Users Conference
Inspiring the future of the ocean industry
London
Application of unmanned surface vessel technologies

Maritime Autonomous systems technology will bring radical changes to future offshore operations. Autonomous vehicle surveys are now common in the subsea industry, and this capability will be enhanced in future by subsea resident and related systems. Offshore operations go beyond passive survey and inspection, however, and include active intervention with subsea equipment. Intervention brings many more challenges: Current technologies can ensure safe and reliable intervention through direct communication with the vehicle, or by direct communication enhanced by partial autonomy in the vehicle. This presentation will discuss the requirements for both construction and operational phases, the challenges, and potential solutions.

Dynamic laser scanning from small subsea vehicles

The new collaborative Micro Inspection Skid delivers high accuracy laser inspection on inspection class ROVs and man-portable AUVs. As the offshore industry shifts to use small easily deployable vehicles to reduce project costs, we unfortunately find that the capability of these vehicles is limited by the range of sensor payloads they can deploy. By combining new miniaturized sensors, the 2G Robotics Micro laser scanner, iXblue Rovins Nano, and Nortek DVL 1000, 3D laser modelling is now possible on vehicles with limited power, weight, and size requirements. This capability has been demonstrated with the modelling of a Canadian Shipwreck.

DriX as an efficiency multiplier against ROV for pipeline pre-lay survey in shallow water

Examination of DriX as an alternate to ROV based pre-lay survey in shallow waters. How does the real world deployment of DriX compare with theoretical savings and efficiencies including challenges of endurance, economics and logistics against proven ROV methodology. What new improvements will allow the DriX to be a disruptive solution in the energy sector.

Technology impact on our part of the industry

Those of us who have been in this business for some years have experienced a dramatic change in technology which in turn has had a major impact on how we work and what we can achieve. The changes are continuing with an increased speed and we are now facing a new technology revolution by remotely controlled and unmanned operations utilizing artificial intelligence and machine learning. During this presentation I will focus on where we are coming from and obstacles faced in introduction of new technology and unmanned operations. Are we moving too fast?
**Smart subsea robotics to promote cost-efficient and flexible offshore operations**

Forssea recently developed a smart ROV and a new visual positioning system and partnered with iXblue to facilitate the interfacing of INS systems onto their innovative robotics platforms. In this presentation, Forssea will introduce 2 milestones of this collaboration:

- **Agile LBL**: a revolutionary method to deploy and recover LBL frames using the Atoll ROV system. Recent tests were organized off the Mediterranean coast using iXblue Canopus LBL and sparse-LBL transponder and Gaps LBL positioning system.
- **V-LOC**: visual localization technology that uses image treatment and inertial fusion to output absolute positions of subsea vehicles. Forssea will present a subsea pipeline use-case.

**Supervised multi-agent autonomy for cost-effective subsea inspection**

Inspection, Maintenance, and Repair (IMR) service providers utilize remotely operated vehicles (ROV) tethered to a surface vessel and piloted in real-time to evaluate and manipulate the subsea infrastructure. This talk will present a novel deployment technique that uses an untethered semi-autonomous underwater vehicle equipped with Schlumberger high-bandwidth acoustic telemetry capable of video transmission to the surface. This system augmented with real-time inspection analytics delivers a novel human-in-the-loop ROV-like command & control, but with significantly reduced support operational expenditure. We present the results of an open-water collaborative mission comprising the OneSubsea UROV working in tandem with iXblue’s Unmanned Surface Vehicle, DriX, to successfully demonstrate wireless video uplink and USBL positioning over 1,000 m of water depth.
### MARUM
Nicolas Nowald
02:40 p.m.

**Deep-sea technology developments at MARUM - a 7 years perspective**
The research center MARUM – Center for Marine Environmental Sciences located in Bremen (Germany) is aiming at producing fundamental scientific knowledge about the role of the ocean and the ocean floor in the total Earth system. In this context, the deployment and development of new and innovative deep-sea technologies, based on the demands and requirements of the scientific community, plays a key role. In this talk we will present ongoing and planned MARUM developments and projects. These include for instance advanced logging tools, improvement of AUV/ROV based navigation and mapping, telepresence or combined H-ROV & AUV missions.

### Ludwig-Maximilians-University Munich
Prof. Dr. Heiner Igel
03:00 p.m.

**The blueSeis-3A sensor: First results from field tests recording rotational ground motions on volcanoes, active faults, and tall buildings**
Seismology has been waiting long for a broadband sensor that measure the rotational ground motions in addition to the classical three components of displacement. There is a wide range of applications ranging from correcting classical seismometers for (possibly strong) tilt contamination, extracting additional features from seismic wavefields, and better resolution for seismic tomography and earthquake source problems. We will report on first field studies indicating the potential of this new seismic instrumentation concept.

### iSTerre Grenoble
Corentin Caudron
03:40 p.m.

**Towards 4-D imaging of volcano subaqueous degassing**
Volcanic gases are the leading forces of volcanic eruptions but also inject Greenhouse Gases into the atmosphere. Even though ~75% of Earth’s volcanism occurs below the sea surface, volcanic gas quantification in aqueous environment remains challenging, thereby limiting the understanding of volcano degassing behaviour as well as its contribution to the atmosphere. Hydroacoustic measurements make the monitoring of many volcanoes a quantitative and economically feasible approach to better constrain volatile output from subaerial volcanoes. Mutualizing the knowledge and technology between universities and industrial sectors in hydroacoustic appears as an appealing way to accelerate research and R&D of new technologies.
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<th>**PRESENTATIONS</th>
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<td><strong>GEOMAR</strong></td>
<td><strong>Black Sea – Lots of methane but where is the gas hydrate?</strong></td>
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<td>Dr. Joerg Bialas</td>
<td>Gas hydrates (GH) are cage like structures of water molecules that bound a large volume of gas inside. GH are found at almost all continental margins worldwide. Natural gas hydrates are primarily formed from methane gas (CH4), which experiences an increasing demand in the course of replacement of coal as energy resource. Within European waters the Black Sea is known to be the largest marine reservoir of dissolved CH4. Hence it has become a target for Germany’s GH investigations. Interdisciplinary investigations revealed the distribution of gas hydrates but leave open questions on the available volume. Seismic surveys rely on Ocean Bottom Seismometers (OBS) to support remote sensing of physical properties. Cable controlled deployment of OBS systems at very short offsets is undertaken using iXblue Posidonia USBL.</td>
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<td><strong>KOBO</strong></td>
<td><strong>Fish stock monitoring in Turkey with SeapiX 3D scanning sonar</strong></td>
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<td>Ümit Küçükoğlu</td>
<td>The project aims to establish monitoring platforms for “Sea Water Ecosystem changes and pelagic fish migratory routes” in 6 locations in Turkey. Main deliveries are Sea Monitoring Buoy Systems for the establishment of an “Internet Based Fish Stocks, Ecosystem and Fishery Activities Data Monitoring Center in Ankara”. These platforms will be positioned at known hot-spots where the seasonal migrations take place. Relevant data (optical dissolved oxygen, salinity, turbidity, ph. temperature, chlorophyll, depth, water current speed &amp; direction, wind speed &amp; direction etc.) will be secured at the platforms and the SeapiX 3D scanning sonar will be collecting instantaneous marine life data, which will be transferred at required intervals to the center.</td>
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