



The SUBSEA newsletter

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British Geological Survey EM 3002D order

The British Geological Survey (BGS) has recently taken delivery of a dual head EM 3002D multibeam system complete with Seapath 200 position, heading and attitude system and Caris HIPS and SIPS post processing software. The MRU 5 from the Seapath 200 can be mounted next to the sonar heads in a subsea housing, minimising the possibility of any offset errors and maximising the quality of the data gathered.

The system was selected following a competitive tender process and will initially be utilised as a portable system for mobilisation on vessels of opportunity. The dual-head, wide swath, configuration was chosen to allow economical surveying of shallow near shore and freshwater areas where quality bathymetric data is often lacking.

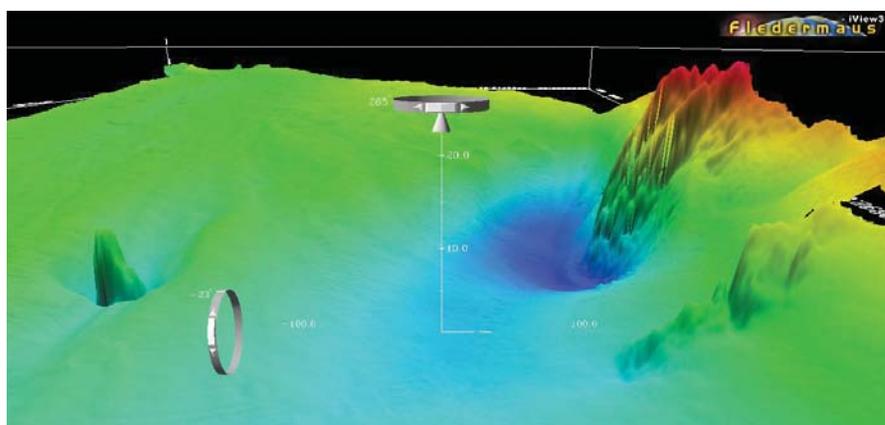
An EM 3002D survey in Forth Estuary was collected in collaboration with Forth Ports on their survey vessel 'Calatria'.

The British Geological Survey is responsible for advising the UK government on all aspects of geoscience as well as providing impartial geological advice to industry,

academia and the public. The BGS is a component organisation of the Natural Environment Research Council (NERC), which is the UK's leading body for basic, strategic and applied research and monitoring in the environmental sciences.

The EM 3002D will be used to map the detailed geology of the sea floor to improve our knowledge of a wide range of environmental issues ranging from habitats and climate change to investigating the very fabric of the earth's crust. This improved understanding will help not only scientific research, but also the management and protection of the marine environment in collaboration with researchers such as the Scottish Association of Marine Science (SAMS), regulatory bodies such as the Maritime and Coastguard Agency (MCA) and with industry clients.

The BGS is a keen advocate of the principle of collecting once and using the same data many times, maximising the value of the data whilst minimising the overall cost. By adding to the national capability in marine mapping the BGS is ready to play its role in a more coordinated approach to national surveys and legislation.



Map deep-water coral and golden crab habitats



NOAA ship 'Nancy Foster' conducted a cruise off of Florida's east coast from June 1 through June 10 to map the ocean floor in Habitat Areas of Particular Concern for the South Atlantic Fishery Management Council (SAFMC).

This mission is a 'cobbling together' of the resources of many to provide data for the Council's needs. The ship is providing support to NOAA's Gray's Reef National Marine Sanctuary,

National Ocean Service, to meet regional science needs to the SAFMC to help map deep-water coral and golden crab habitats.

The National Undersea Research Center (NURC) at UNC-Wilmington offered up the use of its National Institute for Undersea Science and Technology's (NIUST) Autonomous Underwater Vehicle (AUV) to map specific areas of interest in depths of 250-850 meters. After the ship acquires 100% bottom insonification of the sea floor using a Multibeam echo sounder

EM 1002, the AUVs EM 2000 maps these defined areas with high resolution.

The AUV acquires data at speeds reaching 4 knots for up to 30 hours. The synergistic fashion in which this mission is being conducted meets many of the needs of individual programs that might have alone used the platform for a single purpose. 'Nancy Foster' is the first NOAA ship to test and successfully operate an AUV of this magnitude for this type of mission.

UK Royal Navy Upgrade to SIS and Maintenance Contracts



The UK Royal Navy Hydrographic Survey vessels 'HMS Echo', 'HMS Enterprise' and their respective survey motor boats are upgrading their real-time multibeam operator software from the existing Merlin software to the

latest SIS (Seafloor Information System) software.

The SIS software will run on new PC based hardware and take advantage of the 3D graphics capabilities of the systems. The SIS software also provides the operators with a common user interface across all the vessels, simplifying operation and training requirements.

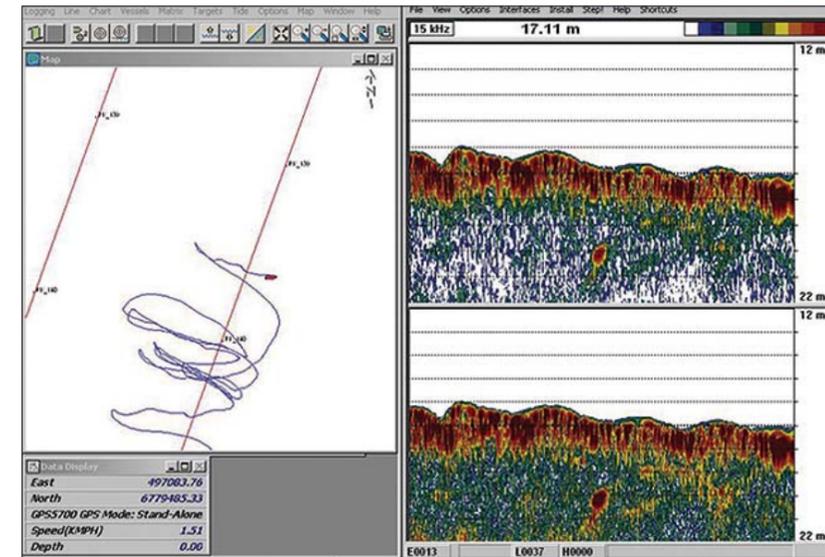
The UK Royal Navy have also taken up maintenance contracts for the hydrographic vessels they support.

All Kongsberg hydrographic systems are supplied with a 2 year warranty as standard and after 2 years this may be extended with an ongoing maintenance contract.

A maintenance contract is flexible and allows the owner to select the cover they require. This cover is then provided at an agreed cost allowing the owner to budget more accurately.

Additionally, preventative maintenance visits can be provided to ensure the systems are maintained to the highest standard.

Going deeper than the sea bottom



The EA 600 singlebeam echo sounders manufactured by Kongsberg Maritime allow survey of bottom relief to be done at depths ranging from a couple of decimeters to the ultimate ocean depths with a lineup of transducers featuring the frequency span from 12 kHz to 700 kHz.

EA 400 - a lower cost version of EA 600 - originally had a 38 kHz minimum frequency limitation since it had been marketed for shallow water operations. However, an opportunity emerged this year to use the 15 kHz low-frequency transducer in the EA 400, too, with the artificially reduced maximum measurable depth. It had been originally presumed that application of a low frequency channel could allow us to find out more about the structure of the sediment layer and clear sound reflections from the below-lying rocks. We were far from planning to substitute the sub-bottom profiler for such an echo sounder but we felt that such a solution could prove useful.

The first results obtained in Oslofjord and Port of Stockholm showed that some results obtained that could look somewhat unusual for hydrographers. We were not quite sure about what to do with the results.

In the spring of 2007, PTF Vozrozh-

deniye, the subsea services contractor (based in Surgut, West Siberia) committed to delivering an IRM service for undersea pipelines, sourced a high-power depth sounding professional tool kit based on the EM 3002 multibeam echo sounder provided by Elkom-Marimeter. The toolkit also included the EA 400 singlebeam depth sounder with the 38/200 kHz frequency span. In addition, the option of sourcing a new seismic profiling system has been discussed. The previously used sub bottom profiler failed to meet expectations as regards detection of pipes likely to be buried 2 meters or deeper. In search of a solution, it became clear that the small-size parametric profilers could not offer due sand penetration, while the ship towed ones are rather complicated for use in the rivers with heavy currents. This is when the new product from Kongsberg was remembered.

In June 2007, the very first low-frequency EA 400 was delivered for testing purposes. The first tests were performed at the water impoundment amid very rugged terrain and shallow depths. Intuitively, the maximum signal emission power was selected. After first tacks, everybody was on the brink of frustration when it became obvious that no pipe was available on the echogram. But the Siberians did not

give up and plunged into examination of every possible adjustment and control. It is hard to describe the surprise when all of a sudden the monitor displayed the clear image of two pipes lying four meters deep even with very limited power and amplification!

The echogram reveals distinct imagery of two pipes buried 4-5 m deep below the sea bottom. It turned out that a couple of meters of sand is nothing for the system and maximum amplification only spoiled the picture. The experiment went on in good humour in the river with the depths down to 20 m and pipe burial four meters in sand. Really, this time we perceived the superb result as a matter of course. (Fig. 1). As it turned out the echo sounders with the 15 kHz channel are an excellent tool for inspecting the pipe position especially when it sunk a great deal down the sand bed. Just one question remains open: how can it be possible?

Well, obviously it may have to do with the algorithm for signal processing used in the Kongsberg echo sounders plus a rather narrow acoustic beam. The point is that similar algorithms have been used in echo sounders designed by Kongsberg Maritime to research bio-resources in the water depths. It is well known that the echo signal is reflected by the air-bladder of fish where a big jump in the speed of sound penetration in the water occurs rather than the fish body. The similar effect develops in the pipe too, whenever the sound speed changes stepwise at the boundary between various media.

Thanks to that, the hydrographic echo sounder was capable of doing the job of a pipe detector better than a seismic profiling system. Following comprehensive tests, enough data is likely to be collected to improve the echo sounder software for the purpose of enhancing its functionality in the area of pipe detection. Nevertheless, EA 400 and its software versatility can provide the solution right now.

First T-AGS 60 Class Upgrade Complete

Kongsberg Underwater Technology, Inc. of Lynnwood, Washington USA reports the successful completion of the first Multibeam Sonar System upgrade on the U.S. Navy T-AGS 60 class survey vessels operated by the Naval Oceanographic Office. The installation on the USNS Sumner (T-AGS 61) was completed in June 2007 in Sasebo, Japan. The project involved decommissioning the EM 121A and EM 1002 multibeam systems and installation of Kongsberg's newest seabed mapping technology, including:

- EM 120 (1°x1°)
- Deep Water Multibeam Echo Sounder
- EM 710 (0.5°x1°) Intermediate Depth Multibeam Echo Sounder
- SBP 120 (3°x3°)
- Full Ocean Depth Sub-bottom Profiler
- EA 600 (200, 38 & 12 kHz)
- Singlebeam Echo Sounder
- ADCP (38 & 300 kHz)
- Acoustic Doppler Current Profiler (Teledyne RD Instruments)

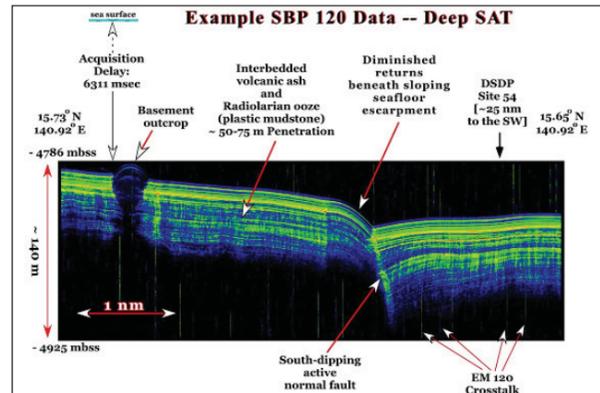
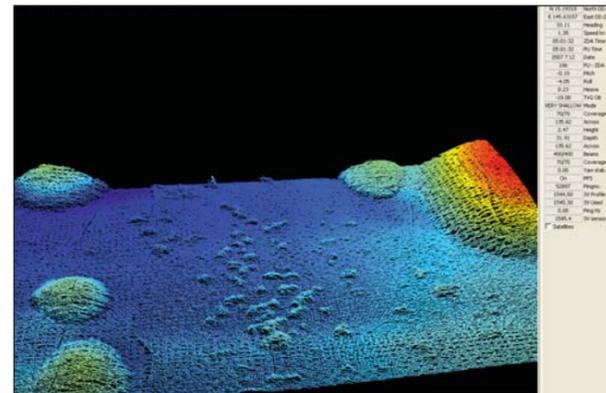


All of the acoustic sensors were installed on a newly designed "gondola" measuring 8 meters across (athwartships) and over 14 meters in length.

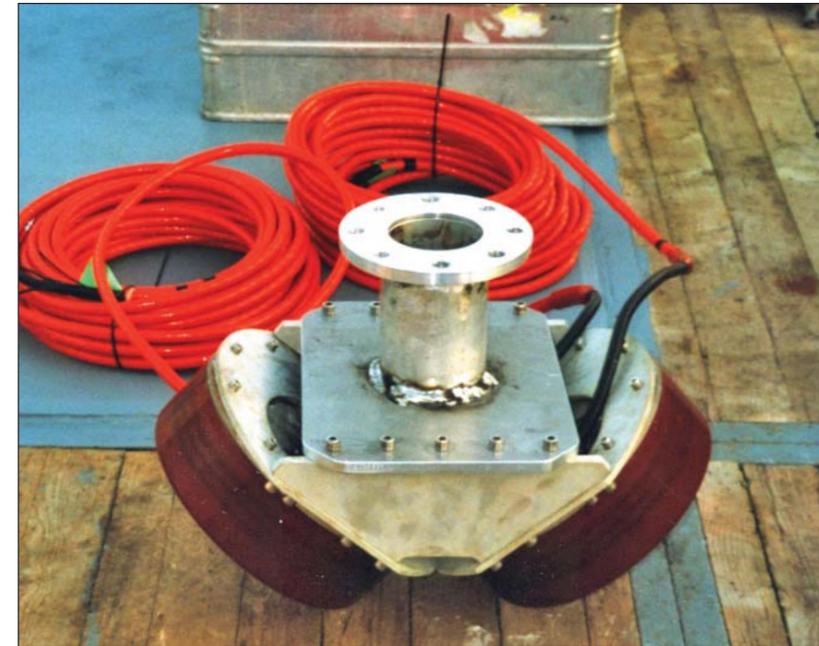
The EM 120 was tested to the deepest spot in the ocean, the Challenger Deep in the Mariana Trench which has a nominal depth of 11,000m. The system successfully tracked bottom to full ocean depth while maintaining swath coverage in excess of 23 kilometers. The EM 710 tracked bottom to greater

than 2,000m; covering a swath of 1 km at that depth. The Saipan reef offered numerous target detection testing opportunities. Analysis by NAVOCEANO and their representatives proved the EM 710 system capable of meeting IHO Special Order target detection requirements.

The SBP 120 system achieved penetration of at least 80-85m in the depth zones tested (3,000-11,000m), exceeding the contract requirements.



Surge of multibeam echosounder sales in middle east



be fully trained to operate & maintain the hydrographic survey systems.

The Kongsberg EM 3002 Multibeam system is also the system of choice for Jeddah based Huta Marine Works Ltd. a 100% subsidiary of HUTA-HEGERFELD Saudia Ltd, The agreement comprises supply, installation and commissioning of the Kongsberg EM 3002 dual head Multibeam Echo sounder system along with the Kongsberg RTK positioning system and ancillary sensors for sound velocity and tide measurements.

Earlier this month a single head EM 3002 Multibeam system was supplied and installed on the survey boat operated by the Coastal Management Department of Dubai Municipality.

The Kongsberg EM 3002 Multibeam Echo sounder system is to be deployed by the Coastal Management Department for conducting hydrographic surveys of the Dubai creek and the near-shore area of the Dubai emirate.

Over recent months there has been a surge in sales of shallow water Multibeam echo sounders in Middle East.

The high resolution performance of EM 3002 and the added technical support capability of Unique System have been the main reasons for clients to choose Kongsberg Multibeam Echo sounder systems.

Unique System has been awarded a contract from the Urban Planning & Development Authority (UPDA) - Doha, Qatar for the provision and installation of a complete hydrographic survey suite.

The Hydrographic Section of UPDA provides hydrographic service for the State of Qatar and the hydrographic survey suite is for installation on its new hydrographic survey vessel.

The contract is for supply, installation

and commissioning of Kongsberg EM 3002 Multibeam Echo sounder & Singlebeam Echo sounder systems along with a complete range of ancillary equipment such as Positioning system with RTK corrections, Motion & Heading sensors, Sound Velocity sensors, Tide gauges with radio tele-metry and a Post Processing system with PC peripherals.

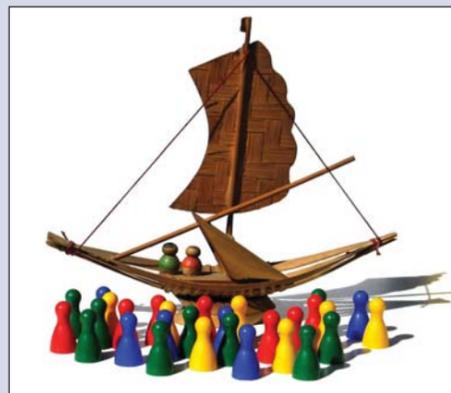
In addition to the order for the hydrographic survey suite, UPDA purchased a significant program for its engineers to

Overview - Standard courses

HPR & HiPAP Acoustic Positioning courses:

Week	Date	Course
41	10-12. October	APOS Basic + HPR Technical
42	16-18. October	APOS Basic + LBL/MuLBL
45	05-07. November	APOS Basic + Rig specific operation
46	12-14. November	APOS Basic + HiPAP Technical

Contact person:
Frank Lian, instructor
E-mail: frank.lian@kongsberg.com
Phone: +47 992 03 963



Acergy Norway AS



Once again Acergy has decided to go with Kongsberg Maritime AS by purchasing a second 0.5 by 1 degree high

resolution EM 710 multibeam echosounder for use in the North Sea. The EM 710 system will be fitted to the new build vessel "Acergy Viking". The system has been delivered and the transducers will be fitted into the hull end September/start October 2007

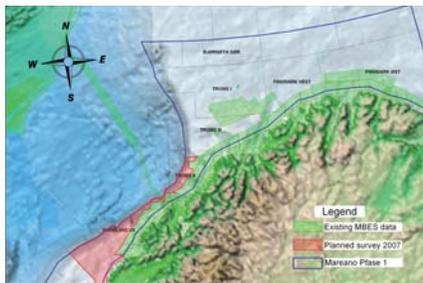
The first EM 710 system was installed in July 2007 on vessel "Acergy Petrel", see fig 1, and has already done survey jobs in the North Sea.

This new addition to the Acergy fleet, currently under construction at Norwegian shipyard Flekkefjord Slipp & Maskinfabrikk AS, confirms the company's strong commitment to the Survey/Inspection, Maintenance and Repair (IMR) market.

Acergy is a leader in seabed-to-surface engineering and construction to the worldwide offshore oil and gas industry.

Detailed bathymetric survey for the Mareano Program

By Stig Øvstedal, Norwegian Hydrographic Service and Cadastre Authority



The Mareano Program aims at providing sufficient knowledge for ecosystem based management of the Norwegian Coastal and Ocean Areas, and to promote knowledge-based sustainable exploitation of ocean resources. The initiators for this Program are the Norwegian Hydrographic Service (NHS), The Institute of Marine Research (IMR, Program management) and Norwegian Geological Survey (NGS). Other co-partners are also involved in the Program. The Mareano Program's three main constituents are:

- Seabed surveying and base studies of the ocean bottom's physical, chemical and biological environment.
- A user friendly Internet information and knowledge system based on the Mareano Partners databases, which will be developed to cover all of Norway's Coastal and Ocean Areas. www.mareano.no
- A research component will focus on deep sea corals, relationship between habitats and sediments, and the relationship between gas and oil leakage and habitats.

The Mareano Program will initially (phase 1) focus on an area between South Barents Sea and Lofoten in the period 2007-2010 (Figure 1).

Figure 1 shows the Mareano area (blue polygon), planned survey 2007 (red) and existing MBES surveys by 2007 (green).

In the early stage of the Program it was soon made clear that our Partners were seeking very high resolution depth data, which exceeds the possibilities from surface platforms at water depth down to 1000 metres. Amongst others, deep sea corals were

to be found. The structure of deep sea corals can often be cone shaped with a height of not more than 10-20 metres off the seabed. Another element to the equation was the guidance to use surface platforms for depth data collection to reduce overall costs. The specification/resolution/quality of the MBES data had to be defined by the NHS, considering above mentioned criterion.

Figure 2 Visualise the difference between EM 1002 (left) and EM 710 (right). The distance between the depth points on EM 1002 is about 5x8 metres, the corresponding distance for EM 710 is 1x2 meters in 200 metres of water depth. The alongtrack distance on the EM 1002 data can be reduced by slower speed, however the NHS does not consider this option as cost effective.

The Mareano Program started up in 2005. The first survey area was in one of the shallowest regions and known to be relative flat. One reason for choosing this area was signs from MBES manufacturers that new equipment with much higher resolution was on its way to the market. The deeper and more topographically challenging areas would be much better determined by choosing a MBES with higher resolution.

After a short heads up warning in 2005 the first job was done by the Norwegian Research and Defence Establishment (FFI) and their vessel HU Sverdrup II. FFI also conducted a survey in 2006, both surveys utilised the well proven EM 1002 echosounder. Altogether FFI collected 2000 sqkm of MBES data on the Tromsøflaket north of Tromsø.

The first Contract to the industry went to Offshore Survey and Engineering (OSAE, Germany) who used the survey vessel Victor Hensen with the new EM 710 echosounder. After a few initial firmware difficulties with the new system, OSAE collected 3600 sqkm of high resolution MBES data, with

a smaller overlap to the already collected data from FFI.

There is a huge difference in resolution between the EM 1002 and the new EM 710 (Figure 2). The Contract for 2007 went to OSAE (now named Fugro OSAE, FOSAE), and the Work is for 13 600 km². This time the firmware problem seems to be solved and the echosounder performs well. The data density is also a challenge for the software packages and the processing philosophy chosen.

The quality management system within the NHS is ISO 9001:2000 certified throughout the whole production line, from our own internal/contract surveying to the internal/contract chart production. To this end, the organisation has several strict quality checking routines.

After putting the data through the quality system and producing terrain models, it is important to distribute these in an efficient manner. Not only to our Partners, but also to others whom should be interested in detailed bathymetric depth data. There is an ongoing procurement sub-project to establish the Norwegian Marine Depth dataBase (NMDB). In this database all depth data collected in Norwegian waters shall be established and managed. The user interface is planned to be web-based.

The procurement process for the remaining areas to be surveyed in the Mareano Phase 1 is planned to start autumn 2007, and will include the Work for 2008 – 2010.



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