

### Kongsberg Discovery

# Be inspired. Share your views. Network with industry colleagues.

Conference Brochure & Event Program



# FEMME 2023 | Edinburgh Contents

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# FEMME 2023 | Edinburgh Foreword

#### Dear FEMME participant,

Today our planet faces the interconnected crises of rapid climate change and biodiversity loss. Climate change is altering weather patterns and ocean currents around the world, the resulting events between droughts and flash flooding increases the risk to sustainability of food supplies. Activities such as oil, gas, and mineral exploration and extraction are moving farther offshore, continuing the need for new pipeline and seabed production infrastructure in the ocean domain. Communication, power transmission cables and offshore wind turbines are further examples of seabed infrastructure that will also increase in importance and require their place and space in the oceans, as we move towards more renewable energy resources.

This increased activity comes with expected economic benefits, but also with unknown effects for the vulnerable marine life. We cannot protect ourselves, develop economically important resources, nor protect sensitive marine habitats without the knowledge of what is out there and how this is impacted by the expansion of human activity. A better understanding through mapping and research is crucial to ensure long-term sustainable coexistence, allowing society to reach our environmental targets as well as securing a sustainable ecosystem.

Science shows a clear path we must take to prevent irreversible damage to the lands and waters. The awareness concerning these changes has increased among the public, however, there is still a great need for data and scientific knowledge. The Seabed 2030 initiative has put the understanding of the world's oceans on the agenda and with approximately 25% mapped that leaves 75% remaining to be fully surveyed.

We need to understand the environmental impact that different activities may have on both local and global ecosystems.

Seabed- and Ocean space data are vital tools to ensuring that we have the necessary information, products, and services to prepare for, and prosper in an ever-changing environment. Such data ensures that ships can safely manoeuvre around natural – and human-made – structures and ensure coexistence.

Kongsberg Discovery has technology that provides necessary insight and key data about life in the oceans and the conditions for the ecosystem. It is key for us to continuously develop our technology to ensure that we are part of securing the oceans for future generations. To succeed, we need to collaborate with our partners, clients, and customers. This will ensure we stay at the forefront of technology, bringing market leading products and solutions to the market.

During this week at FEMME, I look forward to getting to know more about the latest trends and emerging technologies, to understand more about your applications and innovative strategies within the hydrographic field. FEMME is the perfect arena for networking as well as being a hub for collaboration, discussion and learning from each other. The world is facing a truly daunting set of challenges. Only by working together can we solve them.

As the notable and Scottish scientist, engineer and inventor Alexander Graham Bell said, "Great discoveries and improvements invariably involve the cooperation of many minds."

# Welcome to FEMME in Edinburgh and I wish you the best for your stay here.



Kind regards,

Martin Wien Fjell, President Kongsberg Discovery

# FEMME 2023 | Edinburgh Donation to IHO's CB Programme

At previous FEMMEs it has been a tradition to provide paper holders a small token of appreciation for their efforts presenting to participants knowledge and insight for work and research done using Kongsberg Discovery EM Multibeam Echo Sounders.

For the 17th FEMME Kongsberg Discovery has decided to go for a different route, with the desired end state to assist emerging countries within the field

of hydrography. Kongsberg Discovery has therefore decided make a donation to IHO's Capacity Building Programme, more specifically to the Southern African and Islands Hydrographic Commission (SAIHC) region. This will be achieved by combining the normal cost for all paper holder's gifts, then adding on top a sum to make it a good donation to this important IHO programme.

| International<br>Hydrographic<br>Crganization  | IHO Vgranication<br>Hydrographiquo<br>Internationale   |  |  |  |
|--|--|--|--|--|
| <b>Mr. Martin Wien Fjell</b><br>President<br>Kongsberg Discovery AS  |  |  |  |  |
| IHO File No. S3/0127   | 19 September 2023  |  |  |  |
| Subject: Kongsberg support<br>Islands Hydrographic   | to Capacity Building in Southern African and Commission (SAIHC) region.  |  |  |  |
| Dear Mr. Martin Wien Fjell,  |  |  |  |  |
| With reference to the inte<br>earmarked for Capacity Building<br>expresses its appreciation for the<br>can be directed to the entire IHO   | ention of Kongsberg Discovery's to donate a sum<br>g (CB) in the SAIHC region, the IHO Secretariat<br>generous contribution, and hopes that such initiatives<br>Capacity Building Programme in the future. |  |  |  |
| Indeed, with regard to the IHO's Capacity Building programme, it is the process<br>by which the IHO assesses and assists in sustainable development of the Member<br>States and other States, to meet the objectives of the IHO and the obligations related<br>to SOLAS Chapter V, UNCLOS and other international instruments. |  |  |  |  |
| Capacity Building is a s<br>Hydrographic Commissions (RH<br>programme to increase the hydro  | trategic objective of the IHO, and the Regional<br>IC) such as SAIHC benefit from the IHO's CB<br>graphic capacities of their members.   |  |  |  |
|  |  |  |  |  |
|  | Yours sincerely,   |  |  |  |
| On beha  | alt of the Secretary-General   |  |  |  |
| the say  |  |  |  |  |
| IHO Director Luigi SINAPI  |  |  |  |  |
|  | -  |  |  |  |
|  |  |  |  |  |
| iho.int Hydrography –<br>underpinning the digital<br>twin of the ocean   | 4b, quai Antoine 1er Tei. : +377 93 10 81 00<br>B.P. 445 Fax : +377 93 10 81 40<br>MC 98011 MONACO CEDEX e-mail : info@tho.int<br>PRINCPALITY OF MONACO Web srwwi.ho.int                                   |  |  |  |

# A brief history

FEMME is an open forum arranged exclusively for users of the Kongsberg multibeam product range. This is the place for you to exchange experiences and ideas; inspire each other and contribute to improved system performance. The forum features workshops, demonstrations, presentations and poster papers.

#### FEMME 2023 - Kongsberg Discovery's 17th forum for multibeam users

There's something for everybody within the hydrographic industry at FEMME:

- **Be inspired** the forum boasts 3 full days of presentations, papers and workshops from a host of exciting guest speakers
- With workshops and demonstrations given by our team of professionals, you're guaranteed to **learn something new**
- You will get the opportunity to network and have enriching discussions with like-minded colleagues from all over the globe
- You can contribute to the improvement of the multibeam product range with your experiences, opinions and ideas
- Gain an **insight into the entire industry** from our third party exhibitors



FEMME through the years

## **Registration and floor plan**

FEMME is being held at the Sheraton Grand Hotel & Spa in Edinburgh, the capital of Scotland, famous for it's castle, the historic surroundings and otherwise beautiful scenery.



### Third party exhibitors

We are proud to be supported by our Third Party Exhibitors at FEMME 2023. In line with our KONGSBERG products, each exhibitor will have a stand located in Edinburgh Foyer, and will be exhibiting throughout the conference.



#### ML AML Oceanographic

AML Oceanographic provides mission-critical oceanographic sensing equipment including Moving Vessel Profiler (MVP) systems, sound velocity (SV) sensors, CTDs, and multi-parameter instruments. AML offers new advances in its products for uncrewed vessels including an open API for MVP control, plus wireless charging and wireless communication for traditional profiling instruments.

amloceanographic.com

#### $\Delta PE \Delta KF$ Chesapeake Technology Inc.



Chesapeake Technology, Inc. (CTI) has been offering sonar mapping software, custom solutions, SCNARWIZ and thought-leading consulting services to the marine geophysical and geological survey industries for over 20 years. Our flagship product, SonarWiz, provides leading-edge sonar data acquisition and processing software for sidescan, sub-bottom, magnetometry, singlebeam and multi beam sonar systems being used by hundreds of clients worldwide including NAVO, NOAA, USGS, and many of the world's navies and universities.

> SonarWiz delivers now more than ever, sophisticated acquisition, processing and visualization tools, including backscatter post-processing for bathymetric data. With its modern look, integrated plan-view and 3D visualizations, the latest version of SonarWiz helps analysts simplify sonar data acquisition and post-processing ultimately create the best possible amplitude mosaics and reports.

chesapeaketech.com

#### echoview Echoview Software

Echoview Software are experts in hydroacoustic science and software. For over 25 years they have been working with governments, scientists, commercial fisheries, and NGOs to support the understanding and sustainable use of aquatic resources. Their flagship product, Echoview® is comprehensive, flexible, and trusted software for hydroacoustic data processing, capable of handling data from commonly used hydroacoustic instruments, including split beam and multibeam echosounders and sonars. Users can visualize, explore, and analyze their data for water column and bottom studies to support a wide range of hydroacoustic research and project requirements. Echoview is fully documented and rigorously tested by a dedicated quality assurance team, and supported by a group of scientists and developers who provide outstanding technical support and educational resources to customers in over 65 countries. echoview.com



#### HYPACK

HYPACK HYPACK - a Xylem brand, has been serving the marine and hydrographic community for over 25 years. With over 10,000 users worldwide, HYPACK has become a leading developer of hydrographic and dredging software in the industry. It provides the Surveyor with all the tools needed to design their survey, collect data, process it, reduce it, and generate final products. hypack.com

### 

#### Maritime Robotics

Maritime Robotics is an internationally leading supplier of Autonomous Navigation Systems and Uncrewed Surface Vehicles (USV). The company delivers globally to main markets within Mapping & Survey, Defence & Security, Energy, Scientific and transportation. The company was founded in 2005 and has had high growth over the past years. In 2022, turnover was 95 MNOK. This corresponds to a growth of 35% from 2021. maritimerobotics.com

# OPS

**CPS.** QPS are experts in maritime geomatics software and services and has offices in the Netherlands, Canada, USA, and the UK.

> QPS solutions are used across a variety of industries, including hydrographic surveying, offshore construction, dredging, oil and gas, chart production, and piloting. Services include on-site training, setup, and support. With the highest capabilities and industry-renowned stability, QPS keeps even the most complex jobs running smoothly. qps.nl

#### TELEDYNE Teledyne Geospatial

Teledyne Geospatial provides holistic solutions to seamlessly map land and sea through the integration of industry-leading lidar sensors and world-renowned CARIS Ping to Chart software solutions for hydrographic and ocean mapping. teledyne.com



#### Valeport Ltd

Valeport are the UK's leading manufacturer of Hydrographic and Oceanographic instrumentation which include Sound Velocity Profilers / Sensors, Altimeters, Radar Level Sensor, Current Meters, Tide Gauges, Fluorometers, CTDs and Multi-Parameter CTD's.

Supporting Hydrographic surveys with the latest in technology is always our prime aim and our latest SVP, the SWiFT does not disappoint. Designed from the outset with the intention of a seamless workflow, the SWIFT SVP has integral GNSS to geo-locate every profile. This 500m rated, compact and robust unit features high accuracy Sound Velocity, Pressure, Temperature, Salinity & Density measurement, plus integral GNSS, re-chargeable battery and LED status indications for GNSS, battery and communications. Data can be quickly and easily downloaded wirelessly and uses Valeport's new Ocean software for Windows, iOS and Android. Data can be instantly shared in industry-standard data formats. Users of third party survey software from Hypack and QPS (amongst others) will also benefit from direct communication with the probe.

Valeport's work with MBES manufacturers and OEM's has allowed interesting interfaces of SV sensors and Valeport's new ultraSV is designed for simple integration and easy exchange where required for shallow water transducer applications.

valeport.co.uk

# Workshops







# Tuesday 26 September

### **Program overview**

### Workshops and rooms



#### Workshop 1 - Mapping Product Line by Kongsberg Discovery: providing the best solutions Kjetil Jensen

Workshop 2 - SIS Best Practices: tips, tricks and updates Colleen Peters

Workshop 3 - Quantitative scientific split-beam echo sounder and ADCP applications Yoann Ladroit

Workshop 4 - Deconstructing the "kmall": how to leverage the datagrams to the best advantage Terje Haga Pedersen / Jordi Portell (DAPCOM)

Workshop 5 - An Inertial overview and real time performance by Kongsberg Discovery - Seatex Aleksander Hammernes / Runar André Olsen

Workshop 6 -The secrets behind EM backscatter and backscatter calibration Tor Inge Birkenes Lønmo

Workshop 7 - HiPAP 602 Ultra Deepwater Positioning and cNODE Mantis High Speed Video Modem Spencer Collins

Workshop 8 - Sub-bottom discovery Therese Mathisen

Workshop 9 - GPU driven processing of sonar data Espen Reinertsen

Workshop 10 - SIS Remote Live Demo: How to remotely operate an EM system

Colleen Peters / Leonardo Figueroa

### Evening and social event



#### Icebreaker - Brewdog

| When:  | Tuesday 26 September, 19-23, light meal served 19-21    |
|--------|---|
| Meet:  | Brewdog, 50 Lothian Rd (One-minute walk from the venue) |
| Dress: | Smart casual  |

# Wednesday 27 September

## **Program overview**

### Welcome to FEMME - official opening

Session moderator: Helge Uhlen

| TIME  | AGENDA   |
|-------|--|
| 09:00 | Conference opening and welcome                     |
|       | Martin Wien Fjell, President Kongsberg Discovery   |
| 09:10 | Opening address                                    |
|       | David Parker, Head of Hydrographic Programmes UKHO |
|       |  |

### Session 1 - Deep-water survey #1

#### Session moderator: Helge Uhlen

| TIME  |     | PAPER TITLE  | AUTHOR / SPEAKER  |
|-------|-----|--|---|
| 09:30 | 1.1 | Mapping Unchartered Northern Greenland Wa-<br>ters: Implications for Glacier Dynamics and Future<br>Sea-Level Rise Projections   | Speakers(s): Martin Jakobsson<br>Author(s): Martin Jakobsson  |
| 10:00 | 1.2 | EM124 and SBP29 - Installation and qualification of the new deep-sea systems of the French Hydro-graphic Office  | Speaker(s): Olivier Morio<br>Author(s): Olivier Morio   |
| 10:30 | 1.3 | SBP29: A quantum leap in sub-bottom profiling, with<br>hull-mounted acqusition at 9 knots in 3600m water<br>depth in Force 4 conditions yielding near-AUV data<br>quality. (Subtitle: No more sleeping / reading books<br>on the SBP watch!) | Speaker(s): Daniel "DanO" Orange<br>Author(s): Daniel "DanO" Orange, Boe<br>Derosier, Anand Hiroji, Charles Holland,<br>Bruce Applegate |
| 11:00 | 1.4 | New toys for girls and boys: The new Royal NIOZ oceanic research vessel  | Speaker(s): Henk de Haas<br>Author(s): Henk de Haas   |
| 11:30 |     | Lunch break  |   |

### Session 2 - Seafloor backscatter #1

#### Session moderator: Henry Johnson

| ТІМЕ  |     | PAPER TITLE   | AUTHOR / SPEAKER                         |
|-------|-----|---|--|
| 12:30 | 2.1 | Absolute Backscatter Strength Calibration -           | Speaker(s): John Hughes Clarke           |
|       |     | Progress and Frustrations                             | Author(s): John Hughes Clarke            |
| 13:00 | 2.2 | EM 2040 backscatter cross-calibration on the          | Speaker(s): Marc Roche                   |
|       |     | Kwinte reference area (Belgian part of the North Sea) | Author(s): Marc Roche, Ridha Fezzani,    |
|       |     | : principles, results and prospects.                  | Samuel Deleu, Kris Vanparys, Arnaud      |
|       |     |   | Gaillot, Jan Vercaemst, Koen Degrendele, |
|       |     |   | Florian Barette, Xavier Lurton, Jean-    |
|       |     |   | Marie Augustin, Luciano Fonseca          |
| 13:30 |     | Presentation of Posters                               | Poster authors will present themselves   |
| 13:40 |     | Coffee break  |  |

## **Program overview**



### Session 3 - Remote operations

Session moderator: Meme Lobecker

| TIME  |     | PAPER TITLE  | AUTHOR / SPEAKER  |
|-------|-----|--|---|
| 14:00 | 3.1 | Use of Small Uncrewed Vessel for Multivehicle<br>Collaborative Ocean Exploration and Deep-Water<br>Mapping | Speaker(s): Larry Mayer<br>Author(s): Larry Mayer, Val Schmidt,<br>Roland Arsenault   |
| 14:30 | 3.2 | Australia's HydroScheme Industry Partnership<br>Programme – A Kongsberg Operation                          | Speaker(s): Martin Tunwell<br>Author(s): Martin Tunwell   |
| 15:00 | 3.3 | Multibeam surveying with an uncrewed wind-driven platform: Results from Saildrone's mission to Alaska      | Speaker(s): Shannon Hoy, Neah Baechler,<br>Erin Heffron, Colleen Peters<br>Author(s): Shannon Hoy, Colleen Peters,<br>Neah Baechler, Erin Heffron |
| 16:00 |     | Coffee break (30 min)  |   |

### Session 4 - Seafloor backscatter #2

Session moderator: Martin Gutowski

| TIME  |     | PAPER TITLE  | AUTHOR / SPEAKER  |
|-------|-----|--|---|
| 16:30 | 4.1 | Evaluation of the EM 2040P multispectral mode for backscatter and bathymetry in shallow water                | Speaker(s): Julian Le Deunf<br>Author(s): Julian Le Deunf, Olivier Morio,<br>Lilian Bocher    |
| 17:00 | 4.2 | Using multibeam backscatter statistics to search for polymetallic crusts and nodules in the Rio Grande Rise. | Speaker(s): Luciano Emídio Fonseca<br>Author(s): Luciano Emídio Fonseca,<br>Arthur Ayres Neto |
| 17:30 | 4.3 | Multi-frequency Backscatter analysis using three calibrated multibeam echo-sounders                          | Speaker(s): Ridha Fezzani<br>Author(s): Ridha Fezzani, Laurent Berger                         |
| 18:00 |     | Day closed   |   |

## Evening and social event



| When:  | Wednesday 27 September                                      |
|--------|---|
| Where: | You will be invited to dinner by a Kongsberg representative |
| Dress: | Business casual   |

# **Program overview**



### Session 5 - Vessel & data management

#### Session moderator: Magnus Grøtterud

| TIME  |     | PAPER TITLE   | AUTHOR / SPEAKER  |
|-------|-----|---|---|
| 08:30 | 5.1 | Managing Sonar data at NOAA's National Centers for<br>Environmental Information                                 | Speaker(s): Christiane Reiser<br>Author(s): Christiane Reiser, Chuck<br>Anderson    |
| 09:00 | 5.2 | The Multibeam Advisory Committee and Ocean<br>Mapping Community Wiki  | Speaker(s): Kevin Jerram<br>Author(s): Kevin Jerram, Paul Johnson,<br>Vicki Ferrini |
| 09:30 | 5.3 | A Step Towards Standardizing Hydrographic Vessel<br>Offset Surveys  | Speaker(s): Anand Hiroji<br>Author(s): Anand Hiroji                                 |
| 10:00 | 5.4 | Transit Mapping in Support of the Global Ocean<br>Mapping Community: We have the tools, do we have<br>the will? | Speaker(s): Vicki Ferrini<br>Author(s): Vicki Ferrini                               |
| 10:30 | 5.5 | Mapping the Five Deeps, and All Points Between: 2018-2022   | Speaker(s): Victor Vescovo<br>Author(s): Victor Vescovo                             |
| 11:30 |     | Lunch break (60 min)  |   |

### Session 6 - Deep-water survey #2

#### Session moderator: Justin Hornby

| ТІМЕ  |     | PAPER TITLE  | AUTHOR / SPEAKER   |
|-------|-----|--|--|
| 12:30 | 6.1 | Integration of Multibeam Bathymetry, Sub-Bottom<br>Profiler and Water Column Acoustics in Support of<br>Australian Marine Science  | Speaker(s): Chris Yule<br>Author(s): Chris Yule, Philippe<br>Vandenbossche, Amy Nau  |
| 13:00 | 6.2 | Seafloor mapping around the Gulf of Naples: the<br>induction multi beam bathymetric survey of the new<br>CNR RV GAIA BLU   | Speaker(s): Federica Foglini<br>Author(s): Federica Foglini, Marzia<br>Rovere, Renato Tonielli, Francesca<br>Buddillon, Giorgio Castellan, Marco<br>Cuffaro, Gabriella Di Martino, Valentina<br>Grande, Sara Innangi, Maria Filomena<br>Loreto, Fantina Madricardo, Alessandra<br>Mercorella, Paolo Montagna, Camilla<br>Palmiotto, Claudio Pellegrini, Lorenzo<br>Petracchini, Mariacristina Prampolini,<br>Alessandro Remia, Marco Sacchi,<br>Daphnie Sanchez Galvez, Anna Nora<br>Tassetti, Fabio Trincardi |
| 13:30 | 6.3 | Improving resolvability in bathymetry & backscatter<br>data through oversampling; imaging of 32mm<br>(diameter) fiber optic cables in water depths of 1250<br>- 840m and 15cm pipelines in 2700 - 2485m water<br>depths, made possible with next-gen hull-mounted<br>multibeam systems | Speaker(s): Daniel "DanO" Orange<br>Author(s): Daniel "DanO" Orange, Phil<br>Teas, John Decker, Boe Derosier, Anand<br>Hiroji, Garrett Mitchell, Jared Kluesner  |
| 14:00 |     | Photo session (30 min)   |  |
| 14:30 |     | Coffee break   |  |

# **Program overview**



### Session 7 - Shallow-water survey

Session moderator: Øystein Aasbø

| TIME  |     | PAPER TITLE  | AUTHOR / SPEAKER  |
|-------|-----|--|---|
| 15:00 | 7.1 | Optimising a Small Craft for Mapping in >100m WD on the Open Atlantic Coastline of Ireland.  | Speaker(s): David Hardy<br>Author(s): David Hardy   |
| 16:00 | 7.2 | The study of the US brig somers' shipwreck<br>site (1846): Transdicipline between maritime<br>arhcaeology and marine geophysics in Mexico. | Speaker(s): Leonardo Figueroa<br>Author(s): Jorge Herrera   |
| 16:30 | 7.3 | Post-eruption seafloor mapping around Hunga<br>Tonga-Hunga Ha'apai volcano, Tonga  | Speaker(s): Kevin Mackay<br>Author(s): Kevin Mackay, Mike Williams,<br>Shereen Sharma, Karolina Zwolak,<br>Aileen Bohan, Sattiabaruth Seeboruth,<br>Mohamed Elsaied |
| 17:00 |     | Conference closing and summary   | Colleen Peters  |

### Evening and social event



#### Gala dinner at the National Museum of Scotland

| When:  | Thursday 28 September, 18:30-23:00                                 |
|--------|--|
| Meet:  | Sheraton Grand Hotel & Spa, bus transport for guests to the museum |
| Dress: | Business Professional  |

### **Program overview**



### Workshops and rooms



## Workshop 11 - Seabed 2030 - partnerships with industry Stephen Hall

Workshop 12 - Singlebeam echo sounder applications and integration Therese Mathisen

Workshop 13 - Blue Insight and Data Management

#### Leif Bildøy

Workshop 14 - Acquisition Options: Using K-Controller or SIS with 3rd party acquisition software from EIVA, HYPACK and QPS

Colleen Peters / Boris Schultze (HYPACK) / Matthew Brannan (EIVA) / Chrispijn Scheltema (QPS)

Workshop 15 - The sixth edition of the IHO S-44 standard: background, development and changes Christophe Vrignaud (Shom)

Workshop 16 - 3rd party workflows for data visualization and processing with CARIS, EIVA, HYPACK and QPS Colleen Peters / Boris Schulze (HYPACK) / Matthew Brannan (EIVA) / Johan Zegers (QPS) / Travis Hamilton (CARIS)

Workshop 17 - Processing KMALL data: Open source software options Jose Cordero

## Abstracts | Session 1 - Deep-water survey #1

PAPER 1.1: Mapping Uncharted Northern Greenland Waters: Implications for Glacier Dynamics and Future Sea-Level Rise Projections Speaker: Martin Jakobsson Authors: Martin Jakobsson Wednesday 27 September, 09:30

The marine realm of North Greenland is one of Earth's least explored regions, featuring uncharted fjords challenging for even the most powerful icebreakers to access due to severe sea-ice conditions in the Lincoln Sea. These fjords are home to large marine outlet glaciers, critical for the mass balance of the Greenland Ice Sheet. Understanding the dynamics of these glaciers is essential for improving projections of future global sea-level rise, crucial for coastal populations worldwide. Seafloor mapping plays a vital role in gaining insights into the complex interplay between the glaciers and the ocean. In 2019, a significant milestone was achieved when the Swedish icebreaker Oden mapped the previously uncharted Sherard Osborn Fjord, home to the Ryder Glacier. This endeavor faced challenges, including the lack of depth information from the fjord and navigating amidst massive tabular icebergs, requiring continuous monitoring through transponders and satellite imagery. The installed EM122 multibeam system on Oden was used to its full capacity, enabling safe navigation by mapping back and forth across the fjord with the beams extending into uncharted waters. The seafloor mapping revealed two significant bathymetric sills, with one located in the inner fjord acting as a barrier and shielding the Ryder Glacier from inflowing warmer subsurface water of Atlantic origin, as observed by oceanographic measurements. This sill's importance underscores its role in influencing the glacier's dynamics and refining future global sea-level rise projections. The next uncharted fjord targeted for exploration in 2024 with Oden is the Victoria Fjord where CH Ostenfeld Glacier drains.



PAPER 1.2: EM124 and SBP29 - Installation and qualification of the new deep-sea systems of the French Hydrographic Office Speaker: Olivier Morio Authors: Olivier Morio Wednesday 27 September, 10:00

During the dry-docking of the Beautemps-Beaupré, the main hydrographic vessel of the French Navy, the French Hydrographic Service (Shom) carried out a major upgrade of its deep-sea acquisition systems. Both the multibeam echosounder (MBES) and sub-bottom profiler (SBP) were respectively upgraded from EM122/SBP27 to EM124/SBP29. From the installation to the sea acceptance tests and qualifications, with respect to the standards of the International Hydrographic Organization, the upgrade took approximatively three months until completion. For the very first time since Beautemps-Beaupré was build, the entire gondola was blasted and repainted. Some unexpected corrosion was discovered during the removal of the SBP frame from the gondola. The deep water MBES RX and TX antennas and associated electronics have been changed and all MBES systems are now driven by SIS version 5. Other EM712, EA640 and ADCP systems have been cleaned and refitted. Acceptance tests at sea, including patch tests and vertical accuracy surveys, were carried out in the Bay of Biscay on Shom's reference areas (maximum depth of 4500 m). The bathymetry results show very good data quality, in agreement with the IHO order 2. The EM124 also gives a better transverse resolution compared to EM122 which greatly increases the details of the deep-sea areas. Comparisons in shallower waters (above 100m) have been made with the EM712. As for the SBP29, the composite echobeam solution (up to 21 beams) provides much more information about sediment layers, especially in sloped stratifications. These new systems will surely increase the knowledge of deep-water areas.

PAPER 1.3: SBP29: a quantum leap in sub-bottom profiling, with hull-mounted acquisition at 9 knots in 3600m water depth in Force 4 conditions yielding near-AUV data quality. (Subtitle: No more sleeping / reading books on the SBP watch!) Speaker: Daniel "DanO" Orange Authors: Daniel "DanO" Orange, Boe Derosier, Anand Hiroji, Charles Holland, Bruce Applegate

Authors: Daniel "DanO" Orange, Boe Derosier, Anand Hiroji, Charles Holland, Bruce Applegat Wednesday 27 September, 10:30

SBP29 is a narrow-beam (as small as 3°) sub-bottom profiler (SBP) capable of imaging specular from 20° forward to 20° aft, & 15° port to 15° starboard. The system uses a transmit array parallel to (and approximately the same length as) the multibeam transmit array. Both use the same receive array, with the signals separated in the frequency domain; the systems can be operated at the same time. The user can specify the signal strength (227 db maximum); the user can transmit at the legacy source level (e.g.: 215 db) if desired, with implications for 24 hour ops without a marine mammal observer in US territorial waters. In contrast to legacy systems, the user has a very large number of other options, including signal type (chirp-up or -down, CW, FM, burst, etc.), pulse length, frequency, transmit and receive beam widths, echogram settings, filters, gains, file formats, etc. For those familiar with previous generation SBPs, the number of user-selectable options is truly head-spinning, leading to our new mantra, "No more sleeping (or reading books, or watching movies) on the SBP watch!" (the manual is 248 pages!) The resulting data are near-AUV in quality, but hull-mounted - we have acquired spectacular data in water depths up to 3650m and in Beaufort Sea State 4 conditions without data degradation. We have imaged folded hard rock (Miocene Monterey Formation) from the seafloor to 80 meters below seafloor.



The Royal Netherlands Institute for Sea Research (NIOZ) is currently in the process of replacing its research fleet consisting of three vessels. The new ocean research vessel that will replace the now 33 years old Pelagia which will be named Anna Webervan Bosse is expected to be delivered in October 2025.

The oceanic vessel will be about 80 m long, will have a crew of 16 and will be able to house a maximum of 31 scientists and science support staff. The ship will be equipped with state of the art scientific (acoustic) sensors, of which Kongsberg will deliver a large number. The acoustic sensors will be located in a drop keel and a large gondola.

The main scientific acoustic package will consist of various echo sounders. A single beam deep water echo sounder and shallow and deep water multibeam echo sounders will cover the bathymetric package. For geological research a parametric penetrating echosounder will be installed. Underwater navigation will be covered by means of a shallow/medium depth as well as a deep water USBL. On the new vessel acoustic water column investigations will be carried out using a wide band echosounder. In order to determine ocean currents not only near the water surface but also deeper in the water column a set of 4 high to low frequency ADCPs will be installed. In this presentation I will present the general specifications of the ship and explain why NIOZ has chosen for each of these specific sensors mentioned above.

## Abstracts | Session 2 - Seafloor backscatter #1



PAPER 2.1: Absolute Backscatter Strength Calibration - Progress and Frustrations Speaker: John Hughes Clarke Authors: John Hughes Clarke Wednesday 27 September, 12:30

Seabed backscatter strength estimates have been provided by Simrad/Kongsberg multibeam systems since 1991. While those measurements have always been reduced according to estimates of system radiometric and geometric parameters, the resulting measurements were recognized to suffer from assumptions in all the component factors. Thus a means of operationally tying in these first-order reduced measurements to an external absolute seabed reference would be beneficial. Building on a number of previous efforts, this work looks to develop reliable broadband seabed backscatter strength measurements over the full range of grazing angles (90 to 20°). The long term aim is to cover the operating bandwidth of all the EM systems thus extending from 11 to 400 kHz. Using broad band FM chirps, rather than stepped narrowband CW pulses provides both advantages (bandwidth and near nadir angular discrimination) and disadvantages (poorer SN, trickier calibration). Particular complications are noted including: 1 - properly accounting for ensonified area and grazing angle estimation near normal incidence and 2 - the rotational displacement of the transmit beam pattern relative to the receive beam pattern for the longer range, lower frequency (<45 kHz) measurements. Current methodology will be described showing latest progress and identified remaining issues.

# PAPER 2.2: EM 2040 backscatter cross-calibration on the Kwinte reference area (Belgian part of the North Sea): principles, results and prospects

Speaker: Marc Roche

Authors: Marc Roche, Ridha Fezzani, Samuel Deleu, Kris Vanparys, Arnaud Gaillot, Jan Vercaemst, Koen Degrendele, Florian Barette, Xavier Lurton, Jean-Marie Augustin, Luciano Fonseca **Wednesday 27 September, 13:00** 

Cross-calibration on a reference area provides a realistic solution for MBESs backscatter calibration. On a stable reference seafloor area the backscatter response is measured using a calibrated single-beam echosounder. The results are then compared to the backscatter values obtained on the same area by a multibeam system. Thanks to its simplicity, this method is the most realistically applicable option to compensate for the current lack of backscatter calibration operational methods. Applying this pragmatic and relatively simple approach, the Kwinte zone located near Oostende harbour has been surveyed to obtain multi-frequency (50-440 kHz) angular backscatter measurements from a calibrated EK80 accurately steered. In a second step several MBES have been cross-calibrated over the same area that offers a particular interest of stability and accessibility for regional research vessels. In our presentation, cross-calibration results of various MBESs over the Kwinte reference area are presented and discussed. The backscatter correction values (BScorrs) obtained from cross-calibration are compared with the corrections provided by Kongsberg's post-calibration service. The interest of real-time application of the BSCorrs coefficients is finally discussed.

## **Abstracts | Session 3 - Remote operations**



PAPER 3.1: Use of Small Uncrewed Vessel for Multivehicle Collaborative Ocean Exploration and Deep-Water Mapping Speaker: Larry Mayer Authors: Larry Mayer, Val Schmidt, Roland Arsenault Wednesday 27 September, 14:00

Working as part of NOAA's Ocean Exploration Cooperative Institute, we have demonstrated the collaborative use of a small (7.7 m) uncrewed surface vessel (Exail DriX) launched from a mother ship to monitor and control multiple autonomous underwater vehicles (WHOI - Mesobot and NUI) using ROS-based commands sent and received through a Sonardyne USBL. This allowed full situational awareness of the 3-D position of all vehicles, the exchange of information between them, the real-time observation of water column properties and targets, and the ability to monitor the position of the underwater vehicles with respect to the water column targets. We were able to direct the ASVs to specific targets and control the actions of samplers allowing "verified, directed sampling" -- absolute certainty in where sampling is taking place with respect to desired targets. Using the USV to control and monitor the underwater vehicles also frees the mother ship to carry on independent operations to a ranges up to 20 km using an MBR. StarLink offers the opportunity to carry out independent operations far over the horizon. An additional innovation this year on our DriX was the installation of the first of its-kind EM712 USV. The product of tremendous collaboration between Kongsberg and Exail, the new 712 has moved much of the topside electronics into a subsea container that fits in the DriX's gondola allowing mapping beyond 2500m from this small USV and the ability for DriX to act as a mapping force multiplier for a mother ship in deep water settings.



PAPER 3.2: Australia's HydroScheme Industry Partnership Programme – A Kongsberg Operation Speaker: Martin Tunwell Authors: Martin Tunwell Wednesday 27 September, 14:30

Australia's charting effort is now undertaken by industry partners under the HydroScheme Industry Partnership Programme (HIPP). The HIPP has been operating since 2020, prior to which the Australian charting effort was completed by the Royal Australian Navy. This presentation provides an overview of the HIPP where all panel members are now using numerous Kongsberg MBES. Ocean Infinity Australia have completed five projects within the HIPP and are in the process of finishing a sixth. These projects, all using Kongsberg MBES, will be showcased in this presentation.



# PAPER 3.3: Multibeam surveying with an uncrewed wind-driven platform: Results from Saildrone's mission to Alaska

Speaker: Shannon Hoy, Neah Baechler, Erin Heffron, Colleen Peters Authors: Shannon Hoy, Colleen Peters, Neah Baechler, Erin Heffron **Wednesday 27 September, 15:00** 

In August 2022, the Saildrone Surveyor SD-1200 departed Unalaska, Alaska, equipped with Kongsberg EM2040, EM304 Mkl, and Seapath systems, marking the start of the 52-day Aleutians Uncrewed Ocean Exploration expedition. This multipartner project endeavored to enhance understanding of the ocean and seafloor in a remote and understudied part of the United States. This uncrewed expedition was a public-private-academic partnership sponsored primarily by NOAA Ocean Exploration and the Bureau of Ocean Energy Management (BOEM) and facilitated and led by the NOAA Ocean Exploration Cooperative Institute. The goal of the expedition was to collect bathymetric and environmental data in unexplored waters around the Aleutian Islands, identified as a high priority for NOAA, BOEM, the U.S. Geological Survey, and the broader federal Interagency Working Group on Ocean Exploration and Characterization. This was Saildrone's first major multibeam survey. Despite challenging weather and tidal currents, SD-1200 performed well, mapping 16,254 km2 of understudied seafloor around the Aleutians. Nevertheless, operational difficulties and data post-processing complexities highlight unique considerations for mapping with wind-propelled vehicles. Herein, we will review the expedition's multibeam data to discuss these obstacles. Over the course of the SD-1200's preceding sea trials, Kongsberg provided numerous improvements in sonar integration, operation, end-user experience, and survey results as these unique considerations arose. Saildrone Surveyor SD-1200's contributions to mapping remote Alaskan waters highlights the path forward with uncrewed vessels. These platforms are poised to advance global mapping efforts as force--multipliers and over-the-horizon workhorses, driving systems and software technology adaptation for enhanced performance.

# Abstracts | Session 4 - Seafloor backscatter #2

# PAPER 4.1: Evaluation of the EM 2040P multispectral mode for backscatter and bathymetry in shallow water

Speaker: Julian Le Deunf Authors: Julian Le Deunf, Olivier Morio, Lilian Bocher **Wednesday 27 September, 16:30** 

Since 1720, Shom, the French Hydrographic Service, collects information on the physical marine environment, particularly bathymetric measurements, allowing the elaboration of nautical products (including nautical charts). In particular, seafloor characterization is a priority in many industries. In recent years, the popularity of marine renewable energy has led to an increase in the number of offshore wind turbine projects, and knowledge of the nature of the seabed is an essential element for their implementation. Comprehension of the seabed is also a priority for forces throughout the world in order to be more effective for all underwater activities. Precise knowledge of the nature of the bottom is even a necessity according to the standard on hydrographic surveys (S44 - 6th edition – July 2020). The new generation of multibeam echosounders (MBES), such as the EM2040P MKII from Kongsberg Maritime, has made it possible to carry out, so-called, multispectral acquisitions. Contribution of using multiple frequencies (200kHz to 700 kHz) on seafloor characterisation during the same series of ping is evaluated in this work, both on backscatter and bathymetry. Based on multiple surveys performed in Brest Bay on the Shom reference areas (with the help of ENSTA Bretagne) and using different frequencies combinations and dedicated post-processing of the backscatter data (RGB-like image), the first results show that the multispectral mode acquisitions increase the seabed characterisation compared to a standard single frequency survey. In operational surveys conditions, using multispectral acquisitions remains compatible with the standards of the International Hydrographic Organisation (special order).



# PAPER 4.2: Using multibeam backscatter statistics to search for polymetallic crusts and nodules in the Rio Grande Rise

Speaker: Luciano Emídio Fonseca Authors: Luciano Emídio Fonseca, Arthur Ayres Neto **Wednesday 27 September, 17:00** 

The Rio Grande Rise (ERG), located approximately 1500 km off the Brazilian coast, has become the focus of various oceanographic research initiatives in Brazil, generating a significant volume of EM 122 12Khz multibeam data. Additionally, the central ERG region, which is rich in polymetallic crusts, underwent a ROV and sampling survey, resulting in a detailed map of seafloor facies. This map shows that the polymetallic crusts and nodules are located at water depths from 600 to 1500m, usually dispersed on a sandy substrate. The main question is whether we can solely rely on acoustic methods to locate these crusts throughout the ERG area, as the multibeam has a minimum footprint of 10m that area, while the size of the crusts varies from 5 to 20cm, making them probably invisible on the multibeam backscatter mosaics.

In Fonseca et al. (2021), it was discussed that the statistical analysis of acoustic backscatter samples can be a valuable method for remote seafloor characterization. This research demonstrated that the backscatter statistics can be described by a Weibull distribution, with parameters related to the incidence angle and processing level. Polymetallic crusts behave as high-amplitude scatterers when interacting with acoustic wavefront from multibeam echosounders. This interaction leads to a distinct distortion in the statistical distribution of the backscatter samples that would have come from a uniform sandy substrate. By quantifying this distortion in the acoustic backscatter data, it was possible to detect the presence and spatial density of polymetallic crusts and nodules on the sandy seafloor.



PAPER 4.3: Multi-frequency Backscatter analysis using three calibrated multibeam echo-sounders Speaker: Ridha Fezzani Authors: Ridha Fezzani, Laurent Berger Wednesday 27 September, 17:30

Deep-sea research vessels are often equipped with more than one multibeam echosounder (MBES) for mapping different depth ranges and for different applications. This allows to evaluate the potential for seabed discrimination using multi-frequency backscatter data. In addition, the MBES backscatter calibration helps to compare the backscatter of the same seafloor for different surveys over time. Here we present a recent MBES dataset acquired onboard the Ifremer RV Thalassa using three MBES (EM304, ME70 and EM2040) in the Bay of Biscay. Angular analysis methods were applied to study the multi-frequency dependency of the seafloor backscatter.

## Abstracts | Session 5 - Vessel & data management



PAPER 5.1: Managing Sonar data at NOAA's National Centers for Environmental Information Speaker: Christiane Reiser Authors: Christiane Reiser, Chuck Anderson Thursday 28 September, 08:30

Sonar data managers at NOAA's National Centers for Environmental Information (NCEI) preserve, manage, and make marine geophysical data accessible to the public. The archive houses over 66 terabytes of (uncompressed) bathymetric data, 250TB of water column sonar data, 59TB of Trackline data, and more. These datasets are available for download via NCEI data viewers, all of which can be found here: https://www.ncei.noaa.gov/products/seafloor-mapping. NCEI data managers possess extensive domain expertise and work directly with data providers, guiding them through organizing, packaging, and submitting marine geophysical data to the archive. NCEI also offers tools to make data submissions easier such as a Submitting Data Guidelines document and a stand-alone packaging tool called CruisePack, which can be found at https://www.ngdc.noaa.gov/mgg/cruisepack//. With the advent of global mapping initiatives such as the National Ocean Mapping, Exploration, and Characterization Strategy (NOMEC) and the Nippon Foundation-GEBCO Seabed 2030 project, NOAA is seeking new data partners to make progress on these mapping goals.



PAPER 5.2: The Multibeam Advisory Committee and Ocean Mapping Community Wiki Speaker: Kevin Jerram Authors: Kevin Jerram, Paul Johnson, Vicki Ferrini Thursday 28 September, 09:00

The NSF-funded Multibeam Advisory Committee (MAC) aims to improve and maintain high-quality mapping data throughout the United States Academic Research Fleet (USARF). The MAC will describe approaches for sea acceptance testing, routine performance monitoring, planning opportunistic assessments, and reporting results publicly. This talk will also demonstrate the Ocean Mapping Community Wiki and invite the audience to share expertise and 'lessons learned' from their field experience.



PAPER 5.3: A Step Towards Standardizing Hydrographic Vessel Offset Surveys Speaker: Anand Hiroji Authors: Anand Hiroji Thursday 28 September, 09:30

Hydrographic vessel offset surveys establish a ship reference frame and provide precise 3D coordinates and orientation angles for multibeam transducers and their associated position and motion systems. The accuracy of vessel offset surveys plays an important role in determining the subsequent uncertainty associated with acquired hydrographic datasets. At the present time, however, current procedures and standards are usually based solely on manufacturer's recommendations. Furthermore, the manner of demonstrating achieved accuracies can be ambiguous as they are often just estimated based on the accuracy of the utilized total station instrument. To better understand and properly quantify achievable accuracies, an experimental analysis of achievable accuracies in obtaining 3D coordinates and mounting angles is conducted. The experiments include measurements in a controlled simulated environment and a real-world dry-dock situation, using a Sokkia NETO5AXII robotic industrial total station with an angular accuracy of 0.5" and distance accuracy of 0.5mm. The factors that contribute to the accuracy, such as the number of station set-ups, relative geometry of targets, accuracy and precision of the instrument, number of measured points, and baseline lengths, were evaluated in these experiments. Through these experiments, achievable accuracies in both simulated and real-world situations were estimated. In the absence of published standards and procedures, this research aims to review achievable accuracies and draft standard procedures and guidelines for vessel offset surveys.



PAPER 5.4: Transit Mapping in Support of the Global Ocean Mapping Community: We have the tools, do we have the will? Speaker: Vicki Ferrini Authors: Vicki Ferrini Thursday 28 September, 10:00

With the proliferation of multibeam sonars around the world, comes an opportunity to dramatically accelerate the rate of global ocean mapping. Working as a community to consolidate and integrate mapping data can deliver data products that can support exploration and discovery, scientific research, sustainable use of the oceans and the management of offshore resources and infrastructure. While tremendous progress is being made in this space, there are many opportunities for accelerating progress and increasing return on investment. Recognizing the sparseness of global ocean mapping data, and the value of data acquisition opportunities, some organizations and communities routinely acquire opportunistic mapping data during transits. Despite its demonstrated impact on increasing data coverage, cultural and technical concerns continue to impede broad acceptance of transit mapping. This presentation will describe several openly-available tools and resources that can help address technical concerns that inhibit transit mapping. Many of these tools and workflows address concerns related to acquiring and sharing transit data, while others address concerns related to transforming non-survey data into high-quality openly accessible data products. The availability and use of this growing set of openly available tools and workflows, and the creation of a global community of practice, have the potential to spark cultural change and unlock the potential of transit data mapping. Working together as a global community to share technical resources, data and knowledge, will both increase data coverage and help us more readily address issues of equity and access.



PAPER 5.5: Mapping the Five Deeps, and All Points Between: 2018-2022 Speaker: Victor Vescovo Authors: Victor Vescovo Thursday 28 September, 10:30

This presentation will describe the origins of the Five Deeps Expedition (2018-2019) as well as the subsequent "Ring of Fire" and other expeditions between 2019-2022 conducted by Victor Vescovo and his marine exploration team at Caladan Oceanic. Focus will be placed on the decision to purchase the first Kongsberg EM-124 sonar, its use on the expeditions, the extent of its mapping on two global circumnavigations, and the challenges encountered in mapping the seafloor. The final portion will review the state of seafloor mapping, barriers to the GEBCO 2030 goal, and potential ways to continuing the production of high-quality seafloor maps.

## Abstracts | Session 6 - Deep-water survey #2

PAPER 6.1: Integration of Multibeam Bathymetry, Sub-Bottom Profiler and Water Column Acoustics in Support of Australian Marine Science Speaker: Chris Yule Authors: Chris Yule, Philippe Vandenbossche, Amy Nau Thursday 28 September, 12:30

Australian waters host many remote and challenging research areas and have benefitted from marine mapping. Australia's national science agency, CSIRO, and its Marine National Facility (MNF), conducts mapping in support of marine research aboard its blue-water research vessel, RV Investigator. Voyages require sampling and equipment deployments across a wide range of depths (e.g., 10 m to full ocean) and often in remote regions, particularly for biological and geological studies. In the 9 years RV Investigator has been operating, the Geophysical Survey and Mapping (GSM) team have acquired more than 3 million km line length of multibeam bathymetry data, with resolutions ranging from 5 m to 210 m.

CSIRO employs technical acousticians, surveyors and geophysicists, who use various systems and workflows to support critical decisions for optimal scientific outcomes. Conducting research in these dynamic environments demands efficient and expert planning supported with a range of dedicated acoustic systems. RV Investigator is outfitted with a suite of Kongsberg and Simrad systems including the EM122, EM710, EM2040C EK60/EK80, ME70, SH90, SBP120 and K-Sync During voyages, the GSM team operate these systems 24/7 for up to 300 days a year and can acquire data to the highest hydrographic standards. Scientific sampling decisions are guided by the 3D integration of bathymetry, backscatter, water-column and sub-bottom profiler data with highly successful results. We present CSIRO's operations model, unique examples of data from our systems, and our vision for future improvements, to continue our support of high impact national and international marine research.

# PAPER 6.2: Seafloor mapping around the Gulf of Naples: the induction multi beam bathymetric survey of the new CNR RV GAIA BLU

Speaker: Federica Foglini

Authors: Federica Foglini, Marzia Rovere, Renato Tonielli, Francesca Buddillon, Giorgio Castellan, Marco Cuffaro, Gabriella Di Martino, Valentina Grande, Sara Innangi, Maria Filomena Loreto, Fantina Madricardo, Alessandra Mercorella, Paolo Montagna, Camilla Palmiotto, Claudio Pellegrini, Lorenzo Petracchini, Mariacristina Prampolini, Alessandro Remia, Marco Sacchi, Dapnie Sanchez Galvez, Anna Nora Tassetti, Fabio Trincardi

Thursday 28 September, 13:00

From September 28 to October 20, 2022, the new CNR Research Vessel GAIA BLU explored the seafloor of the Gulf of Naples and Pozzuoli and the Amalfi coastal area from 50 m water depth to more than 1300 m, acquiring about 5000 km2 of multibeam data during the inaugural campaign 'Jamme Gaia 2022'. The investigated area is particularly relevant not only because its proximity to the highly populated and touristic coastal area of Naples, but also because it includes large canyon systems, volcanic features, hydrothermal activity, and submarine banks of high geological and ecological value. The area lies directly in the offshore of the Vesuvius and the Campi Flegrei volcanoes, which pose a significant geohazard to the coastal area and need to be constantly monitored. The acquired data revealed, with unprecedented high resolution, the presence of landslides, submarine volcanoes and hydrothermal springs that represent both a threat to the coastal area and on the increasingly intense human activities in the offshore area. At the same time, the data make it possible to identify how and how quickly these anthropic impacts are contributing to the transformation of the marine ecosystem by altering its biodiversity. In this paper, we describe the dataset collected with three different multibeam systems: Kongsberg EM2040, 712 and 304. During the acquisition campaign, bathymetric data were visible in near real time making the datasets FAIR (Findable, Accessible, Interoperable and Reusable).

PAPER 6.3: Improving resolvability in bathymetry & backscatter data through oversampling; imaging of 32mm (diameter) fiber optic cables in water depths of 1250 - 840m and 15cm pipelines in 2700 - 2485m water depths, made possible with next-gen hull-mounted multibeam systems Speaker: Daniel "DanO" Orange

Authors: Daniel "DanO" Orange, Phil Teas, John Decker, Boe Derosier, Anand Hiroji, Garrett Mitchell, Jared Kluesner

#### Thursday 28 September, 13:30

We refer to the intentional overlapping of beams across- and along-track as oversampling. Across-track oversampling is achieved through acquisition of a fixed swath and either equidistant beam spacing (EDBS) or high-density beam-forming (HDBF) and an understanding of the beam dimensions on the seafloor (a function of beam width across- and along-track, water depth, and take-off angle). Along-track oversampling is achieved through vessel acquisition speed and monitoring of the ping repetition rate and the same understanding of beam dimensions on the seafloor. Oversampling results in features on the seafloor being ensonified by many beams across- and along-track. This increases the signal-to-noise ratio, and results in successful imaging of features smaller than the typical detection limits for both bathymetric bin size & backscatter pixel size. In this presentation, we will show pipelines ranging from 15cm to 45cm in diameter imaged with 30 and 12 kHz multibeam in the US Gulf of Mexico in water depths up to 2960m, where a BOEM database of as-laid infrastructure provides ground-truthing. We will also show successful imaging of 32mm (!!) diameter fiber optic cables offshore southern California surveyed with 30 and 12 kHz multibeam backscatter in water depths of 1250 – 840m. We will show how the legacy Kongsberg processing software Poseidon does an excellent job of resolving nuanced seafloor features with multiple overlapping lines, whereas other more recent software packages do not. We commit to working with the software providers to bring them up to Poseidon-level functionality.

## Abstracts | Session 7 - Shallow-water survey

PAPER 7.1: Optimising a Small Craft for Mapping in >100m WD on the Open Atlantic Coastline of Ireland Speaker: David Hardy Authors: David Hardy Thursday 28 September, 15:00

Due to budget/timeline constraints; a small RIB (10m) has been tasked with mapping areas of >100m water depth on the Atlantic coastline of Ireland; contributing to Ireland's mapping program, INFOMAR (www.infomar.ie). Under common scenarios, a larger vessel would be employed in this mapping.

This work can only be attempted during benign weather, but the reduced vessel dimensions leads to a highly dynamic platform even under calm conditions. An initial multibeam echosounder delivered results which complied with IHO-S44 standards - but final gridded resolution was constrained by the irregular spacing of successive pings. This irregular spacing was found to arise from the erratic pitch & yaw movements of this small platform. Achieving the best possible resolution is important for our end-users. A Kongsberg EM2040P was selected to improve these results. System selection was based on the existing MBES mount, cost, maintaining shallow-water suitability and training needs. The EM2040P delivered these, but importantly, also provided yaw & pitch stabilization. Beam stabilization on these two axis (in addition to roll) leads to significant improvements in the regular distribution of pings over mapped ground. Availability of dual swath functionality has further improved the ping distribution pattern. These technologies have markedly improved the resolution that can be achieved by this vessel & use case, for the same operational cost & effort. While each appears as a line-item in specifications that can easily be overlooked - their cumulative impact is a marked advantage. The improved resolution obtained will provide a more valuable output to data users, improving the cost/benefit achieved.



PAPER 7.2: The study of the US brig somers' shipwreck site (1846): Transdicipline between maritime arhcaeology and marine geophysics in Mexico. Speaker: Leonardo Figueroa Authors: Jorge Herrera Thursday 28 September, 16:00

The Maritime Archaeology of the Mexican-American War Project (1846-1848), developed at the National Autonomous University of Mexico (UNAM), investigates the maritime aspects of this conflict, including coastal, offshore, river, and littoral battlefields, as well as coastal defensive forts and shipwreck sites of vessels participating in this war. Among the outstanding sites under study is the wreck of the US brig Somers, which sank in 1846 trying to hunt down a Mexican ship that was breaking the US naval blockade of Mexico's main port, Veracruz. This is the shipwreck site with the best state of preservation of this war and an archaeological resource of great scientific and heritage value. In 2023, UNAM joined forces with Kongsberg Maritime Mexico during a joint investigation that included marine geophysics equipment developed by Kongsberg and owned by UNAM, as well as another set of equipment provided by Kongsberg Mexico. The variety of acoustic instrumentation employed by the team of maritime archaeologists and geophysical engineers included two types of multibeam sonars, M3 (500 kHz) and EM 2040P MKII (300 kHz), a TOPAS PS40 sub-bottom profiler (40 kHz) and an MS1000 1171 HiRes sector sonar (600-1200 kHz). The combination of high and low frequencies, as well as the variety of data and different observation angles of each instrument has allowed us to expand our knowledge of the archaeological features of the shipwreck, as well as to analyse previously unknown details associated with both shipbuilding technologies and processes of formation and transformation of the archaeological site through time.



PAPER 7.3: Post-eruption seafloor mapping around Hunga Tonga-Hunga Ha'apai volcano, Tonga Speaker: Kevin Mackay

Authors: Kevin Mackay, Mike Williams, Shereen Sharma, Karolina Zwolak, Aileen Bohan, Sattiabaruth Seeboruth, Mohamed Elsaied

#### Thursday 28 September, 16:30

Hunga Tonga - Hunga Ha'apai (HTHH), one of 22 volcanoes in the waters around the Kingdom of Tonga, erupted extremely violently on 15th January 2022. This eruption triggered shock waves through the atmosphere and generated a tsunami across the Pacific Ocean. No part of the caldera of the volcano remains above water following the eruption, and the islands of Hunga Tonga and Hunga Ha'apai were vastly reduced in size. Based on multi-vessel seabed mapping surveys in the months after the eruption we assessed the impacts of this eruption on the surrounding ocean environment, from underwater topography to ecosystem structure and function. While the HTHH edifice was largely intact, erosional channels were identified radiating out from the summit caldera indicating turbulent pyroclastic density flows which are supported with our modelling. At least 6 km3 of material was deposited on the seafloor in areas downstream of these pyroclastic flows, and >50cm of fine ash deposition was observed on the seafloor in some areas. Mid-water volcanic ash layers north of the HTHH caldera were identified which indicate on-going venting from the volcano. This study is a rare account of the initial impact of a large-scale eruption which can be used to better understand volcanic risks to the ocean environment in the future.

## Meet the team - Forum leaders



#### Opening Speech Martin Wien Fjell

President of Kongsberg Discovery, former Executive Vice President Global Customer in Kongsberg Maritime, previous Vice President Group Business Development in Kongsberg Group and has been in the Group since 2013. Experience from Umoe Maritime as CFO and Business Development, partner in Fondsfinans and Analyst at Morgan Stanley.



#### Keynote

#### David Parker

David has worked predominantly in the near shore and port hydrography sector for 27 years in commercial survey companies, civil engineering consultants and latterly in government agencies. In that time, he has conducted and led hundreds of successful hydrographic survey projects around the world using a broad range of technologies. As Head of Hydrographic Programmes he is responsible for UKHO's portfolio of seabed mapping projects and programmes, including the UK Centre for Seabed Mapping. Until recently, he ran UKHO survey activity in the Pacific and Caribbean regions, followed by managing the UKHO input of the Civil Hydrography programme. In addition, he also provides hydrographic consultancy and training worldwide on behalf of International Hydrographic Organization. He is the Chair of the IHO's Hydrographic Surveys Working Group, leading a membership of 70 from across member states and industry. He was recently Chief Executive of the Hydrographic Society UK & Ireland, and remains as a Director. He has a BSc degree in Hydrography and Ocean Science, is a Fellow of the Institute of Marine Engineering Science and Technology, a Chartered Marine Scientist and Chartered Manager. He also considers himself lucky to be able to say that he has worked in hydrography in over 50 countries and on every continent - including Antarctica - either as a practicing surveyor, trainer and educator, or programme manager.



#### **Closing Speech**

#### **Colleen Peters**

Colleen has spent most of her professional career at sea. As a Senior Survey Technician for NOAA, and a Lead Marine Technician for Schmidt Ocean Institute and OceanX, she has a breadth of experience acquiring and managing data collected with a wide variety of scientific instrumentation. After graduating from the University of Rhode Island with a Masters in Oceanography and a Masters in Business Administration, she joined Saildrone, where she gained experience remotely integrating and operating the Kongsberg Seapath, EK80, EC150, EM304 and EM2040 on the Saildrone Surveyor. As the Product Manager for medium and deep EM systems, Colleen works on developing new features and improvements for the multibeam echo sounders. As the Product Manager for SIS, she will help continue to improve the capabilities as well as the end user's experience with the software.

Meet the team - Speakers



#### Anand Hiroji

Anand Hiroji received B.E. in civil engineering in 2005 from the Shivaji University, India. In 2011, he received M.E. in geomatics engineering, and in 2016 Ph.D. in ocean mapping from the Department of Geodesy and Geomatics Engineering, University of New Brunswick, Canada. He is currently an assistant professor of Hydrography in the Division of Marine Science, School of Ocean Science and Engineering at the University of Southern Mississippi. His research interest include optimizing backscatter data from multibeam sonars including relative and absolute calibration, improving the positional accuracy of bathymetric data, the effective use of uncrewed surface vessels, and hydrographic vessel configuration surveys.



#### **Chris Yule**

Dr Christopher Yule is a marine geophysicist with the Geophysical Survey and Mapping team at CSIRO. His role at CSIRO is to collect, process and interpret geophysical data acquired onboard the R.V. Investigator. Chris has completed a PhD from James Cook University where he conducted seismic stratigraphic analysis of the Canning Basin. Published results include mapping of 12 stratigraphic units across the onshore/offshore Canning Basin, identification of seismic acquisition parameters for sub igneous rock imaging and classification of the Northwest Shelf Mafic Magmatic Province. Chris' previous role was a data analyst in the AusSeabed team at Geoscience Australia, where he processed and published bathymetry data, engaged with government, academic and industry stakeholders, and developed guidelines for the marine science community.



#### **Christiane Reiser**

Christie Reiser is a Physical Scientist at NOAA's National Centers for Environmental Information in Boulder, Colorado. She is a Bathymetry Data Manager and works with data providers to archive global marine geophysical data. She began her career on board the NOAA Ship Rainier while studying Geography at the University of Colorado and has a background in multibeam data collection and processing. She earned her master's degree in Science Writing from Johns Hopkins University.



#### **Colleen Peters**

As the Product Manager for medium and deep EM systems, Colleen works on developing new features and improvements for the multibeam echo sounders. As the Product Manager for SIS, she will help continue to improve the capabilities as well as the end user's experience with the software.



#### Daniel "DanO" Orange

Daniel "DanO" Orange received a B.Sc. and M.Sc. in Earth and Planetary Sciences from M.I.T., and a Ph.D. in Earth Sciences from U.C. Santa Cruz. Since completing his Ph.D. Dan has worked entirely offshore, combining marine geology and geophysics, with a deep understanding of multibeam, to study tectonics, structural geology, geomorphology, slope failure, seepage and process sedimentology. Dan has over 24 years of industry experience in the USA and overseas, as well as academic experience primarily funded by the U.S. Navy's Office of Naval Research (ONR). Within industry Dan has applied seep science to hydrocarbon exploration and geohazards, used process geomorphology and seismic interpretation to evaluate deepwater geohazards, and applied his knowledge of survey and navigation systems to enable the successful commercialization of Controlled Source Electro-Magnetics (CSEM). Dan has worked on SBP-29 sub-bottom profiling since 2010, and is currently funded by ONR to assist with SBP-29 installations on select US Academic Fleet AGOR-class vessels. Dan has 2 patents, has co-authored a book, and has authored or co-authored 74 peer-reviewed publications.



#### **David Amblas**

David graduated in Geology at the University of Barcelona (UB) and went on to complete a PhD in Earth Sciences. He has participated in over 20 research cruises and 44 national and international research projects. In 2018 David gained a permanent position as Associate Professor (Professor Agregat) at the University of Barcelona. He teaches several courses at the degrees of Earth Sciences and Marine Sciences, and in the Master of Oceanography and Marine Environmental Management. He is responsible for the operational and scientific management of the geophysical equipment of a coastal research vessel (19 m length).



#### David Hardy

David is a geologist in the Marine & Coastal Unit of the GSI; where he has worked on national marine mapping programs since 2003 (www.infomar.ie). His educational qualifications are both a BA and research MSc in Geology, from Trinity College Dublin. Since 2009, he has been heavily involved in the operation of GSI's fleet of small inshore mapping vessels; delivering high-resolution bathymetric and geophysical datasets.



#### **Erin Heffron**

Erin Heffron is an Independent Contractor providing ocean mapping, subsea navigation, geospatial analysis, and GIS services through her company, Ocean Mapping Services LLC. Her undergraduate studies focused on geology and GIS, and she became immersed in the world of ocean mapping while working for IVS3D and, post-acquisition of IVS3D, QPS, as a Senior Product Specialist focusing on pre-sales technical support, product outreach and technical training for nearly ten years. While at IVS3D/QPS, she was a founding member of the Backscatter Working Group and was part the internal core team tasked with investigating client and community needs during the development of the Qimera software. She left QPS in 2015 to pursue her master's degree in Earth Sciences, Ocean Mapping at the University of New Hampshire's Center for Coastal and Ocean Mapping. While completing her master's she began working extensively with the Ocean Exploration Trust, serving as a Mapping Coordinator, Lead Navigator and Expedition Leader aboard the E/V Nautilus on dozens of expeditions. Post-degree she has continued working offshore as well as on shore-based projects ranging from data processing to geohazard analysis, for a variety of clients.



#### Federica Foglini

Federica is a senior marine data scientists at the Institute of Marine science (CNR-ISMAR) in Bologna with main interest in seafloor mapping and geomorphology, marine cartography, habitat mapping technologies (multi beam swath bathymetry acquisition and processing, marine spatial data management, Geodatabase design and implementation. She obtained her degree in Geology at the University of Bologna (2001) and Msc in GIS and Remote Sensing at Greenwich University, London. (2004). She participated in more than 20 oceanographic cruises as chief scientist and supervisor of geophysical, geophysical, geognostic and ROV data acquisition and processing. She is co-author of several international scientific papers and she wrote several technical reports about implementation and design of Marine Geodatabase and GIS mapping and multi beam bathymetry processing. She is supervisor of undergraduate, MSc and PhD theses. She is currently coordinator of the LIFE DREAM project and leader of several European and national projects. She is involved in the GEBCO (General Bathymetric Chart of the Oceans) as vice chair of the TSCOM (Technical Sub-Committee on Ocean Mapping) and Chair of the Metadata working group. He is a member of the GEBCO Italian Oceanographic Commission (COI).



#### Henk de Haas

Henk de Haas was trained as a geologist (sedimentology) and worked on tidal deposits before he completed his PhD thesis on transport and burial of organic matter in the North Sea and other continental shelves. He subsequently worked on sedimentary processes on continental slopes in relation to glacial/interglacial cycles, cold water corals, coastal sedimentary processes in Indonesia, mud volcanoes and various other subjects. During these research projects he became more and more involved, (and interested) into acoustic methods in ocean research. Presently he is a member of the National Marine Facilities group which forms part of the Royal Netherlands Institute for Sea Research. Within this group he is responsible for advising potential users of acoustic equipment, help with data collection, data processing and data interpretation.



#### John Hughes Clarke

John Hughes Clarke is a professor at the Center for Coastal and Ocean Mapping at UNH. He has worked with EM systems since 1991, originally at UNB in Canada until moving to the US in 2015. His primary interest is in resolving seabed sediment transport, through monitoring both morphological and backscatter strength change.



#### Leonardo Figueroa

Leonardo has over 10 years of experience in Marine Sciences. He holds a degree in Geological Engineering and a master's in marine sciences and limnology. His work has involved projects such as characterizing and identifying underwater bubble emissions in the Gulf of California, utilizing bathymetric and water column data acquired through Kongsberg's EM series deepwater multibeam systems, as well as sub-bottom profiler data acquired using the Topas system. In 2014, Leonardo began his journey at Kongsberg as a Service Engineer, engaging in numerous installation, maintenance, support, and training projects within the region. Currently, he leads the Kongsberg Discovery Customer Support team for Latin America, comprised of an excellent group of professionals dedicated to customer assistance.



#### Julian Le Deunf

Julian Le Deunf joined the ENSTA Bretagne engineering school in 2011 and followed the Hydrography & Oceanography curriculum, a high level training and accredited by the IHO category A. Graduated in 2015, he is hired at Shom as a military hydrographic engineer and embarks on the ships of the French Navy to lead hydrographic surveys. Doctor in computer science on topic : bathymetric data processing via Al approaches.



#### **Kevin Jerram**

Kevin Jerram works with research vessels around the world to assess their multibeam mapping system performance and improve data quality.



#### **Kevin Mackay**

Kevin Mackay is a Marine Geologist based at the National Institute of Water and Atmospheric Research (NIWA) in New Zealand, where he currently has the role of NIWA Marine Data Manager. His work focuses on the management of marine data including bathymetry, oceanography and marine biology. For over 25 years Kevin has worked on the collection, processing and management of bathymetric data and has been involved in more than 20 expeditions, ranging from the tropical Pacific to the Ross Sea in Antarctica. Over this time, he has authored 15 bathymetric charts and maps. Kevin is the Head of The Nippon Foundation-GEBCO Seabed 2030 South & West Pacific Data Center, the New Zealand delegate for the UNESCO-IOC International Oceanographic data and Information Exchange (IODE) Committee and is a member of the GEBCO Sub-Committee on Undersea Feature Names. In 2017 Kevin was presented with an Award of Merit for Scientific and Technical Achievement from the Australasian Hydrographic Society.



#### Larry Mayer

Larry Mayer is a Professor and Director of The Center for Coastal and Ocean Mapping at the University of New Hampshire. He received a Ph.D. from Scripps Institution of Oceanography and, after being selected as an astronaut candidate finalist for NASA's first class of mission specialists, went to the University of Rhode Island where he worked on the development of the Chirp Sonar. In 2000 Larry became the founding director of the CCOM. Larry has spent nearly 80 months at sea. He is the recipient of the Keen Medal for Marine Geology, an Honorary Doctorate from the University of Stockholm, was a member of the President's Panel on Ocean Exploration and chaired several National Academy of Sciences studies. He was appointed by President Obama to the Arctic Research Commission in 2016, was elected to the Hydrographic Society of America Hall of Fame in 2017, to the National Academy of Engineering in 2018 and to the Royal Swedish Academy of Sciences in 2019. In 2020 Larry became the first recipient of the Walter Munk Medal and was elected a Fellow of the American Geophysical Union. In 2021 he was elected to the Norwegian Scientific Academy for Polar Research and in 2022 received the Sam Masry Prize from the Canadian Hydrographic Association. Larry's current research deals with sonar imaging and remote characterization of the seafloor as well as advanced applications of 3-D visualization to ocean mapping problems and applications of mapping to Law of the Sea issues, particularly in the Arctic.



#### Luciano Emídio Fonseca

Prof. Luciano E. Fonseca has a PhD in Ocean Engineering at the "University of New Hampshire - UNH", USA (2001). He is Associate Professor in Electronic Engineering at the University of Brasília (2012-present) ; He was a Visiting Professor in Underwater Acoustics at the "Institut Français de Recherche pour l'Exploitation de la Mer - IFREMER", France (2018-2019).



#### Marc Roche

Geologist, Scientific Advisor; since 2005, Head of the Continental Shelf Service in the Belgian Federal Public Service Economy. In charge of marine sand extraction management and control using different methods including regular bathymetric and backscatter measurements with multibeam echosounders.



#### Martin Jakobsson

Martin Jakobsson is a Professor of Marine Geology and Geophysics at Stockholm University. His research interests include the marine cryosphere, with a current focus on northern Greenland, glacial landforms and seafloor mapping. He has served as Co-Chief Scientist on nine polar expeditions and led several other sea-going mapping missions.



#### Martin Tunwell

Martin has over 15 years of experience as a hydrographic surveyor, commencing his career in the UK before relocating to Australia. Martin is currently the Chief Project Manager for Ocean Infinity Australia / New Zealand and has conducted numerous nautical charting surveys for Land Information New Zealand (LINZ) and Australia's HydroScheme Industry Partnership Programme (HIPP). Martin is a Certified Professional Hydrographic Surveyor (CPHS Level 1) and is currently a member of the Geospatial Council of Australia (GCA) Hydrography Commission and the AusSeabed Steering Committee.



#### **Neah Baechler**

Neah Baechler is a hydrographer and marine geologist specializing in deep-sea exploration mapping. After graduating from the College of Charleston BEnthic Acoustic Mapping and Sonar program in 2015, Neah was a contract hydrographer for nearly a decade, mapping for industry applications and with a variety of science-focused exploration vessels worldwide like the R/V Okeanos Explorer and E/V Nautilus. In her current position as Lead Surveyor at Saildrone Inc. Neah continues her dedication to grow the collective understanding of oceanographic processes and expand existing bathymetric maps by utilizing Saildrone's ASV technology. Neah now collects bathymetric data remotely, monitoring the quality and performance of uncrewed systems and exploring their potential within the ocean sciences.



#### **Olivier Morio**

Onboard acoustic systems expert for the French hydrographic Office, I'm in charge of MBES, SBP and VM-ADCP systems on the French Navy vessels (OHI qualification, maintenance...) Former sedimentologist, I keep working on the seafloor characterization subjets using acoustic systems (sounder calibration, geo-acoustic segmentation...)



#### Ridha Fezzani

Underwater acoustic engineer. He is in charge of the MBES data quality onboard the French Oceanographic Fleet. His research interests include MBES backscatter calibration, seafloor backscatter (BS) analysis and characterization, BS multifrequency analysis and modelling and software development.



#### Shannon Hoy

Shannon Hoy is the Expedition Coordinator Team Lead with NOAA Ocean Exploration. She has always had a love of the ocean and started going to sea as an undergraduate on numerous seafloor mapping missions. On two of these expeditions, she was a NOAA Ocean Exploration explorerin-training on NOAA Ship Okeanos Explorer! Now she leads field expeditions aboard Okeanos Explorer using a variety of tools such as multibeam sonars and remotely operated vehicles to map and explore remote and/or poorly understood areas of our ocean. When not in the field, she focuses on improving NOAA Ocean Exploration's operational efficiency and effectiveness and works to improve the pace and quality of ocean mapping as an active participant in the global mapping community. Her specialty is in deepwater ocean mapping and she received a master's degree in Earth Sciences: Ocean Mapping from the University of New Hampshire.



#### Vicki Ferrini

Dr. Vicki Ferrini is a Senior Research Scientist at Lamont-Doherty Earth Observatory (LDEO) of Columbia University, and is the inaugural LDEO Associate Director for Diversity, Equity and Inclusion. After earning an M.S. in Marine Environmental Science and a Ph.D. in Coastal Oceanography, both from Stony Brook University, she shifted to deep sea research and has been working at the intersection of global seabed mapping and geoinformatics for nearly two decades. She has dedicated her career to ensuring that data are Findable, Accessible, Interoperable and Reusable (FAIR), and is deeply committed to broadening access to marine geoscience data. Vicki leads several projects related to the management and curation of seafloor and sub-seafloor data acquired with ships and submersibles in support of the US academic research community, and she has extensive experience in all aspects of the data life cycle. She is the Associate Director of Data Strategy for the U.S. National Deep Submergence Facility and the Head of the Regional Center for the Atlantic and Indian Oceans as part of The Nippon Foundation – GEBCO Seabed 2030 Project.



#### Victor Vescovo

Victor is a private equity and venture capital investor with particularly emphasis in the aerospace, defense, electronics, and life science industries. He is an investor in Colossal Biosciences, which seeks to develop technology to de-extinct species such as the Woolly Mammoth, and is the CEO of a biotechnology company that seeks to cure incurable diseases with targeted genetic therapies. Victor received his MBA from Harvard Business School where he was named a Baker Scholar, received a Master's Degree from the Massachusetts Institute of Technology, and earned his bachelor's degree in economics from Stanford University. Additionally, Victor served 20 years in the U.S. Navy Reserve as an intelligence and targeting officer, retiring with the rank of Commander. In 2017, Victor became the 12th American to complete the "Explorer's Grand Slam" which requires climbing the highest peak on all seven of the world's continents including Mt. Everest and skiing at least 100 kilometers to the North and South Poles. He piloted the first repeated dives to the ocean's deepest point, Challenger Deep, in the Pacific's Mariana Trench -- now fifteen times, and in August 2019 became the first person to visit "The Five Deeps," the deepest point in all five of the world's oceans. Victor has personally mapped and explored the bottom of seventeen deep ocean trenches, made three dives to the Titanic including the only solo dive ever made there, and discovered and piloted surveys of the two deepest shipwrecks in history: the USS Johnston in 2021 and USS Samuel B. Roberts, at 6890 meters, in 2022. He has also named over seventy seafloor features as a result of his team's extensive oceanographic mapping efforts between 2018 and 2022. Victor is a commercially rated, multi-engine jet and helicopter pilot, a certified submersible test pilot, and has flown into space on Blue Origin's New Shepard rocket, becoming the first person in history to climb Mount Everest, dive to the bottom of the ocean, and visit space.

## Meet the team - Workshop moderators



#### Aleksander Hammernes

Having worked as a Customer support engineer, Sales Manager and Product Advisor Aleksander has extensive experience with the products In his portfolio. Installing, commissioning, servicing and supporting advanced INS & gyro systems for more than a decade has given practical insights to how customers use and trust Kongsberg products.



#### **Boris Schulze**

Started doing land surveying and Archaeometry, but quickly moved to marine surveying. Has worked many years as a freelancer doing offshore surveys, wreck hunting and data processing. Started working for ELAC Nautik in 2000 as a Systems Engineer for multibeams and other hydrographic systems and has done a few hundred multibeam installations and surveys/demos all over the world, and occasionally several surveys in extreme areas like Yellowstone Lake and the Dead Sea. Is now Sales Manager for EMEAI&APAC at Hypack, where he has been since 2017.



#### Chrispijn Scheltema

HZS Amsterdam (Hydrography/Marine Electronics) 1998 - Internship Van Oord-ACZ (VOACZ) 1999 - HAM Dredging (Thesis) 2000 - Van Oord (Dredging/Coastal Construction/Offshore) 2008 - QPS

- Laser / INS integrations (real time results)
- QPoS network (VRS/RTN/CORS)
- Support / Training / Installations
- Support Product Manager Qinsy (2014)
- Product Manager Qinsy (May-2020)



#### **Christophe Vrignaud**

Christophe Vrignaud is an Engineer for the French Ministry of Defense and works for the Shom (the French Hydrographic Office). Early in his carrier he has been focusing on fisheries acoustics, he was also in charge of onboard acoustic systems of the Som's fleet and, between 2009 and 2019, he mainly focused on multibeam systems qualification and training of surveyors. He has been conducting multiple acceptance and qualification surveys at sea. Between 2017 and 2020, he was the Chair of the Hydrographic Surveys Project Team of IHO HSSC, in order to review and update the S-44 standard. More recently, since the beginning of 2019, he's a development manager for the French Hydrographic Office in the "Strategy and Development" branch.



#### Colleen Peters

As the Product Manager for medium and deep EM systems, Colleen works on developing new features and improvements for the multibeam echo sounders. As the Product Manager for SIS, she will help continue to improve the capabilities as well as the end user's experience with the software.



#### **Espen Reinertsen**

Espen joined KONGSBERG in October 2015 as a Project Manager. He holds a MSc in Control Engineering from the Norwegian University of Science and Technology and University of California Berkeley and has 10+ years of experience from Engineering and Project Management positions in the Oil and Gas industry. The role as Product Manager started in September 2017. Since 2020 he has been heading the Naval Product Line and Business Unit in Kongsberg Discovery.



#### Johan Zegers

Started at the Maritime Institute Willem Barentsz in 2010, at the study Ocean Technology. Working for QPS since graduating, in the beginning at the Support department and travelled to various countries to help the client setting up the systems or training them in our software. Since March at the Marketing & Sales department. Owns the best dog in the world – Marley



#### Jordi Portell

Jordi (Electronics Engineering UPC 2000, Ph.D. in Applied Physics UPC 2005) has been working on data compression systems since 1999 and on efficient data handling systems since 2000. He is contributing to the Gaia space mission of ESA since 2000. As deputy technology director at the Institute of Cosmos Sciences of the UB since 2017, he is working on several projects such as Virgo, PLATO and the IEEC NewSpace program. He is author or co-author of 51 peer-reviewed journal papers, one book chapter, 39 proceedings, one patent and nearly a hundred technical notes. He has advised 3 PhD theses and 20 master theses. His research interests are focused on Gaia, data compression and massive data processing including cloud computing. He is CTO at DAPCOM Data Services since its foundation in 2013, where he is the lead FAPEC researcher and developer.



#### Jose Cordero

Jose Cordero is the Product Manager for Shallow Multibeam Systems at Kongsberg Discovery. As a naval officer and FIG/IHO cat. A hydrographer, he has more than 20 years of experience in maritime operations and marine data collection and processing for nautical charting in the global ocean. He has commanded the survey vessels "Rigel" and "Malaspina" and served at the Spanish Hydrographic Office as Project Manager and Seabed Warfare advisor. He also being deployed at the European Naval Forces HQ in the Indian Ocean and at the NATO Rapid Deployable Corps Spain. Jose holds BS and MS degrees in Naval Sciences and Ocean Mapping Engineering from the Spanish Naval College and the University of New Hampshire, respectively.



#### Kjetil Jensen

Graduated as a Maritime electrical engineer at the University of South Norway (USN) before he worked 7 years in the offshore survey business as an Offshore Surveyor, Project manager, Managing Director and HR Manager. Joined Kongsberg Maritime as a Product Manager in 2015 and has been responsible for their integrated mapping products and the EM Multibeam products before taking charge of the full portfolio of Kongsberg's Maritimes seabed mapping products in 2021.



#### Leif Bildøy

Leif is an experienced Product Leader who loves creating innovative and successful products. He has managed products from concept through launch using agile methodologies in smaller and larger organizations and has domain expertise in mobile and IoT security. Currently, Leif is Product Manager for Blue Insight, Kongsberg Discovery's ocean data management platform.



#### Leonardo Figueroa

Leonardo has over 10 years of experience in Marine Sciences. He holds a degree in Geological Engineering and a master's in marine sciences and limnology. His work has involved projects such as characterizing and identifying underwater bubble emissions in the Gulf of California, utilizing bathymetric and water column data acquired through Kongsberg's EM series deepwater multibeam systems, as well as sub-bottom profiler data acquired using the Topas system. In 2014, Leonardo began his journey at Kongsberg as a Service Engineer, engaging in numerous installation, maintenance, support, and training projects within the region. Currently, he leads the Kongsberg Discovery Customer Support team for Latin America, comprised of an excellent group of professionals dedicated to customer assistance.



#### Matthew Brennan

Matthew's hydrographic survey career started in 2007, where he worked at Subsea 7, initially offshore as a Data Processor before moving onshore as a Geomatics Specialist where he supported survey and inspection projects. In 2015 Matthew moved to EIVA as a Senior Surveyor conducting training courses, answering technical support queries, creating NaviEdit and NaviModel eLearning modules, suggesting software improvements and assisting the sales team by answering technical questions. At the moment Matthew is EIVA's UK & Ireland sales representative, supplying hardware and software to ultimately enable our customers extract the maximum value from geospatial information. In his career he has processed thousands of km's of pipeline inspection data, so understands the need for increased automation within our industry.



#### Runar André Olsen

Runar grew up on a small island in northern Norway and was born into the maritime domain. He holds a B.S. in Automation (Mechatronics) and a M.S. in Cybernetics from NTNU. He has worked as an aircraft mechanic, firefighter, fisherman, surveyor and ROV pilot. In later years he has been the Product Manager for a USV line in Maritime Robotics and lastly; Senior Sales Manager in Kongsberg Discovery - Seatex. Main area of focus is Kongsberg Inertial Navigation products with Seapath, MRU and MGC as product lines. His surveyor background and technical understanding helps bring together the Kongsberg sensors within Inertial Navigation and Ocean Technology.



#### Spencer Collins

Spencer Collins graduated from the University of Plymouth in 1993 with a BSc Honors in Hydrography and Ocean Science. Spencer started his career as a project surveyor, field testing subsea positioning hardware, software and developing survey procedures for complex offshore operations. He has spent a decade offshore as a Senior Surveyor leading subsea positioning operations from batch setting deepwater oil and gas wells, installation of pipelines, manifolds and various offshore platforms. Subsequently he has taken responsibility for managing sales and operational support offices in Rio de Janeiro, Brazil and Houston in USA. He is now living in Norway and works for Kongsberg Discovery in Horten, which hosts the factory and R&D center for subsea positioning, mapping and fisheries sonar technologies. In his free time he enjoys the outdoors, hiking, skiing and cycling.



#### **Stephen Hall**

Steve Hall, Head of Partnerships for the Nippon Foundation - GEBCO Seabed 2030 project, is a Chartered Marine Scientist, a Fellow of the Institute of Marine Engineering, Science & Technology and of the Society for Underwater Technology. He has over three decades experience on ocean science, technology and policy, including serving as vice-chair of the Intergovernmental Oceanographic Commission of UNESCO 2015-17. He was CEO of the Society for Underwater Technology, and Pembrokeshire Coastal Forum / Marine Energy Wales, and previously worked 27 years for the UK Natural Environment Research Council mainly at the National Oceanography Centre, where his roles included seagoing tracer chemical analysis during the World Ocean Circulation Experiment, managing early Autosub AUV science missions, heading the International and Strategic Partnerships Office, and writing position papers on a wide range of ocean subjects ranging from fisheries to marine autonomous systems, marine renewables and nuclear waste disposal. Steve originated the Underwater Technology podcast for SUT and has contributed to several books including 'Can a Lobster be an Archaeologist?', 'Preparing a Workforce for the New Blue Economy' and 'Exploring the Ocean'. He's now a freelance consultant working on Seabed 2030, supporting the work of marine Learned Societies and Professional Bodies, and providing advice to private and government sector clients.



#### Terje Haga Pedersen

Terje has a master in Engineering Cybernetics from the Norwegian University of Science and Technology, NTNU, in 1989. He worked six years with the Norwegian Mapping Authority and has worked 27 years with Kongsberg Discovery. He has since 2000 worked as Product Manager for Mapping Software with specific responsibility for software related to multibeam echosounders, sonar processing and visualization, and since 2023 as a Product Advisor working with the same topics.



#### Therese Mathisen

Therese has more than 30 years' experience from the hydrographic and geophysical survey industry. She has been employed by Fugro and Kongsberg, working with operations, project management, and as product manager for sub-bottom profilers and singlebeam echo sounders in Kongsberg Discovery since 2018. Therese holds a master degree in geodesy from the Norwegian University of Science and Technology (NTNU) from 1991.



#### Tor Inge Birkenes Lønmo

Tor Inge has worked with R&D at Kongsberg since 2012. He has a background in mathematics and physics and a PhD in signal processing for multibeam echosounders from the University of Oslo. His current position is Principal Engineer, with main focus on the EM Multibeams.



#### **Travis Hamilton**

Travis Hamilton is part of the product management team at Teledyne Geospatial working as the marine survey solutions product manager. His focus is on marine laser scanners and software for processing sonar and laser datasets. Prior to working with Teledyne Travis received his geomatics engineering degree from UNB and spent several years at sea working with subsea and autonomous mapping systems for offshore energy and academic applications. The sense of adventure and close-knit community are what continue to draw Travis into the hydrospatial community.



#### Yoann Ladroit

Yoann has been a fisheries scientist for the past ten years at NIWA in New Zealand, focusing on using acoustics to monitor the marine environment. His expertise lies in using water column data quantitatively from split-beam echosounders to extract ecosystem indicators. It also extends to other applications such as the quantification of gas fluxes from natural seeps or the description of oceanographic features.

### Posters

Supporting interdisciplinary research and ocean exploration using multiple resolutions of multibeam to create integrated data products for on the fly decisions and safe operations.

Author(s): Amanda Bittinger

Next-generation sub-bottom profiler (SBP-29) aboard R/V Sally Ride: A step change in marine geoscience data quality in the U.S Academic Research Fleet

Author(s): Daniel Orange, Boe Derosier, Anand Hiroji, Olaoluwa Oderinde, Charles Holland, Cody Henderson, Lee Ellett, Bruce Appelgate

Hydrocarbon Seeps in the Western Black Sea

Author(s): Buğser Tok, Yunus Can Cezairli, Ahmet Nuri Ünlü

Unlocking the full potential of AUV Hugin for advanced seafloor mapping: insights from Gullmarsfjorden (Sweden) in the Eurofleets+ AUV Workshop 2022

Author(s): David Amblas, Anna K. Wåhlin, Niklas D. Andersson, Rita Cavalinhos, Richie Enzmann, Larissa M. Cruz, Filip Stedt, Andrea G. Varzi

Grid-Based Calibration Achieves Significant Improvements in Data Quality. We need software providers to step up to add this functionality.

Author(s): Daniel "DanO" Orange

There is more to Europe than just Europe: EMODnet Caribbean bathymetry

Author(s): Henk de Haas

Research Vessel TAN KAH KEE

Author(s): Haili Wang

Seabed Mapping in Canada's Arctic Through Collaborative

Author(s): Kirk Regular

The new RV Belgica shallow water multibeam echosounder Author(s): Koen Degrendele

**Exploring coastal dynamics and ecological patterns using multibeam sonar data** Author(s): Mary Young

Where do I plan a multibeam echosounder shipboard acceptance test or quality assurance test? Author(s): Paul Johnson

**THEMACHINETHATGOESPING: Towards Pythonic (++) Processing of MBES and SBES data** Author(s): Peter Urban, Nore Praet, Thomas Vandorp, Thomas Hermans

A backscatter calibration technique for multi-sector multibeam echosounders Author(s): Rui Miguel Cândido, John Hughes Clarke

**Polar Research with The Korean Icebreaker, Araon** Author(s): Shin Dongseob

Introducing the Nippon Foundation - GEBCO Seabed 2030 Project Author(s): Stephen Hall

### **Student posters**

Using EK80 as Sub-bottom Profiler Author(s): Vicent Doñate Felip

Algorithms for real-time detection of marine gas seeps using acoustic sensors mounted on Hugin AUV Author(s): Seçkin Polat

# FEMME 2023 | Edinburgh Social program

As well as papers, presentations, workshops and exhibitions there will also be time for networking. Get to know your industry colleagues in a relaxed setting at the Icebreaker Party on the first evening, dine in style at one of the selected restaurants on Wednesday, and say good bye on the last evening with a spectacular gala dinner at the National Museum.

### Tuesday 26 September

Icebreaker party at Brewdog, 50 Lothian Rd. (One minute walk from the venue)

Dress code: Smart casual.

When: 19:00 - 23:00

- Light meal served 19-21
- Beer tasting
- Cosy informal atmosphere
- Come & go concept









## Wednesday 27 September

#### Dinners at selected restaurants

Dress code: Business casual.

You will be invited to dinner by a Kongsberg representative.



### Thursday 28 September

#### Gala dinner at the National museum

20 minutes walk from the venue. If you need bus transportation, please contact the service desk.

- **19:00:** Welcome/aperitif
- **20:00:** Dinner and entertainment
- 23:00: End of gala dinner

Dress code: Business professional.

Everyone arranges their own transport back.

This will be a spectacular event, and an evening to remember!



### Suggestions for spouse activities

Afternoon Tea at Signet Library Edinburgh's finest afternoon tea!

#### thesignetlibrary.co.uk/colonnades

Edinburgh Castle Defender of the nation.

edinburghcastle.scot

**Rosslyn Chapel** "Simply amazing and takes your breath away"

rosslynchapel.com

Hop on - Hop off City sightseeing

edinburghtour.com/citysightseeing-edinburgh-tour





kongsberg.com/discovery

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