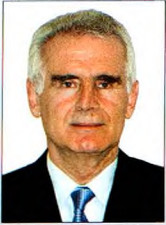


Article



Shallow-Survey 2005 - 4th International Conference, Plymouth, Devon, UK from 12-15 September 2005

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Opening Address by VAdm Alexandros Maratos, President,
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Planning and implementation of National Maritime policies require marine data and information which have to be collected through marine surveys. **Marine surveys** can be defined as "the procedures and means used for the collection, processing, analysis and presentation of data and information of the marine environment required for various purposes". However, 'surveying' is a broad term that can mean many different things. Depending on the general purpose or application, there are hydrographic surveys, geological surveys, biological surveys, military surveys, oceanographic surveys, geophysical surveys, and sea mine surveys. Depending on the method and equipment used to collect the data there can be acoustic surveys, seismic surveys, magnetic surveys, airborne laser surveys, and multi-beam surveys. Depending on the area where the surveys are conducted, there are deep water surveys, offshore surveys, ocean surveys, route surveys, continental shelf surveys, polar surveys, coastal surveys, and – shallow-water surveys. Any combination of this terminology can be used to explicitly identify the purpose or outcome of a marine survey. This includes safety-of-navigation, environmental protection, resource development and maritime security.

The International Hydrographic Organisation (IHO) and its Member States' Hydrographic Offices conduct hydrographic surveys primarily to support the needs of safety of navigation and the protection of the marine environment. We have to note that according to Regulation 9 of Chapter V of SOLAS, the Contracting Governments are obliged to execute hydrographic surveys in the waters of their national jurisdiction, covering mainly the sensitive coastal and shallow-water areas. I am very pleased to participate in the 'Shallow Survey 2005, 4th International Conference', and to make this opening address. My remarks should not be considered a technical presentation. Nor will I try to give answers to specific technical or scientific issues, or problems associated with marine surveys in shallow waters, or to propose techniques, equipment and procedures that should be applied. Instead, I will try to highlight those points where the theme of this conference relates to the activities of the IHO and its Member States.

There are a number of reasons why it is important to stress the need for improved coverage and quality of survey data required to produce high qual-

ity nautical charts and publications. These include the advent of the VLCC (Very Large Crude oil Carrier) with exceptionally deep draught, the need to protect the marine environment, the demands of maritime trade patterns, the importance of seabed resources, and the U.N. Convention on the Law of the Sea affecting areas of national jurisdiction. In addition to providing improved coverage, nautical charts that may have been adequate a decade ago, need to be recompiled using new survey data that is collected to a higher degree of accuracy. The advent of accurate satellite navigation, available to mariners worldwide, has made poorly positioned historical data an even greater problem. The production of ENCs, the fuel for ECDIS accepted by IMO under Regulation 19 of Chapter V of SOLAS as equivalent to paper charts, must be based on new, more accurate surveys. This is especially true in shallow waters if we are to take full and effective advantage of its specifications for the improvement of safety of navigation.

The IHO has adopted three very important Strategic Issues relevant to this Conference:

- a. Achievement of an adequate global hydrographic data coverage, ensuring that good quality hydrographic data is available worldwide where needed;
- b. Transition to the digital era, for the provision of digital services, including collection, production, distribution and updating; and
- c. Provision of services other than for navigation, ensuring that national hydrographic data satisfy the needs of scientists, administrators and others with an interest in maritime issues and that the data are fully and conveniently available to them.

It should be noted that the United Nations General Assembly in 2004 with Resolution A/59/24, entitled 'Oceans and the Law of the Sea' and specifically in the Chapter referring to the 'Maritime safety and security and the flag State implementation', *"Invites the IHO and the IMO to continue their co-ordinated efforts, to jointly adopt measures with a view to encouraging greater international co-operation and co-ordination for the transition to electronic nautical charts and to increase the coverage of hydrographic information on a global basis, especially in the areas of international navigation and ports and where there vulnerable or protected marine areas"*. This resolution of the UN/GA rein-

forces the three main Strategic issues of the IHO. It also recognises the excellent co-operation between and efforts of the IHO and IMO for safety at sea, and emphasises the need for data and information in shallow waters which in turn highlights the importance of the Shallow Survey Conferences.

The objectives of the IHO, as written in its Convention, include: the co-ordination of the activities of national Hydrographic Offices and the adoption of reliable and efficient methods of conducting hydrographic surveys. To accomplish these objectives the IHO established 'The IHO Standards for Hydrographic Surveys' known as Special Publication 44 or S-44. The first edition was published in 1968 with subsequent editions in 1982, 1987 and 1998. The first three editions of the Standards were more or less similar; they applied to surveys conducted for the purpose of compiling nautical charts intended generally for marine navigation, where survey scales were based on the depth, and area and positioning accuracy on the scale. Multibeam echo sounder systems and side scan sonars with dramatically increased data density have resulted in changes to the Standards to describe adequate bottom coverage in lieu of specified line spacing based on scale. To this effect the existing 4th edition was developed using 'orders of survey' to meet the needs and requirements of different end users.

In recognising the development achieved over the last 10 years in the equipment used for hydrographic surveys – especially in shallow water systems, the experience gained with the use of the existing Standards, and comments received from Member States and users, the IHO has established a working group to revisit the Standards and propose improvements. I am pleased that the Chairman of the working group, Chris Howlett from the UKHO, will provide a presentation on Thursday on the way forward to the 5th edition and on the issues that need to be considered so that the new Standard will provide very clear guidance to the users. The co-operation and support of the manufacturers and experts in this effort will, I believe, be very valuable. We hope that the Working Group will manage to finish its work by the end of next year, in order for the new Standard to be discussed and possibly approved by the IHO Member States during its Ordinary International Hydrographic Conference in May 2007.

During recent years the advancement of technology and the demands for new and more accurate products have resulted in the development of new techniques and equipment in the field of marine surveying. The two main parameters that need to be considered are the depth measurement of shallow waters and positioning at-sea. The IHO had to adapt to these new technological developments and to introduce improved Standards and procedures for the acquisition, processing and presentation of the data and information. GPS and GLONASS satellite-positioning systems are now in wide use providing automatic high accuracy indication of the position and GALILEO, a similar satellite positioning system, is under development by the EU. These systems provide full positioning coverage in any part of the world 24 hours a day all year around and are well developed and easily used. Receivers are offered by numerous manufacturers and come in a variety of models, either as separate units or as components of integrated hydrographic surveying systems. Experience has been gained with their use over many years and they are accepted as very reliable systems for use in a variety of applications particularly in shallow water surveys. ECDIS, ENCs and GPS are the main components of the digital navigation that has been accepted by IMO.

For the measurement of the depth, multibeam echo sounding, digital side scan sonar imagery and airborne laser hydrography are three new techniques that have been developed for some years now and are considered to be the latest technology used in hydrographic surveying and especially in shallow waters for a variety of marine industrial activities and for military purposes such as mine hunting. The application of these techniques has resulted in an important change from point and line survey to swath measurements. There are many benefits and advantages, but there are also some difficulties, problems and limitations. A number of Hydrographic Offices have been making use of these techniques for some years now noting that MBES may now be accepted either as a sole acquisition technology or together with SBES or SSS. Let me touch very briefly upon these systems, without, as I mentioned earlier, going into the technical details. There are many papers that will be presented during this Conference on the use, advantages, problems and developments of these techniques, as well as the equipment used in high-resolution

surveys in shallow waters. The IHO is very interested new technological advances, and will give them appropriate consideration.

The Multibeam Echo sounder is a hydrographic survey system with high accuracy, high resolution, high efficiency that potentially provides 100% coverage of the seafloor. This is why it can be used to satisfy the requirements of 'Special Order' in the current IHO S-44 Standard. Multibeam data, especially from shallow waters, are used for interpretation purposes with side scan sonar data, in order to verify whether a feature exists or not and to support modelling and other requirements. The dense soundings can reveal all significant underwater features and eliminate the doubt as to what the seafloor is like between the survey lines. On the other hand we have to observe that capital cost for the acquisition of a complete shallow water system is still high, although somebody may argue that charts are produced now at lower cost than before and with better quality. It is a complex survey system, in which multi sensors are used. It requires special training, experience and an appropriate infrastructure in the HO in order to use it, maintain it and develop different products. A very important issue from a hydrographer's point of view is how the high volume of data collected is to be managed and processed effectively from raw data to final map. Progress has been made on this topic, and various algorithms and software now available. But, I am afraid that this can add confusion rather than providing a uniform answer. For instance, should you use area based editing, automatic surface cleaning, swath based editing or something else? The use of multibeam echo sounders or phase measuring bathymetric sonar, beam forming or interferometric is not clear to many users. I hope that the Working Group that has been formed will look into all these issues and come up with appropriate responses.

LIDAR (Light Detection and Ranging) is an optical system based on laser scanning from the air. It is one of the most promising techniques for fast, high-density sounding of shallow waters, but far too expensive to be used by many HOs. It also has limitations in depth measurement, less than 70 metres, and then only in the very best conditions, based on the water transparency and not providing accurate data in Sea State 5 or above. Dual **channel Side Scan Sonar (SSS)** is an important aid to

modern surveying supporting, the detection of wrecks and obstructions, the gathering of seafloor classification data and the identification of mobile areas of the seafloor. There are other techniques and equipment in development that will have a significant impact on marine surveys and especially shallow water surveys. **Autonomous Underwater Vehicles (AUVs)** have already found a wide use in the offshore surveying industry and they will undoubtedly take on an increasing role in surveys of both deep and shallow waters. **Airborne Electro Magnetic Bathymetry (AEMB)**, is a geological exploration technique that can be used in coastal and shallow waters but, as has been reported, refinements in both instrumentation and interpretation software are still needed.

In discussing these new technological developments we must remember that there are many developing States, whether Members of the IHO or not, that do not have the means to follow and apply these techniques in the shallow water areas of their national jurisdiction. Neither must we forget that hydrographic surveys are a very expensive obligation, under Regulation 9 of Chapter V, for the Contracting Governments to SOLAS and that many developing States are not in a position to execute them. The UN/GA in its Resolution A/58/240 in 2003, recognised this specific problem for developing States and 'Encourages intensified efforts to built capacity for developing countries, to improve hydrographic services and the production of nautical charts'. The IHO has recognised this need and has adopted 'Capacity Building' as one of its Strategic issues. To this end, IHO has established a Capacity Building Committee, a Capacity Building Strategy and a Capacity Building Fund, and has started implementing a programme for the support of developing States either from its Capacity Building Fund or in co-operation with other Organisations and donors.

The dredging of channels and ports, new port constructions, the laying of cables and pipelines and

the effects of disasters in coastal areas give rise to the dynamically changing hydrographic characteristics of coastal and shallow water areas, which need constant monitoring and very accurate surveying. Conducting accurate surveys using the best available means and techniques by all States will assure safety of navigation in all parts of the world and will support the marine transportation, which is an integral component of a nation's transport system and is essential to its economy and national Development. In many respects, hydrographic survey in shallow waters is at the 'heart' of safety of navigation and the IHO and its Member States will continue serving this principle in the best possible way.

Biography of the Author

Vice Admiral Alexandros Maratos after graduation from the Hellenic Naval Academy served in different types of surface combatants and in hydrographic and oceanographic research vessels. He holds a Master of Science Degree in Surveying Engineering from the Technical University of Athens, a Master of Science Degree in Physical Oceanography from the Naval Postgraduate School, Monterey California and a certificate in Hydrographic Engineering from the USN. For many years he was the professor of hydrography, oceanography and underwater acoustics in the Hellenic Naval Academy. He is the author of many reports, articles and manuals of technical and scientific interest.

From 1994 until 2002 Vice Admiral A. Maratos was the Hydrographer of the Hellenic Navy. In April 2002, during the XVI Hydrographic Conference he was elected as President of the Directing Committee of the IHO.

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