,000
Total	35	€ 434,000

¹ Paid by Research Council of Norway

² Paid by NERC

ANNEX 8:

Full list of EMB publications

PUBLICATIONS IN 2021:

- Kopp, H., Chiocci, F. L., Berndt, C., Çağatay, M. N., Ferreira, T., Fortes, C. J. E. M., Gràcia, E., González Vega, A., Kopf, A. J., Sørensen, M. B., Sultan, N., Yeo, I. A. (2021) **Marine geohazards: Safeguarding society and the Blue Economy from a hidden threat**. Muñiz Piniella, A., Kellett, P., van den Brand, R., Alexander, B., Rodríguez Perez, A., Van Elslander, J., Heymans, J. J., [Eds.] Position Paper 26 of the European Marine Board, Ostend, Belgium. 100 pages. ISSN: 2593-5232. ISBN: 9789464206111 DOI: 10.5281/zenodo.5591938
- Thomsen, F., Mendes, S., Bertucci, F., Breitzke, M., Ciappi, E., Cresci, A. Debusschere, E., Ducatel, C., Folegot, F., Juretzek, C., Lam, F-P, O'Brien, J., dos Santos, M. E. (2021) **Addressing underwater noise in Europe: Current state of knowledge and future priorities**. Kellett, P., van den Brand, R., Alexander, B., Muniz Piniella, A., Rodriguez Perez, A., van Elslander, J., Heymans, J. J. [Eds.] Future Science Brief 7 of the European Marine Board, Ostend, Belgium. ISSN: 2593-5232. ISBN: 9789464206104. DOI: 10.5281/zenodo.5534224
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Coordinating author: Per Nieuwejaar; Contributing authors: Valerie Mazauric, Christian Betzler, Mafalda Carapuço, Andre Cattrijsse, Franco Coren, Juanjo Danobeitia, Colin Day, Aodhan Fitzgerald, Stefan Florescu, Jose Ignacio Diaz, Michael Klages, Erica Koning, Olivier Lefort, Giuseppe Magnifico, Øystein Mikelborg, Lieven Naudts
- European Marine Board (2019) **Navigating the Future V: Marine Science for a Sustainable Future**. Position Paper 24 of the European Marine Board, Ostend, Belgium. ISBN: 9789492043757. ISSN: 0167-9309. DOI: 10.5281/zenodo.2809392
Coordinating authors: Ferdinando Boero, Valerie Cummins, Jeremy Gault, Geir Huse, Catharina J.M. Philippart, Ralph Schneider, Anne Marie Treguier. Contributing authors: Sukru Besiktepe, Gilles Boeuf, Marta Coll, Carlos Garcia-Soto, Kevin Horsburgh, Heidrun Kopp, Francesca Malfatti, Patrizio Mariani, Nele Matz-Lück, Jan Mees, Luis Menezes Pinheiro, Denis Lacroix, Martin Le Tissier, David M. Paterson, Gerald Schernewski, Olivier Thébaud, Michiel B. Vandegehuchte, Sebastián Villasante, Martin Visbeck, Jan Marcin Węśławski
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Coordinating author: Carlos Garcia Soto; Contributing authors: Gro Van Der Meeren, Julia A. Busch, Jane Delany, Christine Domegan, Karin Dubsy, Géraldine Fauville, Gabriel Gorsky, Karen von Juterzenka, Francesca Malfatti, Gérald Mannaerts, Patricia McHugh, Pascal Monestiez, Jan Seys, Jan Marcin Węśławski, Oliver Zielinski

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Coordinating author: Alex D. Rogers; Contributing authors: Andy Brierley, Peter Croot, Marina Cunha, Roberto Danovaro, Colin Devey, Alf Haakon Hoel, Henry Ruhl, Pierre-Marie Sarradin, Seline Trevisnaut, Helena Viera, Martin Visbeck
- Flemming N.C. *et al.* (2014) **Land beneath the waves: State of the art, key opportunities and recommendations to advance the European Continental Shelf Prehistoric Research.** European Marine Board Position Paper 21. McDonough N, Chu, NC (Eds). European Marine Board, Ostend, Belgium, 2014.
Coordinating author: Nicholas C. Flemming; Contributing authors: M. Namık Çağatay, Francesco Latino Chiocci, Nena Galanidou, Gilles Lericolais, Hauke Jöns, Tine Missiaen, Fionnbarr Moore, Alar Rosentau, Dimitris Sakellariou, Birgitte Skar, Alan Stevenson, and Henk Weerts. Special Contributions: Geoff Bailey and Deukalion Planning Group (Annex 2), Anders Fischer, Sunhild Kleingärtner and Ian Oxley
- European Marine Board (2013). **Navigating the Future IV.** Position Paper 20 of the European Marine Board, Ostend, Belgium. ISBN: 9789082093100
Contributing authors: Sophie Arnaud, Christos Arvanitidis, Roberto Azollini, Melanie Austen, Eduardo Balguerias, Ferdinando Boero, Catherine Boyen, Antje Boetius, Paul Buckley, Jan-Bart Calewaert, Miquel Canals, Nan-Chin Chu, Robin Cook, Roberto Danovaro, Julien Denègre, Sam Dupont, Jan Olavi Ekeboom, Andre Freiwald, Jan-Stefan Fritz, Cornelius Hammer, Carlo Heip, Jean-Pierre Henriët, Maurice Héral, Serge Heussner, Friedrich Köster, Gerd Kraus, Nikolaos Lampadariou, Kate Larkin, Lionel Lemoine, Harald Loeng, Niall McDonough, Nico Nolte, Erik Olsen, Jeanine Olsen, Katja Philippart, Bernard Queguiner, Eva Ramirez-Llodra, Walter Roest, Ricardo Santos, Jan Seys, Appy Sluijs, Cosimo Solidoro, Isabel Sousa Pinto, Josien Steenbergen, Karl Stømsem, Nabil Sultan, Paul A. Tyler, Sybille van den Hove, Luc van Hoof, Ann Vanreusel, Frédérique Viard, Filip Volckaert, Klaus Wallmann, Philip Weaver, Jacky Wood, Louisa Wood
- Moore M., *et al.* (2013). **Linking Oceans and Human Health: A Strategic Research Priority for Europe.** Position Paper 19. McDonough N., Evrard M., Calewaert JB., French V. (Eds). European Marine Board, Ostend, Belgium. 2013. Contributing authors: Michael N. Moore, Craig Baker-Austin, Michael H. Depledge, Iora Fleming, Philipp Hess, David Lees, Paul Leonard, Lise Madsen, Richard Owen, Hans Pirlet, Mathew White, Vitor Vasconcelos, Nicholas Boase, Nicholas Osborne, Aldo Viarengo
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Contributing authors: Luciano Fonseca, Raquel Goñi, David Johnson, Stelios Katsanevakis, Enrique Macpherson, Esben Moland Olsen, Dominique Pelletier, Marijn Rabaut, Marta Chantal Ribeiro, Phil Weaver, Tania Zaharia
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Contributing authors: Lucas J. Stal, Ruth-Anne Sandaa, Josep Maria Gasol, Fergal O’Gara, Francisco Hernandez, Matthias M. Labrenz, Elena Stoica, Marta Varela Rozados, Adriano Bordalo, Paraskevi Pitta.
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Contributing authors: Joan Albaigés, Maria João Bebianno, Kees Camphuysen, Margot Cronin, Jan de Leeuw, Geir Wing Gabrielsen, Thomas Hutchinson, Ketil Hylland, Colin Janssen, Bo Jansson, Bjørn Munro Jenssen, Patrick Roose, Detlef Schulz-Bull, Piotr Szefer.
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Contributing authors: Torger Borresen, Catherine Boyen, Alan Dobson, Manfred Hofle, Adrianna Ianora, Marcel Jaspars, Anake Kijjoo, Jan Olafsen, Joel Querellou, George Rigos, Rene Wijffels. Special contributions: Chantal Compere, Michel Magot, Jeanine Olsen, Philippe Potin, Filip Volckaert.

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Contributing authors: Maria de Fátima Borges, Anthony Grehan, Andrew Kenny, Harald Loeng, Francesc Maynou, Jake Rice, Ricardo Serrão Santos, Hein Rune, Skjoldal, Olivier Thébaud, Vassiliki Vassilopoulou, Filip Volckaert. External contributions: Olivier Curtil, Harold Level.
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Coordinating authors: Ian Boyd, Bob Brownell, Doug Cato, Chris Clark, Dan Costa, Peter Evans, Jason Gedamke, Roger Gentry, Bob Gisiner, Jonathan Gordon, Paul Jepson, Patrick Miller, Luke Rendell, Mark Tasker, Peter Tyack, Erin Vos, Hal Whitehead, Doug Wartzok, Walter Zimmer.
- Robinson I.S. *et al.* (2008). **Remote Sensing of Shelf Sea Ecosystems. Marine Board Position Paper 12.** Connolly N., Walter N., Calewaert J-B. (Eds). Marine Board-ESF, Strasbourg, France. ISBN 2-912049-77-6, 62pp.
Contributing authors: David Antoine, Mirosław Darecki, Patrick Gorringer, Lasse Petterson, Ian S. Robinson, Kevin Ruddick, Rosalia Santoleri, Herbert Siegel, Patrick Vincent, Marcel R. Wernand, Guy Westbrook, Giuseppe Zibordi.
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Contributing authors: Jacques Binot, Juanjo Dañobeitia, Thomas Muller, Per Wilhelm Nieuwejaar, Marieke J. Rietveld, Paul Stone. Special contributions: Massimiliano di Bitteto, John Breslin, Klaus von Broeckel, Joao Coimbra, Dimitris Georgopoulos, Mick Gillooly, Hannu Gronvall, Jan Piechura, Frans Veenstra.
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- Minster J-F. *et al.* (2006). **Navigating the Future III. Marine Board Position Paper 8.** Marine Board-ESF, Strasbourg, France. ISBN 2-912049-59-8, 69pp.
Contributing editors: Aurélien Carbonnière, Niamh Connolly, Jan de Leeuw, Maud Evrard, Jan Mees, Jean-François Minster, Kostas Nittis, Geoffrey O'Sullivan, Nicolas Walter.
- Prandle D. *et al.* (2005). **Modelling in Coastal and Shelf Seas – European Challenges. Marine Board Position Paper 7.** Connolly N., Walter N. (Eds). Marine Board-ESF, Strasbourg, France. 30pp.
Contributing authors: João Gomes Ferreira, Wolfgang Fennel, Michael Hartnett, Peter Herman, Michiel Knaapen, Hans Los, Morten Pejrup, Thomas Pohlmann, David Prandle, Roger Proctor, Yann-Hervé de Roeck, Karline Soetaert, Takvor Soukissian, Tapani Stipa, Georg Umgieser, Waldemar Walczowski.
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Editors: John Marks, Jean-François Minster, Mario Ruivo, Silvana Vallerga; Other Contributors: Avan Antia, Laura Castellucci, Juanjo Dañobeitia, Jens Degett, Bob Dickson, Graham Edgar, Paul Galvin, David Griffith, Gwyn Griffiths, Harlyn Halvorson, Carlo Heip, Jean-Pierre Henriët, Catherine Jeandel, Frank Lamy, Jacques Legrand, Han Lindeboom, Karin Lochte, Jens Meincke, Geoffrey O'Sullivan, Nadia Pinaridi, Gérard Riou, Douglas Wallace, Gerold Wefer, John Woods.

- Mantoura F. *et al.* (2002). **Integrating Marine Science in Europe. Marine Board Position Paper 5.** Minster J-F. *et al.* (Eds). Marine Board-ESF, Strasbourg, France. 148pp.
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Contributing authors: Maria Alexis, Grant Burgess, Joao Coimbra, Yves le Gal, Maura Grealy, David Gutnick, Harlyn Halvorson, Manfred Höfle, Zuzana Smolenicka, Bernt Walther, Roman Wenne; Special consultant: Jan A. Olafsen.
- Boissonnas J. *et al.* (2001). **Navigating the Future – Towards a Marine European Research Area. Marine Board Position Paper 3.** Marine Board-ESF, Strasbourg, France. 14pp.
Core Drafting Group: J. Boissonnas, O.R. Godø, C. Jeandel, J.W. de Leeuw, K. Lochte, R.F.C. Mantoura, J. Marks, J.F. Minster, G. O’Sullivan, L. d’Ozouville, S. Vallerga, G. Wefer; Other contributors: H. Halvorson, C. Heip, B. B. Jørgensen.
- Boissonnas J. *et al.* (2000). **Towards a European Marine Research Area. Marine Board Position Paper 2.** Marine Board-ESF, Strasbourg, France. 54pp.
Core Drafting Group: J. Boissonnas, O.R. Godø, C. Jeandel, J.W. de Leeuw, K. Lochte, R.F.C. Mantoura, J. Marks, J.F. Minster, G. O’Sullivan, L. d’Ozouville, S. Vallerga, G. Wefer; Other contributors: H. Halvorson, C. Heip, B. B. Jørgensen.
- Heip C., Hummel H. (2000). **Establishing a Framework for the Implementation of Marine Biodiversity Research in Europe. Marine Board Position Paper 1.** Mantoura F. (Ed). Marine Board-ESF, Strasbourg, France. ISBN 2-912049-13-X, 50pp.

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- Heymans, J.J., Skogen, M., Schrum, C., Solidoro, C. (2018) **Enhancing Europe’s capability in marine ecosystem modelling for societal benefit.** Larkin, K.E., Coopman, J., Muñoz Piniella, A., Kellett, P., Simon, C., Rundt, C., Viegas, C., Heymans, J.J. [Eds.] Future Science Brief 4 of the European Marine Board, Ostend, Belgium. 32 pp. ISBN: 9789492043580 ISSN: 2593-5232
- Benedetti-Cecchi, L., Crowe, T., Boehme, L., Boero, F., Christensen, A., Grémare, A., Hernandez, F., Kromkamp, J. C., Nogueira García, E., Petihakis, G., Robidart, J., Sousa Pinto, I. & Zingone, A. (2018) **Strengthening Europe’s Capability in Biological Ocean Observations.** Muñoz Piniella, Á., Kellett, P., Larkin, K., Heymans, J. J. [Eds.] Future Science Brief 3 of the European Marine Board, Ostend, Belgium. 76 pp. ISBN: 9789492043559 ISSN: 2593-5
- Vincx, M., Antia, A., Deprez, T., Fiksen, Ø., Koski, M., Mackenzie, B., McGrane, P., O’Carroll, C., Olsen, J., Menezes Pinheiro, L., Ribera d’Alcalà, M., Rouillet, G. (2018) **Training the 21st Century Marine Professional: A new vision for marine graduate education and training programmes in Europe.** Kellett, P., Larkin, K., Heymans, J. J., McDonough, N., Wouters, N., Chu, N-C. [Eds.] Future Science Brief 2 of the European Marine Board, Ostend, Belgium. 47pp. ISBN: 9879492043511. ISSN: 2593-523

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- European Marine Board (2020). **Policy Needs for Oceans and Human Health**. EMB Policy Brief 8, May 2020. ISSN: 0778-3590 ISBN: 9789492043962 DOI: 10.5281/zenodo.3822099
- European Marine Board (2020). **Next Generation European Research Vessels**. EMB Policy Brief 7, March 2020. ISSN: 0778-3590 ISBN: 9789492043870 DOI: 10.5281/zenodo.3639005
- European Marine Board (2019). **Navigating the Future V: Recommendations for the Ocean Decade**. EMB Policy Brief 6, September 2019. ISSN: 0778-3590. ISBN: 978-94-92043-77-1. DOI: 10.5281/zenodo.3465570
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- Haugan P. (2013) **Getting Ready for an Ice-Free Arctic**. European Marine Board Science Commentary 1. European Marine Board, Ostend, Belgium. 2013

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Contributing Authors: Augusto Barata da Rocha, Cibran Camba Rey, Marc Le Boulluec, John Dalen, Henry Jeffrey, Finn Gunnar Nielsen, Geoffrey O'Sullivan, Nathalie Rousseau, Eoin Sweeney, Judith Wolf.
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Contributing authors: Patrick Berthou, Taco de Bruin, Howard Cattle, Franciscus Colijn, Antoine Dosdat, Michael Gillooly, Johnny Johannessen, Juha Markku Leppanen, Giuseppe Manzella, Geoffrey O'Sullivan, Sylvie Pouliquen, Roger Proctor, Peter Ryder, Dick Schaap.

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- Heip C. *et al.* (2011). **Climate Change and Marine Ecosystem Research: Synthesis of European Research on the Effects of Climate Change on Marine Environments**. Marine Board – CLAMER Special Report. Calewaert J.B., Heip C., McDonough N., Philippart C. (Eds). Marine Board, Ostend, Belgium. 154pp.
Coordinating author: Carlo Heip. CLAMER Scientific Expert Panel Contributors: Carlo Heip, Manuel Barange, Roberto Danovaro, Marion Gehlen, Anthony Grehan, Filip Meysman, Temel Oguz, Vangelis Papathanassiou, Catharina Philippart, Jun She, Paul Treguer, Rachel Warren, Paul Wassmann, Phil Weaver, Rita Yu. Other Contributors: Justus van Beusekom, Philip Boyd, Andrew Cooper, Hein de Baar, Henk de Haas, Felix Janssen, Wolfgang Ludwig, Leif Toudal Pedersen, Michael Tsimplis, Hans Von Storch.

FORUM PROCEEDINGS:

- Alexander, B., Kellett, P., Coopman, J., Muñiz Piniella, Á., Heymans, J. J. (2021). **7th EMB Forum Proceedings**. Big Data in Marine Science: Supporting the European Green Deal, EU Biodiversity Strategy, and a Digital Twin Ocean. DOI: 10.5281/zenodo.4541335.
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Forum rapporteurs: Gilles Lericolais, Jan-Stefan Fritz, Mark James
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Forum rapporteurs: Veronica French, Dina Eparkhina, Kate Larkin, Nan-Chin Chu, Noémie Wouters
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