Hydro 2016

by Ian Holden Chairman of The Hydrographic Society UK

The International Federation of Hydrographic Societies (IFHS) has been holding Hydro conferences since 1976, with one of its member societies volunteering to host each year. Six years after its last visit, the hydrographic community returned to Rostock-Warnemünde last November for Hydro 2016.

The German Hydrographic Society (DHyG) opted to return to the familiar surroundings of the exclusive Warnemünde Yachthafen Residenz. However, Hydro 2016 was much more than a carbon-copy of 2010. For a start, there were the record attendance figures beating all expectations: 48 exhibitors and almost 450 visitors from over 38 countries (including registered delegates, students and those only visiting the exhibition or break-out workshops and demonstrations).

The three-day event kicked off with the traditional, informal ice-breaker reception in the exhibition area on Monday evening. This gave everyone the opportunity to relax, renew acquaintances and make new contacts – and, for those who've never been involved, witness what goes into putting a trade show together.

During Tuesday morning's Opening Ceremony, IFHS Chairman Rob van Ree and Holger Klindt, DHyG Chair, extended a warm welcome to all. Rob spoke of everyone being connected to and by the sea. He noted that if all the seawater covering the earth was consolidated into one sphere it would be 870km in diameter. Special thanks were given to the volunteer Organising Committee and their additional helpers for the week and also to the 18 sponsoring companies.

Mathias Jonas, Vice-President of Germany's Federal Maritime and Hydrographic Agency (BSH) and Robert Ward, newly branded as Secretary-General of the IIHO, concluded the opening speeches. Mathias noted that the majority of consumers are unaware of the role hydrographers play in enabling them to buy commodities such as food, cars and energy while Robert concluded that data underpins man's ability to manage, exploit and preserve the marine environment.

In the first keynote address, **Peter Ehlers**, former President of BSH, analysed *Ocean governance and the current and future role of hydrography*. He stated the undeniable fact that the hydrographic profession, together with its products and services, is a 'sleeping beauty' which hasn't yet gained public recognition and appreciation equivalent to its value and contributions to maritime affairs. Peter then invited hydrographers to further increase their efforts to promote the need for high-quality hydrography and hydrographic services for all maritime undertakings. Hydrography shouldn't only be discussed when catastrophic disasters such as tsunamis hit the media; it needs to be a central ingredient in implementing Blue Ocean and Blue Growth strategies for a sustainable maritime future.

In the second keynote, **John Hughes Clarke**, who recently moved to the University of New Hampshire, took the audience on a tour de force through *Future perspectives on multibeam backscatter and seabed classification*. Particular emphasis was placed on new methods for the identification of seafloor parameters. Correlation between properly chosen measurement geometries and the quality of results, principally in seafloor texture analysis, were discussed. John reviewed a survey in Loch Ness. The same area was surveyed five times at different heights and when furthest away the roughness was better identified by bathymetry rather than backscatter. The differing frequencies were discussed and praise given to the GSI (Geological Survey of Ireland) for their work in this area.

Holger Klindt and Thomas Dehling (Vice-Chair of DHyG) then invited delegates to the formal opening of the exhibition. They noted that despite early concerns about the current decline in the offshore industry, Hydro 2016 had received very strong support from exhibitors. In addition, many companies were also taking the opportunity to host in-depth product demonstrations on the water and classroom-based workshops, with fourteen hosting tutorials, users group and seminars in the adjacent break-out rooms. Within easy reach of the conference hall, the venue's marina offered the perfect setting for the fifteen companies offering live demonstrations of their systems in the (rather cold) waters of the Baltic. Products on display ranged from multibeam systems to laser scanners, sub-bottom profilers, positioning system and autonomous underwater vehicles. The 590GRT offshore support vessel *Noortruck* was also open for delegates to visit.

The main conference ran in two parallel sessions. A full report on all of the high-calibre presentations would exceed the space available. What follows is a taster of the author's Hydro 2016 experience, with apologies to those not featured.

Session 1A (Perspectives of Hydrography) began with **Robert Ward** outlining *General future perspectives of the IHO*. He showed a new IHO-produced video imagining *A World without Hydrography* (www.iho.int/iho_pubs/misc/video_clips/). Echoing Peter Ehlers, he re-emphasised the ever-growing need for a stronger strategic promotion of hydrography and hydrographic products. According to a recent IHO survey, 50% of all coastal zones of the world are still unsurveyed (29% in the UK). He suggested that existing IHO survey standards will, in future, need to reflect the latest advances in modern technologies and methods and that another update round is, therefore, high on the IHO agenda. All hydrographic stakeholders, from administrations to industry and academia, were invited to take part in this dialogue. Robert concluded with a direct invitation to IFHS to become a primary contributor and coordinate a consolidated industry position.

Next **Mathias Jonas** presented his views on *The provision of hydrographic services as core element of e-Navigation*. He asked "why, if S-57 was so successful, do we need to evolve the existing IHO standard towards S-100"? He also outlined how the new S-100 framework is structured and how, in future, not only hydrographers and mariners will enjoy the flexibility of digital chart data. S-100 paves the way for a completely new world of maritime applications in, for example, e.g. IALA, VTS and oceanography.

Don Ventura closed this session with a hydrographic perspective on *Intelligent exploitation of the blue economy*. He also flagged-up the lack of public perception and awareness of the role and importance of hydrography and how this might be improved if hydrographers start to think in a more 'user-driven' way. His show-stopping statistic suggested a 72km long train would be required to transport all of the goods from one of the world's largest ships. He postulated that it is essential to build in end-user data layers in order to maximise the Blue Economy.

Throughout Session 2A (Student Session) only the session title gave any clue to the status of the presenters; all should be given the highest accolade possible.

First up was **Jean-Guy Nistad** presenting his work on *Backscatter adjustment for multi-sector multi-swath multibeam echo sounders*. The collection of properly calibrated backscatter data still poses major challenges to routine hydrographic work. The GeoHab guidelines for backscatter measurements aim to address this issue. Calibration for backscatter is central to improving quality and avoiding modulation effects. This was discussed in detail, with examples given for Kongsberg systems. Next was **Mark Gray** with *RapidCast: Analysis of spatio-temporal variability in high resolution speed of sound measurements*. Mark analysed and discussed sound velocity data been collected continuously over a full tidal cycle in Plymouth Sound and how, by means of the RapidCast approach, he was able to reduce SVP-induced errors in surveys. **Arne Lohrberg** presented an *Analysis of gas seep activity in Eckernförde Bay and assessment of its linkage to pockmarks and sub-bottom strata*. This was very clearly structured, scientific work on multi-sensor geophysical assessment of glacial deposits with gas in the rock structure. Arne was able to show that the seepage was not just concentrated in the pockmark areas. Although the area in Eckernförde Bay is well-known, this was the first time visualisation of the gas seepage had been achieved.

Last, but certainly not least, was the winner of the annual IFHS Student Award for 2016, **Geraud Naankeu Wati**, who presented his work on *Error budget analysis for hydrographic survey systems; implementation on an inspection campaign of pipelines by an AUV*. First, Geraud reviewed achievable error budgets with vessel-mounted set-ups. Since this approach becomes impractical in deepwater, he considered AUVs as an alternative survey platform. The bias introduced by using non-independent parameters and latency between sub-systems was reviewed, together with new equations for the error propagation. The equations were validated on a campaign in Angola where there were some permanent LBL frames. The AUV and LBL results were compared to give an indication of the sounding accuracy. Geraud concluded that the error budget estimation was improved for both underwater and surface systems.

That evening, the traditional Conference Dinner offered a chance to unwind in the informal setting of nearby Karls's Erdbeer Hof (Karl's Strawberry Farm). Although the strawberries were out of season, there were plenty other very appetising local alternatives on offer. Entertainment was provided by the ATLAS Elektronik Big Band – 22 musicians and singers who all work within the company's engineering group – proof that they know how to generate *and* control underwater sound!

During the evening, Rob van Ree handed the prize for the Best Student Presentation to Jean-Guy Nistad, who had been chosen in a ballot at the end of Session 2A. Geraud Naankeu Wati also received his IFHS Student Award. He had been previously selected by the IFHS Board, at the conclusion of a nomination process in which each member society may nominate one candidate.

The following morning, the innovative content of both Sessions 4A (In-situ and remote hydrography) and 5A (Space hydrography) attracted a lot of interest. **Ingo Hennings** opened the former with *Comparison and characteristics of oceanographic in situ measurements and simulations above submerged sand waves in a tidal inlet*. His aim was to prove the theory of upwelling artefacts. 2002 ADCP data was used to study the concentration of suspended sediment and compare this to the visible ocean colour from space.

In Session 5A, **Stefan Wiehle** introduced the *BASE-platform project: deriving the bathymetry from combined satellite data*. The two-year BAthymetry SErvice platform project was established to address the lack of high-resolution bathy data in many areas of the world. It uses data from GEBCO and EMODNET, though both are limited by resolution and supplemented by a number of sources including CSB (crowd-sourced bathymetry). The BASE-platform will offer a single source of data off-the-shelf, on demand and with meta data.

Knut Hartmann followed with *Satellite-based bathymetry and seafloor mapping for the shallow water zone*. In this study, the colour band of a satellite image was stretched to view the green/blue reflectance data containing the seabed, turbidity scatter, vessel traffic, sea state, etc. Images observed 2-3 times per day were used to create a database. Shallow water is defined by where the sun is reflected. Images have the data other than the seabed removed and are then harmonised. Accuracies have been seen to be 0.7m compared to MBES in the Red Sea and 2m compared with LiDAR in Western Australia and the Caribbean. Uncertainties increase with depth and are affected by the seafloor properties. The system is now used in hydrodynamic modelling and is efficient and good for conflict areas, there is a re-process archive and it can be used for border boundaries. The UKHO has used the data on charts since 2015.

Pau Gallés presented *Global bathymetry from satellite altimeter sensors*. His approach uses open-bathy optimised by local observations with a new SAR mode. Gravity anomalies tilt the surface and thus there is a need to work backwards. Differential ranges from SAR data are taken along track from Cryosat 2 (N/S) and Jason 1 (E/W) and combined with the gravity spectrum from EGM 2008 and have the sea surface height added. The lack of land data affects the model at >10km and due to small undulations in the sea surface is good from 2km; 200m accuracy is achieved at 5km.

Session 6A (Energiewende - Challenges in the wind offshore business) saw **Jens Wunderlich** report on *Burial depth determination of cables using acoustics – requirements, issues and strategies*. The cross-track method was discussed with narrow beams for good detection. However, there are many more lines and vessel time and thus along-track is used for most surveys. Approaches were discussed to overcome the limitation of the cable tracking technology including various options for utilising a sub bottom profiler. Jens also concluded that cables should be designed for survey. The session, which had also featured past IFHS Student Award winner **Oliver Anders** speaking about finding the correct method for surveying power cables, concluded with **David Rose** discussing *Offshore unexploded ordnance recovery and disposal*.

Session 7A (LiDAR case studies for hydrographic assessments) began with **Markus Aufleger** presenting two examples of *High-resolution, topo-bathymetric LiDAR coastal zone characterisation in Denmark*. **Wilfried Ellmer** reported on the *Use of laser bathymetry at the German Baltic Sea coast* as part of a three-year project using differing sensors from 2012-14. Finally, **Lutz Christiansen** described *New techniques in capturing and modelling of morphological data*. The Hawkeye III observed down to 8m in a difficult area with a 3m Secchi depth. The aim was to collect data for coastal protection measures and the achieved height accuracy, in the order of 10-20cm, compared well to existing surveys.

I hope you're still reading. Often at conferences (and in reports) there can be a drift off in delegates towards the end. Not so at Hydro 2016, where delegates were treated to an excellent final day of sessions. The morning began with a choice between Session 8A (State-of-the-art GNSS techniques) and Session 8B (Education). I chose Education.

Firstly, **Jan Appelman** discussed the *Changing market requirements for competence and certification for the hydrographic surveyor*. The format of Skilltrade's Cat B course has changed significantly over a decade due to the increasing time required to complete all the aspects. Today e-learning modules, onshore classroom sessions and extensive offshore experience are included. Over nine years, 161 students have registered and 55 diplomas been awarded.

Derrick Peyton then described *Hydrographic certification in Canada*. Their scheme can put an engineering graduate who has had a two-year development period, including ethics, up before for a board for professional certification by the Association of Canada Lands Surveyors. This accreditation is essential to undertake rig moves. Someone completing an IBSC Cat A course would need two years' experience to gain Level 1 accreditation – three years for Cat B. An open forum followed, during which some concerns were voiced that highly-experienced people, who have evolved with the industry, may potentially be no longer viewed as 'competent'.

Session 9A (Hydrography in extreme environments) was not for the faint-hearted. **Melanie Barth** described Fugro's search for the tragic MH370. The search centred on a 172,500km^2 region situated 2,700km from Perth, Western Australia where water depth varies from an average 3,500m to a maximum 6,000m. Some of the statistics quoted were staggering.

Finally, **Wilhelm Weinrebe** presented a hugely-entertaining account of *Multibeam mapping in the remote fjords of South-East Greenland*. To do so, they went back in time aboard a 1951 topsail schooner equipped with a pole-mounted MBES. There was no radar nor labs but lots of sea ice. The CDT probe was lowered to, and recovered from, 700m depths by hand. Perhaps we should all appreciate the comfort and convenience of modern vessels and systems a little bit more! The stunning photographs confirmed that everyone involved with the survey thoroughly this relished once-in-a-life-time experience. If you r get the chance to see this talk, your enjoyment is guaranteed.

All good things must come to an end. In formally drawing Hydro 2016 to a close, the Chairmen of IFHS and DHyG thanked all who had contributed to its success once again. The final act was the announcement that Hydro17 will be in Rotterdam from 14-16th November. I hope to see you there.

Many of the presentations and papers can be downloaded at **www.hydro2016.com**.

To learn more about future Hydros or to download presentations from past events visit **www.hydroconferences.org**.