

Challenger Wave



Monthly newsletter of the Challenger Society for Marine Science (CSMS)

NEWS

Celebrating CIESM 100th Anniversary in style

CIESM was 'officially' born 100 years ago, one of the very first Intergovernmental Organisations in the world. To mark this important Anniversary, an emblematic stamp has been released by the Postal Office of Monaco, the country hosting the seat of the Commission.



It was in November 1919 that the Constitutive Assembly of CIESM gathered with great pomp in Madrid, under the presidency of the King of Spain, Alfonso XIII. Years have passed and the number of Member States has grown from seven at the origin to 23 today.

World's first live video broadcast from underwater using commercially available technology

International news agency Associated Press (AP) used Sonardyne's BlueComm wireless through-water optical modem technology for the live broadcast from a two-person submersible operating in waters off the Seychelles, in the Indian Ocean. AP said that the broadcast via YouTube was "the first multi-camera live signal in full broadcast quality from manned submersibles using optical video transmission techniques, in

which the pictures transmit through the waves using the electromagnetic spectrum."

The broadcast is part of the Nekton Deep Ocean Research Institute's First Descent expedition, which is exploring some of the world's least explored areas of the ocean around the Seychelles, as part of a project to increase understanding and aid protection of the marine life they contain. By using a Sonardyne BlueComm free space optical modem on the submersible, and a BlueComm receiver deployed from the hull of the Ocean Zephyr research vessel, real-time video from one of the mission's two submersibles was able to be streamed through the water and then broadcast live across the world, enabling the general public to, in-effect, join the scientists as they explore the underwater habitats.



Broadcasting from the deep on the Nekton First Descent mission using BlueComm

Sky News and Sky Atlantic, as part of Sky Ocean Rescue, have also joined the mission, to broadcast three live "subsea programmes", which will include live simultaneous broadcast from both of the mission's two, two-person submersibles.

While video transmission from a manned submersible using optical communications has been achieved before, this will be the first time it has been achieved from two, working in close

proximity, which means overcoming the challenges of signal interference. "Without BlueComm, this could not be done," says Darryl Newborough, Sonardyne's Technical Director. "The submersibles have no cable connection to the vessel, so they cannot send their video feed through a cable. Acoustic communications technologies work well, and over long distances, but their bandwidth is not wide enough to support live video streaming."

BlueComm is the only commercially available technology that enables wireless transmission of high bandwidth data, including video, over ranges of a few tens or potentially even hundreds of metres, at rates of up to 10 megabits per second. Sonardyne is the official Subsea Communications Partner for the First Descent mission, which is exploring the Indian Ocean through 2019-20. The first expedition is running from March-April 2019.

Supported by 13 scientists based on the Ocean Zephyr, Nekton's goal is to undertake at least 50 "first descents" into these waters to generate data which will support a Seychelles' Government commitment to protect 30% of their national waters. Very little research has been undertaken beneath 30 metres (scuba depth) across Seychelles' vast ocean territory of 1.37 million square kilometres. The objective is to contribute to establishing a baseline of marine life and the state of the ocean in Seychelles. Research is focused from the surface into the Bathyal Zone (200m to 3000m), home to some of the greatest patterns of biodiversity, and the impact of human activities on these vital ecosystems. Newborough adds, "We're delighted to both be bringing the excitement of entering unexplored waters to live television audiences, but also, more importantly, helping to advance ocean exploration and, ultimately, the protection of the Seychelles' marine environment."

Nominations for the 2020 EGU Ocean Sciences division awards please.

Information about the Fridtjof Nansen Medal <https://www.egu.eu/awards-medals/fridtjof-nansen/>

Information about the Outstanding Early Career Scientist award <https://www.egu.eu/awards-medals/division-outstanding-ecs-award/>

This is your chance to take an active part in increasing diversity in the group of EGU

awardees and medalists. We encourage the EGU membership to consider gender, and geographical and cultural balance when nominating outstanding ocean scientists at various career stages. The final deadline for nominating candidates for both of these awards is 15th June 2019.

For more information on proposing candidates and on the selection process, please see: <https://www.egu.eu/awards-medals/proposal-and-selection-of-candidates/>. The awards and medals will be presented at the EGU General Assembly 2020 (3rd – 8th May) in Vienna. - **Karen Heywood, President of the EGU Ocean Sciences Division; k.heywood@uea.ac.uk**

9th Annual Meeting of the NOC Association

There are still some places left for the 9th Annual Meeting of the [National Oceanography Centre \(NOC\) Association](#) on 9th May 2019 at [Central Hall Westminster](#). After a morning of Association business, the afternoon will focus on the [United Nations Decade of Ocean Science for Sustainable Development \(2021-2030\)](#) and we are keen to hear views from the community on how the UK might contribute to this initiative.



credit: Howard Marson

The agenda and registration page for this free event are available on this link: <https://noc-association-2019.eventbrite.co.uk> and to access, please use password: **NOCA2019**. If you have any questions, please contact NOC Association Secretary Jackie Pearson on jfpea@noc.ac.uk or telephone 023 8059 609

The Sea Mammal Research Unit Pool Facility

Established in 1978, the Sea Mammal Research Unit (SMRU), based at the Scottish Oceans Institute, St. Andrews University is recognised internationally for its work on Marine Mammals. The Pool Facility at SMRU was established in 1997 and over the last 20 years has been utilised for collaborative Marine Research with a specific focus on Marine Mammal Biology.



We are now opening our large seawater facility to the wider community. The Pool Facility at SMRU comprises several large seawater pools located within a secure site at the Scottish Oceans Institute. The facility is well equipped to offer a controlled testing platform for a range of marine and underwater equipment. Through previous Marine Research collaborations we have successfully used our facility for a diverse range of testing, calibration and optimisation of bespoke marine equipment.



We offer access to and use of:

- 42m x 6m wide x 2.5m deep seawater pool
- 3m x 2m deep circular seawater pool
- 4m x 2m deep circular seawater pool
- 3m x 1.5m deep circular seawater pool
- Travelling overhead gantry crane with 2 x 500kg load lift
- Modular dock systems

- 240/110V power
- Workshop space
- Desk space
- Vehicle access

We welcome enquiries from all sectors and offer a flexible, bespoke service at competitive rates. We qualify for the Interface Standard Innovation Voucher scheme for small and medium sized businesses in Scotland. For more information please visit our website www.smrु.st-andrews.ac.uk/pool, send an e-mail smrupool@st-andrews.ac.uk or call us on 01334 463472.

VIEWS

Structures in the Marine Environment (SIME2019)

SIME2019 is a new one-day conference that will be taking place in Glasgow on Friday 17th May 2019. The inaugural and successful INSITE Programme has led to a number of important studies concerning the ecology, connectivity and dynamics of man-made structures within the marine ecosystem (such as O&G platforms and pipelines). The programme has also identified that there are significant knowledge gaps for any new infrastructures that may be put in place over the coming decades (e.g. renewable energy structures), a robust evidence base is needed to support appropriate environmental management and policy/regulatory decision-making.

You are invited to submit abstracts for 15 minute presentation slots (12 minute talks + 3 minutes for questions) or a poster. Papers can be offered in any field of study within the context of offshore man-made structures and the impact their presence or removal may have on related ecosystems. This can include, but is not exclusively limited to, connectivity, modelling, temporal/spatial interactions, environmental and climate impacts, data handling/availability, ecology and habitat, geochemistry, physics, decision-making, species/community interactions, and ecosystem function etc.

Presenters are encouraged not to solely focus on past and current research but reflect on gaps of knowledge and future research directions. Studies need not only be from the North Sea as learning from other regions is also very useful.

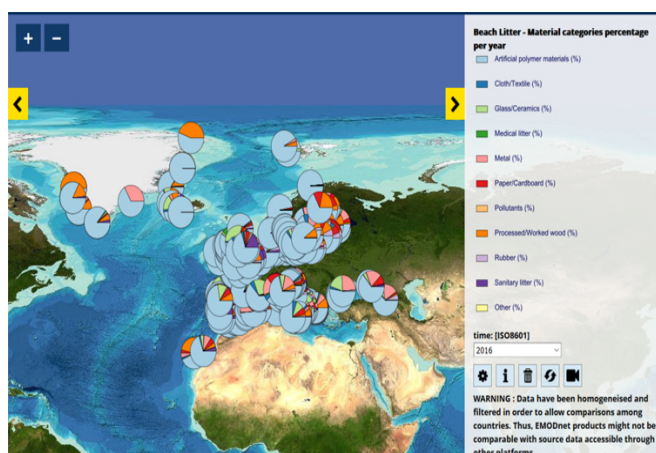
Talks and posters should be accessible to other disciplines, by avoiding jargon and keeping technical details simple. See masts@st-andrews.ac.uk for more information.

New maps show the extent of marine litter in European seas

EMODnet launches new digital maps of beach and seafloor litter, providing a comprehensive information tool for marine policy and wider society.

Increasing concentrations of plastic in our environment are a growing threat to ecosystems and human health. Plastic has been detected in nearly all marine life, from whales to molluscs. In order to fight this threat, there have been calls in international fora such as G7, G20 and the United Nations to bring the many measurements and observations together to create a complete picture.

Europe is now leading the way. Authorities and the wider society now have a new tool to help track, map and identify where litter ends up in our seas and oceans and check how it is affecting ocean health, www.emodnet.eu/new-maps-show-extent-marine-litter-european-seas.



The production of the EMODnet maps is based on data from hundreds of data providers and monitoring efforts to gather marine litter information scattered over Europe.

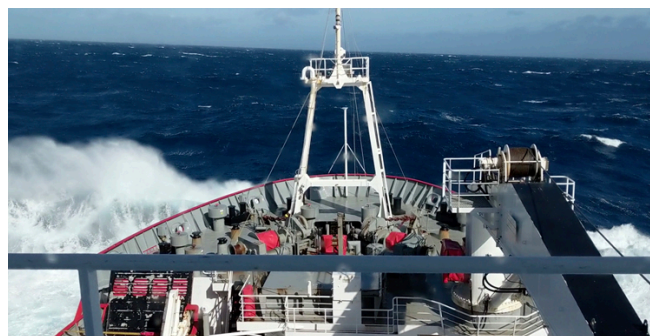
The maps show, among others, the spatial and temporal distribution of beach and seafloor litter based on official monitoring surveys and wider sampling efforts across European countries. The types of litter are also identified, from plastics to glass, wood and metal, and from fishing related items to land-based products such as cigarettes.

www.challenger-society.org

SALTS

“It’s all about the iron...”

I work on the biogeochemical cycle of iron in the oceans and have been lucky enough (or crazy enough) to have spent the past four months in the field. November was an expedition across the Drake Passage, part of the ORCHESTRA and GO-SHIP programs, looking at transport through the Drake Passage, and importantly the carbon and heat that the water masses take with them.



December was a beautiful trip to three Antarctic fjords with the ICEBERGS project, which is investigating the effects of rapidly retreating glaciers on benthic ecosystems. My final two months were at a British Antarctic Survey research station, using small boats and SCUBA divers to sample waters and sediments in order to better understand the balance of iron sources to coastal waters. The three projects link together by helping me account for variability of these coastal iron sources, and look at where this iron ultimately gets to: an important question because in most of the open Southern Ocean phytoplankton are limited by low supply of iron.



It’s hard to sum up three back-to-back expeditions, as each one had its own set of goals,

colleagues, highlights and challenges. Sailing southward across the Drake Passage in November was probably the first hurdle. The rough weather sometimes made it impossible to sample (or even access my lab) although a flexible approach to station planning and amazing support from 'Team Physics' meant that I was still able to do all the sampling I'd hoped for. An extremely soupy seafloor was a serious problem in December resulting in several failed deployments to collect sediments. The solution to this one was the technicians fitting a pair of skis so that our equipment sat nicely on the mud soup.



My final stop was Rothera Research Station; I've already spent several seasons here, including an Antarctic winter, and it is certainly one of the most amazing places on earth. But any stunningly beautiful platform for coastal ocean research is not without its challenges: brash ice too thick for boating, apex marine predators lurking around and keeping the dive team out of the water. Of course, the upside to spotting leopard seals and orca is that we get to see leopard seals and orca. A highlight for me was seeing the local orca pod hunting, and trying to knock seals off of sea ice by working together to launch a big wave over the iceberg (in this case the seal hung on!).

These perks and triumphs in doing research are what make the long hours, distance and lack of internet worth it, and keep up my enthusiasm when we host "open night" in the lab to showcase what we're working on to the wide range of people on the base; from chefs to plumbers to pilots to construction foremen to electrical engineers. On the flight home, I was answering follow-up questions from one of the doctors who had been at the open night. He summed up his exchanges with the marine team: "I started out being worried about the decline of penguin

populations because of climate change. Then I talked to a marine biologist and found out that one of the factors in that, is changes in krill because of climate. Next I spoke to an oceanographer and realised that I also need to be worried about krill food, phytoplankton. Finally I talk to you and I find out that to understand the phytoplankton, it's all about the iron!".



Knowing that I've been successful at communicating the point of my research, and that people around me understand that my piece of the "how-our-oceans-are-changing" puzzle is an important one, is the icing on the cake. - **Amber Annett, Senior Research Fellow, University of Southampton.**

CALENDAR

6th – 10th May 2019: 51st Liège colloquium on ocean dynamics: Polar oceans facing changes

Liège, Belgium

To be held at [Place of the Conference: University of Liège – Place du XX-Août, 7 – 4000 Liège – Belgium.](#)

Polar oceans are facing profound changes. The Arctic Ocean and the waters west of the Antarctic Peninsula are at the forefront of global warming, while the rest of the polar oceans will face changes in the very near future. The changes to face are not limited to a rise in atmospheric temperature and modification in the freshwater budget. Increases of economic activities (shipping, tourism, fisheries and mineral extraction), contaminants and invasive species also put polar oceans at risk. Changes are already witnessed in terms of ice shelf volume,

wind patterns and precipitation, sea ice extent, ocean circulation, ocean acidification and freshening, primary productivity, biodiversity and community structure or ecosystem functioning. As polar oceans are key components of the Earth system, changes there will have global impacts such as sea level rise, changes in lower latitude oceanic productivity, and oceanic CO₂ uptake, among other ecosystem services.

The 51st Liège colloquium on ocean dynamics will address the observation and prediction of these changes and their consequences. More specifically, the following topics will be covered:

Measuring anthropogenic impact and pollutants. This spans measurement of physical parameters, trace contaminants, inventory of climate related gases, micro plastics measurement, bio-indicators, monitoring economic activities

Observing changes. Remote sensing is key to monitor sea ice and ice sheet shrinkage, ocean warming and freshening, changes in ocean circulation and environmental forcing. In parallel, several initiatives (e.g. AMAP, SOOS, SOCCOM, ASPeCt, ANTOS, INTAROS, SAON, CAFF, BEPSII among others) have developed to reinforce monitoring of the polar oceans and provide insights on current changes

Assessing impacts. Anthropogenic forcing are impacting physical processes and biogeochemistry but also biodiversity and food web functioning. Tracking changes in an evolutionary perspective is challenging

Specific cryosphere-oceans interaction. At the interface between land and polar oceans, ocean interactions with ice sheets and sea ice are key in controlling ice-sheet balance, sea level rise and water mass transformation rates

Enlarge our temporal perspective: paleo-oceanographic changes. Ocean sediment records provide paleoclimate proxy indicators of past changes. These benchmarks allow a better grasp on current changes in term of level, significance and rapidity

Predicting future changes. Modeling is a major tool to understand past and present changes and to predict future changes from a local to a global perspective. More specifically, simple ocean model, ice sheet or sea ice- ocean coupled model, biogeochemical model, dynamic energy

budget, species/trait distribution model among others are well suited to investigate changes in polar oceans.

Teleconnection and global perspective. As a result of the teleconnection of polar oceans to the global ocean, changes in polar oceans can propagate more globally. Assessing such impacts is critical to understand actual and future changes of the global ocean

Mitigation. Several tools can be used to mitigate or limit the impact of some anthropogenic pressures: enforcement of conservation measures, marine protected areas, sewage treatment, education and awareness raising that need to be further developed to tackle polar ocean changes.

Further details are available on the web site : labos.ulg.ac.be/gher/home/colloquium/. We are looking forward to welcoming you in Liège in the name of the Organizing Committee.

Sincerely, Bruno Delille and Gilles Lepoint,
(Chercheur Qualifié FRS-FNRS)

6th – 10th May 2019: GODAE OceanView Symposium, Ocean Predict '19

Halifax, Canada

The next GOV Symposium invites ocean scientists, ocean observation specialists, industry representatives, service providers and users of ocean data and products from across the local, national and international operational oceanography community to engage in science sessions, booth exhibitions and discussions to explore and define the direction of future operational oceanography.

GODAE OceanView continues to provide coordination and leadership in consolidating and improving global and regional ocean analysis and forecasting systems. The Symposium objectives include:

- Getting a common picture of future development in all aspects of Operational Oceanography
- Motivating integrated international community projects to further advance science and benefits of Operational Oceanography
- Enhancing end-user awareness of present capacity and providing collaborative output of future in operational oceanography and end-

user engagement

The symposium is built around [six major themes](#) covering all aspects of Operational Oceanography. Abstracts will be invited to contribute to plenary, splinter and poster sessions. Especially welcome are representatives from the service provider and end-user community, to exhibit their work and products, and to engage with the science community.

Further information about the symposium, themes and description of sessions is now available from the OceanPredict '19 website: <http://www.oceanpredict19.org>.

We are looking forward to your participation; Fraser Davidson, Eric Chassignet, PN Vinayachandran and Kirsten Wilmer-Becker on behalf of the OceanPredict '19 Symposium Organising Committee. The Symposium is sponsored and supported by MEOPAR, DFO and other members of the [GODAE OceanView Patrons Group](#).

10th – 11th May 2019: Arctic Circle Forum - China and the Arctic: Polar Silk Roads - Oceans - Transport - Energy - Science - Indigenous Dialogue - Governance
Shanghai, China

Registration is now open for the Arctic Circle China Forum at the Shanghai Science and Technology Museum.



Hosted by the Ministry of Natural Resources of the People's Republic of China, the Forum will be organized in cooperation with the Polar Research Institute of China (PRIC), Shanghai Institutes for International Studies (SIIS) and the Shanghai Science & Technology Museum. The Forum is supported by the Ministry of Foreign Affairs of the People's Republic of China.

Participants will have the opportunity to visit the Polar Research Institute of China and Shanghai International Shipping Centre at Yangshan Deepwater Port.

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The Arctic Circle provides an open, democratic forum for discussion and cooperation on Arctic Affairs, china@arcticcircle.org.

11th May 2019: Tides and the port of Liverpool
Liverpool, UK

The Merseyside Maritime Museum is hosting a one day meeting on Tides and the port of Liverpool. This meeting marks the 100th anniversary of the world-famous Liverpool Tidal Institute. Founded at Liverpool University in 1919, before moving to Bidston Observatory on the Wirral, this was the precursor of the Proudman Oceanographic Laboratory and the National Oceanography Centre. It also marks the start of teaching and research in Oceanography at Liverpool University, the first oceanography department in the UK.

This meeting is organised by the National Oceanography Centre and the University of Liverpool, in association with the Centre for Port and Maritime History (University of Liverpool, Liverpool John Moores University and Merseyside Maritime Museum) and the Liverpool Institute for Sustainable Coasts and Oceans (National Oceanography Centre, University of Liverpool and Liverpool John Moores University).

The meeting will run from 10 am to 2 pm with free registration and free refreshments. For a list of speakers and to sign up, please go to: <https://conference.noc.ac.uk/ocean-tide-and-port-liverpool> and download a ticket. The National Oceanography Centre building in Liverpool will also be open that day for you to see the machines which made tidal predictions before the days of digital computers; see the above web site for information on that also. Please sign up yourself and spread the word to your friends, schools etc.

17th May 2019: Structures in the Marine Environment Conference (SIME2019)
Glasgow, Scotland, UK

The inaugural and successful INSITE Programme has led to a number of important studies concerning the ecology, connectivity and dynamics of man-made structures within the marine ecosystem (such as oil & gas platforms and pipelines). The programme has also identified that there are significant knowledge gaps for any new infrastructures that may be put in place over the coming decades (e.g. renewable energy structures), a robust evidence base is needed to support appropriate environmental

management and policy/regulatory decision-making.

You are invited to submit abstracts for 15 minute presentation slots (12 minute talks + 3 minutes for questions) or a poster. Papers can be offered in any field of study within the context of offshore man-made structures and the impact their presence or removal may have on related ecosystems. This can include, but is not exclusively limited to, connectivity, modelling, temporal/spatial interactions, environmental and climate impacts, data handling/availability, ecology and habitat, geochemistry, physics, decision-making, species/community interactions, and ecosystem function etc. Presenters are encouraged to not solely focus on past and current research but reflect on gaps of knowledge and future research directions. Studies need not only be from the North Sea as learning from other regions is also very useful. Talks and posters should be accessible to other disciplines, by avoiding jargon and keeping technical details simple. Please submit your abstract on the website template and submit to masts@st-andrews.ac.uk before 16.00 on 17/4/19.

20th May 2019: Institute of Aquaculture Students' Association Careers Fair for Postgraduate Students
Stirling, UK

We would like to draw your attention to the event Aquaculture Careers 2019 organized by the Aquaculture Students' Association (ASA) at the Institute of Aquaculture, University of Stirling. This year the event is taking place a month later than usual, and will run from 09:15 – 16:00.

In the past the event has hosted some stands free-of-charge. However this year the students have decided to apply a nominal charge of £50 for a stand. This charge will contribute toward the sole significant overhead of the event, which is catering. Would this be of interest to any of your companies? In the last two years the event attracted 150 – 200 students of MSc/PhD level with a keen interest in Aquaculture. If this would be of interest, please could you contact Carolina Fernandez carolina.fernandez@stir.ac.uk who is President of the ASA.

20th – 24th May 2019: 8th EGO Meeting and International Glider Workshop
Rutgers University, New Jersey, USA



Save the days, express your interest at docs.google.com/forms/d/e/1FAIpQLSeEksxZdaYLtQc0Em9NMCsUaBWY6NEfZkY2ISu55i9CkkacuA/viewform.

17th – 21st June 2019: IMBER 2nd Open Science Conference
Brest, France

The 2nd IMBeR Open Science Conference.
<http://www.imber.info/en/events/osc--imber-open-science-conference/osc-2019/2019-imber-open-science-conference>



8th – 18th July 2019: 27th IUGG General Assembly

Montreal, Canada

Details of the P02 symposium, Physics and Biogeochemistry of Semi-Enclosed, Shelf Seas, and Coastal Zones can be found below and at this link <http://iugg2019montreal.com/p.html>.

This interdisciplinary symposium provides a joint forum for oceanographers whose research focuses on physical, chemical, and biological processes in coastal zones, semi-enclosed and shelf seas of the World, as well as their responses to climate change and anthropogenic impacts. These areas are often characterized by complex interactions between land, ocean, and atmosphere, they exhibit rich dynamics driven by a variety of feedbacks and forcing mechanisms. Marginal seas and coastal areas are particularly vulnerable to climate change effects and anthropogenic stressors. Given their limited geographical extension and their sometimes constricted connection to the open ocean, these environments often exhibit shorter timescales in their responses to external forcing: this is why they are widely recognized as natural “laboratories” for studying oceanic processes and interactions between the physical, biogeochemical and climatic spheres. They also play an exceptionally important role in ecosystem services and socio-economic issues and require careful governance measures to avoid or mitigate environmental deterioration.

Gathering experts from different regions, the symposium will give a global perspective of the topic through comparison and elucidation of similarities and differences. Contributions on different regions are invited, related to themes such as innovative observational, theoretical, experimental and modeling studies of the hydrodynamics, marine biogeochemistry (e.g., nutrient dynamics, primary production, acidification, algae blooms) and the influence these regional seas and coastal zones exert on the adjacent basins/oceans and on the global scale. Studies of past, present and future climate variability are welcome, as well as interdisciplinary studies on the bio-physical interactions in semi-enclosed and shelf seas.

The convenor and co-convenors of this session are: Peter Zavialov (Russia), Jianping Gan (China), Osmar Moller Jr (Brazil), Katrin Schroeder (Italy).

www.challenger-society.org

17th – 19th September 2019: IOCCP meeting, OceanObs '19

Honolulu, Hawaii, USA

For more details of the IOCCP OceanObs'19 meeting, please go to <http://www.oceanobs19.net/breakout-sessions/>.

1st – 5th October 2019: Ecological Modelling Global Conference

Salzburg, Austria



The International Society for Ecological Modelling Global Conference 2019 have organised symposiums at the conference. The deadline to submit your abstracts is the 8th April 2019, www.elsevier.com/events/conferences/international-society-for-ecological-modelling-global-conference/submit-abstract.

This global conference, to be held at the Salzburg Congress Centre, is the 22nd biennial conference of The International Society for Ecological Modelling (ISEM) and will bring together scientists from all professions and applications that deal with the use of ecological models and systems ecology. The Conference Chairs are:

Gudrun Wallentin, Department of Geoinformatics, University of Salzburg

Tarzan Legović, Ruđer Bošković Institute

Brian Fath, Department of Biological Sciences, Towson University

2nd - 4th October 2019: MASTS ninth Annual Science Meeting (ASM)

Glasgow, Scotland, UK

The 9th ASM, will take place at the Technology and Innovation Centre, find out what you missed at the 2018 ASM by reading the "MASTS ASM Reflections" (<https://www.masts.ac.uk/media/36739/masts-asm-news-final-2.pdf>), or why not check out the video-casts here <https://www.masts.ac.uk/annual-science-meeting/2018-vidcasts/>. More details will follow about this event over the next month or so, but please get in touch before then if you would like to be involved.

7th – 11th October 2019: 42nd CIESM Congress

Cascais, Portugal

We hope to see as many of you as possible next October in Cascais, where our Congress will zoom in on the Atlantic/ Mediterranean interface. Some 1000 scientists will be there to share and debate their findings and their views on marine issues.



If your research matches one of our 76 Congress themes, we encourage you to submit a paper online. Do not wait much longer: Cascais is a picturesque town, highly popular with tourists and so hotels and pensions in the vicinity will fill up quickly. Have a close look at the Congress themes selected by our Science Council for the occasion, www.ciesm.org/. Please make a note that the period to submit your one-page illustrated paper online will run from 15th January to 5th April 2019. - **Cordially, The CIESM Congress Team**

10th – 13th October 2019: Seventh Arctic Circle Assembly

Reykjavik, Iceland

Following consultations with Arctic Circle partners and participants, it has been decided to open the Arctic Circle Assemblies ONE day earlier, on Thursdays. Plenary Sessions will end on Saturdays and the party for all participants will

take place on the Saturday evening. On Sunday, thematic Excursions and Tours devoted to areas of interest to Arctic Circle participants will be offered.

Breakout Sessions will begin on Thursday morning and the Opening Session will be held after lunch on that day. In addition opportunities will be created for those who so desire to hold Breakout Sessions, working or networking meetings on Sunday morning. Pre-Events will consequently be on Wednesdays. Proposals are now being accepted for Breakout Sessions with a submission deadline of the 10th May 2019.



Participation will be granted based on session topic, area of focus, goals, and room availability at the Harpa Reykjavík Concert Hall and Conference Center. When proposals are submitted, 50% of speakers need to be confirmed. Programs from previous Assemblies, which list all past Breakout Sessions, may be found at www.arcticcircle.org. The Arctic Circle provides an open, democratic forum for discussion and cooperation on Arctic Affairs.

21st - 25th June 2020: 6th International EcoSummit Congress, EcoSummit 2020 - Building a sustainable and desirable future: Adapting to a changing land and sea-scape, Gold Coast, Australia

This conference series was founded in 1996 in Copenhagen, as a forum for scientists, practitioners, and policy-makers working across disciplines to solve the integrated environmental, social, and economic problems facing the world today. Since 1996, EcoSummits have occurred around the world (Canada, China, USA and Europe), with EcoSummit 2016 hosting 1400 participants from 87 countries in Montpellier, France.

EcoSummit 2020 will have a focus on coastal and marine ecosystems including adjacent terrestrial ecosystems and all habitats that are integrated within those ecosystems, including river networks, wetlands and catchments. We expect all aspects of environmental modelling, engineering, science, and policy to be covered under the focus of climate adaptation and the need for developing socio- economic and environmental resilience and sustainable prosperity around the world. Further focus will be placed on fragile systems that are more likely to suffer the consequences of climate change and anthropogenic pressure such as islands, coastal communities and arid landscapes.

In the current context of an increasing world population, in particular in coastal regions, it is evident that building sustainable cities and using

resources sustainably is inevitable. It is envisaged that the Summit will produce a declaration encompassing its vision and policy recommendations. We welcome your participation and look forward to seeing you at EcoSummit 2020

EcoSummit 2020 Co-Chairs:

Robert Costanza, Crawford School of Public Policy at Australian National University, Australia.

Bai-Lian (Larry) Li, University of California, Riverside, USA.

Jan-Olaf Meynecke, Griffith University, Australia

Visit the EcoSummit 2020 website:
ecosummitcongress.com


The CSMS email address is info@challenger-society.org.uk. Contributions for next month's edition of Challenger Wave should be sent to: john@vectisenvironmental.com by the 30th April.

We continue to send printed copies of Challenger Wave to members of the CSMS without email addresses. However it is in everybody's interest to send your email address to Jennifer Jones, jxj@noc.ac.uk, as soon as possible

JOBS

There are jobs on the IMBER web site

<http://www.imber.info>

**IMBeR**
Integrated Marine Biosphere Research

Jobs and opportunities

- Sustainable business analyst: Future of Fish, Apply by 15 April
- Fellowships for North Pacific Arctic Conference Fellowships, 14-16 August. Apply by 15 April
- Lecturer: Ocean science, University of Liverpool, UK. Apply by 20 April
- BNP Paribas Foundation Climate and Biodiversity Initiative. Apply by 28 April
- Postdoc Fellowships: Interdisciplinary graduate school for the blue planet ISBlue. Apply by 3 May
- Postdoc: Role of microbes in shaping ocean processes. Apply by 14 June
- PICES: Executive Secretary, Sidney, BC, Canada. Apply by 15 June

Visit the IMBeR Website

imber@imr.no