

9:00 Doors Open

9:20 Welcome to the 64th Marine Measurement Forum

9:30 Round 1: Ocean Science

Nathan Lawrence (ANB Sensors) 09:30

Novel Self-Calibrating pH Sensors for Oceanographic Monitoring

As documented by the IPCC, since 1970, the oceans have absorbed more than 90% of the extra heat that's come about through global warming. This has resulted in warmer, less salty and more acidic waters. The growing acidification of the seas poses threats to coral and fisheries and the possibility that warming might melt permafrost, releasing huge amounts of CO₂ gas. It is evident there is a need for in situ pH measurements to provide a high spatial and temporal resolution of the world's oceans.

With the help of Innovate UK and Horizon 2020 funding, ANB Sensors have translated their ground-breaking sensing technology into a cutting-edge system suitable for oceanographic monitoring. They will introduce this technology, highlighting the fundamental chemical principal behind the solid-state transducer, illustrating how they achieve calibration free sensing. This will be demonstrated through the plethora of results obtained across many sensor interfaces in a variety of waters.

Samuel Stanton (NatureMetrics) 09:45

eDNA: Present & Future Methods of Biodiversity Analysis

NatureMetrics is playing a leading role in the development of the standards and best-practice guidance for the use of eDNA in the regulatory and compliance markets, working in collaboration with academic researchers, policy makers and industry collaborators. The sampling technology is so simple it can be put in the hands of anyone, to deliver robust and comprehensive biodiversity data. eDNA regularly identifies many more species in an area versus traditional techniques. As these techniques become increasingly mainstream in marine assessment, Dr Samuel Stanton will introduce eDNA as an assessment tool, considering the advantages offered over conventional techniques, before focusing on the Blyth Windfarm eDNA trial. This joint NatureMetrics/Natural Power/EDF/OWGP project has received its first round of data comparing eDNA to conventional trawling with some interesting initial findings. In conclusion, Sam will consider what the future is for eDNA and how this might fit into the digital world or autonomous sampling solutions.

Phoebe Chadwick (RS Aqua) 10:00

Cross-Sector International Collaboration for HAB Management

Harmful algal blooms (HABs) can have devastating impacts on marine site salmon farms and are an increasingly frequent problem. While it is hard to quantify how severe a HAB might be at a certain time, the risk of mortality events occurring on farms is incredibly high. Despite this, there is no off the shelf solution to warn farms of incoming HABs. Supported by an Innovate UK grant, RS Aqua and Canadian partner Innovasea have been developing a HAB early warning system. The system will notify fish farmers of potential HABs before they arrive, enabling them to initiate preventative measures ahead of time to protect stocks.

Steven Rice (University of Plymouth) 10:15

Driving Marine Measurement Innovation and Delivering the Future Workforce through Cross-Sector Partnership

Effective partnerships between world leading marine research institutions, cross sector industries, national centres for innovation and with domestic and international defence forces, has led to the shaping of a compelling joint capability in remote and autonomous marine measurement and sensing that serves to not only grow the UK's role in the global market but also ensuring the knowledge and skills produced by universities and colleges maintains the UK's position in producing leading talent to the future workforce.

This talk outlines the region's significant partnerships and recent developments driving the unique natural and digital capital of initiatives such as Smart Sound Plymouth, how a partnership with the Royal Navy is allowing academics and students to unlock new sensing capabilities whilst upskilling defence and industry and finally how this all lays the foundation for a significant global hub for development and export of these new technological and operational solutions.

10:30 Ocean Science Panel Q&A

10:45 Break

11:10 Round 2: The Seabed

Richard Dowdeswell (GeoAcoustics) 11:10

Artificial Intelligence for Processing Sonar Data

GeoAcoustics Ltd have been working with the University of East Anglia (UEA) for the last three years on the development of Artificial Intelligence based techniques to processing sonar data.

Extracting the seabed from raw bathymetric data is a relatively easy task pattern recognition task for the human brain but is a challenging problem to automate. This presentation will discuss the steps that GeoAcoustics took to engage with the researchers in the computer science department at UEA in an approach that de-risked the project significantly.

Geraint West (Sonardyne) 11:25

Positioning for Heritage Wreck Surveys

Sonardyne has a long history of providing positioning systems for heritage wreck surveys, ranging from first surveys of the Mary Rose in 1975 to the discovery of the Endurance earlier this year. The demands of these surveys have varied widely according to wreck location and means of survey employed.

The talk will present an overview of highlights over the years but will focus on work during 2021 with MSDS Marine, who have used Sonardyne Ultra Short Base Line technology on a number of heritage wrecks, including the London, which sank off Southend on Sea in 1665.

Robert Hines (Inosys) 11:40

Monitoring of Offshore Carbon Capture Storage Sites

The use of the UK maritime assets for storage of captured CO₂ is an industry set to benefit from huge investment over the next decade. Rapid expansion will take place with 2 UK storage sites becoming operational in the next 5 years and many more in development throughout the UK, EU and rest of the world. For effective monitoring there is a strong driver for a multiple discipline approach to ensure the integrity of storage complexes.

The requirement for escaped CO₂ detection needs layered sensor coverage from water column through to the containment formation. This data then needs careful handling and contextual integration to ensure that high levels of confidence can be ascribed to the results. This talk will examine the requirements for monitoring options, examining the findings of UK research projects. From this it is possible to explore what options there are for store operators and how suppliers can best tailor their product catalogue to provide compliant products and services.

11:55 The Seabed Panel Q&A

12:10 Steering Committee Update

12:20 Lunch

13:40 Round 3: Large-Scale Projects

Jamie McMichael-Phillips (Seabed2030) 13:40

The Nippon Foundation / Gebco Seabed 2030 Project: Collaboratively Delivering the Definitive Global Map of the Ocean Floor

Seabed 2030 is a collaborative project between the Nippon Foundation of Japan and the General Bathymetric Chart of the Oceans (GEBCO) that aims to bring together all available bathymetric data to produce the definitive global map of the ocean floor by 2030, and make it freely available to all.

Project Director, Jamie McMichael-Phillips, will introduce Seabed 2030, explain why bathymetry matters to human society, highlight our achievements to date and discuss how technological innovation will play a crucial role in our efforts to fill the gaps in datasets by the end of the UN Ocean Decade - everyone can make a difference.

Philip Bishop (National Oceanography Centre) 14:00

Bora Blue Ocean Research Alliance™: Partnering World-Class Research with Global Industry Firepower

BORA Blue Ocean Research Alliance™ is a unique partnership between the UK's leading marine institute, the National Oceanography Centre (NOC) and global offshore service provider, Subsea 7. BORA brings science and industry together to accelerate research, promote international collaboration and drive technology innovations in ocean sciences. In this talk we will explore how BORA is giving researchers access to industry's global footprint, infrastructure and firepower like never before, and how Subsea 7 and other partners are engaging with international efforts to improve society's knowledge of the global oceans. We will introduce some of our current BORA projects, our plans for the future and explore what this means for the future of industry and research collaboration.

Dr. Charlotte Braungardt & Adrian Ragbourn (Seas Your Future) 14:15
Ocean Science for Sustainable Development on a Tall Ship

The charity Seas Your Future provides opportunities for personal and professional development of young people and contributes data to ocean research. We achieve this through sail training, citizen science activities, volunteering and internships, ocean education programmes and scientific data collection aboard our tall ships Pelican of London and Fridtjof Nansen.

With case studies that highlight the benefits of integrating maritime science and technology and sustainability education into the personal growth environment of a traditionally-rigged ship, we will chart the path of our charity to the ambition to make every mile at sea count in the UN Decade of Ocean Science for Sustainable Development: culturally, economically, socially and environmentally.

In this context, we are seeking collaborations with the view to expand our data collection capabilities with a range of sensors and instruments that contribute valid data to ocean and climate research institutions. Through this we will support refined climate change modelling, sustainable development, marine conservation and also diversify the career pathways we introduce to our sail trainees.

14:30 Large-Scale Projects Panel Q&A

14:45 Break

15:10 Round 4: Optimising Science & Exploration

Claire Cardy (Nortek) 15:10
The Complexities of Collecting Metocean Data from Surface Buoys

Reliable metocean data can be challenging to obtain at times. In some instances, the infrastructure around the deployment mechanism (e.g., buoys and frames) can interfere with the performance of Acoustic Doppler Current Profilers (ADCPs).

We present examples of metocean data that have been collected through a variety of ADCP deployments, and explain how this data indicates when a deployment issue has occurred. We demonstrate how simple adjustments or checks can be made to optimise your metocean data collection, thereby ensuring successful deployments first time.

In particular, we provide useful tips and insights on using acoustic technology underwater, and explain what is and isn't possible to correct in your metocean data during the post-processing stage.

Elizabeth Paull (Chelsea Technologies) 15:25
Measuring Primary Productivity: from Ocean Deserts to Algal Blooms

Marine primary producers or phytoplankton form the base of the marine food chain and represent approximately half of the photosynthesis and carbon fixed on the planet. Therefore, almost all life on Earth relies directly or indirectly on primary productivity (PhytoPP) and is why the Global Ocean Observing System (GOOS) has classified PhytoPP as an essential ocean variable. Most of the current methods used to measure PhytoPP directly (including ¹⁴C fixation and oxygen evolution) are laboratory-based and require extremely long incubation times and therefore can only be

applied on spatial scales that fall well short of those required. The end result is extreme undersampling of the oceanic environment for PhytoPP.

Over the last ten years, Chelsea Technologies has worked closely with world-leading researchers to develop highly sensitive benchtop and deployable systems that can be used to improve our understanding of the global carbon cycle and aquatic ecosystem function. Single turnover active fluorometry (STAF) technology enables scientists to collect a full range of PhytoPP parameters in 15-20 mins, compared to 8+ hours of incubation with the 14C method. A new deployable STAF instrument has the potential to generate data on spatial scales from a few metres up to oceanic basin scales and has recently been trialled on AUVs. The introduction of these new instruments has the potential to revolutionise primary productivity measurement and our understanding of oceanic ecosystems.

Thomas Dhoop (Channel Coastal Observatory) 15:40

Contributions of Cross-Sector Collaborations to the Southeast Regional Coastal Monitoring Programme

Over the past 20 years, the Southeast Regional Coastal Monitoring Programme (SE RCMP) has collected, and made publicly available, a wide array of marine measurements, principally in support of the Environment Agency's Flood and Coastal Erosion Risk Management (FCERM) Strategy. A key service provided by the SE RCMP is the real-time provision of wave, tide and met measurements by a network of 12 wave buoys, 8 tide gauges, and 9 met stations. As such, we offer a platform for ocean technology companies to test new measuring devices against an established network of industry-standard instrumentation. Examples of successful partnering come from collaborations with Datawell, RS Aqua, Oceanwise, and Valeport.

Another key service is the provision of swath bathymetry. The baseline is the result of a long-standing partnership with the Marine Coastguard Agency (MCA) and UK Hydrographic Office (UKHO), which allows many surveys to take place as extensions of the MCA's Civil Hydrography Programme (CHP), while the UK Hydrographic Office (UKHO) provides rigorous quality assurance of the data. This talk will illustrate the mutual benefits that cross-sector collaboration can provide using case studies derived from our hydrodynamic network and bathymetry service.

15:55 Optimising Science & Exploration Panel Q&A

16:10 End of Programme

