



INMARTECH 2016
4-6 October – Bergen, Norway



INMARTECH 2016 PROGRAM

INMARTECH 2016 Symposium
4–6 October 2016
Grieghallen, Bergen, Norway

Hosted by
Institute of Marine Research (IMR)

- 1**

Grieghallen
Conference venue

→

2

Bergen Aquarium
Conference dinner
Wednesday 5 Oct.

→

3

Marineholmen
Side session
Wednesday 5 Oct.

→

4

Terminus Hotel
Ice Breaker
Tuesday 4 October

→

5

Scandic Byparken Hotel
Get together
Monday 3 Oct.



INMARTECH 2016

CONFERENCE MAP

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Social events:

Monday 3rd october, 19:00-21:00, "*Get together*" at [Hotel Scandic Byparken](#) Sponsored by Scanmar

Tuesday 4th october, 19:00-21:00, "*Ice Breaker*" at [Hotel Grand Terminus](#), sponsored by the University of Bergen

Wednesday 5th October, 19:00-21:00 *Conference dinner* at [Bergen Aquarium](#), sponsored by Kongsberg Maritime



INMARTECH 2016 Key note speaker: Dr. Ole Arve Misund

The Inmartech 2016 Organizing Committee is very happy to introduce the key note speaker, Dr. Ole Arve Misund. Misund has always taken a keen interest in our research vessels and the scientific instruments and equipment used. He has also played a key role in the preparations of the current renewal of our research vessel fleet in Norway.

Ole Arve Misund is currently the Managing director of the National Institute of Nutrition and Seafood Research (NIFES) in Bergen (www.nifes.no), a position he took in October 2015. He is also Professor II at University of Bergen in Fisheries and seafood, and Chair of the board of Sven Lovén centre for marine infrastructure at the University of Gothenburg.

Misund's former positions was Managing director at the University Centre in Svalbard (UNIS), 2012–2016, chair of the UNIS CO₂ Lab (2012–2016), Research Director at Institute of Marine Research (IMR), Norway, 2000–2012, and Head of the Fish Capture Section, IMR, 1997–2000 (www.imr.no).

Dr. Misund has been a member of the Norwegian delegation to the Joint Norwegian–Russian Fisheries Committee 2005–2011, and lead the Science Group of the same committee 2005–2011. He has also been elected Chairman of the International Council of the Exploration of the Sea (ICES, www.ices.dk), Fishing Technology Committee 1999–2001.

Other former key tasks in his career are:

Norwegian Research Council programs/committees:

- Member of the Sea and the Coast (2005–2011)
- IPY (2006–2011)
- Global Change (from 2010–2013)
- Polar Committee (2012–2013)
- Svalbard Science Forum (2012–2015)

Member of:

- The board of the Norwegian Meteorological Institute (from 2011)
- The ConocoPhillips Arctic Program advisory board (from 2012)
- The board of the Bergen Museum (2005–2012)
- Academia Europea
- Norwegian Scientific Academy for Polar Research
- Scientist at IMR from 1990–2000
- Worked with ORSTOM (now IRD), France, in 1992, specializing in fisheries technology, abundance estimation of fish, and fish behaviour
- Published about 50 scientific articles, co-authored several books and book chapters, given many presentations and interviews, and acted as a referee for scientific journals

Educated as fisheries biologist at the University of Bergen, Norway (Cand. Scient. 1986), and holds a Dr. of Philosophy degree at University of Bergen from 1991. Senior Executive Course at the Norwegian Defence University College, spring 2011.

Time	Abstract No	Title
08:00-09:00		Check in
09:00-09:05		<i>Welcome</i>
09:05-09:35		Key Note Speaker
09:35-09:45		Institute of Marine Research (IMR)
09:45-09:50		Overview of side sessions
09:50-10:20		<i>Break</i>
10:20-13:40		Peer Gynt salen - Session Hydroacoustics - Session chair Egil Ona
10:20-10:40	20	Measuring important fish stocks with acoustic instruments. How can we do it, and where can it go wrong?
10:20-11:00	43	Kongsberg Maritime
11:00-11:20	28	The TS-probe, a new instrument for detailed TS measurements of single targets and for profiling the water column
11:20-11:40	19	Underwater radiated noise
11:40-12:00	33	Presentation of Scanmar products
12:00-13:00		<i>Lunch sponsored by Rapp Marine</i>
13:00-13:20	9	Real Time Communications on a deep see trawl
13:20-13:40	31	Deep Vision: a trawl-mounted stereo camera system for fisheries surveys
13:40-14:10	36	Advances in polar marine geosciences – trial and error with junk yard support
14:20-14:50		<i>Break</i>
14:50-17:00		Peer Gynt-salen - Session In situ Observation Systems - Session chair Jan Erik Stiansen
14:50-15:10	21	In situ observation systems
15:10-15:30	7	RAIA Observatory - Galician meteorological and oceanographic coastal network: A love-hate story
15:30-15:50	29	The Lofoten–Vesterålen cabled observatory (LoVe) – a real time transect approach
15:50-16:10	30	Ocean microstructure measurements from moored and autonomous platforms
16:10-16:30	57	UHDAS+CODAS: underway ADCP acquisition and processing
16:30-16:50	66	Operational and technical update from the Galway Bay Marine and Renewable Test Site (MaRETS)
17:00		End of day 1

Side sessions

Room: Trolldtog	Room: Bekken
Kongsberg Maritime (13:00-17:00) <ul style="list-style-type: none"> A brief overview of KM acoustics for research vessels and various acoustic platforms A new range of Simrad EK80 transceivers and transducers. Introduction to Kongsberg Seafloor Identification System (SIS) for the EM multibeam series 	Rapp Marine (13:00-17:00) Research Winch Systems - Learn By Experience! Open Q & A session - User feedback - exchange of experience.

Time	Abstract No	Title
08:30-09:00		<i>Coffee</i>
09:00-11:00		Peer Gynt-salen - Session Autonomous and Tethered Vehicles - Session chair Rolf Birger Pedersen
09:00-09:20	15	Intro Autonomous and tethered vehicles
09:20-09:40	61	Scanmar HCL for microplastic sampler
09:40-10:00	17	HUGIN HUS
10:00-10:20		Break
10:20-10:40	40	MOCNESS Operation Using SBE 9plus CTD
10:40-11:00	49	On the Hunt for a New Deep-Sea Cable and Improvements on the NIOZ Box corer
11:00-17:00		Peer Gynt-salen - Session Data Management and Ship-Shore Communications - Session chair Jostein Solhaug
11:00-11:20	56	Data Acquisition Software
11:20-11:40	46	SeaDataNet - EMODnet - building a pan-European infrastructure for marine and ocean data and data products
11:40-12:00	24	Data management, NMD
12:00-13:00		<i>Lunch sponsored by Imenco</i>
13:00-13:20	3	Sea2Data – From data acquisition to advice
13:20-13:40	13	Eurofleets2 – EVIOR and e-access to underway data of research vessels
13:40-14:00	14	Towards the development of an overarching Marine Research Infrastructures information system
14:00-14:20	2	New generation of data registration applications
14:20-14:40	6	Ship to shore communication
14:40-15:00	10	Introduction to a shipboard web based geographic information system
15:00-15:20		<i>Break</i>
15:20-15:40	39	Any ocean, any data, any time the systems architecture and operation of HiSeasNet
15:40-16:00	53	Web-based management of real-time marine scientific data
16:00-16:20	62	Ship-to-Shore Telepresence – Enabling a New Paradigm for the UNOLS Fleet
16:20-16:40	63	Rolling deck to Repository (R2R): Recent developments in the U.S. Academic Research Fleet
16:40-17:00	64	Design, installation and performance of ICT and data systems on CSIRO's RV Investigator
17:00:00		End of day 2

Side sessions

Room: Trolldtog	Room: Bekken
Kongsberg Maritime (10:00-12:00) • AUV operation from Research Vessels	Scanmar (10:00-15:00) • New bridge system / New door height sensor • Device programmer – software upgrades of sensors • Option editor – configuration of sensors • Sensor programming from charger • Trawley programming

Room: Trolldtog	Marineholmen (15 min walk)
Kongsberg Maritime (13:00-14:00 and 14:00-15:00) Handling solutions for various research vessel operations, including seismic, CTD's and fishing operations.	Ocean Technology lab (13:00-17:00) At this side event UiB and IMR will present the Norwegian Ocean Laboratory which host major marine research infrastructure like the Ægir ROV and the LOVE seafloor observatory.
Eurofleet/Eurocean (15:00-17:00) Demonstrations and explanations of the various EVIOR components and interaction with the participants.	Imenco will present the latest development subsea LED Lights and Low Latency IP Subsea Cameras and accompanying Client Software. Kongsberg Maritime – AUV Hugin

Time	Abstract No	Title
08:15-08:40		<i>Coffee</i>
08:40-12:00		Peer Gynt-salen - Session Seismic and coring - Session chair Haflidi Haflidason
08:40-09:00	25	Recent developments in high-resolution seismic profiling and sediment coring instrumentation
09:00-09:20	26	The Calypso Corer System
09:20-09:40	27	High-resolution P-Cable 3D seismic
09:40-10:00	55	UNOLS Wire Pool- Experience Using Synthetic Ropes in a Gravity Coring Application
10:00-10:20		<i>Break</i>
10:20-10:40	41	A New Large Diameter Core System for RV Neil Armstrong [AGOR 27]
10:40-11:00	47	RV Investigators Long Core System
11:00-11:20	32	The RV Marcus G. Langseth: Capabilities and Future Operations Planning
11:20-11:40	50	Ifremer makes Penfeld feel young again and stronger
11:40-12:00	60	Developing add-on technology for remotely operated seabed drills to meet the scientific demands of IODP Expedition 357 'Atlantis Massif Serpentinization and Life'
12:00-13:00		Lunch
13:00-16:40		Peer Gynt salen - Session Vessels and operations - Session chair Per W. Nieuwejaar
13:00-13:20	35	Mentoring expertise, technology transfer and emergency staffing: A solution implemented by the US Academic Research Fleet
13:20-13:40	42	Ifremer contribution to the Polar Pod project
13:40-14:00	11	The new UK polar research ship the RRS Sir David Attenborough
14:00-14:20	4	N-ICE 2015 - Wintertime research operations in the Arctic Ocean
14:20-14:40	1	ARANDA modernization project
14:40-15:00	67	Web based cruise planning software tool
15:00-15:20		<i>Break</i>
15:20-15:40	52	Ifremer Modernization of RV Thalassa
15:40-16:00	54	RV Investigator - The good, the bad and the scary...
16:00-16:20	45	The new "Dr. Fridtjof Nansen" research vessel
16:20-16:40	44	New RV Kronprins Haakon
16:40-16:45		Wrap up and safe journey home

Abstract

Abstract 1

Title: ARANDA modernization project

Author: Jukka Pajala – Finnish Environment Institute Marine Research Centre

The marine research vessel Aranda will be renovated to meet the needs of future marine research in the Baltic Sea. The renovation reduces the vessel's operating costs, increases its energy efficiency and reduces its emissions. At the same time, the vessel's modernisation makes it the Finnish marine industry's flagship of competence in the design and construction of special-purpose vessels.

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Abstract 2

Title: New generation of data registration applications

Author: Hans Victor Koch – Institute of Marine Research

The presentation will show the functionality of the following applications:

- New Survey logger, which handles all actual NMEA telegrams as well as human registrations of events like trawl and CTD activities. It integrates a map view with layered and zooming capabilities, from superstations to local stations with text descriptions. All data will be Quality Assured in real time.
- New Fish Measurement application using electronic fish measuring board and scales, with label print capability for otoliths and lab orders. Integration between the applications and the NMDC repository using NMD-API (a REST API implementation).

The applications are developed as multi-user web applications using Javascript and HTML5 (Meteor and react), and includes several physical platforms and technologies, as Raspberry PI, iPad, WiFi and USB.

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Abstract 3

Title: Sea2Data – From data acquisition to advice

Authors: Sjur Ringheim Lid, Åge Fotland, Harald Gjørseter, Espen Johnsen, Jens-Otto Krakstad, Helge Sagen, Thomas Wenneck, Nils Olav Handegard – Institute of Marine Research

Institute of Marine Research in Norway (IMR) provides advice to decision makers on questions related to anthropogenic impact on the marine environment and how to harvest marine living resources. It is required that our advisory processes are transparent, has efficient access to data and uses standardized and quality-assured data-processing tools. IMR has over the last years been building an e-infrastructure addressing these requirements using fisheries management as a use case. This infrastructure includes data acquisition, data transfer and management, data storage and data processing. The design is modular and the various modules communicates through application programming interfaces (APIs) that allow us to upgrade, maintain and replace the modules independent of each other. The current modules on data acquisition include data registration software and data storage on our research vessels, data transfer to shore based stations, a shore based data centre module that allows versioning of the data, a light weight data browser for efficient data access, an R-package to access and process data, and a standalone software to estimate indices of fish abundance. Historical data is converted and incorporated in the infrastructure to allow estimation of historical survey time series. Without a close collaboration between developers and users through an agile approach, the project would not have met its objectives.

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Abstract 4

Title: N-ICE 2015 - Wintertime research operations in the Arctic Ocean

Author: Tor Ivan Karlsen & Marius Bratrein – Norwegian Polar Institute

In January of 2015, the Norwegian Polar Institute with international collaborators set out with RV Lance to spend 6 months drifting in the sea ice in the Arctic Ocean at 83°N while performing a host of atmospheric, biological, cryospheric, and oceanographic measurements and observations. The team of crew, technicians, and researchers faced challenges such as working in the polar night, cold temperatures, dynamic sea ice conditions, and polar bear safety. This talk will present some of the major technical and practical problems and solutions, and also describe some of the lessons learned.

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Abstract 6

Title: Ship to shore communication

Author: Gordon Furey – P & O Maritime

Gordon Furey started his sea going career 14 years ago as an Instrumentation & IT Technician. At the time voice communications was restricted to Mini-M costing about €10 per minute. Email was via a single PC on the bridge which was on an expensive Fleet 77 dial up pay as you go service.

Why VSAT:

- Greater Business Productivity
- The Marine Institute\P&O are now utilizing the VSAT network to improve several important aspects of its operations.
- Increasing daily phone and email usage from ship to shore.
- Improving operations by running real-time business applications on board vessels.
- Reducing costs associated with vessel management and maintenance by enabling remote access and support.
- Accessing real-time weather and navigation information, this significantly helps with scientific survey planning.
- Expanding contact with customers, vendors, port authorities and scientific operations.
- Key Benefits for Scientific\Crew Use
- Internet 24/7 with unlimited download.
- Blog for “Science At Sea” which is used for PR and aids funding.
- VOIP calls cost less than 10cent per minute compared to €10 per minute in 2006.
- ROV video streaming ashore to video web portal.
- Social networking for crew and scientists. Has a major benefit for moral.

We recently rolled out Enterprise wifi solution which covers most of the working and accommodation decks. This offers laptop wifi connectivity to some senior scientific staff. There is also a wifi network for personal wifi devices with 100MB per day allowance. This allows crew and scientists to keep in touch for free. Only when the VSAT breaks do you realise how coveted the service is by all on board. It has a higher social requirement than TV. The biggest benefit from an operational perspective is remote support for IT and Instrumentation. Scientific equipment can be extremely complicated. The ability to give a service engineer direct control from the other side of the world to diagnose a problem is invaluable and significantly reduces down time.

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Abstract 7

Title: **RAIA Observatory - Galician meteorological and oceanographic coastal network: A love-hate story**

Authors: A. Almécija, P. Álvarez, I. González, B. Vila, S. Allen-Perkins, S. Salsón, – M.Á. Rúa.
Centro Tecnológico del Mar, Fundación CETMAR

RAIA Observatory was born in 2009 as a cross-frontier infrastructure for monitoring and prediction of the ocean environment, aimed at giving support to the main maritime activities developed in the NW coast of the Iberian Peninsula (Galicia and North of Portugal). It includes data sources and forecasting services implemented by the major institutions that are actively involved in operational oceanography on both sides of the frontier. In this paper, we are going to focus on the Xunta de Galicia (Regional Government of Galicia) meteorological and oceanographic (metocean) coastal network development and maintenance.

The Xunta de Galicia network is formed by six metocean automatic monitoring stations, moored along the Rías Baixas. Four of them are coastal buoys (Muros, Ribeira, Cíes and A Guarda), and the others are pre-existing singular structures where instrumentation has been installed (the pillars of Rande Bridge –Ría de Vigo– and an experimental bed –Ría de Arousa–). All of them are self-designed and equipped with homogeneous instrumentation and provide real-time data by telemetry systems.

Singular structures' stations were settled in 2007; the first buoy –Cíes– was moored in 2009. Along this time, experiences and incidents have helped us to improve the network general performing, by modifying buoys design, software and instrumentation in order to ease or lessen maintenance operations. However, several issues related to biofouling, power supply, data quality and buoys drift are waiting for new solutions to be solved.

* RAIA projects (RAIA, RAIA.co and RAIATEC) were funded by POCTEP through the European Regional Development funds.

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Abstract 9

Title: **Real Time Communications on a deep see trawl**

Author: Jeff Cordell – CSIRO

CSIRO Australia have developed an autonomous platform known as the Acoustic Optic System (AOS) which is attached to the headline of a trawl net and acquires data from multiple echosounders, and images from video and paired digital still camera systems. The AOS is used for performing biomass surveys of Orange Roughy aggregations in Australian and New Zealand waters. This technology has served industry and government well by providing information which assists in managing a fishery sustainably. There is an increasing need for fishers to demonstrate responsible behaviours in managing their fisheries sustainably and a new project has been developed to allow realtime access through Fiber Optics to this platform. With this capability, decisions can be made to avoid trawling over delicate fauna, or avoid fishing species which may be protected.

This presentation details the technical challenges that are presented when a fiber optic cable is attached to a deep sea trawl. In conjunction with Industry, CSIRO has developed a remote release system which allows the wheelhouse to activate a mechanical and electrical separation of the cable from the trawl, should trawl doors cross or trawls become hooked up on the seabed. The presentation will include video on how the release works, how its attached onto the net and discuss some of the limitations we encountered when we 'borrowed' a winch. It will conclude with some footage of another platform which CSIRO developed for calibrating and characterising echosounder transducers in realtime through the fiber optic cable.

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Abstract 10**Title:** Introduction to a shipboard web based geographic information system**Authors:** Steven Roberts, John Haverlack, Steven Hartz – University of Alaska, Fairbanks

While working for UCAR/LDEO, Mr. Steven Roberts developed a web based graphical information system (GIS) coined MapServer to support science operations aboard the United States Coast Guard icebreaker Healy. In 2013 Mr. Roberts joined the University of Alaska as a Science Systems Engineer in efforts to support the National Science Foundation's 80m polar class research vessel SIKULIAQ. He reconstructed MapServer taking advantage of HTML5 and modern web tools. Ship based GIS tools are accessible to all sailing aboard SIKULIAQ via a web browser on ship's LAN. Layers include but are not limited to ship track, course, coastlines, multibeam bathymetry, NOAA weather analysis, modeled ice drift, modeled ice thickness, MODIS imagery, RADAR SATII imagery,, MapServer has been instrumental in increasing spatial awareness of ship navigation and science operations in and around ice. Although this software is still in development it has been well received by the scientific parties sailing aboard SIKULIAQ. This is elucidated in the following quotes by end users of the SIKULIAQ. Steve Roberts' creation of the map server and his steady willingness to improve and support it is a huge plus to sailing on the SQ.

Steve Roberts provided a mission-critical service for real-time mapping of ice and forecast products. The combination of these three individuals meant that science productivity could stay high for every minute of our 42 day cruise. They were always at the ready to contribute their expertise, and the ship's comprehensive suite of equipment, to our science.

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Abstract 11**Title:** The new UK polar research ship the RRS Sir David Attenborough**Author:** Peter Enderlein – British Antarctic Survey

In 2019 Britain's new polar research ship will be ready for sea trials. The RRS Sir David Attenborough will be the largest civilian ship built in the UK since the 1980s. The new ship and an associated modernisation programme at Britain's five Antarctic research stations represent the country's largest investment into polar infrastructure and science since the 1980s.

Replacing the RRS Ernest Shackleton and RRS James Clark Ross, the new ship will have a dual role as a science and logistics vessel, spending 200+ days a year in the Southern Ocean. Faster station relief logistics will allow the ship to spend more time at sea on scientific cruises, sailing unsupported for up to 60 days and up to 19,000nm at a time. The engineering challenges of the new ship include combining a low draught of 7m and minimised fuel consumption, bubble sweepdown and noise propagation with powerful icebreaking capability and accurate dynamic positioning systems.

As a "mother ship" capable of deploying a range of gliders, ROVs and AUVs, the RRS Sir David Attenborough will extend the range and access of research into the most remote and inaccessible regions of our planet. With its support for robotic and remotely operated technologies and future-proof containerised laboratories, Britain's new polar research vessel will transform how ship-borne science is conducted in the polar regions.

Peter Enderlein is Head of Antarctic Mechanical Engineering at British Antarctic Survey. He has participated in over 30 scientific cruises on the RRS James Clark Ross, including ten as Chief Scientific Officer, and has worked in the Falkland Islands, South Georgia and the Weddell and Bellingshausen Seas around the Antarctic Peninsula.

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Abstract 13**Title: Eurofleets2 – EVIOR and e-access to underway data of research vessels**

Author: Dick M.A. Schaap – Marine Information Service MARIS. B.V, the Netherlands

The EU funded Eurofleets2 project concerns the European fleet of Research Vessels and aims at developing a common strategy and at establishing a European fleets infrastructure. This includes activities such as structuring and integrating, on a European scale, by e-platform, the way that research vessels are operated and their interoperability capacities; and promoting interoperable and standardized tools for data management.

The Eurofleets2 project has developed the European Virtual Infrastructure in Ocean Research (EVIOR) by way of an integrated information portal, providing up-to-date information about research vessels (RV), cruise programmes, completed cruises and special equipment. EVIOR also includes a prototype for a Dynamic Vessel Tracking & Events System. This gives dynamic charts of the momentary position and sailing tracks of selected RVs with position, speed, and bearing as well as 24 hour Ship Summary Reports (SSR) by clicking on any position of the vessel track; the SSR includes options to retrieve the event logs for the fixed instruments on board of the RVs.

It is an ultimate goal to establish a common system for giving e-access to underway and operational information and data from sailing research vessels. For that purpose use is made of the OGC ‘Sensor Web Enablement’ (SWE) standard which facilitate describing in detail the sensors making measurements and the platforms that carry the sensors. Cooperation takes place with a range of other EU supported projects in the marine domain to formulate and implement SWE standards that can be applied by operators of operational marine observation systems, such as real-time ocean monitoring networks and underway data from systems on board research vessels, to provide standardised access to observations using the SOS service protocol.

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Abstract 14**Title: Towards the development of an overarching Marine Research Infrastructures information system**

Author: Sandra Sa, EurOcean – European Centre for Information on Marine Science and Technology

“The development, update and maintenance of comprehensive publicly-available online inventories of a wide array of marine research infrastructures is one of EurOcean’s core tasks. These InfoBases gather information on over 900 unique pieces of infrastructure, such as research vessels, large exchangeable instruments, aquaculture research facilities and observation systems among others. The maintenance of four separate databases, with slightly varying and sometimes overlapping information has become more difficult as the quantity of information grows. Therefore an integrated system has been developed (<http://rid.eurocean.org>) in order to harmonise these InfoBases, to be compatible with standards and vocabularies deployed by oceanographic organisations, to streamline the update process, to improve the filtering and the displaying functions and to allow for easier evolution of the information system. This streamlining facilitates Eurocean’s objective to leverage the value of this information by creating synergies with ongoing initiatives and projects.”

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Abstract 15**Title: Autonomous and tethered vehicles**

Author: Rolf Birger Pedersen – University of Bergen, Bergen, Norway

Autonomous and tethered underwater vehicles have become essential tools for marine research and for the subsea industry. The international fleet of AUVs and ROVs that today are available for research can provide high-

resolution surveys and targeted sampling and seafloor intervention to support science and marine management. Presently, AUVs and ROVs - as well as new hybrid vehicles - are being developed to provide effective and safe operations in ultra deep and ice covered waters. Autonomous and tethered vehicles are also being adapted to install, maintain and to operate from seafloor observatories. The development of a variety of new sensors and sampling systems that can be carried by marine robots also continues to advance the forefront of marine research. Last but not least, a strong focus on minimizing downtime in industrial sub sea operations has resulted in more reliable technology. This presentation will summarize some past and present advances, and it will address the current development of a Norwegian Marine Robotics Facility.

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Abstract 17

Title: HUGIN HUS

Authors: Ole Jacob Lorentzen or Kristin Mikkelsen – Norwegian Defence Research Establishment (FFI)

For more than 20 years the Norwegian Defence Research Establishment (FFI) has been involved in the development of autonomous underwater vehicles. Our first prototypes, “AUV demo” (1992) and “HUGIN I” 1996, were instrumental in the early development of the HUGIN family of AUVs, developed in close cooperation with Kongsberg Maritime.

Since 2008 FFI has been operating HUGIN HUS, a scientific AUV specifically designed for civilian and military research, experimentation, concept development and surveying. As a part of this it has been continuously upgraded with new sensors and technology. It has been operated from a number of vessels, but it is mostly used from FFI's own research vessel H.U. Sverdrup II.

HUGIN HUS is primarily used in Norwegian waters, especially in the Barents Sea, and this has given FFI's operators plenty of experience with AUV operations in rough conditions. We would like to share some of our experiences in operating HUGIN HUS as well as give a short overview of some of the scientific cruises HUGIN HUS has been part of.

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Abstract 19

Title: Underwater radiated noise

Author: Hans Petter Knudsen – Institute of Marine Research

Underwater radiated noise has been a problem as long as underwater acoustic instruments have been used. Originally, it was primarily put attention to the signal/noise ratio. Later, the avoidance behavior of marine life became a hot topic for marine biologists working with acoustic surveys. Noise reduced research vessels have become usual around the World, but there is still lack of knowledge about the effectiveness of noise reduction with respect to acoustic surveys. There is also a great concern about the noise from worldwide shipping's impact on marine life. A few recommendations and standards for noise level limits and procedures for measurement of underwater sound from ships have been developed. This presentation gives an overview of the noise sources, means for reducing noise and methods and procedures for measuring and reporting underwater radiated noise.

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Abstract 20

Title: Measuring important fish stocks with acoustic instruments. How can we do it, and where can it go wrong?

Author: Egil Ona – Institute of Marine Research

Measuring important fish stocks with acoustic instruments. How can we do it, and where can it go wrong? The abundance of several large and economically important fish stocks are measured acoustically with research vessels or hired fishing vessels one or several times per year, and is often essential to the assessment of these stocks. It is then important that standard procedures are followed during planning and execution of these surveys, and that the personnel involved has the necessary training and skills.

Ona's talk will focus on potential errors in a typical survey on herring and on technical challenges in these surveys. The major error sources like vessel avoidance, acoustic blind zones, interpretation errors, calibration errors, bubble attenuation, migration, noise and target strength errors will be covered, with examples of how the Institute of Marine Research try to minimize each of these in order to approach an estimate close to absolute stock abundance with measurable total uncertainty.

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Abstract 21

Title: In situ observation systems

Author: Jan Erik Stiansen – Institute of Marine Research

In situ measurements have always been the foundation for understanding the functioning, processes and dynamics of the ocean itself and the life it contains. Vessels have been the governing platform for such observations, but new instrumentations and techniques now allow us to measure both more rapidly and cover larger areas than before. Fixed observation sites, drifters, ship surveys, satellites and models all give valuable knowledge for parts of the time-space domain of the ocean. An observation system may be looked upon as a network of observational platforms together with the system that ensures that the data are collected, stored and made available for stakeholders.

This introduction will set the stage for the following talks by addressing strengths and weaknesses of in-situ observation platforms and how the resulting data and knowledge reach various stakeholders, using observation systems in Norwegian waters as examples.

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Abstract 24

Title: Data management, NMD

Author: Helge Sagen – Institute of Marine Research

NMD, the Norwegian Marine Datacentre, hosted by the Institute of Marine Research (IMR) is the responsible NODC National Oceanographic Data Centre of Norway and is coordinating the national research infrastructure NMDC Norwegian Marine Data Centre. Datamanagement of marine data at IMR put into a distributed system with 6 nodes managing data from 16 institutions.

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Abstract 25

Title: Recent developments in high-resolution seismic profiling and sediment coring instrumentation

Author: Haflidi Haflidason – Department of Earth Science, University of Bergen, Bergen, Norway

The last two decades a major effort has been made by a number of leading marine research institutions to develop both new techniques for improving high-resolution seismic data acquisition and develop new techniques that contribute to high quality of long coring. The focus has been on facilitates that can be used on an ordinary research vessels. These new developments have offered new possibilities for a large group of marine researches to collect a wealth of high-resolution quality data for a low cost that earlier was reserved for expensive survey vessels and/or industry companies. As most of the newly designed research vessels are in a similar size category (65-95 m long) these new instruments, meant originally for one specific vessel, can in many cases also be moved around and used on other research vessels without much extra cost for upgrading. In the presentation it will be given a short historical view and what the new instrument developments have resulted in the last decade or so.

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Abstract 26

Title: The Calypso Corer System

Author: Stig Monsen – Department of Earth Science, University of Bergen

The 21 m long Kley France produced Calypso corer system has been applied for long piston coring on the RV G.O. Sars since 2003. It is a mobile system that can be operated down to 4800 m water depth with a core diameter of 10 cm. The talk will focus on our experience of using this mobile system and the modifications that has been done the last years to achieve a high quality coring results.

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Abstract 27

Title: High-resolution P-Cable 3D seismic

Authors: Andreia Plaza-Faverola, Stefan Bünz, Jürgen Mienert – Centre of Excellence for Arctic Gas Hydrates, Climate and Environment (CAGE), University of Tromsø

The P-Cable 3D high-resolution seismic system consists of a seismic cable towed perpendicular (cross cable) to the vessel's steaming direction. An array of multi-channel streamers is used to acquire many seismic lines simultaneously, thus covering a large area with close in-line spacing in a cost efficient way. The cross-cable is spread by two paravanes that due to their deflectors attempt to move away from the ship. The P-Cable system is designed and developed as a tool for marine geological research and the petroleum industry. It may be used in both frontier and mature regions in an intelligent, versatile way to acquire successive small-size surveys (25 to 250 km²) in areas of special interest, e.g. 4D seismic monitoring of the shallow overburden at CO₂ storage sites. This is due to the fast deployment and recovery of the P-Cable and the short turns needed between adjacent sailing lines. The P-Cable technology has proven data quality, surpassing conventional 3D and equal or better than HiRes 2D. The increase in lateral resolution compared to conventional 3D seismic data is at least one order of magnitude. This technology images the top 500-800 m of the overburden in unprecedented detail. The P-Cable equipment at the University of Tromsø is a National Infrastructure funded by the Research Council of Norway in 2009 under the "Large Infrastructure Scheme". The University of Tromsø has been co-leading the development of this system since 2001 and has more than 30+ successful seismic acquisitions on the Norwegian and Svalbard margins. We will present the system and a number of data examples documenting its unique imaging capabilities.

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Abstract 28

Title: The TS-probe, a new instrument for detailed TS measurements of single targets and for profiling the water column

Authors: Rolf Korneliussen, Ronald Pedersen and Egil Ona – Institute of Marine Research

The target strength probe was initially developed for in situ target strength measurements. It carries 4 split beam echo sounders, a stereo camera, CTD and a high frequency QADCP. The probe is used like a CDT, communication with the vessels on optical cable. Most of the electronics is mounted inside a large pressure cylinder. The motorized transducer platform is used for calibration the transducers at any depth, but also to keep the platform horizontal during TS measurements. Challenges with respect to engineering, noise and survey operation is describes, together with a few examples from in situ TS measurements and profiling stations using with Simrad EK60 and EK80 split beam echo sounders.

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Abstract 29

Title: The Lofoten-Vesterålen cabled observatory (LoVe) - a real time transect approach

Authors: Olav Rune Godø, Espen Johnsen and Gavin Macaulay – Institute of Marine Research

The eastern Atlantic high north is a rim ocean totally dependent on heat and plankton influx from the outside to maintain its biological production. The narrow Norwegian shelf north of Lofoten is considered a gateway to the High north because the suite of key processes that take place here impact productivity of the High north in successive months. LoVe plans to install 5 cabled nodes and one autonomous node along a transect from shore to 2000m depth in this area. This will enable quantitative measurements of water transport as well as biomass migration through this transect. This is key information for Norwegian marine monitoring and will become part of the basis for modeling the state of the physical and biological environment in the Lofoten hotspot as well in the Barents Sea.

Node 1 of this observatory has been in operation for three years and results will be demonstrated. The design and technology solution of the full transect, which will be launched in 2017, will be presented along with expected application of LoVe data in marine monitoring and research.

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Abstract 30

Title : Ocean microstructure measurements from moored and autonomous platforms

Author: Ilker Fer – University of Bergen

In this talk I will summarize our studies where we conducted ocean microstructure measurements from platforms including a bottom-anchored moored subsurface buoy, a bottom lander, as well as a glider. Temperature, shear, and velocity microstructure are measured using fast thermistors, air-foil shear probes and high-frequency Doppler current profilers. Concurrent profiling measurements from the ship are used to evaluate the data quality. The glider utilized is a 1000-m-rated Teledyne Webb Research Slocum electric glider, fitted with a neutrally buoyant, self-contained turbulence instrument package MicroRider-1000LP, manufactured by Rockland Scientific International (RSI). The vertical microstructure profiler is a loosely tethered VMP2000 (RSI). The subsurface buoy is a custom-StableMoor buoy modified to accommodate the MicroRider-1000LP further interfaced with a Nortek Doppler current meter and motion sensors. The bottom lander is equipped with a Nortek 5-beam 1000 kHz Doppler current profiler. In energetic environments, glider serves as an excellent platform for studies of both ocean mixing processes and long-term monitoring and mapping of diapycnal mixing. Data collected from the subsurface buoy require care in the wave-affected surface boundary layer to account for wave orbital velocities and platform

motion, whereas in deep, relatively steady flow, the instrument serves as a reliable alternative, providing several-months long, fixed-point turbulence measurements.

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Abstract 31

Title : **Deep Vision: a trawl-mounted stereo camera system for fisheries surveys**
Author: Shale Rosen – Institute of Marine Research

Trawl sampling in marine research often results in the capture and discard of large amounts of fish and other organisms. Furthermore, a substantial amount of at-sea work is involved in the manual process of handling, classifying and measuring individual fish. The Deep Vision system, being developed by Scantrol Deep Vision AS in close cooperation with the Norwegian Institute of Marine Research, seeks to address these issues by providing an image-based in situ measurement system for installation in research trawls. Fish or other objects entering the trawl are identified and measured from stereo pairs of images. For investigations requiring only size and species classification, the system can virtually eliminate sampling mortality by trawling with an open codend. Using an open codend also makes it possible to sample for a much longer duration without fear of accumulating a catch that is too large to take onboard. Added scientific value is provided in the form of precise depth and position of each object as it passes the camera. The presentation will cover the principles and performance of the system, as well as the likely responsibilities for technical staff if such a system is implemented as standard sampling equipment.

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Abstract 32

Title : **The R/V Marcus G. Langseth: Capabilities and Future Operations Planning**
Author: Sean Higgins – LDEO/Columbia University

The research vessel Marcus G. Langseth (RV Langseth) is part of the US academic fleet and is operated by Lamont-Doherty Earth Observatory of Columbia University (LDEO) on behalf of the National Science Foundation (NSF). The vessel is unique to the US fleet in that maintains a significant marine seismic capability for imaging features in deep sub-seafloor. The RV Langseth was recently upgraded to a Sercel Seal 408 recording system with Sentinel solid hydrophone streamer cable that allow us to tow up to a 15km long single streamer for long offset 2D surveys or support a 4x6km 3D array. This is all supported by a well-tuned sound source with 4 linear subarrays. In addition, the vessel can carry and deploy a large number of short period (active source) or broadband Ocean Bottom Seismometers (OBS) to support large scale refraction experiments or be used in combination with multi-channel reflection seismic projects. A Kongsberg 1x1 degree array EM122, Knudsen Chirp 3.5kHz system, OS75 ADCP, towed magnetometer, and gravitimeter provide critical survey capabilities for all projects. The RV Langseth is at the beginning of a new Regional Plan with NSF for operations for the vessel that will look to establish a "long term" schedule for all ship users. The goal is to be able to identify regional areas of interest far in advance that will allow researchers (US and others) interested in these locations to prioritize projects that will allow for scheduling the vessel as efficiently as possible. This new plan will begin starting in SE Pacific (Chile) in fall 2016 and then move "clockwise" around to the SW Pacific/Indian Ocean in 2017/2018 and then proceed northwards towards Alaska region and US Pacific Northwest.

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Abstract 33

Title : Scanmar
Author: Ulf Lundvall – Scanmar

Scanmar's Catch systems have been developed through more than 30 years to give accurate and reliable information that can contribute to more efficient fishing and reduced fuel cost, damage and wear of the equipment. Significant resources and investments during these years has led to developing new advanced technology, which has given extremely robust sensors with increased user benefits, considerably increased operating time and quick charging.

New noise hydrophone. Scanmar are about to unveil one of their latest innovation, a hydrophone with noise detection/measurement. Its revolutionary capabilities include features such as interpreting noise from the vessel and what this means for the individual fisheries. The hydrophone also estimates the scare factor, based on the fish species' different hearing curves. This will to all appearances become an invaluable instrument for fishing with seiner and trawl in the future.

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Abstract 35

Title : Mentoring expertise, technology transfer and emergency staffing: A solution implemented by the US Academic Research Fleet
Author: Tony D'Aoust – UNOLS Tech Pool

A brief history and introduction of the UNOLS tech pool, with a more in depth discussion of the benefits to early career and late career technician's, vessel operations, staffing complex technical cruises and retention of expertise.

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Abstract 36

Title : Advances in polar marine geoscience – trial and error with junk yard support
Author: Yngve Kristoffersen – Dept. Earth Science, Univ. of Bergen/Nansen Environmental and Remote Sensing Centre

The marine geoscience activity carried out by academic institutions often shows a huge disparity between the operating costs of a modern research vessel and the lack of devoted attention and effort on the part of the scientists to improve their own scientific tools. Hydrostatic power represents an underused, but formidable energy source which is technically fairly simple to harness. We have pursued several approaches for development of sediment sampling tools. The Selcore hydrostatic hammer corer by far outperforms any gravity corer of similar weight. Our tests of a single shot hydrostatic mechanism suggests that you can fire a core barrel 10 m into the seabed with a drive section weight of less than hundred kilos. A pure gravity drive mass is limited by the breaking strength of the wire, while the limits of the hydrostatic drive remains untested. Our alternative to physically scale everything up, is an innovative approach to IODP-style hydraulic piston coring without the use of a drill string. We have also tested a shallow drilling concept in sheltered water and in sea ice conditions using a regular mining prospecting rig mounted on the back of a research vessel. The results are promising. As a polar nation without an ice breaker, we have explored the use of hovercraft as an alternative science platform. A hovercraft fully equipped as a scaled down modern research vessel has travelled more than 4.000 n.m over sea ice and recently completed a 11.5 month drift from the North Pole down into the Fram Strait. The joint icebreaker/hovercraft operation is a very cost efficient approach to successfully access areas of the Arctic Ocean not accessible to icebreaker surveys.

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Abstract 39

Title: Any Ocean, Any Data, Any Time The Systems Architecture and Operation of HiSeasNet
Author: Kevin Walsh – Scripps Institution of Oceanography

HiSeasNet is a satellite communications project designed to bring full-time, scalable bandwidth Internet connections to ships at sea in the University-National Oceanographic Laboratory System. Bandwidth can be scaled or expanded on a per ship, per cruise basis to meet the performance requirements of more demanding applications, such as bi-directional full motion video telepresence. This presentation and accompanying paper will outline:

- The end-to-end architecture of HiSeasNet, from the shore teleport, to the space segment leases, and to the shipboard satellite systems
- Network management, measurement and systems monitoring
- Operational teamwork between the HiSeasNet support engineers and the RV Technicians
- Managing bandwidth for end user laptops, smartphones and devices
- Use cases - supporting ocean science in action
- Bringing the future closer - achieving uninterrupted Internet access at sea

HiSeasNet is based at the Scripps Institution of Oceanography, at the University of California San Diego and supported by the National Science Foundation (<https://hiseasnet.ucsd.edu/>).

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Abstract40

Title: MOCNESS Operation Using SBE 9plus CTD
Authors: Carl Mattson and Lee Ellett – Scripps Institution of Oceanography, UCSD

Technicians with Shipboard Technical Support at Scripps Institution of Oceanography have developed hardware and software to operate a MOCNESS system using a Seabird 9plus underwater unit.

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Abstract41

Title: A New Large Diameter Core System for R/V Neil Armstrong [AGOR 27]
Author: James E. Broda – Woods Hole Oceanographic Institution

A new large diameter [10 cm I.D.] piston core is under development for AGOR 27 at the Woods Hole Oceanographic Institution. The system will be capable of deploying and recovering cores up to 30 meters long. An acoustic modem/release will trigger the corer guided by a 12 KHZ pinger. Starboard and aft handling equipment will be added to the deck, but otherwise the operation relies exclusively on existing ships equipment. The ships massive knuckle-boom crane will enable all equipment transitions during overboarding and recovery. The Aft A-frame will support the load during coring operations. The Markey traction winch [a dual storage drum system located below-deck] will be fitted with a high-modulus synthetic rope that will be specially constructed for the project. Testing is underway on multiple candidate ropes in the range of 14 to 16 mm with breaking strengths between 25 and 30 metric tons. Durability and resistance to elongation are key factors in the test program. The corer will be ready for sea by mid 2017. The core system will be compatible with RV Sally Ride [AGOR 28] operated by Scripps Institute of Oceanography.

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Abstract 42

Title: Ifremer contribution to the Polar Pod project

Author: Marc NOKIN – IFREMER

POLAR POD is a project led by Dr Jean-Louis Etienne and his team. The objective is to develop a new state of the art oceanographic platform that is going to undertake a world tour through the Southern Ocean following the Antarctic Circumpolar Current. The project has engaged the interest of the international scientific community due to the global importance of the Southern Ocean and the possibilities presented by POLAR POD.

The POLAR POD was inspired by the FLIP, a U.S Navy research platform that has been in active use for over 50 years. Like the FLIP, the POLAR POD will be a very stable platform. POLAR.POD's 100 meter hull (70 meter water draught, 40 meter air draught), weighing 720 tons, is scaled to handle the largest waves observed by satellite in the "Furious Fifties".

Ifremer supports the project and is involved in the technical and scientific aspects. Technically, Ifremer provides assistance to the project for the integration on the platform of the various scientific equipment. Those include aerial instrumentation for atmospheric parameters measurement and assessment of chemical contamination, a variety of multi-parametric probes spread along the platform column as well as passive and active acoustic equipment (ADCP, hydrophones, sounders).

Furthermore, Ifremer is involved in two scientific problematic : Air-Sea exchanges in the southern ocean that is a key component of the climate system and anthropic impacts with in particular organic and metallic contaminations that are transported there through oceanic currents and atmospheric circulation.

This talk gives a general presentation of POLAR POD with a specific focus on the Ifremer contribution to this project.

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Abstract 43

Title: Kongsberg Maritime

Author: Rune Olsen – Kongsberg Maritime

Some reflections and suggestions from the KM project manager for Kronprins Haakon.

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Abstract 44

Title : New RV Kronprins Haakon

Author: Jan Bremnes – Institute of Marine Research

The icebreaker RV 'Kronprins Hakon' is under construction at Fincanteri shipyard in Muggiano, scheduled for completion in the third quarter of 2017. The vessel will be the first Norwegian Icebreaker built for Polar research. The vessel will have a PC 3 class icebreaker: Year-round operation in ice-covered waters.

The vessel will be equipped to handle a numbers of scientific tasks, covering operation from fishery to geology reaches and many more. In order to cope with its operational tasks a large instrumentation is necessary. In this session we will present an overview of the vessel and look at the instrumentation that will be available onboard, such as hydro acoustic instrumentation, scientific winches and laboratories.

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Abstract 45

Title: The new "Dr. Fridtjof Nansen" research vessel

Author: Åse Sudmann – Institute of Marine Research

The Norwegian government decided in September 2012 to fund construction of a new research vessel. The new vessel is built in Spain at the Astilleros Gondan ship yard and will be ready for sea trials in November 2016.

This vessel will replace the old RV "Dr. Fridtjof Nansen". The new vessel is the third generation research vessel which has been deployed for most ecosystem surveys organized by the Nansen project. The vessels have strongly supported carrying out fisheries research in a number of developing countries mostly in Africa since 1975.

There are about 30 beds for cruise personnel on board and there is a separate auditorium for teaching, in addition to extra space in laboratories to conduct practical training and guidance. The vessel also has a work boat to be used in shallow waters.

The technical personnel onboard will operate all the scientific equipment on the boat such as Hydro acoustic, oceanographic equipment, Scientific Winches, network, collecting data, etc. The vessel has also room for three containers on deck for portable equipment such as ROVs and towed vehicles.

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Abstract 46

Title: SeaDataNet - EMODnet - building a pan-European infrastructure for marine and ocean data and data products

Author: Dick M.A. Schaap – Marine Information Service MARIS. B.V, Netherlands (dick@maris.nl)

SeaDataNet has set up and operates a pan-European infrastructure for managing marine and ocean data by connecting National Oceanographic Data Centres (NODCs) and oceanographic data focal points from 35 countries bordering European seas. The SeaDataNet portal provides users a unified and transparent overview and controlled access to the large collections of data sets, managed by its connected data centres. SeaDataNet is also establishing and governing marine data standards and interoperability solutions to connect to other e-infrastructures. SeaDataNet at present gives overview and access to more than 1.8 million data sets for physical oceanography, chemistry, geology, geophysics, bathymetry and biology from more than 100 connected data centres.

Access to marine data is also a key issue in the implementation of the EU Marine Strategy Framework Directive (MSFD). The EU communication 'Marine Knowledge 2020' underpins the importance of data availability and harmonising access to marine data from different sources. SeaDataNet qualified itself for an active role in the data management component of the EMODnet (European Marine Observation and Data network) that is promoted in the EU Communication. Starting 2009 EMODnet portals have been initiated and further developed for marine data themes: digital bathymetry, chemistry, physical oceanography, geology, biology, and seabed habitat mapping. These projects encourage uptake of standards and services by many data providers and develop and provide harmonised data products for all European sea regions.

The EMODnet Bathymetry project is very illustrative for the synergy between SeaDataNet and EMODnet and added value of generating public data products. The project develops and publishes Digital Terrain Models (DTM) for the European seas. These are produced from survey and aggregated data sets. The portal provides a versatile DTM viewing service with many relevant map layers and functions for retrieving.

The presentation will highlight key achievements of SeaDataNet and EMODnet and give further details and views on the EMODNet Digital Bathymetry for European seas.

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Abstract 47**Title:** RV Investigators Long Core System

Author: Marc Lewis – CSIRO

The RV investigator has purchased a long core system from SEAS Australia. The vessel deploys the system from a Triplex overhead boom, core head handler and twin cranes to support the barrel. The core barrel used is drill pipe capable of having a 100mm outer diameter liner inserted. We have both polycarbonate and PVC liners. The system is capable of having 24 metres of barrel and being used in either gravity or piston mode. The main coring cable is 24mm Dynema, 8,400m long with a maximum working load of 20 tonnes.

Theoretically our system is capable of retrieving 24 m cores from 7,000 m water depth. To date the system has only been used on a few research voyages and after tuning has retrieved up to 10.2m of core in gravity mode (12m of barrel) and 13.62m of core in piston mode (15m of barrel). Our piston is in two parts and capable of using a range of shear pin sizes.

My experience with these systems is limited so I have been talking to as many people around Australia and New Zealand as I can as well as overseas including helpful staff from IPEV, IFREMER and NIOZ and web searches on a few other institutions. My principle reason for being here is to get as much information as I possibly can about how to get the best out of our system.

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Abstract 49**Title:** On the Hunt for a New Deep-Sea Cable and Improvements on the NIOZ Box corer

Authors: Lorendz Boom and Yvo Witte – NIOZ

We have been working for many years with a 9000 m Aramid deep-sea cable. The current cable will soon need to be replaced, taking into account the fact that the technology as well as the demands on the cables are changing all the time. We are currently searching for a new deep cable which can meet our needs and meet the challenges of future deep-sea research.

The NIOZ standard box corer has been improved to allow for easier handling on deck, which results in less disturbed samples. Moreover, the top valve that closes the box has been redesigned and now consists of a transparent lid that seals and stays on the box after retrieval. The new valve includes connections, which can be used among others for respiration or incubation experiments of the whole box core sample.

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Abstract 50**Title:** Ifremer makes Penfeld feel young again and stronger

Author: Loic Dussud, IFREMER – Centre de Bretagne

Ifremer makes Penfeld feel young again and stronger In the 90', Ifremer developed a weighty machine, the penetrometer called Penfeld for dedicated to seabed soil characterization at 6000 meters seawater depth. The hydraulic powered motorization unrolls gradually a stainless steel rod, driving it 30 meters down into the sediment then extract it and rolls it back.

Geological data are acquired at the rod tip while digging the rod: typical data includes tip resistance, sleeve resistance and pore pressure. These data are useful for both scientific and industrial purposes. The sediment nature can be easily determined, the geological trends and optimal locations for coring operations can be assessed.

Recently, Ifremer increased Penfeld specifications bringing maximal penetration from 30 to 50 meters. Now, Penfeld capacities are consistent with the coring capacities of the RV Pourquoi pas ? In addition, a new operating process was made available. Instead of being extracted, the sensors equipped rod can now be left in place to

perform long term measurement. An installation this type was performed in September 2015. Indeed a 50 meters piezometer made up of 20 pore pressure sensors in a series was install offshore of Nice (South coast of France).

In the coming years, Penfeld tip will be equipped with additional probes to acquire parameters such as conductivity, or ... Penfeld brings a clean break with sediment instrumentation. It will find numerous applications for multidisciplinary sediment studies for instance, referring to deployment at Nice, within the scope of seafloor observatory deployment.

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Abstract 52

Title: Ifremer Modernization of RV Thalassa

Author: Briec Créan – Ifremer

The Thalassa (74 m long) vessel, delivered in 1995, is an oceanographic ship mainly dedicated to the missions of public service in the field of fish stock assessment (DCF: Data Collection Framework) and physical oceanography. The vessel is able to deploy the ROV Victor 6000 (Remotely Operated Vehicle) and AUV (Autonomous Underwater Vehicule), responding partially answering the need of deep environment cruises. Ifremer has decided to modernize the vessel by works next year (in 2017) to enlarge her capacity in the fields of marine geosciences and deep sea environnement.

From her delivery, Thalassa is designed to perform fisheries research, especially studies of:

- population ecology
- assessment of exploited species
- study of the spatio-temporal distribution of resources
- catches and processing techniques

Moreover, the vessel carries out other types of surveys as physical oceanography, and occasionally, deployments of AUV and ROV Victor 6000. The objectives of the modernization are:

- to replace all obsolete scientific equipment by up-to-date ones
- to ensure the remedial and curative maintenance at mid-life of the vessel
- to provide a reliable and efficient platform appropriate to the coming 20 years of marine science
- to modify vessel accommodation

This talk gives a general presentation of this modernization.

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Abstract 53

Title: Web-based management of real-time marine scientific data

Authors: K. Cromer, J. Katebini, S. Chang, P. Zubaly, M. Gelman – National Oceanic and Atmospheric Administration, Office of Marine and Aviation Operations, Silver Spring, Maryland, US

NOAA is developing a web-based version of its Scientific Computing System (SCS) for the acquisition, dissemination, analysis, and visualization of real-time marine scientific data. Running within the research vessel environment, SCS 5.0 is an ASP.NET MVC web application and suite of services controlled through a browser user interface from networked computers. The application uses a bi-directional communication software library developed by Microsoft to broadcast high-frequency real-time data updates to client browsers. Built-in as well as user-defined numerical and statistical tools enable enhanced, customized quality control monitoring. Data observations are stored within a MySQL data source, and may be easily queried for historical analysis and charting.

Custom software applications may access real-time and historical data through a web application programming interface (Web API) or .NET API. The features and availability of SCS 5.0 are the subject of the discussion.

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Abstract 54

Title: RV Investigator - The good, the bad and the scary...
Author: Stephen Thomas – CSIRO

The RV Investigator has been in service with CSIRO for 2 years. Primarily from a marine tech viewpoint, how has the ship performed? What has worked well? What didn't work well? What has been changed since taking delivery? This presentation hopes to help others learn from our experience when considering a new ship build or refitting a research vessel.

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Abstract 55

Title: UNOLS Wire Pool- Experience Using Synthetic Ropes in a Gravity Coring Application
Author : Rick Trask – UNOLS Wire Pool Manager, Woods Hole Oceanographic Inst., MA USA

The use of synthetic tension members on US research vessels is slowly gaining momentum and the University-National Oceanographic Laboratory System (UNOLS) Wire Pool is becoming involved with the testing and experimental use of synthetics as a possible alternative to wire rope. UNOLS is a US organization of 60 academic institutions and National Laboratories involved in oceanographic research with the purpose of coordinating oceanographic ships' schedules and research facilities. The UNOLS Wire Pool came into existence to support the wire rope and cable needs of the UNOLS research vessel fleet and more recently as a resource for evaluating their condition.

Experience with several synthetic ropes in a gravity coring application will be presented. The synthetics were used on existing ship's equipment with minimal modifications to the winch system in order to evaluate the ease with which a synthetic material could be used as a direct replacement for wire rope in certain applications. The preparations and modifications undertaken for the short gravity coring cruise will be discussed. Additional dock-side lift tests and results from laboratory test performed on the materials used at sea will also be presented.

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Abstract 56

Title: Data Acquisition Software
Authors: Clodic Guillaume, Drouineau Ludovic – IFREMER

The objective of the new data acquisition software is to provide the capability to acquire, log and disseminate data coming from sensors based on modern web application architecture. This project aims at the standardization of the data acquisition process while improving quality assurance and quality control of the data. Prototype software has been developed as part of the Eurofleets 2 project.

The first step of the software is to perform the acquisition and decoding of the raw data coming from different kind of sensor. Furthermore, the connection of a new sensor in the system is simplified. Then the data is timestamped and archived in NetCDF files, raw format but also stored in a database.

The data acquisition software offers to scientists the ability to monitor the data in a browser. Scientists, technicians, operators could personalize their monitoring view through a system of dashboard. This allows them to

configure what they want to see depending on their current activity. Data could be monitored through thematic views (weather, thermosalinometer, winch, map, multibeam ...). Digital video streams could also be displayed.

The software enables extraction of data and metadata based on different criteria and temporal interpolation. The result of the data query can be downloaded through different formats (NetCDF, CSV, JSON).

In term of quality assurance, the operator will be able to define a number of rules that will qualified data and generate alarms. The expressed need here is to have automated quality control of the data able to report an alarm in real time in case of detected anomalies and also generate a report at the end of the cruise which summarize al the anomalies.

This talk gives a general presentation of the data acquisition and visualization software.

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Abstract 57

Title: UHDAS+CODAS: underway ADCP acquisition and processing

Author: Dr. Julia Hummon – University of Hawaii

Ocean currents derived from ADCP (Acoustic Doppler Current Profiler) measurements are used by many oceanographers. The fundamental components of the ADCP system are the instrument itself, ship's heading, and position. University of Hawaii had been involved for over 20 years in developing, maintaining, and supporting robust, configurable, open source software to process ADCP data. This processing software, "CODAS" (Common Ocean Data Access System), is the core of a larger effort to create a reliable and robust system to acquire and process ADCP data on board ships, providing near real-time access to high-quality ocean current data to users on the ship via the on-board ship's network.

This live shipboard ADCP data acquisition and processing system, "UHDAS" (University of Hawaii Data Acquisition System), has been installed on 20 UNOLS (US) research ships, 11 NOAA ships, (with several more to come), and 5 other ships. UHDAS sends a relatively small (100Kb) daily email back to shore with information about data quality, computer health and other ancillary information.

This presentation will describe UHDAS at sea: acquisition, processing, data access, and monitoring. A brief discussion of CODAS processing will introduce existing ADCP Python data tools for calibration, quality assessment, and plotting.

UHDAS+CODAS documentation is found at http://currents.soest.hawaii.edu/docs/adcp_doc/index.html.

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Abstract 60

Title: Developing add-on technology for remotely operated seabed drills to meet the scientific demands of IODP Expedition 357 'Atlantis Massif Serpentinization and Life'

Author: D.J. Smith – British Geological Survey

The International Ocean Discovery Programme (IODP, <https://www.iodp.org/>) is an international marine research collaboration that aims to serve the scientific interests of participating countries by drilling, coring and monitoring the seafloor.

The European Consortium for Ocean Research Drilling (ECORD, <http://www.eso.ecord.org/>) contributes to IODP by providing platforms of opportunity to run 'Mission Specific Platforms' (MSPs) to meet the demands of scientific drilling in shallow water, ice-covered seas or in lithologies that are challenging for conventional drilling.

IODP Expedition 357 (<http://www.eso.ecord.org/expeditions/357/357.php>) drilled in deep water in altered oceanic basement on the Atlantis Massif (approximately 30°10'N, 42°10'W) close to the Mid-Atlantic Ridge using remotely operated drilling technology deployed from the UK research vessel RRS James Cook.

In addition to the aim of collecting cores from multiple boreholes, the Science Party had several additional scientific requirements that necessitated the development of new technology to meet the demands of microbiology sampling, borehole fluid sampling, bottom water and downhole measurements.

This presentation will describe the additional add-on tools developed and fitted to 2 seabed drills, the MeBo70 (MARUM, Center for Marine Environmental Sciences, University of Bremen, Germany) and the BGS RD2 (British Geological Survey, UK). These are:

- a borehole tracer injection system for microbiology contamination testing
- a borehole plug to seal the borehole for future research
- downhole logging tools to provide petrophysical measurements of the cored formation
- real time fluid chemistry measuring and fluid capture system

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Abstract 61

Title: Scanmar HCL for microplastic sampler

Author: Ulf Lundvall – Scanmar

The MultiSampler, developed in the 90s in a co-operative project between IMR's Catch Division and Scanmar, is a system for remotely opening and closing multiple codends on pelagic or bottom trawls. The system makes it possible to take several uncontaminated samples during discrete, user-selected periods within a single trawl haul, using conventional large-scale trawl gear.

Scanmar's HCL (Hydro acoustic Communication Link) system is used to monitor and operate the MultiSampler system. The HCL provides two-way wireless control of the sampling device. Plastic debris in the environment is a problem which is drawing more and more attention. One reason for this is that plastic will never completely biologically degrade and disappear, but will instead become so called microplastic. Microplastics are small particles ranging from 1µm to 5mm. Tons of these particles get into our natural waters and end up in the ocean.

The establishment of a reliable, verified and standardized method to quantify the amount of microplastic particles in the environment is vital in order to assess the consequences of plastic debris in aquatic ecosystems. An important step in microplastic research is sampling – getting the particles out of the waters in order to quantify and examine them.

Oslo University has developed a new sampling device for the sampling of microplastics in the layers of the water column. The sampler is operated with a Scanmar HCL system, thus making it possible to take one or several discrete samples of microplastics from any depth layer, without “contamination” of the sample during setting or retrieval of the sampler. The microplastic sampler is in use onboard RV Trygve Braarud.

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Abstract 62

Title: Ship-to-Shore Telepresence – Enabling a New Paradigm for the UNOLS Fleet

Author: Dwight F. Coleman – URI Graduate School of Oceanography

Telepresence-enabled operations have been proven on a number of oceanographic ships for more than a decade, especially related to projects funded by NOAA's Ocean Exploration program. The Ocean Exploration Trust's EV Nautilus and the NOAA Ship Okeanos Explorer have relied heavily on telepresence to accomplish the goals of their research and exploration programs. The University of Rhode Island's (URI) Inner Space Center (ISC) has been reliably supporting telepresence operations on these ships since their debut. Through recent efforts funded by the National Science Foundation, the Office of Naval Research, and other federal and private US entities, the

telepresence paradigm has been expanded to other research vessels including several in the University-National Oceanographic Laboratory System (UNOLS) fleet. The ISC has recently supported telepresence operations onboard URI's RV Endeavor and onboard Woods Hole Oceanographic Institution's (WHOI) RV Atlantis using a private satellite-based networking solution in partnership with Verizon. In addition, through continuing collaborations with WHOI (using their ships and deep submergence vehicle systems) and Scripps Institution of Oceanography (using HiSeasNet as the satellite network provider), the ISC supported several projects during the summer of 2016 and will continue to partner for telepresence-enabled oceanographic research on several upcoming cruises. This has become increasingly important with the introduction of several new ships in the UNOLS fleet that are smaller in size (and contain fewer science berths) than the ships they replaced. Telepresence is becoming a new standard for shore-based participation in seagoing marine science programs, allowing teams of researchers to connect remotely and feel like they are part of the cruise. Telepresence also enables live educational outreach programs to be delivered that engage broad audiences in active oceanographic research. The expansion of this paradigm to new platforms comes with many challenges, but leads to a multitude of opportunities.

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Abstract 63

Title: **Rolling Deck to Repository (R2R): Recent Developments in the U.S. Academic Research Fleet**

Authors: Robert Arko, Suzanne Carbotte – Lamont-Doherty Earth Observatory, New York, Cynthia Chandler - Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, Shawn Smith – Florida State University, Tallahassee, Florida, Karen Stocks – Scripps Institution of Oceanography, La Jolla, California, and the R2R Program Team

The R2R Program provides a suite of data services for U.S. oceanographic research vessels including a complete catalog of all cruises, a repository for the original underway data from each cruise, standard post-processing of selected data types after each cruise, processing of nearreal-time METOC data using the Shipboard Automated Meteorological and Oceanographic System (SAMOS), and support for event logging at sea. The final underway data package is transmitted directly to R2R by the vessel technician at end of each cruise, while the corresponding personnel manifest is transmitted by the port office and a release letter is transmitted by the chief scientist.

Several new vessels have recently joined the R2R program including RVs Sikuliaq, Neil Armstrong, Sally Ride, and Falkor. Other recent developments include support for data submissions via Dropbox and Google Cloud Platform; post-processing of additional data types (CTD and subbottom); new Web-based services including a Catalog Search and a Vessel Profiler; and linking the Cruise Catalog to related journal articles, researcher profiles, and sample logs online. R2R contributes data to global compilations including the Global Multi-Resolution Topography Synthesis (GMRT), International Comprehensive Ocean-Atmosphere Data Set (ICOADS), and World Ocean Database (WOD). R2R is supported by the U.S. National Science Foundation, Office of Naval Research, and Schmidt Ocean Institute, in collaboration with the University-National Oceanographic Laboratory System (UNOLS) and NOAA National Centers for Environmental Information.

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Abstract 64

Title: **Design, Installation and Performance of ICT and Data Systems on CSIRO's RV Investigator**

Author: Hugh Baker – CSIRO

In 2014, CSIRO took delivery of the RV Investigator – a 93.9m purpose built ocean class research vessel with state of the art communications, acoustics, underway instrumentation, data acquisition and general ICT. CSIRO Marine National Facility operates Investigator as a blue-water research capability available to the Australian scientific community and their international collaborators for work around Australia's vast marine estate.

This presentation will overview Investigator's capabilities, with particular focus on the design and implementation of ICT, satellite communications and data acquisition/management systems, and a look at how these systems have performed in her first two years of operation.

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Abstract 66

Title: Operational and technical update from the Galway Bay Marine and Renewable Test Site (MaRETS)

Author: Dr Mark Wemyss – P&O Maritime Services

The paper will give a full update from the Galway Bay MaRETS, the jewel of the Irish SmartBay programme.

The geographical location of the site allows for an ideal location for testing wave energy convertors, and the installation of infrastructure to support marine research. The site has excellent wave resource, ¼ of full scale ocean conditions. The sheltering effect of the Aran Islands controls this resource and also allows for suitable year round weather windows. The location also allows for good site communications, ports and a well-established offshore supply chain. These favourable features has allowed for a unique blend of research and commercial projects, covering both the marine energy, and scientific sectors, as well as providing opportunities for much broader applications.

The paper will give an overview of the significant projects undertaken to date, with findings from these projects, for example in the fields of: marine energy conversion, fish migration, water quality, and dynamic mooring systems. The paper will also detail the recent upgrades to the test site and how these investments are supporting current projects. For example, in 2015 a new 4.5 km subsea cable was installed allowing the installation of a real time scientific observatory with a suite of traditional marine science sensors, as well as supporting a range of new projects.

Also of significant interest at present, is the deployment of the Seapower WEC and interrelated projects, such as wave, acoustic, and environmental monitoring of the device while on site. The deployment, operation & maintenance, monitoring will be discussed and will include the test site facilities used to aid this project such as data communications, CCTV, HSEQ framework and so on.

Finally the paper will describe the planning underway for future infrastructure improvements, and the projects that will be taking advantage of the existing and future infrastructure.

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Abstract 67

Title: Web based cruise planning software tool

Author: Matthew Tiahlo –, Natural Environment Research Council

This paper will introduce a newly developed web based system soon to become fully operational at NERC for planning and operation of UK national marine facilities.

Administration of the cruise programme for the UK's research fleet and National Marine Equipment Pool (NMEP) currently makes extensive use of an in-house web based software tool, the 'Marine Facilities Planning' system (MFP). NERC's MFP has been in successful operation since 2005, encompassing all stages of the cruise project lifecycle: from ship time requests, programme construction, equipment and personnel planning to cruise delivery and post cruise processes. Following a meeting with OFEG partners in 2012, NERC and NIOZ embarked on a project to commission an updated and improved system; building on NERC's MFP and NIOZ's existing inventory management system (IMS). The modular package has been designed as a highly customisable solution to allow easy adaptation by additional RV and equipment pool operating partners. The new Marine Facilities Planning system is now in the final stages of development and here we present an overview of its existing functionality and areas for possible future development.

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Posters

Poster 1

Title: Designing a Power&Data transceiver-platform for coax-core cable on coastal RVs

Authors: Michiel T'Jampens, Robin Houthoofdt - VLIZ

On our RV Simon Stevin we have two hydrographic winches each equipped with 300m of cable. Since the second winch, which has a coax core, has been rarely used we wanted to increase the possible usage scenarios. Because of this the requirements are atleast 25W of power and 1Mbyte of datarate over a 300m cable.

While looking on the market it was clear that the technology for both power and data over coax was readily available but either as an integrated product (as a deckunit for a specific device) or serious overkill for our situation (10km cable, >1km depth) which results in a high price.

Since the search for a plug and play solution turned up nothing, we did the next logical thing: enter some relevant terms in google and hope for the best! This search resulted in a transceiver that has 'upgrading old coax based security cameras to new Ethernet based ones while maintaining cables' as use-case, which sounds perfect for our situation.

Since the price was ok (530€/set) we bought one and did a test without proper test leads meaning the data rate achieved would be worst case scenario. Since the achieved rate was a steady 7MB/s the initial requirement was easily achieved. A power test hasn't been executed yet but using a calculator on the manufacturers site resulted in 40W based on the cable resistance at a maximum of 650m.

Just having a transceiver doesn't make this a platform. But considering that you get 40W of power and a 7MBps Ethernet link, the options are extensive. Add a simple serial device server to have some serial ports or go all the way and add a mini-pc which enables USB devices, local storage and remote or standalone operation. These and more options will be covered on the poster.

Poster 2

Title: DA System evolution onboard RV Simon Stevin

Authors: Michiel T'Jampens, Vlaams Instituut voor de Zee vzw Flanders Marine Institute - VLIZ

Five years ago, with the transition from our old RV Zeeleeuw to the newbuild RV Simon Stevin, the question arose to either purchase an established DA product or develop our own solution. Since we prefer total flexibility and had the legacy of the old system, the in-house development of our MIDAS (Marine Information and Data Acquisition System) was continued.

The first major change included the setup of web-based tools to allow both crew and scientists to interact with the system. This eases maintenance and allows the scientists to use their own devices.

The second major change divided the workload over two institutional departments. The IT department covers the typical IT activities like building the websites, database backend, synchronization with land based databases etc. The marine technicians became responsible for the system communicating with the different sensors. On the IT side this resulted in the earlier mentioned interface for the scientists and crew. The old website for retrieving cruise data was adjusted and a new website (www.lifewatch.be) was added where the ship and the activities can be followed in real-time.

The DA system onboard is now capable of gathering data from various sources, perform necessary checks and calculations and then store and redistribute the data. In a later stage automations based on location of the vessel were added (switching pumps and sensors on and off) and a warning system using both email and SMS was implemented.

This approach meant that the DA system was split in two entities which communicate with each other through websocket messages in real-time or database queries. These websocket messages aren't just used for the interaction on the ship but are also regularly send to shore via a satellite link.

Poster 3

Title: A small buoy for measuring waves in open ocean and in sea_ice interactions

Authors: M.Hamon, P.Thomas, S.Prigent, O.Peden, F.Ardhuin, P.Sutherland, T.Terre - Ifremer, Univ. Brest, CNRS, IRD, Laboratoire d'Océanographie Physique et Spatiale (LOPS)

A new versatile autonomous buoy has been developed to measure ocean waves with applications in open sea and ice-sea interactions. The poster will present the architecture of the buoy, the possible configurations and performances based on different sensors. Some results from in situ applications will illustrate the poster. The work in progress to improve the current functions of the buoy will conclude the presentation.

Poster 4

Title: Wave Buoy

Author: All BAS Engineers + J.P. Wilkinson – British Antarctic Survey

These buoys form part of an ONR funded MIZ intensive field programme. This programme will employ an array of cutting-edge autonomous platforms to characterise the processes that govern Beaufort Sea MIZ evolution from initial breakup and MIZ formation through the course of the summertime sea ice retreat.

For more information, go to:

<http://www.apl.washington.edu/project/project.php?id=miz>

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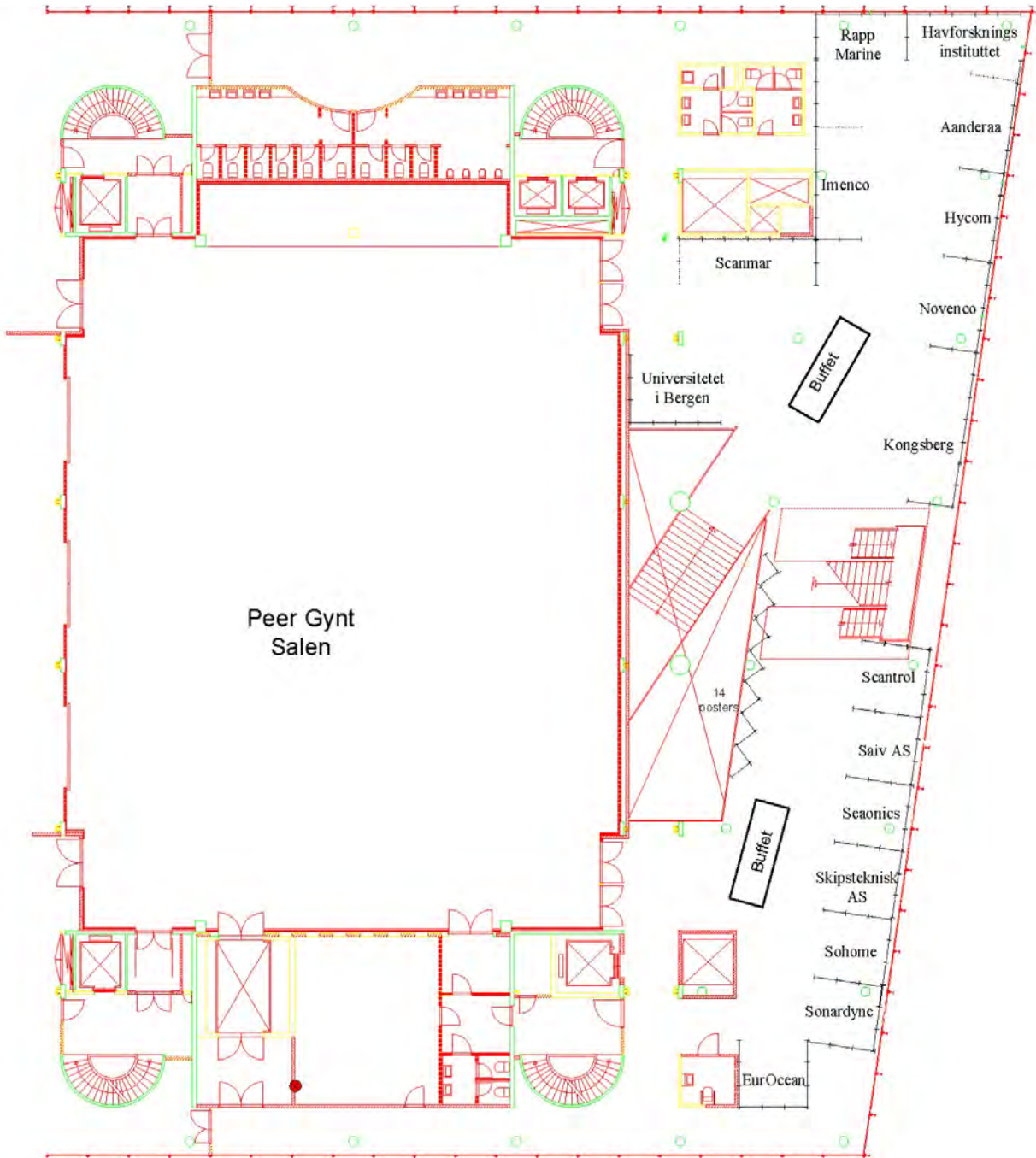
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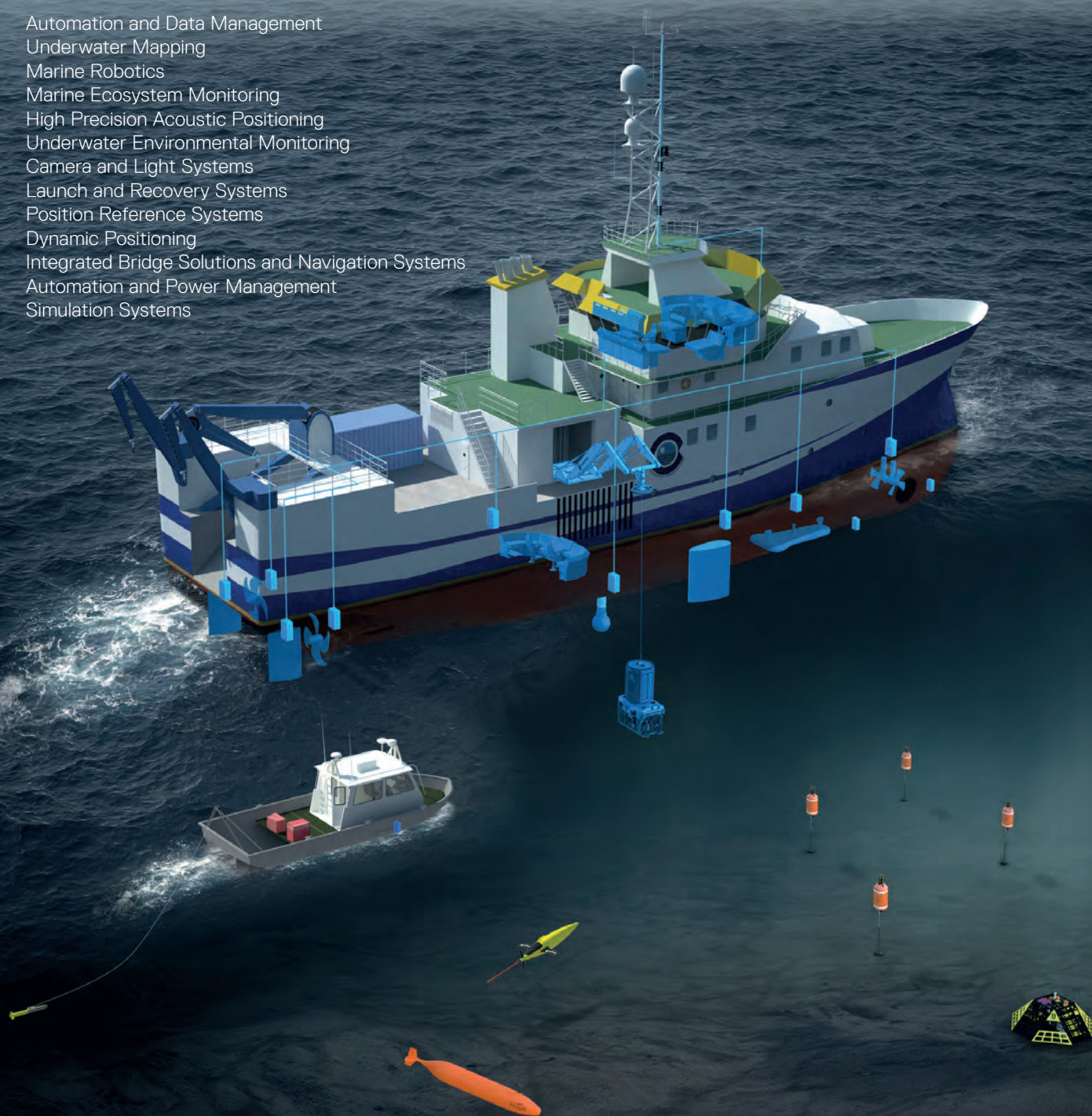


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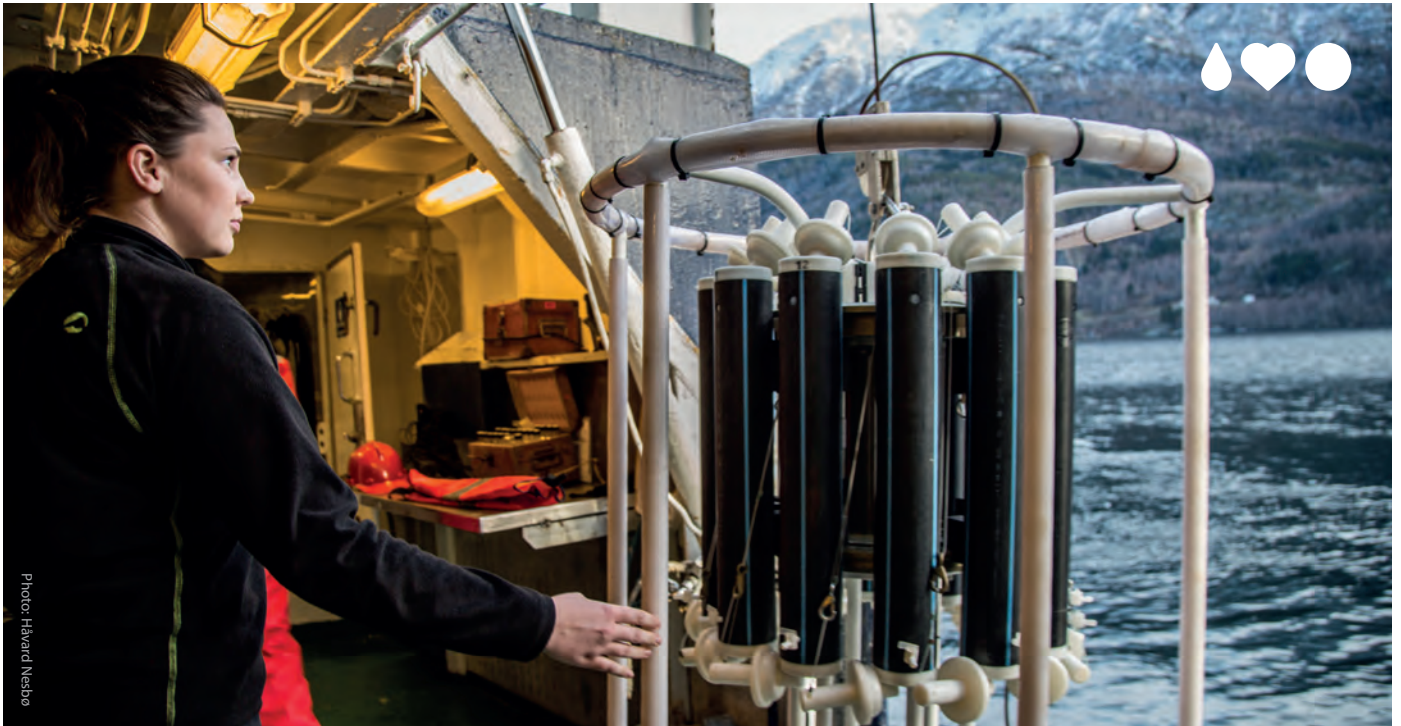


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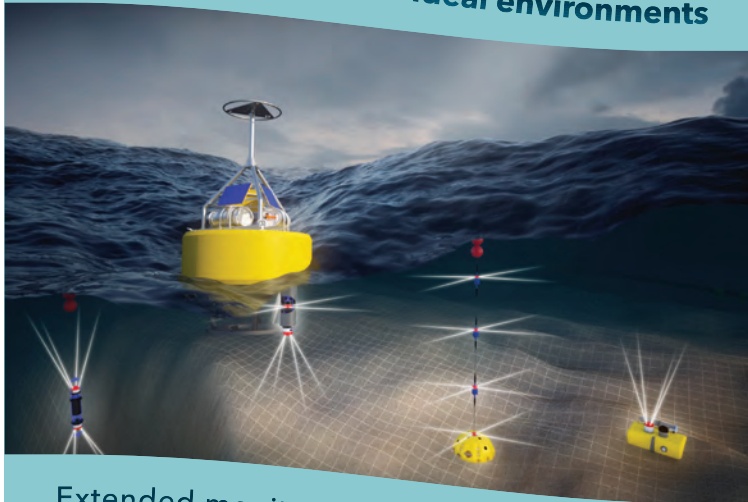
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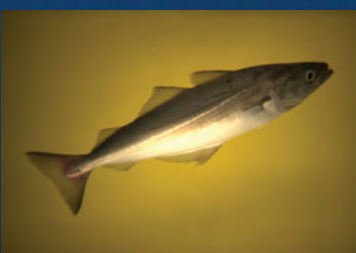
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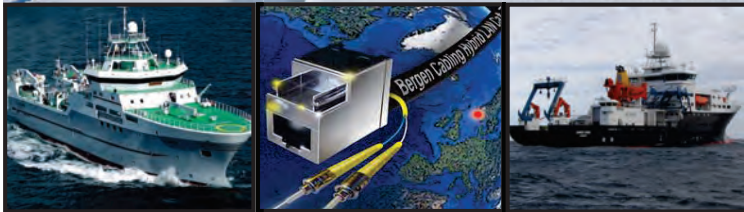


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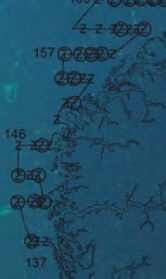


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