Be inspired. Share your views.
Network with industry colleagues

CONFERENCE BROCHURE & EVENT PROGRAMME

CONTENTS

BROCHURE CONTENTS:

Hôtel Pullman Bordeaux Lac
Le Lac, Avenue Jean Gabriel Domergue,
33300 Bordeaux, France

WELCOME TO FEMME 2018

Welcome to FEMME 2018! This is the 16th Forum for the Exchange of Mutual Multibeam Experiences.

We greatly appreciate you taking time out of your busy schedule to join us and share your experiences and ideas. We have an exciting FEMME program, with in-depth presentations, papers and workshops covering a broad range of educational and inspiring topics. I trust it will spur some good discussions amongst colleagues and friends, both old and new.

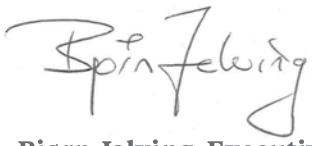
Sustainability is high on the political agenda in most countries. The way we understand and manage the oceans, water ways and lakes are significant to achieve the United Nation's 2030 sustainability goals. *Our FEMME community*, through our research and surveys, can significantly improve this understanding. Our drive to continuously push for better mapping technology will trigger new ideas and open up new avenues. Our findings can; ensure safer transportation and navigation for vessels; provide safe and efficient offshore energy production; bring clarity to the ocean crust's resources and geohazards; and improve understanding of food resources.

The governments, research institutes and commercial organizations we represent see the strength and possibilities in what we can achieve individually and by working together. Our mutual experiences in research, surveys, and monitoring matters!

For Kongsberg Maritime this is an event that we really look forward to. We hope FEMME 2018 gives you an opportunity to network and have enriching discussions with like-minded colleagues and partners from around the world. Innovation is core to Kongsberg Maritime and your input and feedback is vital to this process. Together we can continue to improve mapping solutions.

Be inspired. Share your views. Network with industry colleagues. Enjoy FEMME 2018!

Kind regards,



Bjørn Jalving, Executive Vice President
Kongsberg Maritime Subsea

FEMME 2018 | BORDEAUX

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 papers.

FEMME 2018 - KONGSBERG MARITIME'S 16TH FORUM FOR EM® 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 exhibitions.

FEMME through the years







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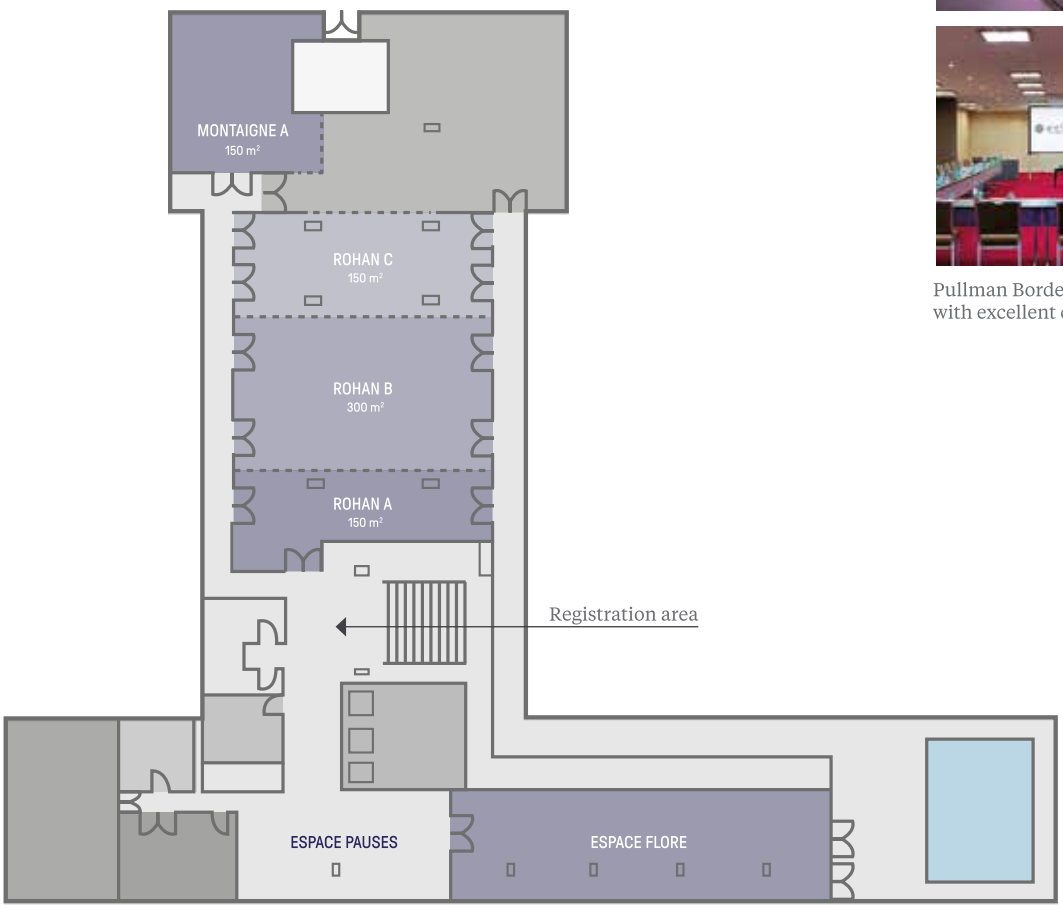
FEMME 2018 is being held at the Pullman Hotel in Bordeaux; the sixth largest city in France famous for it's Bordeaux wine and historic city. Part of the city is on the UNESCO World Heritage List as an 'outstanding urban and architectural ensemble' of the 18th century.

REGISTRATION

Registration opens Tuesday 11 September at 11:00am, and will continue throughout the evening in conference room area Espace Pauses (shown on the floor plan below)

Pullman Bordeaux Lac: A 4-star hotel with excellent conference facilities.

A floor plan of the conference area



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We are proud to be supported by our Third Party Exhibitors at FEMME 2018. In line with our KONGSBERG products, each exhibitor will have a stand located in Espace Pauses, and will be exhibiting throughout the conference.

AML

AML Oceanographic provides ocean sensing solutions for hydrographic, environmental, and research applications. Supported by over 40 years of experience, we help our customers simplify their operations. With the world's only automated real-time underway profiler, Moving Vessel Profiler (MVP), we have helped survey organizations around the world remove technical and financial unpredictability from their operations. AML's SVP, CTD, and multiparameter sondes provide flexibility and convenience without sacrificing performance, making them the instrumentation of choice for hundreds of organizations.
amloceanographic.com

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

TELEDYNE CARIS

For 35 years, CARIS™ software has been the number one choice of hydrographic offices. The trusted CARIS HIPS and SIPS™ software works seamlessly with the full range of Kongsberg sonars and provides direct integration into chart production and GIS workflows. Find out more about the CARIS Ping-to-Chart™ solution by visiting:
teledyne-caris.com

QPS

Quality Positioning Services BV (QPS), headquartered in Zeist, The Netherlands, is an independent software design company founded in 1986. QPS provides turnkey software solutions for the hydrographic and maritime industry. The key technology of QPS is based on precise navigation, the collection and presentation of large volumes of navigation and depth data. This also includes new techniques for 3D visualization of the underwater environment. QPS navigation and positioning software is used on board offshore construction vessels, pipe-lay barges, drilling rigs, seismic research vessels and hydrographic survey vessels.
www.qps.nl

VALEPORT

Valeport manufacture products for measurement of Sound Velocity, Tide and Bathymetry. We are pleased to introduce our latest development the SWiFT SVP. This new compact unit features Sound Velocity, Pressure, Temperature, Salinity & Density measurement, plus integral GPS, re-chargeable battery and LED status indications for GPS, battery and communications.
www.qps.nl

KONGSBERG

BATHYMETRIC COMPETITION

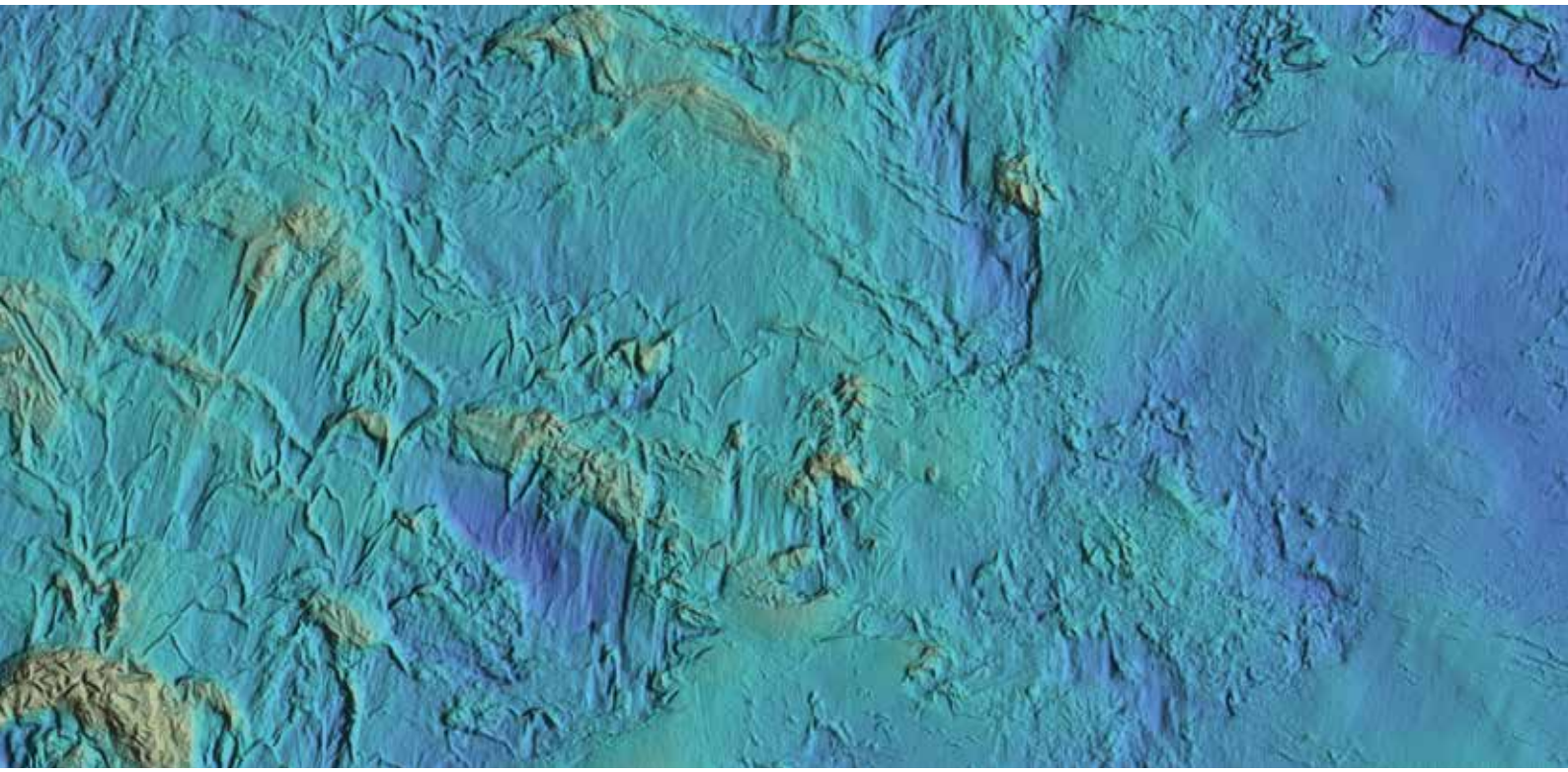

IMAGE: Winner of the 2017 competition. ‘Glacier Activity’ by Øyvind Tappel | Kongsberg product: EM® 712

We are pleased to announce that our bathymetric image contest is now open

To enter, simply send us a bathymetric image or video taken using any KONGSBERG bathymetric equipment. We were blown away by the number and quality of entries to the 2017 competition, and we can’t wait to see what exciting images will be submitted by our customers this year!

The winning image will receive a GoPro camera, and the two runner up images will receive a set of speakers. As with previous years, the 12 best contributions will be included in the official Kongsberg 2018 Underwater Mapping calendar.

For more information and to enter, visit:
http://kmcompetition.com

The workshops will be running throughout the afternoon of Tuesday 11 September and the morning of Friday 14 September. For more details on the timings see pages 10 & 15. Below you can find a summary of what you can expect to learn at each workshop.

WORKSHOP 1

SIS 5, K-CONTROLLER AND NEW DATAGRAM FORMAT

SIS 5 has been redesigned to give improved user experience. Support of the next generation logging format, .kmall, gives a very easy interface to the EM-data. This format is well defined and described, and the files can be read using simple tools, like Python.

Multiple EM-systems can be controlled from one SIS, and together with the Remote Operation setup this allows one operator to control several vessels remotely. Third party software vendors will find it easy to connect to EM-systems as the K-controller software is now available as a separate option. The EM-system is now set up and controlled by K-controller while the results (terrain models) can be produced by 3rd party applications.

This workshop demonstrates how the process works.

Led by: Terje Haga Pedersen | Product Manager - Bathymetric Software

Tuesday 11 September 12:00 1 hour 30 min

WORKSHOP 2

EM® PRODUCT RANGE

This workshop will present our current EM product range as well as our EM legacy products. We will look at current and future development, and the floor will be open for discussion regarding customer needs and wants from EM systems in the future. A look at available upgrade programs as well as known issues and what we are doing about them will also be part of this workshop.

Led by: Sverre Tetlie | Product Line Manager & Kjetil Jensen | Product Manager - Multibeam

Tuesday 11 September 12:00 1 hour 30 min

WORKSHOP 3

BEST PRACTICE USE OF PORTABLE HYDROGRAPHIC SYSTEMS

This workshop will focus on best practise for setting up an EM 2040 PHS.

We will share our experiences and insights regarding installation, software setup, survey and post processing with use of delayed heave and correctional services. This will be an interactive workshop where users of EM systems are encouraged to share their experiences with setting up survey spreads, surveying under different conditions and performing post processing of EM system data.

Led by: Kjetil Jensen | Product Manager - Multibeam

Tuesday 11 September 13:45 1 hour 30 min

WORKSHOP 4

HISAS

This workshop will introduce the HISAS product family on Kongsberg and Hydroid platforms, hereunder HUGIN, MUNIN and REMUS. There will also be presentations of the sonar systems:

HISAS 1032
HISAS 2040
Cassandra

The workshop will also touch on the basic principles of SAS, survey planning, performance and data products.

We will present high-resolution data from recent deliveries and prospects for the product line.

Led by: Espen Reinertsen | Product Manager - Synthetic Aperture Sonar

Tuesday 11 September 13:45 1 hour 30 min

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33300 Bordeaux, France

WORKSHOP 5

MAPPING CLOUD - VISUALIZE, ANALYZE AND SHARE MULTIBEAM DATA IN REAL-TIME

Today's workflow is structured around collecting data offshore, then processing and analysing data once the vessel is docked. This imposes limitations to data collection and use of resources in general. To eliminate some of these limitations, we introduced the cloud based platform and open ecosystem Kognifai.

Thanks to Kognifai, data from multibeam echosounders and other sensors can be stored in a secure environment for later use. The data can then be processed in near real-time and made available for immediate distribution. Consequently, various 'products' can be produced by combining sonar data with data from other sources to provide the end-user with a complete understanding of the mapped environment. Available to everyone with granted access - anywhere in the world - this enables true remote control of an ongoing operation and access to results from previous operations.

Led by: Sverre Tetlie | Product Line Manager

Tuesday 11 September 15:30 1 hour 30 min

WORKSHOP 6 & 10

SEABED IMAGE AND BACKSCATTER CALIBRATION

This workshop will focus on the workflow of getting your EM Multibeam system backscatter calibrated.

We will demonstrate the process, and show before and after results of BS calibration. Further, we will explain the benefits and limitations of calibrating your EM Multibeam.

Led by: Kjell E. Nilsen | Principal Engineer, MPC & Kjetil Jensen | Product Manager - Multibeam

Tuesday 11 September 15:30 1 hour 30 min

WORKSHOP 7

SEAPATH, MOTION REFERENCE UNIT (MRU) & MARITIME BROADBAND RADIO (MBR)

PART 1: Extending INS functionality – Tests on the River Regnitz in the City of Bamberg, Germany: How Cooperation between End User and Manufacturer Improves Overall Functionality.

Over the last 20 years the Seapath GNSS/INS family have set the standard for position and attitude performance. In cooperation with a wide customer base, and their request for new and improved functionality, we have continued to develop the Seapath family. We have seen from earlier data that the end user struggled with GNSS outage when passing under bridges. The cooperation between the end user and manufacturer in this case gives an overall performance gain for all surveys needing accurate data when passing under bridges. The recent release of new INS sensors (MGC and miniMRU) gives new opportunities in combination and utilization of the sensors. In this paper we will look in to the challenges related to passages of bridges and how the performance can be improved.

Led by: Aleksander Hammernes | Technical Advisor

PART 2: Maritime Broadband Radio – Expanding Operations Over the Horizon.

Maritime autonomy platforms are generally intended for the acquisition of data from many sensors to be used together to inform decision makers, either in real-time or post-mission.

The simplicity of network interfacing across multiple platforms, already in wide use among sensor manufacturers on a single platform, allows for the shared use of real-time data to expand autonomous operations. In the development of multiple platform operations, current telemetry methods are limited by range, bandwidth, and cost. In this workshop we present examples illustrating the potential of a phased array smart antenna to maximize coordination amongst manned, semi-autonomous, and fully autonomous platforms. Utilizing a flexible, long-range, high bandwidth solution empowers integrators and end-users to expand the capabilities of their platforms in single or multiple operational modes.

Led by: Vegard Haugen | Sales Manager

Friday 14 September 09:00 2 hours

WORKSHOP 8

UNMANNED HYDROGRAPHIC SYSTEMS

This workshop will discuss the capabilities and run through a case study conducted by Kongsberg Maritime's MUNIN AUV system.

The workshop includes an overview of AUV systems and their capabilities, followed by a walk-through of the processing chain for generating an AUV data set. Specifically we will discuss navigation and positioning, sensor payload data processing and data visualisation.

Led by: Richard Mills | Director of Sales - Marine Robotics and Solutions & Craig Wallace | Marine Robotics Business Manager

Friday 14 September 09:00 2 hours

WORKSHOP 9

SUB-BOTTOM PROFILERS FROM KONGSBERG MARITIME

The session will focus on the families of Sub Bottom Profilers delivered by Kongsberg Maritime. This includes EA, GeoPulse, SBP29/27 and TOPAS systems.

Led by: Sverre Tetlie | Product Line Manager and Paul Ellis | Product Specialist

Friday 14 September 11:15 1 hour 45 min

WORKSHOP 10

As workshop 6, see above

SEABED IMAGE AND BACKSCATTER CALIBRATION

Friday 14 September 11:15 1 hour 45 min

TUESDAY 11 SEPTEMBER

Note: The papers and speakers are subject to change at short notice

WORKSHOPS

TIME	WORKSHOP 1	WORKSHOP 2	WORKSHOP 3	WORKSHOP 4	WORKSHOP 5	WORKSHOP 6
12:00 - 13:30	⚙	⚙				
13:45 - 15:15			⚙	⚙		
15:30 - 17:00					⚙	⚙

Workshop 1 - SIS 5, K-Controller and new datagram format
Terje Haga Pedersen

Workshop 2 - EM Product Range
Sverre Tetlie / Kjetil Jensen

Workshop 3 - Best Practice Use of Portable Hydrographic Systems
Kjetil Jensen

Workshop 4 - HISAS
Espen Reinertsen

Workshop 5 - Mapping Cloud, Data Storage and Processing
Sverre Tetlie

Workshop 6 - Seabed Image and Backscatter Calibration
Kjell E. Nilsen & Kjetil Jensen

EVENING AND SOCIAL EVENT

ICEBREAKER PARTY - THE PULLMAN HOTEL
When: Tuesday 11 September, 19:00 - 23:00
Meet: Pullman Hotel lobby
Dress : Business casual

Hôtel Pullman Bordeaux Lac
Le Lac, Avenue Jean Gabriel Domergue,
33300 Bordeaux, France

WEDNESDAY
12
SEPTEMBER

Note: The papers and speakers are subject to change at short notice

WELCOME TO FEMME - OFFICIAL OPENING

TIME	AGENDA
08:25	**CONFERENCE OPENING AND WELCOME** Bjørn Jalving, Kongsberg Maritime
08:30	**OPENING ADDRESS** Monsieur Bruno Frachon - Chief Hydrographer of France | Service Hydrographique et Océanographique de la Marine - SHOM
08:50	**VIDEO** Dr. Mathias Jonas - Secretary General | International Hydrographic organization (IHO)
09:00	**TRENDS IN OCEAN MAPPING** Bjørn Jalving, Kongsberg Maritime
09:25	COFFEE BREAK (20 minutes)

SESSION 1 - SEABED MAPPING

TIME	PAPER TITLE	SPEAKER / AUTHOR
09:45	**Seabed 2030 - Building a Global Ocean Map through International Collaboration**	Speaker: Vicki Ferrini | Columbia University's Lamont-Doherty Earth Observatory Authors: V. Ferrini, S.Bindra, B.Dorschell, M.Jakobsson, G.Lamarche, L.Mayer, H.Snaith, P.Weatherall
10:10	**Learnings and recommendations from the 950,000km2 Gulf of Mexico deep water mapping survey comparing 30khz and 12khz systems**	Speaker: Dan Orange | ONE (Oro Negro Exploration LLC) Authors: Orange D.L., Decker J., Teas P. A.
10:35	**The evolution of multibeam; From simple echo sounders to complex devices for multi-purpose, multi spectral, multi dimensional, cross disciplines studies**	Speaker: Fabio Sacchetti | Irish Marine Institute Authors: Sacchetti F.
11:00	**Integration of the new EM 304 on RV Thalassa**	Speaker: Brieuc Crénan | IFREMER Authors: Crénan B.
11:25	**First results of EM 304 sea trials on board RV Thalassa**	Speaker: Jean-Marie Augustin | IFREMER DFO/ NSE/ASTI Authors: Augustin J.M (IFREMER DFO/NSE/ASTI) and Bisquay H. (GENAVIR DEC/QAE)
12:15	LUNCH BREAK (60 minutes)	

WEDNESDAY 12 SEPTEMBER

Note: The papers and speakers are subject to change at short notice

SESSION 2 - OCEANOGRAPHY

TIME	PAPER TITLE	SPEAKER / AUTHOR
13:15	**Monitoring the direct impact of sand extraction on the bathy-morphology and the seabed sediment in the Belgian part of the North Sea. Lessons of fifteen years of MBES measurements.**	Speakers: Marc Roche & Koen Degrendele | Federal Public Service Economy of Belgium Authors: Roche M., Degrendele K.
13:40	**Multibeam water column imaging - a "sound" tool for ocean biomass assessment**	Speaker: Wilhelm Weinrebe | GEOMAR Authors: Weinrebe W
14:05	**Analysis of the radiated sound field of deep water multibeam echo sounders using an underwater hydrophone array.**	Speaker: Michael J. Smith |CCOM / University of New Hampshire Authors: Smith M.J., Weber T.C., Mayer L.A., Lyons A.P., Schmidt V.E., (CCOM / UNH), Lurton X. (IFREMER)
14:30	**Quantifying the impact of Internal Wave activity on multibeam bathymetry.**	Speaker: John Hughes Clarke | CCOM / University of New Hampshire Authors: Clarke J. H.
14:55	**Improved sound speed control through remotely detecting thermocline undulations**	Speaker: Jose Cordero | Instituto Hidrografico dela Marina, Spain. Authors: J. Cordero (Instituto Hidrografico de la Marina), J.H.Clarke University of New Hampshire
15:20	COFFEE BREAK (20 minutes)	

SESSION 3 - BACKSCATTER

TIME	PAPER TITLE	SPEAKER / AUTHOR
15:40	**Backscatter calibration for MBES**	Speaker: Julian Le Deunf | SHOM Authors: Deunf J Le., Vrignaud C. (SHOM), Lurton X, Berger L., Augustin J.M (IFREMER)
16:05	**Interest of multibeam echosounder calibration for seafloor backscatter measurements: a case study and a practical methodology**	Speaker: Xavier Lurton | IFREMER Authors: Lurton X., Augustin J.M., Berger L., Fezzani R., Bouffant N. Le
16:30	**Comparing seafloor backscatter from an EM 302 MBES and a 45°-tilted EK60 split-beam SBES: Is cross calibration a valid method?**	Speaker: Arne Pallentin |National Institute of Water and Atmospheric Research (NIWA) Authors: Pallentin A., Ladroit Y., Lamarche G.
16:55	**Exploring Field Backscatter Calibration for Kongsberg EM 2040 Systems**	Shelley Devereaux | NOAA Office of Coast Survey Authors: Devereaux S.
17:20	**Unambiguous Radiation Pattern Extraction Method and its Application for Multisector Multibeam Sonars**	Speaker: Anand D. Hiroji | HSRC/University of Southern Mississippi Authors: Hiroji Anand D. (HSRC/USM), Clarke J.H.(CCOM/UNH)
17:30	DAY CLOSED	

EVENING AND SOCIAL EVENT

DINNER PARTY AT LA BRASSERIE BORDELAISE
When: Wednesday 12 September, 20:00
Meet: La Brasserie Bordelaise | 50 rue Saint-Rémi 33000 Bordeaux, France | Phone +33 5 57 87 11 91
Dress : Business casual

Hôtel Pullman Bordeaux Lac
Le Lac, Avenue Jean Gabriel Domergue,
33300 Bordeaux, France

Note: The papers and speakers are subject to change at short notice

SESSION 4 - DATA QUALITY ASSURANCE

TIME	PAPER TITLE	SPEAKER / AUTHOR
08:30	**Multibeam Advisory Committee (MAC): Looking back on 7 years of multibeam echo sounder system acceptance testing and quality assurance visits for the ships of the U.S. Academic Fleet**	Speaker: Paul Johnson | CCOM / University of New Hampshire Authors: Johnson P. (CCOM/UNH), Ferrini V. (Columbia University's Lamont-Doherty Earth Observatory), Jerram K. (CCOM/UNH)
08:55	**Multibeam Data Quality assurance at Genavir**	Speaker: Hervé Bisquay | GENAVIR Authors: Bisquay H., K.A. Michaux, P. Viollette
09:20	**Operation of an EM 2040P aboard a Global C-Worker 4 ASV**	Speaker: Val Schmidt | CCOM / University of New Hampshire Authors: V. Schmidt | CCOM / University of New Hampshire
09:45	**Towards an improved, quantifiable, and efficient method for hydrocarbon plume localization on the deep seafloor with EM 122 and EM 302 multibeam echosounders from Deepwater High-Resolution Seep Hunting – Understanding the Limits and Tradeoffs between Multibeam Mapping Coverage and Data Quality**	Speaker: Garret A. Mitchell | Fugro USA Marine, Inc Authors: Mitchell G.A.
10:10	COFFEE BREAK (20 minutes)	

SESSION 5 - INSPECTION SURVEY

TIME	PAPER TITLE	SPEAKER / AUTHOR
10:30	**(1) BGR HOMESIDE – An EM 2040 based deep towed multibeam echo sounder** **(2) Imaging of non-gas hydrothermal plumes in the water column using a deep-towed EM 2040: examples from the Indian Ocean**	Speakers: Ralf Freitag (1) Henning Wedemeyer (2) The German Federal Institute for Geosciences and Natural Resources - BGR Authors: Wedemeyer H. (1), Freitag R. (2)
11:00	**Applying AUV for regional seabed and habitat mapping, coral damage assessment and location of toxic waste - experiences from the Norwegian seabed mapping program MAREANO**	Speaker: Terje Thorsnes | Geological Survey of Norway Authors: Thorsnes T. and the MAREANO team
11:25	**PSA Dry Quay Wall Construction - Panama**	Speaker: Steven Bontekoe |Jan De Nul N.V Authors: Bontekoe S., Winne J. De, Evenepoel J.
11:50	**First sea trials with EM 2040 multibeam sounder innovative integration on Hybrid ROV Ariane**	Speaker: Lucie Somaglino | IFREMER Authors: Somaglino L., Jaussaud P., Piasco R., Raugel E.
12:15	LUNCH (60 mins)	
13:15	**PHOTO SESSION (30 mins)**	

THURSDAY 13 SEPTEMBER

Note: The papers and speakers are subject to change at short notice

SESSION 6 - SEABED MAPPING

TIME	PAPER TITLE	SPEAKER / AUTHOR
13:45	**EM 2040P – MBES Portable solution in Pacific remote areas**	Speaker: Christophe Vrignaud | SHOM Authors: Vrignaud C, Deunf J. le, Gléau M. le
14:10	**Quantitative geomorphology based on multibeam bathymetry - insights from the new seafloor mapping of the Israeli Exclusive Economic Zone**	Speaker: Mor Kanari | Israel Oceanographic & Limnological Research Authors: Kanari M., Ketter T., Tibor G., Hall JK., Lang, G. and Schattner U.
14:35	**The ultra-high resolution mapping of tidal channels in the Venice Lagoon, Italy**	Speaker: Fantina Madricardo | CNR ISMAR Authors: Madricardo F.
15:00	**Amphibious Coastal and Nearshore Habitat Mapping Following a Massive Earthquake in Kaikōura, New Zealand**	Speaker: David Donohue | Ixblue Authors: Donohue D.
15:25	**Surveying coastal waters in the Caribbean with a deep water multibeam - Initial results**	Speaker: Henk de Haas | NIOZ Royal Netherlands Institute for Sea Research Authors: Haas H. de
15:50	**The use of multiple AUV's for efficient seabed mapping**	Speaker: Jan Arvid Ingulfsen | Swire Seabed and Ocean Infinity Authors: Ingulfsen J.
16:15	**CONFERENCE CLOSING - Bjørn Jalving | Kongsberg Maritime**	

EVENING AND SOCIAL EVENT

GALA DINNER - CHÂTEAU SMITH HAUT LAFITTE

When: Thursday 13 September, 18:00 - 00:30
Meet: Hotel Pullman lobby
The guests will be taken by bus to the Château at 18:00
The return bus departs from the Château at 00:30
Dress : Formal

Hôtel Pullman Bordeaux Lac
Le Lac, Avenue Jean Gabriel Domergue,
33300 Bordeaux, France

FRIDAY
14
SEPTEMBER

Note: The papers and speakers are subject to change at short notice

WORKSHOPS

TIME	WORKSHOP 7	WORKSHOP 8	WORKSHOP 9	WORKSHOP 10
09:00 - 11:00	⚙	⚙		
11:15 - 13:00			⚙	⚙

Workshop 7 - Seapath, MRU and MBR
Aleksander Hammernes & Vegard Haugen

Workshop 8 - Unmanned Hydrographic Systems
Richard Mills & Craig Wallace

Workshop 9 - Sub-Bottom Profilers from Kongsberg Maritime
Sverre Tetlie

Workshop 10 - Seabed Image and Backscatter Calibration
Kjell E. Nilsen & Kjetil Jensen

POSTER PAPERS

High-performance multibeam water column data compression: Tests on EM 710, EM 302 and EM 2040 data
Author: Jordi Portell | HafenCity University, Hamburg

We will present a tool for simulating MBES surveys. Due to the high cost in development, prototyping and testing new sonar designs and concepts, it is imperative to perform realistic simulations of the sonar setup. The solution proposed here models the wave-field emitted by all kind of array geometry with arbitrary choice of pulse shape.
Author: Antoine Blachet | University of Oslo

A new multidisciplinary research vessel to replace the RV A962 Belgica
Author: Reinhilde Van den Branden | RBINS - OD Nature

4D Multi-Sensor Visualisation
Author: Frances Cooke | CSIRO

Temporal variability of sea-bed morphology: insights from 20 years of multibeam surveying near New York
Author: Roger Flood | Stony Brook University, New York

Research Projects in HafenCity University Hamburg
Author: Dilip Adhikari | HafenCity University, Hamburg

Monitoring sediment transportation along the israeli continental shelf using high resolution multibeam data
Author: Asaf Giladi | Affiliation:Department of Marine Geology and Coastal Processes, National Institute for Oceanography, Israel Oceanographic and Limnological Research
Co-authors: M Kanari, T. Ketter, T. Katz and G. Tibor

Innovative Cloud Technologies for global ocean exploration. The GEBCO-NF Alumni concept for the Shell Ocean Discovery XPRIZE competition and NF-GEBCO SeaBed 2030
Author: Christina Franco de Lacerda | GEBCO and Tomer Ketter GEBCO NF

Bathymetric Studies of the Mexican Subduction Zone Using Kongsberg MultiBeam Systems: Northern Zone
Author: William Bandy | Universidad nacional Autonoma de Mexico

Bathymetric Studies of the Mexican Subduction Zone Using Kongsberg MultiBeam Systems: Southern Zone
Author: Carlos Mortera Gutiérrez | Universidad nacional Autonoma de Mexico

PAPER 1.1: SEABED 2020 - BUILDING A GLOBAL OCEAN MAP

Speaker: Vicki Ferrini | Columbia University's Lamont-Doherty Earth Observatory
Authors: V. Ferrini, S. Bindra, B. Dorschell, M. Jakobsson, G. Lamarche, L. Mayer, H. Snaith, P. Weatherall
Wednesday 12 September, 09:45

The Nippon Foundation – GEBCO Seabed 2030 Project seeks to create a comprehensive map of world ocean bathymetry by the year 2030. The project aspires to empower the world to make policy decisions, use the ocean sustainably, and undertake scientific research that is informed by a detailed understanding of the World Ocean floor.

Seabed 2030 is a truly global challenge. International coordination, capacity building and partnerships are fundamental to ensuring that existing data are shared, that new and emerging technology is utilized, and that mapping campaigns are coordinated to efficiently 'map the gaps.' This presentation will describe the goals and strategy of Seabed 2030 as well as progress to date.

PAPER 1.2: LEARNINGS AND RECOMMENDATIONS FROM THE 950,000KM² GULF OF MEXICO DEEP WATER MAPPING SURVEY COMPARING 30KHZ AND 12KHZ SYSTEMS

Speaker: Dan Orange | ONE (Oro Negro Exploration LLC)
Authors: Orange D.L., Decker J., Teas P.A., Pryne D., Mitchell G., Gharib J.
Wednesday 12 September, 10:10

We will present data acquired with 30 kHz (EM 302) and 12 kHz (EM 122) multibeam systems in the Mexican and US Gulf of Mexico as part of TGS' "Gigante" and "Otos" multi-client programs. In total, 950,000km2 of multibeam data were acquired, with ~1500 6m piston cores, 145 Jumbo Piston Cores (JPCs), and 145 heat flow stations.

(JPCs), and 145 heat flow stations. We will present and compare data acquired with both 12 and 30 kHz systems, and will discuss observable differences between the two different frequencies over the same seafloor, and backscatter variations for a single frequency (same vessel). USBL-positioned 6m piston cores, and 20m Jumbo Piston Cores (JPCs) were acquired to ground-truth the features interpreted from MBES data. The Gigante and Otos data are binned at 15m, independent of water depth, with a backscatter pixel of 5m. The data allow interpretation of geologic features that have relief of <0.1% of water depth. We attribute the exceptional data quality to a calibration approach that optimizes precision over accuracy, obtained using a grid-based calibration approach (Orange, 2017), and to high quality normalization of all 3 vessel's backscatter (including multiple modes for each vessel). Complimentary to the backscatter data are the water column data and corresponding anomalies. Water column anomalies aided in the interpretation of geologic features as well as contrasting differences between the 30 and 12 kHz systems; we also identified artifacts in the water column data.

PAPER 1.3: THE EVOLUTION OF MULTIBEAM; FROM SIMPLE ECHOSOUNDERS TO COMPLEX DEVICES FOR MULTIPURPOSE, MULTI SPECTRAL, MULTI DIMENSIONAL, CROSS DISCIPLINES STUDIES

Speaker: Fabio Sacchetti | Irish Marine Institute
Authors: Sacchetti F.
Wednesday 12 September, 10:35

In the last 3 decades, multibeam echo sounders (MBES) have evolved from relatively simple devices just able to resolve water depths, to advanced systems, used across an increasing number of scientific and engineering disciplines, to address many complex and practical problems.

This paper will discuss how multibeam technology is used within the Irish Marine Institute to carry out routine hydrographic survey for the national mapping program (INFOMAR) but also to support a wealth of other less conventional applications from archaeology to fisheries, geotechnical to marine biology and oceanography.

PAPER 1.4: INTEGRATION OF THE NEW EM 304 ON RV THALASSA

Speaker: Brieuc Crénan | IFREMER
Authors: Crénan B.
Wednesday 12 September, 11:00

All MBES installations look the same but are all different, this is a presentation of all work done around the multibeam installation on RV Thalassa in summer 2017.

PAPER 1.5: FIRST RESULTS OF EM 304 SEA TRIALS ON BOARD RV THALASSA

Speaker: Jean-Marie Augustin | IFREMER DFO/NSE/ASTI
Authors: Augustin J.M (IFREMER DFO/NSE/ASTI) and Bisquay H. (GENAVIR DEC/QAE)
Wednesday 12 September, 11:25

RV Thalassa has been recently modernized and equipped with a new set of sensors for geoscience and physical oceanography, extending her previous specialization of a fisheries research vessel to all domains of ocean science. In particular, she has received two Kongsberg multibeam systems, partly transferred from RV Le Suroît (now decommissioned): an EM2040, and very noticeably the first EM304 to be put into service.

PAPER 2.1: MONITORING THE DIRECT IMPACT OF SAND EXTRACTION ON THE BATHY-MORPHOLOGY AND THE SEABED SEDIMENT IN THE BELGIAN PART OF THE NORTH SEA; LESSONS OF FIFTEEN YEARS OF MBES MEASUREMENTS

Speakers: Marc Roche & Koen Degrendele | Federal Public Service Economy of Belgium
Authors: Roche M., Degrendele K.
Wednesday 12 September, 13:15

Sand is an important resource in the Belgian Part of the North Sea (BPNS). The extraction is only allowed offshore in specifically defined areas on sandbanks and only with trailing suction hopper dredgers.

Based on the precautionary principle, the extraction is limited to 5m under a reference bathymetric surface, and is closely supervised. The monitoring of the impact of the extraction on the marine environment is a legal obligation enshrined in Belgian and European legislation. Inevitably, the extraction of large volumes of sediment disturbs the seabed. The abrasion of the superficial sediment layer during dredging operations has a direct impact on the bathymetry and the seabed habitats.

PAPER 2.2: MULTIBEAM WATER COLUMN IMAGING - A SOUND TOOL FOR OCEAN BIOMASS ASSESSMENT

Speaker: Wilhelm Weinrebe | GEOMAR
Authors: Weinrebe W
Wednesday 12 September, 13:40

The water column imaging (WCI) function of current generation multibeam systems provides an efficient way to investigate large volumes of ocean water masses simultaneously to regular bathymetric mapping with only little additional effort during data acquisition.

During six research cruises of the German Federal Institute for Geosciences and Natural Resources (BGR) WCI data had been collected in the Indian Ocean along more than 20,000 km of profiles. Abundant indications of various types of marine life were nicely displayed in the data, among them schools of fish, marine mammals and layers of zooplankton. This comprehensive data set had been used for an extensive study on the distribution of marine biomass. Furthermore, as several different multibeam echosounder (EM 302, EM 122 in various configurations) had been used, an interesting comparison of system features and results could be achieved and will be presented.

PAPER 2.3: ANALYSIS OF THE RADIATED SOUND FIELD OF DEEP WATER MULTIBEAM ECHO SOUNDERS USING AN UNDERWATER HYDROPHONE ARRAY

Speaker: Michael J. Smith ICCOM / University of New Hampshire
Authors: Smith M.J., Weber T.C., Mayer L.A., Lyons A.P., Schmidt V.E., (CCOM / UNH), Lurton X. (IFREMER)
Wednesday 12 September, 14:05

Multibeam Echo Sounders (MBES) are tools used to collect geophysical information on both the seafloor and the water-column. Calibration of the transmit array provides direct measurements of the ensonification pattern which is necessary for precise calibration of backscatter intensity and can also provide information on how the use of the MBES contributes to localized soundscapes.

PAPER 2.4: QUANTIFYING THE IMPACT OF INTERNAL WAVE ACTIVITY ON MULTIBEAM BATHYMETRY

Speaker: John Hughes Clarke | CCOM / University of New Hampshire
Authors: Clarke J. H.
Wednesday 12 September, 14:30

PAPER 2.5: IMPROVED SOUND SPEED CONTROL THROUGH REMOTELY DETECTING THERMOCLINE UNDULATIONS

Speaker: Jose Cordero | Instituto Hidrografico dela Marina, Spain.
Authors: J. Cordero (Instituto Hidrografico de la Marina), J.H.Clarke University of New Hampshire
Wednesday 12 September, 14:55

Internal waves are a common phenomena associated with stratification developed in summer-time shallow tidal seas. From a hydrographic point of view, they result in very rapid undulations in the main velocline which, if not accounted for, will result in significant refraction errors in multibeam data. Mechanical sound speed profiling, both static and mobile, cannot sample this structure adequately. Thus an alternate means of detecting and accounting for that variability is needed.

A directional filter algorithm has been developed to try and extract the location and undulations of the scattering layer(s) from the EK60 echograms. The results of this approach are presented, particularly focusing on those periods when the correlation was poorer. This was noted to occur at dawn and dusk when the diurnal plankton migration occurred. It is recognized that area of operations is one of a relatively strong thermocline, and that the method may be less useful in more complex stratification conditions.

PAPER 3.1: BACKSCATTER CALIBRATION FOR MBES

Speaker: Julian Le Deunf | SHOM
Authors: Deunf J Le., Vrignaud C. (SHOM), Lurton X, Berger L., Augustin J.M (IFREMER)
Wednesday 12 September, 15:40

Shom, the French Hydrographic Office, uses multibeam echosounders for its bathymetric nautical products. With this bathymetric data, MBES provide also Reflectivity information, related to the seafloor characteristic, but not exclusively. Indeed, to date, it is not so simple to use raw Backscatter data to manage a seabed classification (because of the transmit frequency, pulse length, etc). This problem makes the creation of a consistent backscatter database a real challenge.

Thanks to the new generation of MBES, The Kongsberg's systems offer the opportunity to adjust the reflectivity values, using a "backscatter correction" file. Ifremer (French Research Institute for Exploitation of the Sea) and Shom, are working on a methodology to calibrate these MBES backscatter data. Within this study, the feasibility has been already proved. Furthermore, first acquisitions are on the way, to compute these calibrated "Backscatter correction" files, for all the Shom's fleet. Finally, Shom expects to release a database dedicated to normalized backscatter data, for specific products such as "seabed classification map".

The presentation will explain some elements of theory, why the calibration is relevant, what the methodology of the backscatter calibration is and how it can help us in seabed characterization.

PAPER 3.2: INTEREST OF MULTIBEAM ECHO SOUNDER CALIBRATION FOR SEAFLOOR BACKSCATTER MEASUREMENTS: A CASE STUDY AND A PRACTICAL METHODOLOGY

Speaker: Xavier Lurton | IFREMER
Authors: Lurton X., Augustin J.M., Berger L., Fezzani R., Bouffant N. Le
Wednesday 12 September, 16:05

The interpretation of seafloor backscatter is greatly improved when the data are recorded using a calibrated multibeam echo sounder (MBES). This is demonstrated by a case study: a very large dataset was logged by a calibrated MBES (Simrad ME70) and analyzed using an automated signal-based method.

Regarding absolute-level backscatter calibration, seafloor-mapping MBES cannot use the same fisheries method (sphere-target) applicable to ME70; however they can be compared locally with a calibrated same-frequency SBES over natural areas fulfilling conditions of regularity and homogeneity. This was demonstrated for an EM 2040-D on a shallow (20-m) area suitable for highfrequency MBES (>200 kHz). Absolute reflectivity was measured using calibrated fishery SBES (Simrad EK60 200 & 333 kHz) tilted at various incidence angles [0° to 60°]. Reference levels are fitted to a heuristical model of angular backscatter and compared to EM 2040 backscatter angular values. The difference, to be measured for every working mode, gives the MBES angular biases, which can be checked on SBES and MBES data obtained on different sediment types. Cross-calibration is far more practical than demanding metrology operations in controlled environment, while providing accuracy compatible with mapping/monitoring applications. It has been improved by using the wide-band SBES EK-80, and extended to lower frequencies (EM 710 and hopefully EM 304).

PAPER 3.3: COMPARING SEAFLOOR BACKSCATTER FROM AN EM 302 MBES AND A 45°-TILTED EK60 SPLIT-BEAM SBES: IS CROSS CALIBRATION A VALID METHOD?

Speaker: Arne Pallentin | National Institute of Water and Atmospheric Research (NIWA)
Authors: Pallentin A., Ladroit Y., Lamarche G.
Wednesday 12 September, 16:30

Obtaining absolute seafloor backscatter measurements from MBES is yet to be achieved. We propose an experiment using a hull-mounted, 45°-tilted, 38 kHz EK60 SBES to cross-calibrate the seafloor backscatter levels of an EM 302 MBES.

The experiment was run at various depths in Cook Strait, New Zealand, over areas used for the generation of backscatter compensation data. Reciprocal lines were run with both systems triggered using a K-Sync unit to ping interlaced. Self-comparison of the EK60 data on one same site (but different direction) showed an average difference of 0.1dB, which is within the system accuracy. EM 302 and EK60 data are usually consistent with the variability of EK–EM between lines below 1.0 dB.

Our results demonstrate that using a calibrated EK60 system gives an absolute measurement of backscatter that constitutes a valid reference for the compensation curves of a MBES. Such low-cost calibration could be undertaken systematically prior to any survey.

PAPER 3.4: EXPLORING FIELD BACKSCATTER CALIBRATION FOR KONGSBERG EM 2040 SYSTEMS

Speaker: Shelley Devereaux | NOAA Office of Coast Survey
Authors: Devereaux S.
Wednesday 12 September, 16:55

Seafloor acoustic backscatter plays a critical role in current seafloor classification methods. At NOAA's Office of Coast Survey, multibeam echosounder backscatter products are a valuable contributor to this information base. Accounting for the parameters impacting the acoustic return is critical for consistent mosaic representations of the seafloor.

Changing between acquisition parameters, such as power and pulse length, alter the resulting backscatter mosaic. While absolute calibration of these systems accounts for these parameters, we are interested in finding a practical field-based. Comparing mosaics from vessels utilizing more than one acoustic system can be a useful method in achieving relative calibration between sonars and acquisition modes.

We demonstrate this approach by establishing a patch of seafloor for a calibration standard. We tested this method by comparing mosaics, collected in different acquisition modes, of eight Kongsberg EM 2040 systems. The results were compared using cross-correlation, creating a post-processing normalization value for each sonar and acquisition setting.

PAPER 3.5: UNAMBIGUOUS RADIATION PATTERN EXTRACTION METHOD AND ITS APPLICATION FOR MULTISECTOR MULTIBEAM SONARS

Speaker: Anand D. Hiroji | HSRC/University of Southern Mississippi
Authors: Hiroji Anand D. (HSRC/USM), Clarke J.H.(CCOM/UNH)

Wednesday 12 September, 17:20

The multibeam backscatter data is being used for seafloor characterization by many organizations for a variety of applications. Recently the multispectral backscatter analysis technique has improved the details of seafloor characterization. In order to increase the confidence on the characterization, any artifacts in the backscatter data need to be removed to the maximum possible extent.

The effects like angular response of seafloor, attenuation in seawater, ensonified area computation, cause systematic artifacts in the backscatter data. For Kongsberg multibeam systems, these artifacts are minimized in real-time using simplified assumptions and many users have used post-processing approach to fine-tune the real-time corrections using then available information. A major remaining artifact in the backscatter data is the radiation pattern of the transducer. Although Kongsberg has a way to correct for this artifact in real-time by applying values in Bscorr file, there is no unambiguous method to compute these values and in most cases, the default values are used. All other methods to extract radiation pattern relies on predictions/models to estimate the average angular response of the seafloor for the test area. Also, they do not consider how different sonars (EM 2040 vs EM 302) have hardware limitations that leave different radiation pattern on the backscatter data due to different roll compensation strategies.

To address above problems an unambiguous geometrical method to extract the radiation pattern without using any models/predictions of seafloor type was previously developed and tested on different sonars (EM 2040, EM 710, EM 302). An extension to this method is developed recently which generates a new Bscorr file for the particular system which can be used to replace existing Bscorr file to correct the transmitter radiation patterns in real-time. Examples from RV Celtic Explorer, CSL Heron, NOAA ship Thomas Jefferson are presented.

PAPER 4.1: MULTIBEAM ADVISORY COMMITTEE (MAC): LOOKING BACK ON 7 YEAR OF MULTIBEAM ECHOSOUNDER SYSTEM ACCEPTANCE TESTING AND QUALITY ASSURANCE VISITS FOR THE SHIPS OF THE U.S. ACADEMIC FLEET.

Speaker: Paul Johnson | CCOM / University of New Hampshire
Authors: Johnson P. (CCOM/UNH), Ferrini V. (Columbia University's Lamont-Doherty Earth Observatory), Jerram K. (CCOM/UNH)
Thursday 13 September, 08:30

Beginning in 2011 the U.S. National Science Foundation funded the University of New Hampshire's Center for Coastal and Ocean Mapping and Lamont-Doherty Earth Observatory to coordinate the effort in standardizing the quality of multibeam echosounder (MBES) data across the U.S. academic fleet.

The fleet has 9 different ship operating institutions that manage 12 different multibeam-equipped ships that are carrying 6 different models of MBES systems. Because of the complexity of this endeavor, the Multibeam Advisory Committee (MAC) was formed to support the needs of the academic fleet's systems. This talk will look back over lessons learned during our 7-year journey.

PAPER 4.2: MULTIBEAM DATA QUALITY ASSURANCE AT GENAVIR

Speaker: Hervé Bisquay | GENAVIR
Authors: Bisquay H.
Thursday 13 September, 08:55

Although post processing data can be provided on-demand, Genavir generally delivers raw data to the scientific party. However one of its missions is to check the quality and the integrity of those data. The present paper describes the procedures and the tools that are used for this purpose.

PAPER 4.3: OPERATION OF AN EM 2040P ABOARD AN ASV GLOBAL C-WORKER 4 ASV

Speaker: Val Schmidt | Center for Coastal and Ocean Mapping / Joint Hydrographic Center
Authors: Val Schmidt
Thursday 13 September, 09:20

The Center for Coastal and Ocean Mapping owns and operates an ASV Global C-Worker 4 model Autonomous Surface Vehicle (ASV). The vehicle provides a research platform for the use of autonomous technologies for hydrographic survey and marine science.

The Bathymetric Explorer and Navigator (BEN) is powered with a 30 HP diesel jet drive and factory equipped with color and FLIR cameras, marine radar, single-beam echo-sounder and basic navigation autonomy. The Center has further equipped BEN with an Applanix POS/MV and Kongsberg EM 2040P seafloor mapping system, as well as Windows and Linux computers for sensor integration and "back-seat driver" capability. Here we present our experience integrating the EM 2040P into the vessel, our experiences thus far in survey operations at sea, ongoing efforts to increase the autonomy of the vessel and the sonar and practical survey strategies for autonomous vessels.

PAPER 4.4: TOWARDS AN IMPROVED, QUANTIFIABLE, AND EFFICIENT METHOD FOR HYDROCARBON PLUME LOCALIZATION ON THE DEEP SEAFLOOR WITH EM 122 AND EM 302 MULTIBEAM ECHOSOUNDERS FROM DEEPWATER HIGH-RESOLUTION SEEP HUNTING – UNDERSTANDING THE LIMITS AND TRADEOFFS BETWEEN MULTIBEAM MAPPING COVERAGE AND DATA QUALITY

Speaker: Garret A. Mitchell | Fugro USA Marine, Inc
Authors: Mitchell G.A.
Thursday 13 September, 09:45

Fugro's regional seep hunting surveys map over 1,000,000 km2 annually in deepwater frontier basins searching for hydrocarbon seeps for the oil and gas industry.

Multibeam echosounders (Kongsberg EM 122 and EM 302) can reliably detect seeps in water depths to over 4,000 m over 1,500 km2 of coverage per day. Characteristic acoustic seep signatures are interpretable in bathymetry, seafloor backscatter, and midwater backscatter datasets and can better resolved through optimizing the multibeam specifically for deepwater seep detection. These surveys are inherently different from traditional hydrographic multibeam surveys from an operational and scientific standpoint. Seafloor backscatter is prioritized during seep surveys and operationally there needs to be a balance between the exploratory nature of the mapping with data quality that is fit for purpose to interpret complex seafloor morphology for geochemical sampling. Using examples from Fugro's recent seep surveys acquired with Kongsberg EM 122 and EM 302 systems, we discuss the tradeoffs between spatial coverage in deepwater with interpreting subtle acoustic seep signatures that can be obscured by noise-related acquisition artifacts.

PAPER 5.1 (A): BGR HOMESIDE – A KONGSBERG EM 2040 BASED DEEP TOWED MULTIBEAM ECHO SOUNDER

Speaker: Ralf Freitag | The German Federal Institute for Geosciences and Natural Resources - BGR
Author: Wedemeyer H.

PAPER 5.1 (B): IMAGING OF NON-GAS HYDROTHERMAL PLUMES IN THE WATER COLUMN USING A DEEP-TOWED EM2040: EXAMPLES FROM THE INDIAN OCEAN

Speaker: Henning Wedemeyer | The German Federal Institute for Geosciences and Natural Resources - BGR
Author: Freitag R.

Thursday 13 September, 10:30

(5.1(A)) In 2015, the German Federal Institute for Geosciences and Natural Resources (BGR) developed the Kongsberg EM 2040 (0.7°, single RX) based deep towed multibeam echo sounder HOMESIDE, which since then is a "workhorse" of BGR's massive sulphide exploration project.

This presentation focuses on technical details and the operation of HOMESIDE. A brief technical overview will be given. It will be shown, how HOMESIDE operates during a massive sulphide exploration cruise. Operation experiences, as well as issues and improvements are topics. Precise underwater positioning e. g. is challenging with such deep towed sonar systems. An outlook on further developments (e. g. EM 2040 dual RX) will be given.

(5.1(B)) Germany holds a license from the International Seabed Authority for exploration on polymetallic sulphides in a 10.000 km2 large area in the Central Indian Ocean. In order to locate the most wanted inactive hydrothermal ore mineralisation, the hunting for active plume sites is promising as the inactive sites clustering around quite often.

We use an online deep-towed (up to 6000 m) EM2040 multibeam system to high-res image the seafloor and to retrieve backscatter signals in the water column from non-buoyant, non-gas bearing hydrothermal plumes in real-time. The system is able to image particle plumes as well as non-particle plumes composed of just warm shimmering water up to 120 m above the discharge area. The deep-towed system is introduced here and recent findings from newly discovered hydrothermal vents are presented.

PAPER 5.2: APPLYING AUV FOR REGIONAL SEABED AND HABITAT MAPPING, CORAL DAMAGE ASSESSMENT AND LOCATION OF TOXIC WASTE - EXPERIENCES FROM THE NORWEGIAN SEABED MAPPING PROGRAM MAREANO

Speaker: Terje Thorsnes | Geological Survey of Norway
Authors: Thorsnes T. and the MAREANO team

Thursday 13 September, 11:00

Emerging platforms and tools like autonomous underwater vehicles and synthetic aperture sonars provide interesting opportunities for making seabed mapping more efficient and precise. National and regional mapping programmes are tasked with mapping large areas, and survey efficiency, data quality, and resulting map confidence are important considerations when selecting the mapping strategy.

We have over a period of a few years tested a more modern approach, using an Autonomous Underwater Vehicle (AUV) as the survey platform for the collection of acoustic data (Synthetic Aperture Sonar (SAS), EM 2040 bathymetry and backscatter) and visual data (still images using a TFish colour photo system). We have chosen four applications in different settings : 1 – regional shelf-wide sediment mapping; 2 – natural gas flares and associated authigenic carbonate crust habitats; 3 – physical damage to coral reefs; 4 – investigations of dumped toxic material, like WW2 munition and – likely in the future – dumped barrels with chemical waste.

PAPER 5.3: PSA DRY QUAY WALL CONSTRUCTION - PANAMA

Speaker: Steven Bontekoe |Jan De Nul N.V
Authors: Bontekoe S., Winne J. De, Evenepoel J.
Thursday 13 September, 11:25

Jan De Nul has been involved in the construction and excavation works for the newly built PSA terminal in Panama.

The construction of an 800m long quay wall has been done “in a dry excavation pit”. The entire works have been followed up by conventional and new topographic equipment. Once the quay wall has been finalized, the construction was flooded and an EM 2040C multibeam has been used to measure the entire installation. This unique project site gave JDN survey department the opportunity to compare the results from conventional survey equipment, over laser scanners and photogrammetry to multibeam.

PAPER 5.4: FIRST SEA TRIALS WITH EM2040 MULTIBEAM SOUNDER INNOVATIVE INTEGRATION ON HYBRID ROV ARIANE

Speaker: Lucie Somaglino | IFREMER
Authors: Somaglino L., Jaussaud P., Piasco R., Raugel E.
Thursday 13 September, 11:50

PAPER 6.1: EM 2040P – MBES PORTABLE SOLUTION IN PACIFIC REMOTE AREAS

Speaker: Christophe Vrignaud | SHOM
Authors: Vrignaud C, Deunf J. le, Gléau M. le
Thursday 13 September, 13:45

The French EEZ is a large area, with approximatively 11 M sq.km. Shom, the French Hydrographic Office, has been using for many years multibeam systems in Atlantic Ocean, Indian Ocean and Mediterranean Sea, but, so far, not in remote areas located in Pacific Ocean. Until shortly, in French Polynesia and New Caledonia, surveyors used single beams and Side Scan Sonars, whereas multibeam would be far more efficient, especially in corals areas.

In 2017, Shom published a public tender to equip its Pacific survey units with the MBES capability. The specifications applied for a rugged portable system, with a long depth range, ready for tropical environment with high temperature and hygrometry. The EM 2040P, from Kongsberg-Maritime won this contract. At the very beginning, first sea tests were carried out in the Bay of Brest (Europe), before the final acceptation in Nouméa (French Polynesia) in February 2018. It was also the opportunity to test the preliminary version of SIS v5, with the new kmall data format.

The presentation is about this project: schedule, integration, results of the sea tests qualifications and operational surveys.

PAPER 6.2: QUANTITATIVE GEOMORPHOLOGY BASED ON MULTIBEAM BATHYMETRY - INSIGHTS FROM THE NEW SEAFLOOR MAPPING OF THE ISRAELI EXCLUSIVE ECONOMIC ZONE

Speaker: Mor Kanari | Israel Oceanographic & Limnological Research
Authors: Kanari M., Ketter T., Tibor G., Hall JK., Lang, G. and Schattner U.
Thursday 13 September, 14:10

We analyzed two sets of recently acquired high-resolution data from multibeam (Kongsberg EM 302 and Kongsberg EM 2040) bathymetry and Chirp sub-bottom seismic reflection in the Israeli EEZ, at the deep basin offshore Israel (water depths up to 2100 m). Semi-automatic mapping of seafloor features and seismic data interpretation yielded a quantitative morphological analysis of the seafloor and its underlying sediment with penetration depth up to ~60 m.

Results reveal morphologies of four major elements: channels, faults, folds and sediment waves, validated by seismic data. A quantitative analysis for these elements composed of spatial distribution, morphological, surface, slope and orientation analyses of these phenomena we identify two main process types, which dominate the formation of the seafloor in the Levant basin: structural and sedimentary. We present the interaction between these processes and its contribution to better understand the link between sediment deposition in deep water and its relation to the shallower parts of the basin in the shelf and slope.

PAPER 6.3: THE ULTRA HIGH RESOLUTION MAPPING OF TIDAL CHANNELS IN THE VENICE LAGOON, ITALY

Speaker: Fantina Madricardo | CNR ISMAR
Authors: Madricardo F.
Thursday 13 September, 14:35

Coastal and transitional environments change rapidly under natural and anthropogenic pressure. Their shallowness has so far prevented the use of underwater acoustics. The recently developed multibeam echosounder systems, however, achieve very high performances also in such shallow environments. In this work, we present the results of an extensive multibeam survey carried out with a Kongsberg EM 2040C Dual Head system in 2013 in the tidal channels of the lagoon surrounding the historical city of Venice, Italy.

To understand and monitor the future evolution of the lagoon, CNR ISMAR within the national project RITMARE carried out an extensive survey, involving more than 25 scientists, collecting ultra high resolution (up to 0.05 m) multibeam data of the key areas of tidal inlets and channels. Following a broad multidisciplinary approach, the data are now employed for geomorphologic and archaeological studies, habitat mapping, and modelling of evolution trends of this highly dynamical and complex transitional environment.

PAPER 6.4: AMPHIBIOUS COASTAL AND NEARSHORE HABITAT MAPPING FOLLOWING A MASSIVE EARTHQUAKE IN KAIKŌURA, NEW ZEALAND

Speaker: David Donohue | Ixblue
Authors: Donohue D.
Thursday 13 September, 15:00

A 7.8-magnitude earthquake struck Kaikōura, New Zealand in November 2016, causing widespread landslides and significant horizontal movement and uplift along the coast. Following the quake, Land Information New Zealand (LINZ), initiated a hydrographic surveying project in the nearshore waters surrounding Kaikōura Peninsula to re-map 35,000 hectares of seabed. iXblue was contracted to conduct hydrographic charting IAW LINZ standards. This included marine priority areas designated for production of additional science by-products.

From November 2017 through April 2018, these areas were insonified using high-resolution multibeam technology. In addition, detailed acoustic backscatter analysis, mobile laser scanning, seabed sediment sampling, and aerial drone-based photogrammetry were used to map the coast in specific sites.
This suite of technologies identified undocumented faults which influence the structure and sediment type of the seafloor. The complex fault regime controls the alluvial river systems sculpting the land and the offshore canyon morphology. The data suggests the faults also play an important role in the seafloor habitats and resulting biological communities. The recent uplift, up to six metres in some areas, has formed new reef structure while other pre-existing reef platforms have become subaerial, causing massive die-offs in important nearshore habitat. Quantifying these shifts is vital for local fisheries and coastal management.

PAPER 6.5: SURVEYING COASTAL WATERS IN THE CARIBBEAN WITH A DEEP WATER MULTIBEAM - INITIAL RESULTS

Speaker: Henk de Haas | NIOZ Royal Netherlands Institute for Sea Research
Authors: Haas H. de
Thursday 13 September, 15:25

As part of a North-Atlantic wide research program with the NIOZ research vessel Pelagia in January 2018 a short research cruise was organised around Curaçao, Bonaire and Aruba. The goal of this cruise was to investigate the possible role of bacteria in the decline of coral reefs in the Caribbean. One of the major problems while organising this cruise was the lack of accurate bathymetric maps of the area. The most recent maps where (partly) based on wide spaced single beam surveys carried out in the nineteen seventies.

Since a shallow water multibeam was not available we were forced to use the ships EM 302 deep water multibeam system for a survey carried out in waters (almost) up to the coast line.
Because of the use of this type of system in a shallow water setting, beforehand there was some doubt on the final quality of the data. Initial results will be presented to allow the viewer to get an idea on what can be achieved with a deep water multibeam installed on board of a medium sized vessel while surveying sometimes extremely close to the rocky coastline.

PAPER 6.6: THE USE OF MULTIPLE AUV'S FOR EFFICIENT SEABED MAPPING

Speaker: Jan Arvid Ingulfsen | Swire Seabed and Ocean Infinity
Authors: Ingulfsen J.
Thursday 13 September, 15:00

The purpose of this presentation is to present Ocean Infinity's novel approach to wide area sea floor mapping with use of multiple Autonomous Underwater Vehicles (AUVs) from one single host vessel. Experiences from a challenging operation of combining a host vessel, multiple AUV's in a simultaneous operation will be presented.

Ocean Infinity's approach to subsea mapping allows for an extensive coverage per unit vessel time thus achieving considerably-higher regional coverage while maximizing the daily cost of the vessel in the field.
The use of multiple AUVs, deployed from a single Host Surface Vessel (HSV) and tracked on a one-to-one basis by USVs, makes it possible to map a multiple of the survey area compared to the traditional "One Vehicle/One AUV" concept of operations, cutting the cost significantly. This is disruptive technology at its finest and a "Paradigm Shift" for the collection of seafloor data.

The session moderators are in place to help FEMME 2018 run smoothly. We have an exciting and fully packed timetable this year with 28 presentations running back to back. Our team will be on hand to make sure everything is in place for guest speakers and also to make sure that the schedule stays on track.

OPENING SPEECH AND CLOSING SPEECH

Bjørn Jalving

Bjørn Jalving is Executive Vice President for the Subsea Division in Kongsberg Maritime. Subsea provides sensor systems and marine robotics to offshore energy, naval, marine research, fishery and underwater mapping markets. Bjørn has a M.Sc. in Engineering Cybernetics from the Norwegian University of Science and Technology. He started his career at FFI, the Norwegian Defence Research Establishment on development of autonomous underwater vehicles. He has authored or co-authored more than 30 publications. In 2014 he received the Compass Distinguished Achievement Award from the Marine Technology Society for his contributions to use of AUVs for detailed seabed mapping.

OPENING ADDRESS

Monsieur Bruno Frachon

Bruno graduated from École Polytechnique in 1976 and then École nationale supérieure de techniques avancées in 1981. He then attended the practical course of the French naval academy, aboard FNS Jeanne d'Arc. An armament engineer and specialist in hydrography and oceanography, he began his career in 1982 at the Service hydrographique et océanographique de la marine (Shom), holding various positions in hydrographic operations, technical expertise and management. At the headquarters of Shom, he has been responsible for co-operation policy liaison with national and foreign organizations in the field of oceanography, especially for Defence applications. Bruno was appointed director general of SHOM in June 2010.

KEY NOTE

Dr Matias Jonas

Dr Mathias Jonas was elected Secretary General of the International Hydrographic Organization (IHO) at the 1st Assembly in April 2017. His appointment initiated at the IHO Secretariat in Monaco on Sep 1 2017.
Prior to this he held the posts of Vice President of the Federal Maritime and Hydrographic Agency and National Hydrographer of Germany with responsibility for sea survey and sea cartography. Being a mariner, Dr Jonas has been involved in integrated navigation since the beginning of the nineties. He completed the world's first ECDIS type approval in 1999 and has continuously contributed to IMO and IHO standardisation activities for navigation equipment, survey and cartography. In his former position as Chairman of the IHO Hydrographic Standards and Services Committee (HSSC) he supervised ten different technical standardisation working groups, including one of the core projects of the IHO; the S-100 concept.

MASTER OF CEREMONIES

Nick Burchill

Nick joined Kongsberg from the Canadian Navy more than 18 years ago. He is responsible for subsea products including Multibeam Echo Sounders, AUVs and sensors for harsh environments. Over the years, Nick and his customers have been driving Kongsberg's development (and driving our Engineers mad) by working in some of the most demanding conditions on the planet. Nick specializes in innovative multibeam solutions for polar environments; helping customers gather mutibeam data in the Canadian Arctic using ice-breakers and autonomous vehicles.

CONFERENCE BOARD OF DIRECTORS

The 16th FEMME forum Board of Directors consists of Helge Uhlen, Audun Berg, Nick Burchil & Kjetil Jensen.

Hôtel Pullman Bordeaux Lac
Le Lac, Avenue Jean Gabriel Domergue,
33300 Bordeaux, France

Terje Haga Pedersen

Terje has a master in Engineering Cybernetics from the Norwegian University of Science and Technology in 1989. He worked 6 years with the Norwegian Mapping Authority prior to 22 years with Kongsberg. He is Product Manager for Mapping Software, with responsibility for software related to multibeam echosounders, sonar processing, visualization and Mapping Cloud.

Sverre Tetlie

Prior to joining Simrad in 1990 Sverre work on international offshore and simulation projects. After joining he has held several management positions including 12 years as Vice President for Hydrography. His current position is Product Line Manager Underwater Mapping.

Kjetil Jensen

Kjetil worked for 7 years in the offshore survey business as an Offshore Surveyor, Project manager and HR manager before joining Kongsberg as a Product Manager in 2015. He has been Product Manager for the EM Multibeam, M3 Sonar Bathy and GeoSwath since 2017.

Espen Reinertsen

Espen joined Kongsberg in October 2015 as a Project Manager. He holds a MSc in Control Engineering and has several 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.

Kjell Echolt Nilsen

Kjell has worked with R&D at Kongsberg since he graduated as an electronic engineer beginning with with fishery and naval sonars in the 1980's. From 1990 the focus has been on multibeam echo sounders for the Hydrograpic market. Over time the focus changed from electronic design to firmware and software development, project management and product responsibility. He is now working with the system design of new Multibeam products.

Aleksander Hammernes

Aleksander has been a service engineer within navigation and reference systems at Kongsberg for 14 years. He bridges the gap between end users and the technical departmet to fulfill requests and provide valuable input to development of new solutions. He is heavily involved in the development of sensor fusion (GNSS/INS) both from a hardware and software perspective, and works closely with end users with the new innovative INS solutions from Kongsberg.

Vegard Haugen

Before joining Kongsberg Seatex in 2012 ha was in the Royal Norwegian Navy for 19 years. During these years he went to the Royal Navy Academy and sailed on Submarines and Coast Guard Vessels. The last 9 years as XO and CO. In Kongsberg Seatex he works with sales, and has main responsible for the Maritime Broadband Radio-MBR and work closely with R&D at Kongsberg Seatex, as well as KM offices and customer worldwide.

Richard Mills

Richard is Director of Marine Robotics Sales at Kongsberg. His team is responsible for HUGIN, MUNIN, K-MATE and Eelume products. Richard joined Kongsberg in 2012. Before that he was the sales and marketing manager for International Submarine Engineering Ltd.

Craig Wallace

Craig graduated with a BEng in Electrical Engineering in 2002. Craig began his Subsea career with Kongsberg in 2006. Working in the Underwater Navigation Group he initially worked with positioning vehicles. His focus is now extended to the utilisation of AUV as a bathymetric mapping tool and the measures required to maintain IHO stanadards.

Dr. Vicki Ferrini

Vicki is a Research Scientist at Columbia University's Lamont-Doherty Earth Observatory (LDEO). Her research focuses on using mapping techniques to understand the processes that shape the seafloor in a variety of environments. She has participated in more than 20 research expeditions mapping shallow water and deep-sea environments using ships, boats, submersibles and towed platforms. For nearly 15 years, she has worked on geoinformatics projects ensuring that high-quality marine geoscience research data are made available to the science community and to the public. She is the Head of the Seabed 2030 Atlantic/Indian Ocean Regional Data Center.

Dan Orange

Dan is a marine geologist with over 20 years of industry experience, as well as academic experience primarily funded by the U.S. Navy's Office of Naval Research (ONR). Dan's academic work combined seafloor mapping and 2D seismic to both find seafloor seeps and interpret their driving mechanisms (with seepage ground-truthed by ALVIN submersible and ROV dives, and piston cores). It was during this research that Dan realized that hydrocarbon seeps have a distinctive geophysical / acoustic signature, and he brought that perspective with him to industry. Within industry, he has applied seep science to hydrocarbon exploration, used process geomorphology to evaluate deep-water geohazards, and applied his knowledge of survey and navigation systems to enable the successful commercialization of Controlled Source Electro-Magnetics (CSEM).

Fabio Sacchetti

Fabio is a hydrographic team leader and senior surveyor for INFOMAR, the Irish national mapping program. After the completion of a Masters degree in marine science, Fabio worked for few years as hydrographic surveyor on a number of Oil&Gas international projects. In 2003 he joined the Marine Institute of Ireland where he worked as party chief, hydrographic surveyor and data processor for the Irish National Seabed Survey and more recently for the INFOMAR programs. Within INFOMAR he looks after the entire hydrographic process flow, from survey planning, equipment installation, survey, reporting, data management and delivery of INFOMAR core products. In 2013 Fabio also completed a PhD on the geomorphology and sedimentology of the Irish continental margin. Fabio is a passionate, competent and motivated marine scientist with a clear commitment toward seabed mapping and ocean exploration.

Brieuc Crénan

Brieuc is an electronics engineer with strong background in field work. After passing his Master's degree of engineering in apprenticeship on AUV software programing, he left office-based work and industry to scientific field work. In 2011 he spent a full year managing a geophysics observatory on a sub-Antarctic island between roaring forties and furious fifties. Back in Europe he merged his interest for state-of-the art technology and his passion for ocean and earth study. Since 5 years, Brieuc manages the scientific instrumentation integration on Ifremer's vessel for the French Oceanographic Fleet.

Jean-Marie Augustin

After an academic training as an electronic engineer, Jean-Marie Augustin joined Ifremer (the French government institute for marine research) in 1984, as a R&D engineer in data processing. Since then he has worked as a software developer for oceanography applications, specializing in sonar image and bathymetry processing. He is presently a senior engineer at the Acoustics unit. His interests include software development for signal, data and image processing applied to seafloor-mapping sonars, featuring bathymetry computation algorithms and backscatter reflectivity analysis. He is the conceiver, designer and main developer of the software suite SonarScope®.

Dr. Marc Roche

Marc is Dr in Geology from the University of Liège (B), Scientific Advisor in the Federal Public Service Economy of Belgium. Since 2004, Head of the Continental Shelf Service in charge of the sand extraction management in the Belgian part of the North Sea, promoting a sustainable management of the marine sand by combining a strict control of the extraction itself from the Electronic Monitoring System with a regular monitoring of the impact of the extraction based mainly on bathymetric and backscatter data derived from multibeam echosounder.

Koen Degrendele

Koen Degrendele has been working for the Belgian Federal Governement since 1998. His main focus as a geographer in the team of the Continental Shelf Service is the organization and implementation of the monitoring of the impact of sand extraction in the Belgian part of the North Sea. He's responsible for the acquisition, processing and cartography of bathymetric data.

Dr. Wilhelm Weinrebe

Wilhelm graduated as a geophysicist from the University of Kiel in 1974, where he worked for 6 years as a research assistant. He then moved on to Dr. Hell GmbH as a software developer. He completed a PhD of Natural Sciences in 1987. In 1989 he became Head of the Data Center of GEOMAR Helmholtz Centre for Ocean Research where he stayed until retirement in 2013, working the last 9 years as Deputy Head of the IT Center.

Wilhelm has been responsible for bathymetric mapping on 50 research cruises. With more than 50 scientific publications, he is a key contributor to bathymetric mapping research. He is specifically interested in high-resolution seabed mapping with multibeam echo sounder systems and side-view sonars, fluid leaks at active continental margins and mapping of submarine landslides. Since 2013 he has participated in 10 research cruises, the next in October 2018.

Michael Smith

Michael graduated from the University of Rhode Island in 2015. He received his B.S. in Ocean Engineering and his B.A. in Spanish through the International Engineering Program.
He is currently pursuing his Master's in Ocean Engineering/ Ocean Mapping at the Center for Coastal and Ocean Mapping at the University of New Hampshire. His thesis concerns the radiation patterns of deep water multibeam echo sounders. In his free time, Michael enjoys skateboard, surfing, kayaking, spearfishing, snowboarding and anything else outdoor related.

John Hughes Clarke

John Hughes Clarke is a Professor at the Center for Coastal and Ocean Mapping at the University of New Hampshire. Previously he was with the Ocean Mapping Group at the University of New Brunswick for 24 years. He enjoys using acoustic imaging systems to examine marine sedimentary and oceanographic phenomena.

Jose Cordero

LCDR Jose Cordero graduated from the Spanish Naval College in 2001 and completed his IHO Cat A Hydrographic surveyor certificate in 2006. Recently he finished his MS degree in Ocean Mapping at the University of New Hampshire. He is being serving onboard combat and scientific vessels for 15 years. He is also a Geospatial analyst. Currently he is posted at the Data Acquisition and Quality Control department of the Instituto Hidrografico de la Marina in Cadiz (Spain).

Julian Le Deunf

Julian Le Deunf is a French hydrograph categories A engineer. After graduating in 2015 for ENSTA Bretagne, where he made 6 months internship at CCOM (UNH, US), he started at Shom as team leader during survey (in Cameroun, Gabon, Mauritania, and France). Now, he is an expert in bathymetric data processing for Shom. He just started a PhD on this topic.

Xavier Lurton

Xavier has a PhD in Applied Acoustics. In 1979 he joined Thales, specializing in underwater sound propagation and sonar performance modelling. Since 1989 he has worked at IFREMER in R&D. Mainly in acoustical oceanography applications, and specializing in the technology and signal processing of multibeam echosounders applied to geosciences. He has been involved in most sonar projects & R&D programmes. He has collaborated for 25 years with Kongsberg in the improvement of multibeam echo sounders. He is the author of 'An Introduction to Underwater Acoustics'.

Arne Pallentin

Arne is a Principal Technician in Marine Geology at the National Institute of Water and Atmosphere (NIWA). With 20 years experience in geology and environmental sciences and 15 in in multibeam survey work in shallow and deep water-depth as MBES technician to party chief and client representative. At NIWA he manages the charting objectives supporting public good and commercial science projects in the wider field of seafloor mapping; from data acquisition and processing to data management and analysis. His main interest is the seafloor and water-column backscatter components of the acoustic data.

Shelley Devereaux

Lieutenant (junior grade) Shelley T. Devereaux is currently serving as the Hydrographic Systems and Technology Branch (HSTB) Field Support Liaison, Pacific. She began her career in the NOAA Corps aboard NOAA Ship Rainier in 2015, where she conducted hydrographic surveys in Alaska. Following on her initial sea tour, she has supported hydrographic missions and system readiness trials aboard various NOAA ships. In her current assignment, LTJG Devereaux oversees sonar acceptance analysis throughout the hydrographic fleet, assists with development of NOAA backscatter specifications and processing, and continues to provide technical support to West Coast ships.

Dr. Anand Hiroji

Dr. Anand Hiroji is an assistant professor at the University of Southern Mississippi in the US. His current research focuses on improving multibeam backscatter data from multisector systems. He has Ph.D. and Master of Engineering degrees from the University of New Brunswick, Canada and Civil Engineering degree from the Shivaji University India. He has extensive hydrographic and engineering offshore survey experience.

Paul Johnson

Paul is the data manager for the Center for Coastal and Ocean Mapping at the University of New Hampshire. He is also the co-principal investigator of the Multibeam Advisory Committee (MAC), a U.S. National Science Foundation funded effort, which works with the ships of the U.S. Academic Fleet. With the MAC, Paul plans and conducts both sea acceptance trials on newly installed multibeam systems, as well as leading quality assurance tests to assess system performance of previously installed multibeam systems. Paul also works with other U.S. and international vessels directing multibeam trials.

Hervé Bisquay

Hervé is a surveyor working for Genavir in France, mainly involved in sea trials and data quality assesment. During his career on french vessels, he has operated various Kongsberg multibeam systems from EM12 (1990) to EM304 (2018).

Val Schmidt

Val has a Bachelor in Physics from the University of the South, Sewanee, TN, 1994. During his junior undergraduate year, he joined the Navy and served as an officer in the submarine fleet aboard the USS HAWKBILL until 1999. He left the Navy to work for Qwest Communications as a telecommunications and Voice Over IP engineer until 2002. He then began work as a research engineer for the Lamont Doherty Earth Observatory of Columbia University, then completed his Master in Ocean Engineering from the Center for Coastal and Ocean Mapping (CCOM) at the University of New Hampshire in 2008. His thesis involved development of an underwater acoustic positioning system for whales that had been tagged with an acoustic recording sensor package. He continues to work at CCOM, focussing on seafloor and water column mapping from AUVs, sensor development and sonar signal processing.

Garrett Mitchell

Garrett is a marine geoscientist in the Seep Exploration Consulting Group within Fugro USA Marine, Inc. based in Houston, Texas, U.S. where he has worked since 2013. His professional interests multibeam mapping, seafloor, and mid-water imaging of hydrocarbon seeps and mid-ocean ridges. For Fugro, he spends most of his time working globally offshore on seep hunting surveys as a QC geophysicist and geologic interpreter for regional-scale deepwater surveys in unexplored frontier basins for the oil and gas industry.

Ralf Freitag

Ralf, a classical on-shore structural geologist, was focused on evolution and kinematics of active margins (Chile, Kamchatka). He came to BGR in 2010 and since then has worked on an exploration program on Polymetallic Sulphides in the Indian Ocean initiated by the International Seabed Authority in cooperation with the German Ministry of Economics. His tasks in this project is to locate inactive seafloor massive sulphides and estimate the economic feasibility of the resources using high resolution deep towed measurements tools.

Henning Wedemeyer

Henning Wedemeyer works as an engineer (with a Diplom degree in Communication Engineering from the Hannover University of Applied Sciences) at the Marine Resource Exploration division of the German Federal Institute for Geosciences and Natural Resources (BGR), which he joined in 2011. His main tasks are the development of marine exploration devices (he e. g., together with Dr. Ralf Freitag from BGR, developed the deep towed multibeam echosounder BGR HOMESIDE) and the operation of these devices during research and exploration cruises. He took part on 12 manganese nodule and massive sulphide research and exploration cruises so far.

Terje Thorsnes

Terje Thorsnes is a senior geologist at the Geological Survey of Norway. He was “godfather” of the Norwegian MAREANO programme , which is one the world’s largest integrated seabed mapping efforts. He has been a pioneer in using multibeam bathymetry and backscatter for mapping the landscapes, geology and coral reefs of the Norwegian shelf. Since 2011, using AUVs for a variety of applications has been of the primary interests, and particularly using synthetic aperture sonar to reveal the secrets of the seabed.

Steven Bontekoe

Steven Bontekoe started to work for the survey department of Jan de Nul with a degree as civil engineer back in 2008. Throughout the years, worldwide assignments on large dredging and marine construction sites, gave him the basis to become an expert in hydrographic and topographic systems. Currently at position of manager survey systems he is team lead for software, hardware, data and installations as member of the survey department of Jan De Nul.

Lucie Somaglino

Lucie Somaglino is an acoustic engineer in the Underwater Systems Department of IFREMER located in Toulon. She has a PhD degree (2011) and research experience in biomedical acoustics before joining the Institute 3 years ago. Her work focuses on the integration of acoustic sensors (MBES, Modems, Sonars...) on ROVs and AUVs. She performs data analysis to validate their operation and the quality of the data according to the environment. She’s currently working on EM2040 integration on Hybrid ROV Ariane and future AUV CORAL and developing tools to perform quick quality, integrity and validity check of raw data sounder during surveys.

Christophe Vrignaud

Christophe Vrignaud is an Engineer for the French Ministry of Defense. His main interest is related to underwater acoustics. Early in his carrier he has been focusing on fisheries acoustics. Since 2007, he is in charge of the French Hydrographic and Oceanographic Service onboard acoustic systems. He mainly focuses on Multibeam systems qualification and training of surveyors. He has been conducting multiple acceptance and qualification surveys at sea. More recently, he’s the Chair of the Hydrographic Surveys Project Team of IHO HSSC, in order to review and update the S-44 standard.

Mor Kanari

Mor is a marine geologist with solid background and experience in geophysics, neo-tectonics and paleoseismology. PhD in Geophysics awarded 2016 (Department of Geosciences, Tel Aviv University). Works as a researcher at the Dept. of Marine Geology and Geophysics, Israel Oceanographic and Limnological Research (IOLR) in Haifa, Israel.
Mor Specializes in marine seismic and multibeam data acquisition and analysis, and Geo-Informatics (GIS advanced analysis and database management). His fields of interest are quantitative seafloor morphology, sediment transport systems in the Mediterranean, habitat mapping, paleoseismology, and geo-hazard investigations like earthquakes and submarine slumps. He attends a bonfire every Thursday.

Fantina Madricardo

Obtained the degree in Physics at the University of Padova, Italy, the PhD in Theoretical Physics at the University of Hamburg, Germany. In 2008, she was post-doc fellow at the Universitè Pierre et Marie Curie in Paris, France. Since 2009, she is staff member of the Institute of Marine Sciences of the National Research Council in Venice, Italy. Her main research topics are applied geophysics and underwater acoustics with focus on seafloor mapping and geomorphology. She is interested in semi-automatic classification of seismic and of multibeam echosounder data for seabed sediment characterization, benthic habitat mapping and geomorphometric analysis.

David Donohue

David is the Managing Director of iXblue, a specialist survey firm established in 2007 to undertake nautical charting and safety of navigation surveys in the Australasian region. Since 2007, iXblue has been the predominant supplier of hydrographic survey services to the New Zealand Government with the award of over $30m worth of work to this client alone. iXblue is now looking forward to being a panel member and supplier to the Australian Hydrographic Service as they move to a contracted survey model in line with other western nations.
David was formerly a hydrographic surveyor in the Royal Australian Navy and over a 15 year career served in HMAS MORESBY, LEEUWIN and MELVILLE.
He now resides in Brisbane with his wife and three children.

Henk de Haas

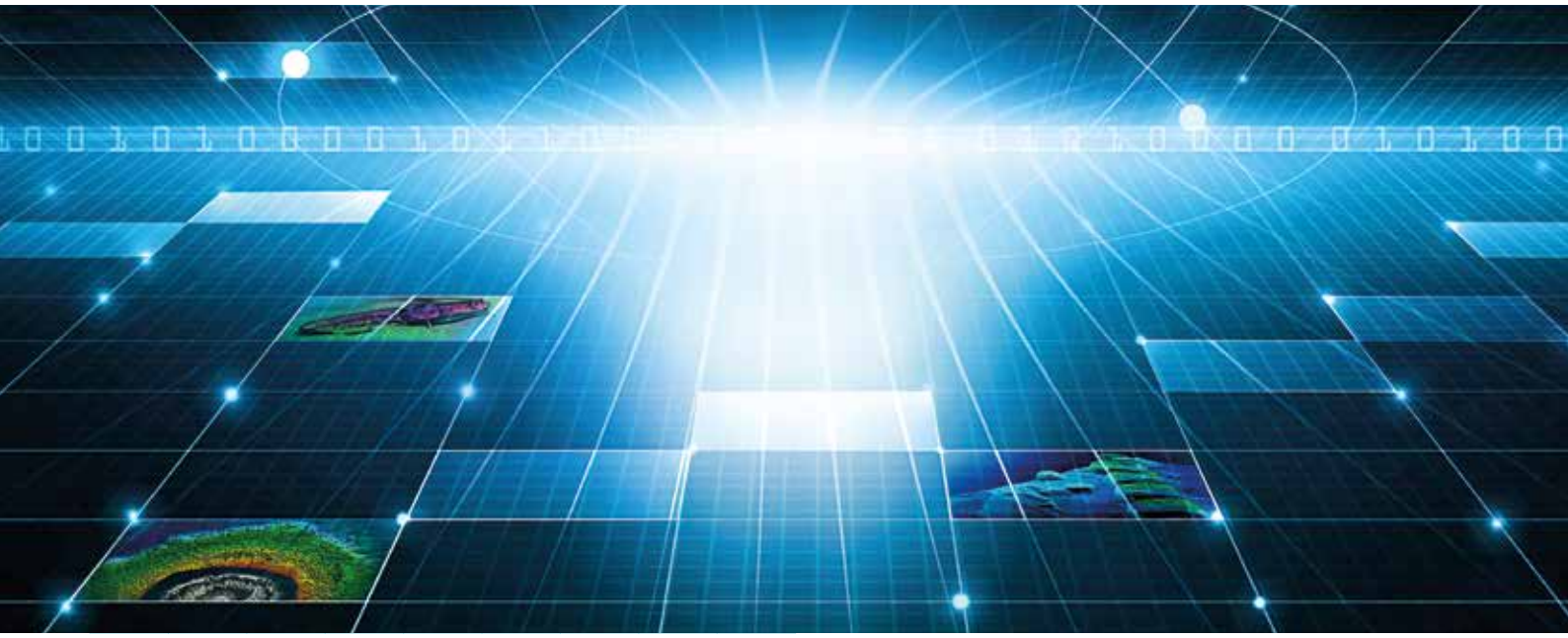
Henk de Haas is a marine geologist who conducted his PhD research on organic matter transport and burial processes in shelf seas at the Royal Netherlands Institute for Sea Research (NIOZ). This work was followed by a series of research projects on a variety of subjects, ranging from sediment transport in coastal Indonesia, via glacial/interglacial cycle sedimentation processes on continental slopes to cold water coral studies in the Atlantic Ocean. During these activities he became more and more involved into marine acoustics.
Currently at NIOZ he is responsible for the support in the use of acoustic equipment and data processing for the scientific community using the NIOZ research vessels.

Jan Arvid Ingulfsen

Jan Arvid Ingulfsen has more than 30 years of experience within the survey industry and the last 16 involved in Autonomous Underwater Vehicle (AUV) projects. Started his subsea survey career as a surveyor and cartographer. Since 1994 worked as a manager for a team of specialists using ROV's, KM Hugin AUVs and hullmounted systems for detailed seabed mapping and inspection.

KONGSBERG

MAPPING CLOUD



Visualize, analyze and share multibeam data in real time

- Easy storage of different types of data files in the Cloud
- Upload and distribute real-time data
- Use the Cloud to manage sharing, processing and archiving
- Run existing PC- applications in a Virtual Machine environment
- Share results with partners and customers through web-browsers

Upload data in Australia, process it in Paris, and display the results in San Francisco in your favourite application.

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 a cocktail party on the first evening, dine in style the following evening at La Brasserie Bordelaise, and say au revoire on the last evening with a spectacular gala dinner at Château Smith Haut Lafitte.

ICEBREAKER PARTY AT THE PULLMAN HOTEL

Date and time: Tuesday 11 September, 19:00
Meeting point: Pullman Hotel lobby

FEMME 2018 kicks off with a cocktail party and a selection of Bordeaux wines. The party is held at the Pullman Hotel. Live music and a DJ will play throughout the evening.

THE PULLMAN HOTEL:
Le Lac, Avenue Jean Gabriel Domergue, 33300 Bordeaux, France
Phone: +33 5 56 69 66 66
http://www.pullmanhotels.com/gb/hotel-0669-pullman-bordeaux-lac/index.shtml

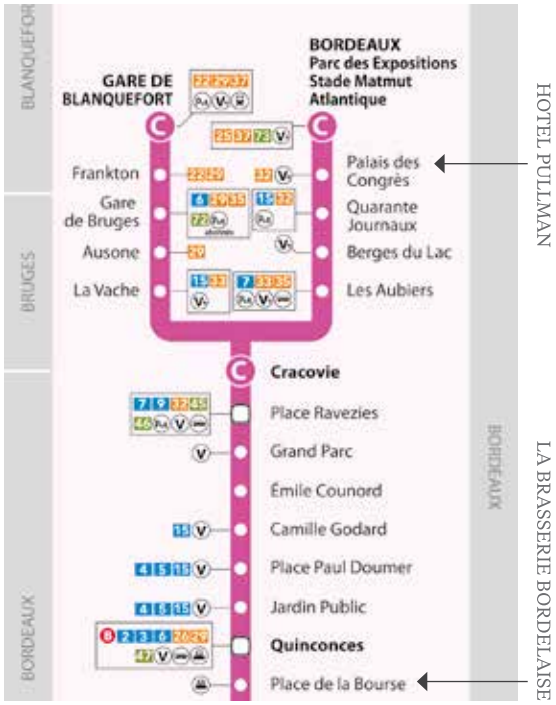
DINNER PARTY AT LA BRASSERIE BORDELAISE

Date and time: Wednesday 12 September, 20:00
Meeting point: La Brasserie Bordelaise | 50 rue Saint-Rémi 33000 Bordeaux, France | Phone +33 5 57 87 11 91

On Wednesday evening we will meet at La Brasserie Bordelaise, a restaurant serving the famous Bordeaux wines, local meat and fine vegetables. It is a unique, rustic location with a lot of atmosphere.

LA BRASSERIE BORDELAISE:
50 rue Saint-Rémi 33000 Bordeaux, France
Phone +33 5 57 87 11 91
https://www.brasserie-bordelaise.fr/en/ Le

GETTING THERE:
The brasserie can be reached by tram via the pink line (C), and is a 25 minute ride from the hotel. From the hotel you take the tram from Palais des Congrès to Place de la Bourse. From there it is a 1-minute walk to the restaurant.



Hôtel Pullman Bordeaux Lac
Le Lac, Avenue Jean Gabriel Domergue,
33300 Bordeaux, France

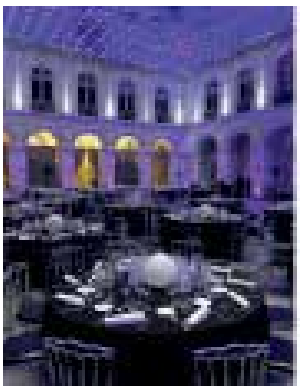
GALA DINNER AT CHÂTEAU SMITH HAUT LAFITTE

Date and time: Thursday 13 September, 18:00
Meeting point: Bus leaving Hotel Pullman

This will be a spectacular event, and evening to remember! Before dinner we have arranged for a wine tour at the chateau. The tour kicks off at 18:50. The Gala dinner will be served at 20:00. After dinner we will enjoy live music from Jazzskiff before busses return to the Pullman Hotel at 00:30

GETTING THERE:
Busses will leave the Pullman Hotel at 18:00

CHÂTEAU SMITH HAUT LAFITTE:
33650 Martillac
https://www.smith-haut-lafitte.com/en/



FEATURING LIVE MUSIC FROM JAZZSKIFF

KM.KONGSBERG.COM/UNDERWATERMAPPING

KONGSBERG