

Challenger Wave



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

ocean
BUSINESS19

The hands-on ocean
technology exhibition
and training forum
Southampton, UK • 9-11 April



NEWS

Racing home with a WIN for Beach Schools South West at the Rural Business Awards

Community Interest Company, Beach Schools South West won the accolade of Best Rural Educational Business at the prestigious finals event held by the Rural Business Awards at Bath Racecourse. Company Directors Tess Stuber and Alexis Bowater represented the Beach Schools South West team as they attended the event, being one of five businesses in their category to reach the finals.

Beach Schools South West make it no secret that they are proud to teach on the beach. Their full-time practitioner travels around the beaches of the South West to take children out of the

classroom and onto the beach for curriculum-linked learning and for them to learn about the world around them - improving their social and academic outcomes and boosting their health, wellbeing, mental health and life chance outcomes. Children are taught about the world around them and their place in it. Thousands of children in Devon and Cornwall have benefitted from beach schools sessions delivered by the Community Interest Company, many of whom have never been to the beach before - not only those living in rural areas but those living in cities too.

"Beach Schools South West (BSSW) is the only Community Interest Company dedicated to teaching children on the beach. We have been established for five years and have had a permanent, positive, transformational impact on thousands of children across the South West,"

says Company Director, Tess Stuber. "There are many Forest School facilitators in the region which hold the same philosophy as us, teaching in the outdoors, but we are the only organisation to take the Forest Schools philosophy and apply it to the marine environment, exclusively."



"BSSW has taken a bold step in bringing outdoor learning to the shoreline that no one else has, so it is wonderful to have this recognition. We did something different. People didn't believe we could do it, we were out there, we stepped off the map - and to be honest it was scary. But it worked. To date we have changed the lives of more than 15,000 children in Devon and Cornwall in a positive, permanent and irreversible way."

Co-director Alexis Bowater adds: "We continue to work with disadvantaged children across the region. Right now, we have ambitious plans to take hundreds of disadvantaged Primary School children from Plymouth and introduce them to the marine environment, many for the first time. At a time when Britain's Ocean City is looking to become a National Marine Park we back that campaign entirely. Simultaneously as it happens we are rolling out a pilot project working with children with mental health challenges and their families to improve their lives through six week sessions of Beach Schools. Our long-term vision is to make sure every child in the West Country has access to learning in the marine environment so they can understand the world they live in and help conserve it."

"We believe that the custodians of the future are the children of the present and if they don't know about the sea, why would they want to save it? It's estimated that up to 9 out of 10 Primary School children in Plymouth have never been to

the beach. That has to change. If we are to conserve anything at all about the marine environment then we need to absolutely go back to square one and start with education and making sure that children know that the beach and the sea is actually there."

The Beach Schools South West Team will go on to join other Rural Business Awards Regional winners for the National Finals at the impressive venue of Chateau Impney in Worcester in February. For more information on Beach Schools South West CIC visit: www.beachschoolsouthwest.co.uk and you can follow on social media at www.facebook.com/BeachSchoolsSouthWest or www.twitter.com/@beach_sw, www.instagram.com/BeachSchoolsSouthWest.

Introducing the Supergen ORE Hub.

In July 2018 the Engineering and Physical Sciences Research Council (EPSRC) awarded a 4-year grant to a consortium of 10 leading UK Universities for the new Supergen Offshore Renewable Energy (ORE) Hub. The hub will provide research leadership to connect academia, industry, policy and public stakeholders, inspire innovation and maximise societal value in offshore wind, wave and tidal energy.

Supergen ORE Hub

Launch Event - 22nd January 2019

The Supergen ORE Hub launch event will take place at the University of Plymouth on 22nd January 2019. The event will introduce the Hub, provide an update on current ORE research, hear from Industry regarding the latest developments and look at the future of ORE and the cutting edge ideas that will take us there.

The event will be free to attend, but places will need to be reserved. We will send another update soon with a link to our booking system to reserve your place and information regarding local accommodation and transport connections.

We look forward to welcoming you on the day.

Led by Prof. Deborah Greaves at the University of Plymouth, the Hub Partner Universities and Co-directors are shown below. "We've got a brand new team in place and we'll be introducing ourselves more fully in future ORE Hub newsletters, but so you can put names to the roles, we are Lee Richards (Hub Manager) Greg Brina (Comms and Engagement) and Barbara Fuller (Team Administration). If you have any queries about the Supergen ORE Hub you can contact us at supergenOREhub@plymouth.ac.uk or on (01752) 586102.



Sonardyne leads ocean autonomous systems collaboration project

Underwater positioning and communications technology company Sonardyne International Ltd. has initiated a collaborative project to drive a major step change in ocean system autonomy for long-endurance autonomous underwater vehicles (AUVs). The ambition of the Innovate UK-supported Precise Positioning for Persistent AUVs (P3AUV) project is to enable AUVs to operate at high levels of navigation performance with less surface support and for longer periods.

With partners L3 ASV and the National Oceanography Centre (NOC), Sonardyne will focus on longer-term navigational accuracy for AUVs in deep water, while reducing power requirements and increasing autonomy in marine operations. The P3AUV project will involve trials using Sonardyne's underwater positioning technology on the NOC's Autosub Long Range (ALR) and L3 ASV's C-Worker 7 autonomous surface vehicle (ASV). The project, which will include trials in Loch Ness next month, is due to run until late 2019.

The project will focus on three key areas. One will be increasing long-duration navigational accuracy by integrating low- and high-power Inertial Navigation System (INS) sensors. "The accuracy of low-power sensors degrades over time and AUVs consequently often have to surface to reinitialise with a GPS fix," said Geraint West, Global Business Manager - Oceanographic.

"However, by including high-performance, high-power navigation instruments, like our SPRINT INS, and integrating them with the low-power instruments to dramatically reduce power consumption, vehicle operators will get the best of both worlds, which will enable longer-duration independent deployments."

Second, we will improve positioning accuracy while underwater vehicles descend and ascend through the water column, through the integration of Doppler Velocity Log (DVL) current measurement capabilities and INS technologies with on board processing of data. "Our class-leading SPRINT-Nav instrument, which combines our SPRINT INS sensor, Syrinx DVL and a high-accuracy pressure sensor in a single housing, can measure water current as well as velocity relative to the seabed," said West. "SPRINT-Nav will be able to use the water current velocity to reduce the dead reckoning mid-water navigation error, important to improving accuracy during both the dive and surfacing phases of an operation."

The third area will be enabling ASV deployment of seafloor positioning transponders. "Autonomous low-cost deployment of seabed transponders by an ASV is attractive to the offshore energy industry for AUV operation, as well as a wide range of scenarios throughout the whole life of a field, including exploration," added West. "Combining all of these capabilities will bring about a step change in AUV operations, providing a disruptive capability in the subsea monitoring and inspection space."

"L3 ASV is excited by the promise of this technology, which provides autonomous systems with the capability to complete offshore work without the support of manned vessels," said James Cowles, Commercial Technical Sales Manager, L3 ASV. "This project is a continuation of L3 ASV's previous subsea positioning work, combining asset deployment and positioning."

Aidan Thorn, Innovation Centre business manager, said, "I am delighted that we continue to build on a successful partnership that was established around the Innovation UK Marine Autonomous Systems (MAS) round of funding in 2015, and continue to successfully bid for funding that enables novel deployment methods for MAS, which ultimately helps us to tackle the biggest scientific challenges. The strong and productive relationship between the NOC and our Innovation

Centre partners is a proven example of UK industry and the public sector working together to generate mutually beneficial returns.”

Latest Challenger Awards

We are delighted to announce that this round's Travel Awards have gone to Mathilde Bue, Daniel Montgomery and Matteo Marasco. In addition, Richard Sims has received the Stepping Stones Bursary. For more information, see www.challenger-society.org.uk. - **Sophie Wilmes**, *Student Travel Awards and Stepping Stones*

EU Copernicus-backed research highlights worrying decline in ocean health

Dramatic changes in the extent of sea ice at the poles, huge variations in the ocean circulation in the Atlantic, a sharp increase in carbon uptake are some of the more sobering findings detailed in a comprehensive new report published as a supplement of the Journal of Operational Oceanography (JOO), one of the Institute of Marine Engineering, Science and Technology's (IMarEST) peer-reviewed academic journals.

Issued as an annual JOO special supplement, the Copernicus Marine Service Ocean State Report charts physical changes taking places in the world's ocean over several decades. With particular focus on the more pronounced variations recorded in 2016, the second edition arrives in the wake of a number of record-breaking extreme weather events across Europe. The Copernicus Marine Service has also published a summary of the report designed to boost ocean literacy amongst the general public and decision-makers.

The interaction between oceans and the atmosphere plays a key role in the Earth's climate system, so a deeper understanding of these dynamics is critical to developing an effective response to global climate change. More than 100 scientific experts from more than 30 European research centres contributed to the work, drawing on empirical data gathered from satellite and *in-situ* measurements as well as numerical models as part of the European Union's Copernicus Earth Observation programme. Mercator Ocean International, a centre for ocean analysis and forecasting, is the entrusted entity selected by the European Union to implement the Copernicus Marine Service. By analysing this unique corpus of data, researchers seek to interpret and describe the natural

variations in the ocean as well as changes in line with climate change.

The finished 150-page report is intended as a reference document on ocean health and ocean climate for stakeholders across the marine scientific, business and policy communities. It will assist national and regional authorities to prepare more effective strategies to deal with challenges such as sea-level rise. It will help businesses in the Blue Economy to better understand and anticipate changes in the environment in which they operate and work. The findings will also inform and stimulate further research in scientific circles.

The second edition draws attention to the rising heat content of the global ocean and the European regional seas. Corroborating previous studies, the new research indicates that the volume of sea-ice in the Arctic is declining by an estimated 15.4% per decade. It reveals a drop in the extent and volume of Antarctic sea-ice in late 2016, unprecedented in the history of satellite observation of the region. This startled scientists as it had previously been slowly but steadily growing. The authors suggest that the cause could be due to a complex interplay of variations in ocean hydrography and air-sea-interfaces.

The report goes on to chronicle the large variations in the Atlantic Meridional Overturning Circulation (AMOC), a sweeping ocean conveyor system that circulates water throughout the Atlantic. These powerful currents fuel the Gulf Stream, warm cities in continental Europe and North America, affect sea-levels and bring nutrients up from ocean depths that help sustain marine ecosystems and fisheries. The strength of the AMOC weakened since 2005, which is driven by long-term variability rather than an ongoing trend. The Gulf Stream has decelerated over the past 25 years.

The document also reports a sharp uptake in the amount of CO₂ absorbed from the atmosphere and stored by the ocean since the beginning of the 2000s. Whilst this carbon sink function performed by phytoplankton is seemingly helpful in mitigating anthropogenic CO₂, there is a price to pay in the form of ocean acidification. Often referred to as climate change's 'Evil Twin', ocean acidification will have a devastating impact on biodiversity, and knock-on effects on fisheries and aquaculture, threatening food security for millions

of people worldwide.

IMarEST chief executive David Loosley commented: "While we often think of oceans as conduits for global trade, they play an intrinsically more important role in weather systems and climate that ultimately sustain life on Earth. In addition to long-term, state-of-the-art monitoring and cross-disciplinary research, devising better management approaches calls for sustained and objective science-based reporting on which to base policy decisions. IMarEST is proud to contribute to these efforts through the publication of the Copernicus Marine Service Ocean State Report."

Published periodically, the Journal of Operational Oceanography disseminates the latest research into a range of maritime environmental issues as explored through the lens of ocean science. To learn more and subscribe, visit: www.tandfonline.com/tjoo.

VIEWS

Publication of the European Marine Board (EMB) Future Science Brief No. 4 "Enhancing Europe's capability in marine ecosystem modelling"

This assesses the use of marine ecosystem models for environmental management and recommends ways to strengthen the existing capability for current and future policy and wider societal needs. The publication and a short fact sheet can be downloaded from the website, www.marineboard.eu/publications/enhancing-europes-capability-marine-ecosystem-modelling-societal-benefit.

EMB would like to thank the EMB WG Modelling Chairs and co-authors, contributors and reviewers. This publication also builds on an EMB expert workshop in Plymouth, U.K. on 7 July 2018 organized in collaboration with the Advances in Marine Ecosystem Modelling Research (AMEMR) 2017 Conference.

We would be grateful if you could disseminate the Future Science Brief and Factsheet widely within your networks and promote the publication on your websites / twitter feeds, or interact with the EMB Twitter account (@EMarineBoard).

www.challenger-society.org

You can subscribe to the EMB Newsletter, marineboard.eu/emb-newsletter, for regular updates of EMB and wider activities. Don't hesitate to contact the EMB Secretariat at info@marineboard.eu with any questions, to request hard copies or to notify us of potential dissemination opportunities. - **Kate Larkin, on behalf of the EMB Secretariat**

An Offshore Renewable Energy, Environmental Research and Innovation Strategy for the UK

The Marine Alliance for Science and Technology for Scotland (MASTS) Renewable Energy Forum are pleased to announce the publication of "An Offshore Renewable Energy Environmental Research & Innovation Strategy for the UK". The principal aim of developing this environmental R&I strategy for UK ORE, is to set out the high level environmental R&I priorities for the next five to ten years, together with measures for coordinating activity across the various funding organisations and key stakeholder interests, to ensure that the general direction of travel is towards developing a sustainable ORE industry. Read the report here - [An Offshore Renewable Energy Environmental Research & Innovation Strategy for the UK](#). This work has been coordinated by the MASTS and received funding from MASTS, SNH & NERC

Special Edition European User Conference on Argos Wildlife

On November 21st and 22nd, a group of biologists and Argos tag manufacturers from many countries gathered in Toulouse, France, to share their work using the Argos system at the European Users



Conference on Argos Wildlife (EUCAW). The latest ArgosForum, is pleased to feature the noteworthy projects of the scientists attending this conference. "We salute the work of these determined and brilliant teams and the organizations they represent. We were very proud to host this group of scientists and manufacturers, hailing from Europe, Australia,

New Zealand, South Africa, Canada and the

United States, illustrating the great spirit of international collaboration that the Argos system embodies." For more about the conference and current Argos users download and read the ArgosForum #85, www.argos-system.org/argos-forum-85/

Institute of Aquaculture Students' Association Careers Fair for Postgraduate Students

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 on the 20th May 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.

OTGA Training Course: Discovery and Use of Operational Ocean Data Products and Services.

The period for applications for the IODE Training Course on Discovery and Use of Operational Ocean Data Products and Services is open between 13th December 2018 until 15th January 2019. All information, including a course flyer, can be found following the link <https://www.oceanexpert.net/event/2138>.

This course will provide knowledge and hands-on experience for data, satellites and instrumentation, access and formats, tools and software for operational activities. A pre-course phase of the training will provide an essential overview of data, products and tools used to monitor the ocean and will focus on preparation for the classroom phase where students will work on a short project to learn more about the data and its applications.

Priority will be given to participants originating from Europe and North African countries. UNESCO is committed to promote gender

equality. Therefore, applications from women are strongly encouraged. A Certificate of Participation will be issued to all successful students.

The UNESCO/IOC Project Office for IODE is certified as a Learning Services Provider (ISO 29990:2010). The OceanTeacher Global Academy is a Project of IOC/IODE supported by the Flanders-UNESCO Trust Fund (FUST) of the Government of Flanders, Belgium.

Please fill in the online application form on <https://otga.wufoo.com/forms/s1r08pg8143tlzz/> or <https://bit.ly/2zU1ggY> no later than **15 January 2019**. Do not leave for the last minute since the system will close automatically. In case you have any questions please contact the organisers well in advance: given time differences and the holiday period you may not get a reply to your questions immediately. No tuition fee applies. Both full- and co-sponsoring are available for a limited number of participants. For detailed information on how to apply check the OceanTeacher Global Academy website <http://bit.ly/2ACZY9r>.

In case of questions please contact the OTGA Secretariat on training@iode.org always indicating as subject 'OTGA Training Course: Discovery & Use of Operational Ocean Data Products & Services, 11 – 15 March 2019, Oostende, Belgium'. - Claudia Delgado, Training Coordinator, c.delgado@unesco.org.

SALTS

No news from sea this month I'm afraid

I know that this is a favourite section for many readers, where we get the inside information about life at sea, its thrills and spills. So please the next time you are at sea or carrying out any fieldwork, please remember that a simple paragraph or two will get you published here. –

Ed

CALENDAR

28th January-1st February 2019: Time series analysis and related aspects in environmental

research: Join the training school and conference.

Tromsø, Norway

It is our pleasure to announce the third training school and conference on "*Environmental Time series analysis*". Please have a look at the web page for more information and registration: https://www.actris.eu/Events/Eventsdescriptions/T_S3_2019.aspx.



The concept of this event is to gather scientists from a large range of disciplines in Earth Sciences based on regular and constant in-situ measurements, and provide a discussion forum in the field of time series analysis and forecasting. There will be a 2½ day training school for students, followed by the conference. The program will be based on three different topics based on climate change:

- Atmospheric compositional change
- Ocean and marine environment, including connections with land and atmosphere
- Mathematical tools to understand climate change

Based on in-situ and remote data analysis and modelling, the conference will gather senior and young researchers (post-doctoral, doctoral and master students) to share their experience in time series interpretation across several scientific fields. The deadline for abstract submission is 31st December 2018.

You can find a link to the first conferences here (http://wwz.ifremer.fr/rd_technologiques/Projets/Time-series-analysis/Conference-2012) and to the second conference here (<http://www.fico3.eu/events/time-series-analysis-in-environmental-science-and-applications-to-climate-change>). We hope this will be of interest for many in the community.

On behalf of the coordination group, Benedicte Ferré (University of Tromsø), Cathrine Lund Myhre (NILU), Paolo Laj (UHEL/CNRS), and Ingrid Puillat (IFREMER).

21st-22nd February 2019: World Ocean Circulation User Consultation Meeting

Frascati, Italy

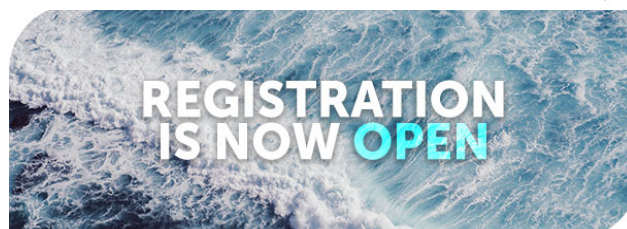
Your attention is drawn to the forthcoming World Ocean Circulation User Consultation Meeting that will be held by the European Space Agency (ESA) -ESRIN. This event has been organized to prepare a roadmap for new initiatives on ocean circulation research and applications to be implemented in the ESA Earth Observation Science for society program element. If you are interested to contribute, you can find all details at: <http://woc2019.esa.int>. Please also forward this message to all colleagues potentially interested to the subject.

25th-27th February 2019: Oi Americas 2019

San Diego, California, USA

Oioceanology
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25TH-27TH
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The newly rebranded Oi Americas is returning to San Diego after a successful first event. Come and celebrate 50 years of delivering world leading ocean technology and marine science events. Now with brand new features for 2019.

Here are five reasons to attend Oi Americas in 2019:

1. Discover the latest technologies and innovations from 200 exhibiting companies displaying state of the art marine technologies and take the opportunity to explore a diverse range of solutions.
2. Experience live demos and hands on technology from global suppliers under one roof.
3. Collaborate and learn at our conferences: Technical Tracks, Ocean Futures Forum and

Catch The Next Wave - www.oceanologyinternationalamericas.com/Conference.

4. Connect with your industry colleagues at one of our many OceanSocial events and through our digital tools
5. Discover future and disruptive technologies in our Future Tech Hub and Ocean ICT set to change the way ocean technology and marine science industries operate.



The ocean has always been a subject of wonder and mystery. Even after years of research, we still know little about the watery abode that covers more than 70% of our planet. However, thanks to some of the latest technologies and innovations in the marine industry, we're able to explore the ocean like never before. In our latest blog post, <http://inside.oceanologyinternational.com/2018/10/10/innovations-in-the-marine-industry/>, we're outlining some of the newest technologies that are part of that change.

Oceanology International Americas invites small organisations with less than 10 employees AND with a new product or innovation (launched since the first San Diego event in Feb 2017 or pending an upcoming launch) to exhibit in our Future Tech Hub at OiA19. If you are part of a small company, this could be the perfect opportunity for you to showcase products and technologies to be seen by the Marine Technology community.

You'll get:

- A centrally located booth
- Pre-show promotion with a special digital registration
- Two 20-minute presentation opportunities

View Future Tech Hub at: <http://www.oceanologyinternationalamericas.com/en/Exhibiting/Interested-in-Exhibiting-/Stand-build-options-/Future-Tech-Hub/>.

Don't miss this opportunity to create value for you and your business. For more information, visit: www.oceanologyinternationalamericas.com

7th to 12th April 2019: 2019 EGU general assembly

Vienna, Austria

The conveners kindly invite you to submit your abstract to the following session: OS4.9, "Recent advances in physics and biogeochemistry from gliders and other autonomous underwater vehicles", <https://meetingorganizer.copernicus.org/EGU2019/session/30236>. This session provides an open forum for interdisciplinary discussions of the latest advances in oceanographic applications of autonomous underwater vehicles, including their use and complementarity in combination with other platforms. We welcome contributions on all aspects of the scientific analysis of data collected with such platforms on the coastal, regional, basin, or global scales.

Topics for this session include physical (e.g. hydrology, hydrodynamics, acoustic, optic), geochemical (e.g. nutrients) and biological (e.g. primary and secondary production, biomasses) variability of the ocean, ocean processes at different spatial and temporal scales (from ocean turbulence to basin-wide circulation), and interactions between the ocean, atmosphere and land. We also invite contributions on AUV data management and on their operational use (e.g. in Operational forecasting systems) and on the development/implementation of new instrumentation and sensors.

Following its success last year, we propose again the PICO formula that is highly suitable for the session topic. Looking forward to seeing you in Vienna, the conveners, Antonio Olita, Bàrbara Barceló-Llull, Louise Biddle, Federica Pessini and Simón Ruiz.

The conveners encourage you to submit an abstract to the following session on the "The realm of (sub)mesoscale dynamics: variability, impact, and new challenges". It is listed in the programme group Ocean Sciences (OS) as OS4.5/NP6.9: <https://meetingorganizer.copernicus.org/EGU2019/session/30232>.

Mesoscale and submesoscale structures such as fronts, meanders, eddies, and filaments are found worldwide, from the global ocean to marginal seas. During recent years it has been shown that these features play a key role in the advection of heat, salt, biogeochemical properties, and in the enhancement of biological activity across all trophic levels. Due to their typical spatial and

temporal scales, direct observations of these features remain currently an open challenge and their study requires a joint multi-platform effort combining in situ and remote sensing observations with theory and numerical models.

This session will provide a forum to properly address the new scientific advances associated with:

- Variability of (sub)mesoscale structures through observations (in situ and remote sensing), theory, and numerical simulations.
- 3D dynamics related to (sub)mesoscale features.
- Temporal and spatial interactions between different structures.
- Impact on mixing and transport of hydrographic properties.
- Physical and biogeochemical interactions.
- Limitations and improvements of the observational platforms and numerical simulations.
- A particular emphasis is put on challenges associated with the observation and numerical representation of subsurface (sub)mesoscale eddies.

We are looking forward to meeting you in Vienna, the conveners, Bàrbara Barceló-Llull (IMEDEA (UIB-CSIC)), Angel Amores (IMEDEA (UIB-CSIC)) and Bruno Buongiorno Nardelli (CNR).

The conveners invite you to submit an abstract to the session 'Copernicus Marine Environment Monitoring Service (CMEMS)' (session OS4.11). This CMEMS session will focus on:

- research activities that are required to maintain CMEMS systems at the state of the art and prepare their long-term evolution, including (but not limited to):
 - for models: physical and biogeochemical modeling, coupling with coastal systems; coupling with sea-ice, atmosphere & waves; data assimilation both for physics (ocean, sea-ice, wave) and biogeochemistry; progress in short-term forecasts and assessment of forecasting skills.
 - for observations: impact of existing and future in situ and satellite observations for estimates of the ocean state; processing and analysis of remote and in-situ observations of the ocean; use of Sentinel products.
 - for long-term evolutions: seasonal to

multidecadal regional projections for the coastal ocean and marine ecosystems, ocean model forcing from river discharge of freshwater and nutrients.

- verification, validation and uncertainty estimates of CMEMS products, forecasting skills,
- ocean monitoring and long-term assessment of the ocean physical and biogeochemical states,
- the use of CMEMS products for downstream applications.

Please note that presentations are not to be limited to research teams directly involved in CMEMS and participation from external teams is also strongly encouraged. Please feel free to contact us for more information, and to forward this email to interested colleagues, the conveners: Angélique Melet (Mercator Ocean, France, angelique.melet@mercator-ocean.fr), Stefano Ciavatta (PML, UK, s.ciavatta@pml.ac.uk), Emanuela Clementi (CMCC, Italy, emanuela.clementi@cmcc.it), Ananda Pascual (IMEDEA, Spain, ananda.pascual@imedea.uib-csic.es).

The deadline for abstract submission is 10th January 2019, 13:00 CET. Detailed information on how to submit an abstract can be found at https://egu2019.eu/abstracts_and_programme/how_to_submit_an_abstract.html. If you would like to apply for a Roland Schlich travel grant to attend the meeting, please submit your abstract no later than 1st December 2018, https://egu2019.eu/about_and_support/roland_schlich_travel_support.html. If you enjoyed a session this year at EGU, why not propose something similar for next year and perhaps offer to convene it. If you thought something was missing this year, why not propose it. If your session was successful, please propose it again. Note that no sessions are carried over now. You can do this at: <https://meetingorganizer.copernicus.org/EGU2019/provisionalprogramme>. Please use this opportunity to suggest sessions with conveners and descriptions.

9th to 11th April 2019: Ocean Business 2019 Southampton, UK

As one of the most unmissable events in the ocean technology calendar, exhibit space at Ocean Business is already over 80% sold. With still 5 months until the show is due to take place

at the National Oceanography Centre. The organisers have been overwhelmed by how quickly re-bookings have been flooding in; "Never before have we had such an incredible response to re-booking exhibition space. Exhibitors see Ocean Business as the perfect platform to seek out new opportunities for a relatively low cost. Such a rapid and positive response has been astounding!" exclaimed Cheri Arvonio, event manager.



Conference focused on the technology, operations and business issues in the global field of offshore surveying

9 - 10 April 2019 Southampton UK

The 2019 event will see the same winning formula as in previous years with an international exhibition, three-day programme of hands-on training and demonstration sessions, a cutting edge conference, various associated meetings, Ocean Careers and an amazing line of up social events keeping exhibitors and visitors networking around the clock.

The organisers have opened up the last few remaining stands to new companies wishing to exhibit. Interested parties are encouraged to be quick as every show to date has been a sell out and for a number of years there has been a long waiting list. Space won't be available for long. For further information on exhibiting at Ocean Business, visit www.oceanbusiness.com/exhibition/why-exhibit/.

Ocean Business dinner tickets are now on sale, but be quick as they are expected to sell out fast. The famous Ocean Business dinner has returned, but this time at the luxury Southampton Harbour Hotel. Located in Ocean Village, Southampton, it features a stunning contemporary design. Guests can catch up with friends old and new whilst taking in the views across the marina. The evening will take place on Wednesday 10th April and will start with pre-dinner drinks, followed by a three course meal, promising a night to remember. Tickets are £85 +VAT per person, to purchase your ticket, email Apinya Wright awright@divcom.co.uk.

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**.

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.

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

www.challenger-society.org

December 2018

docs.google.com/forms/d/e/1FAIpQLSeEksxZdaYLtQc0Em9NMCsUaBWY6NEfZkY2ISu55i9Ckkacua/viewform.



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

The deadline has been extended for abstract submission for Future Oceans2, The 2nd IMBeR Open Science Conference. DEADLINE is now 15 JANUARY 2019.



We welcome abstracts for oral and poster presentations. Abstracts should be submitted for specific sessions or workshops, and so it is advised to consult the session and workshop details prior to submission. Please submit abstracts through the abstract submission portal <http://www.imber.info/en/events/osc--imber-open-science-conference/osc-2019/2019-imber-open-science-conference/abstract-submission>.

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

Montreal, Canada

This is to inform you that until February 18th 2019 it is possible to submit your abstract to the IAPSO Symposium P02. 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).

1st – 5th October 2019: 42nd CIESM Congress

Salzburg, Austria



Invites participants of The International Society for Ecological Modelling Global Conference 2019 to organise symposiums at the conference. Possible symposium topics, which include marine ecology and fisheries, are listed on our website, www.elsevier.com/events/conferences/international-society-for-ecological-modelling-global-conference, and we also welcome other topic suggestions. To submit your symposium proposal please click www.elsevier.com/events/conferences/international-society-for-ecological-modelling-global-conference/about/symposiums and submit before the 22nd February 2019.

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

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 as soon as 15th January. 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. Besides, by registering before 15 February you will enjoy a significant 40% reduction in your fee. 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**

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 28th December.

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>



Integrated Marine Biosphere Research

Jobs and opportunities

- Fully funded studentships for Masters in Water and Coastal Management (WACOMA). Apply by 15 Jan. Study at: University of Bologna (Italy); University of Algarve (Portugal) or University of Cadiz (Spain)
- Research Associate: Climate change adaptation and sustainability, Ludwig Maximilians University, Munich, Germany. Apply by 9 Jan
- MSC: Benthic biodiversity patterns, Falkland Islands. Apply by 6 Jan
- Raman Postdoc Fellowships, Indian Institute of Science, Bangalore, India. See <https://iisc.ac.in/post-docs/>
- Assistant Prof: Large-scale ocean dynamics and climate, University of Toronto, Canada. Apply by 31 Jan
- Junior (tenure track) or Senior Scientist: Marine Chemical Oceanography, Royal NIOZ, The Netherlands. Apply by 28 Jan
- Junior (tenure track) or Senior Scientist: Physical Oceanography, Royal NIOZ, The Netherlands. Apply by 21 Jan
- Open call for POGO shipboard fellowship offered to students, postdocs and early career researchers working in developing countries
- Two postdocs on ocean sustainability science, University California Santa Barbara, USA. Apply by 21 Dec
- MSc and PhD positions, Ocean Frontier Institute, Halifax, Canada. Apply by 31 Jan
- PhD: Vulnerability of life stages of calcifiers to changing ocean chemistry. Trinity College Dublin, Ireland. Apply by 11 Jan
- PhD Research Assistantship, University of Vermont, USA. Review of applications starts 18 Jan
- EURASTIP exchange programme: Aquaculture education, industry and research. Apply by 27 Jan
- JPI Oceans Call for joint research proposals on microplastics in the oceans. Proposals by 28 Feb
- Two Phds: Coral Climatology, ZMT, Germany. Apply by 31 Jan

Visit the IMBeR Website

imber@imr.no