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Development of electronic nautical charts for pleasure boating market with high-density data.

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Abstract:
Nautical paper charts, which consist of geographically related hydrographic information printed on paper, have been used since the past centuries by mariners as a means for planning, drawing and monitoring the own ship's route.
With the technological evolution, which began in the early eighties and continued exponentially in the following years, it was clear that printed nautical charts would be replaced in a short time by digital vector nautical charts displayed on specific electronic systems installed on board ships.
Electronic Navigational Charts (ENCs) are the official vector nautical charts published by the national authorized Agencies, such as the Italian Hydrographic Institute (Istituto Idrografico della Marina_IIM), and compliant with the standard S-57 released by the International Hydrographic Organization (IHO).
ENCs displayed on the screen of a type-approved ECDIS (Electronic Chart Display and Information System) satisfy the carriage requirement for nautical charts as established by IMO-SOLAS (International Maritime Organization-Safety Of Life At Sea) regulations.

In recent years, thanks to modern techniques in the implementation of hydrographic surveys, which allow to collect a large amount of high-resolution data, several Hydrographic Offices have seen with great interest the possibility of using this hydrographic data for the production of Electronic Navigational Charts (ENCs) with high-density bathymetry.
A High-Density ENC (HD ENC) includes bathymetry depicted with depth area intervals of 1 metre or closer and may also include more detailed port infrastructure. The area covered by high-density bathymetry typically affects a limited portion of the ENC cell coverage, such as shoal areas where the under-keel clearance is minimal and/or where vessel manoeuvrability is restricted. The compilation scale of a HD ENC, chosen by the charting authority, should be larger than 1:5.000. An important aspect that should not be underestimated is the updating of bathymetric data, which depending on the variability of the seabed, could lead to frequent hydrographic surveys within a few months. Close cooperation between each Hydrographic Office and pertinent maritime authority is therefore essential.

With a view to improving and increasing the safety of navigation in national waters, IIM has always paid attention also to pleasure boating. Since 2006, in fact, IIM has been publishing and updating a nautical paper chart portfolio, pertinent exclusively to pleasure boating, that includes coastal and approach paper charts (scales 1:100.000 and 1:30.000) of all Italian coastline. However, during last twenty years, the installation of Electronic Chart Systems (ECSs) on a large number of pleasure crafts has contributed to an exponential growth in the use of vector nautical charts also for this type of ships. In recent years, moreover, the pleasure boating market has addressed interest in the possibility of using official electronic nautical charts with more detailed bathymetric data.
In order to satisfy this demand of the pleasure boating market, IIM is about to start a study for the production of electronic nautical charts with high-density bathymetry related to small Italian ports. The project will initially focus on the analysis of hydrographic data inside and immediately outside the tourist port of Portofino in order to define the depth range to be represented with high-density bathymetry based on the draft of the boats that moor in the port. The project will lead to the compilation of the "pilot chart" with high-density data of Portofino Port at scale 1:3.000. This first HD vector nautical chart will have the double advantage to visualize safety margins with higher resolution than a standard harbour vector chart and to provide more detailed information on deep soundings within navigable areas.
In the next years a new portfolio of HD electronic nautical charts for the pleasure boating market, aimed at making navigation more reliable and safe, is expected.

References:

– IHO S-65 Annex A "High Density (HD) ENC Production and Maintenance Guidance" Ed. 1.0.0 January 2020
– IHO S-66 "Fact about electronic charts and carriage requirements" Ed. 1.1.0 January 2018
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