



UK Hydrographic
Office

United Kingdom Generic National Report to the Regional Hydrographic Commissions



This Report provides general information about the United Kingdom, the UK Hydrographic Office (UKHO) and its activities of interest to Regional Hydrographic Commissions and to other IHO Member States. A supplementary UK National Report will be submitted to each Regional Hydrographic Commission attended by UK, to provide the information specifically relevant to that Commission. For further details of UKHO's role and other activities, please see gov.uk/ukho

This document will be reviewed annually.

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I: The UK Hydrographic Office (UKHO)

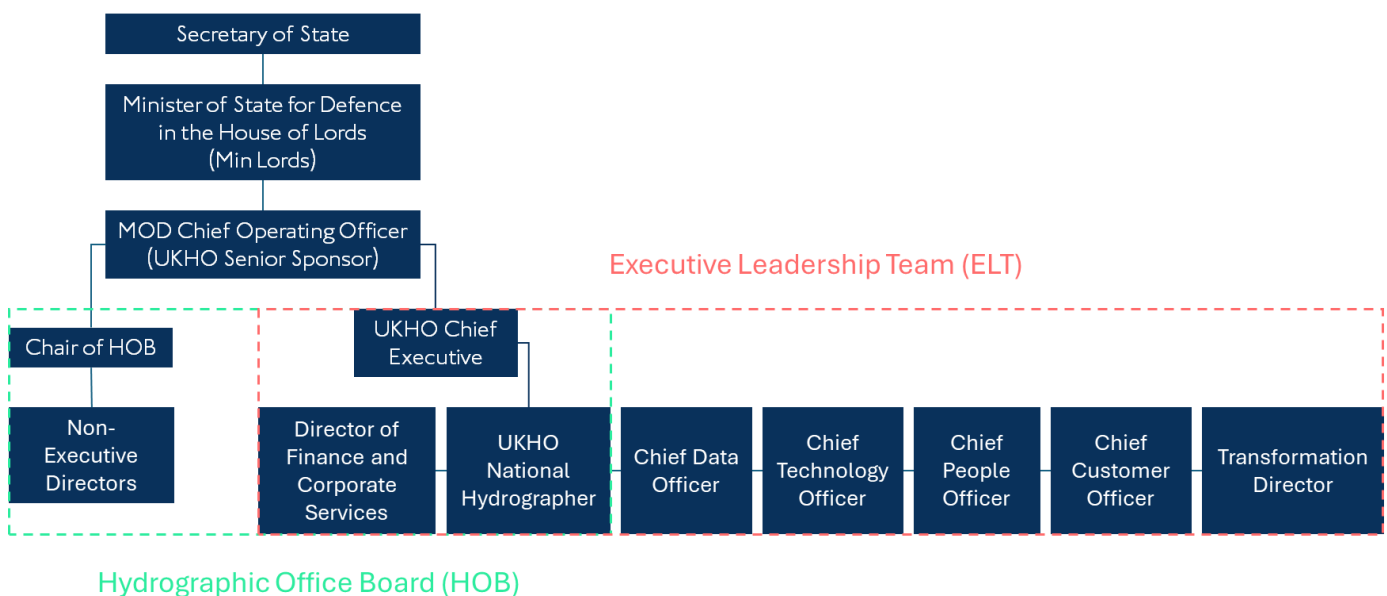
UK Delivery of Hydrographic Services

1.1 The UK is a Contracting Government to the International Convention for the Safety of Life at Sea (as amended and including its Protocol of 1988), 1974 (SOLAS). The UK Maritime and Coastguard Agency (MCA), an agency of the Department for Transport, is the UK National Maritime Administration, and is responsible for ensuring that the UK's obligations under SOLAS are met.

UKHO Governance and Targets

1.2 The UKHO is an Executive Agency and Trading Fund of the Ministry of Defence (MOD). As a Trading Fund, the UKHO is required to be self-financing. It retains the income it receives for its products and services to cover running costs and to fund investment. It pays a dividend to its parent department, the MOD, and is required to make a return on the capital employed. More information about UKHO Governance and its Public Task can be found in its [Framework Document](#).

1.3 The UKHO's current top level organisation structure is currently:



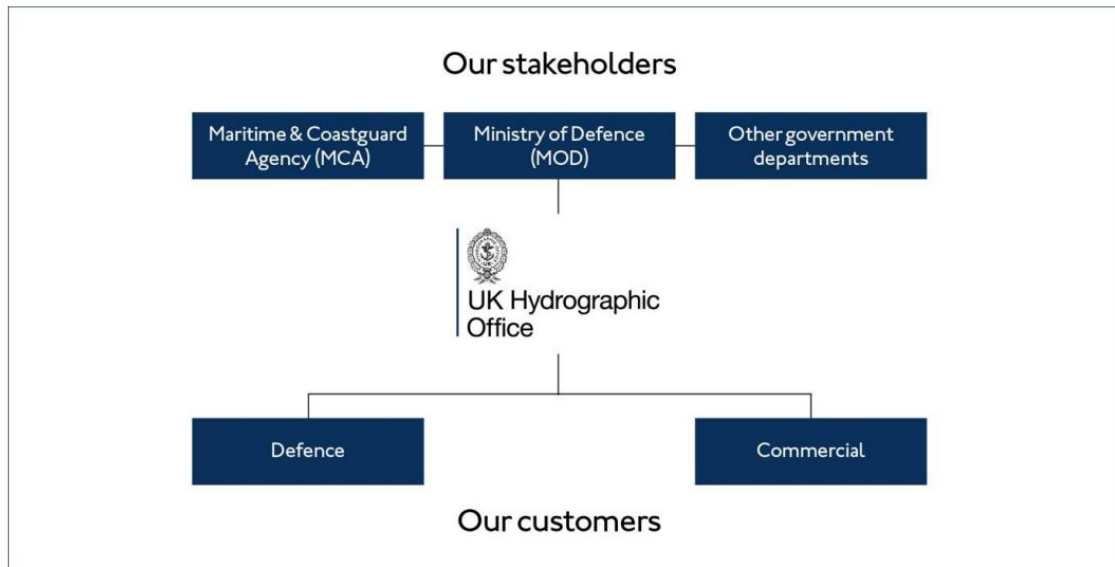
1.4 The owner of the UKHO is the Secretary of State for Defence. Responsibility for the UKHO is delegated to the Minister of State for Defence in the House of Lords (MinLords). The UKHO Corporate Plan is approved by MinLords and they receive regular performance reports.

1.5 The Hydrographic Office Board (HOB) meets every two months to provide strategic guidance and to ensure that the Corporate Plan is achieved. The HOB has a non-executive Chair and includes: a representative of the MOD, a representative of the Royal Navy; three non-Executive Directors; plus the UKHO Chief Executive, the National Hydrographer and other appropriate Executive Officers. The HOB has regular observers including representatives from Strategic Command and from UKHO's Largest Trade Union. Further details about how HOB operates can be found within the [UKHO Board Charter](#).

1.6 The running of the UKHO is steered by the Executive Leadership Team (ELT) and chaired by the Chief Executive.

UKHO Partners

1.7 The UKHO has a memorandum of understanding with the MCA to ensure both appropriate provision of hydrographic services for waters of UK national responsibility, and representation of UK in international hydrographic and maritime forums. Further details of the delivery of hydrographic services in UK waters are provided in IHO publication C-16 (National Hydrographic Regulations).



1.8 In addition to meeting SOLAS obligations, the UKHO has a responsibility to deliver hydrographic support to the UK armed forces for operations world-wide and contributes to UK's efforts to provide technical assistance to other countries.

UKHO Targets

1.9 Every year the UKHO is set Key Targets by its Owner. These are the highest level measures of the UKHO's performance; they are linked to UKHO Top Level Objectives (which are contained in the UKHO Framework Document). Performance is reported against the Key Targets and a return submitted at the end of each financial year for inclusion in the MOD Departmental Performance Report. The Key Targets are in the public domain: they are announced in Parliament and performance is reported in the UKHO Annual Report and Accounts, copies of which, with further information, can be found via the [UKHO website](#).

Production Systems

1.10 The UKHO works with a digital production flow line where source information is recorded and stored centrally within Source Data Receipt (SDRA). Real world changes are assessed against our products within this system and changes to existing Standard Nautical Charts (SNCs), Electrical Navigational Charts (ENCs), and Additional Military Layers (AMLs) are made using the Hydrographic Database (based around CARIS HDB). Changes are fed to product outputs such as digital print and digital updates.

Cooperation and Partnerships

1.11 The UK is committed to collaborative partnerships through bilateral arrangements, developed in co-operation with other international government hydrographic authorities and data providers, covering a range of topics, including the use/re-use of data protected by copyright and intellectual property rights of those authorities. These also promote other forms of co-operation between the participants, helping to enhance international maritime safety and protection of the environment.

1.12 The UKHO's support to international capacity building and to the International Hydrographic Organisation (IHO) is described in sections 8 and 12 of this document, respectively.

1.13 The UKHO works with selected partner organisations in order to source specialist capabilities we do not have in-house; to enhance our products for the marine user. We work closely with them to deliver basic safety and navigational solutions, and seek to be the marine geospatial data provider of choice to those providing wider vessel and marine management solutions.

IC-ENC

1.14 The UKHO is a founding Member and the Operator of the International Centre for ENC's (IC-ENC). IC-ENC is a Regional ENC Coordinating Centre (RENC) which provides production support, ENC validation, distribution and revenue management services to its 50 Members (about half of active IHO Member States are IC-ENC Members). These services are provided across four regional offices, based in the UK, Australia, Brazil and United States. IC-ENC has a global folio of almost 12,000 ENC's, which makes up well over half of the global ENC folio. IC-ENC appoints and manages Value Added Resellers and Distribution Partners to distribute these ENC's and provide end-user services to ECDIS equipped vessels and non-ECDIS vessels.

1.15 IC-ENC operates multilaterally through its Steering Committee (SC), for which each Member is invited to participate. The scope of the SC is to help determine the strategy for the future operation of IC-ENC. The SC has three subordinate bodies, the Technical Conference, Distribution Working Group and Production Support Working Group. These groups meet regularly to discuss and provide recommendations to the SC on technical and policy issues surrounding the production, content, application and availability of Marine Data Products.

1.16 IC-ENC is currently developing new services for S-100 products in line with the IHO S-100 Roadmap. To support Members with the transition from S-57 to S-101, IC-ENC offers a Conversion Readiness Service which is focused on helping Members prepare their S-57 ENC's for conversion to S-101. S-100 training is also being developed as a priority for the IC-ENC Learning Management System. Further information can be found on the IC-ENC website (www.ic-enc.org).

2: Regional Activity

Hydrographic Programmes

2.1 The UKHO runs a range of hydrographic programmes funded by internal UK Government support or external funding. These programmes cover the UK Overseas Territories and Primary Charting nations across the globe and look to improve the quality of seabed mapping data and underlying hydrographic governance. These programmes continue to highlight the importance and utility, locally, within government of the wider use of Hydrography not only to increase the safety of navigation reducing the likelihood of a maritime incident occurring but to support, manage and protect the marine environment in relation to the wider blue economy.



Surveys and Capacity Building

2.2 Any requests for survey assistance from coastal states will be considered. The UKHO has a dedicated team of specialists that manage the portfolio of survey and hydrographic development programmes. In addition to survey advice, the team are configured to provide support and advice in the development of hydrographic governance and identifying funding. Further information can be obtained from (hydrographicprogrammes@UKHO.gov.uk)

Civil Hydrography Programme

2.3 Civil hydrographic surveys in UK Home Waters are carried out under the government funded Civil Hydrography Programme (CHP), managed by the MCA with guidance and technical support provided by the UKHO. The aim of the CHP is to carry out systematic hydrographic surveying of UK waters (outside port limits) including regular surveys in areas of unstable seabed, to ensure that navigational charts are based on sufficient information for safe navigation. MCA manages the funding for the CHP, utilising commercial survey contractors to undertake the work. Collaboration between the UKHO and MCA ensures that the CHP is delivered at the best value for money, maximising the coverage of targeted survey work to areas of greatest need.

2.4 The UKHO provides planning, technical oversight, validation, and assessment of these surveys, and is responsible for archiving the Civil Survey Data. All CHP hydrographic surveying is carried out to a minimum of UKHO order IA standard, ensuring that the data will meet all requirements to ensure safe navigation. The UKHO is responsible for incorporating new survey data within appropriate navigational products and for archiving the CHP data.

2.5 Survey areas are prioritised jointly by the UKHO and MCA using a risk analysis methodology. Routine resurveys are undertaken in areas of high seabed mobility and analysed at the UKHO to identify the changes and to assess whether the limits of the resurvey areas and the frequency of surveys, remain appropriate or should be revised.

2.6 The UK's National Hydrographic Coordinating Committee (known as the Civil Hydrography Working Group) meets on an annual basis and provides the necessary breadth of interests to ensure that all requirements are taken into account when prioritising the work of the CHP. In addition, the Civil Hydrography Annual Seminar (CHAS) includes select UK agencies involved in seabed survey and has been successful in promoting co-operation between these organisations; bringing life to the maxim "survey once, use many times".

2.7 Details of planned and completed CHP surveys can be found on the MCA CHP website (<http://www.gov.uk/guidance/share-hydrographic-data-with-maritime-and-coastguard-agency-mca>).

2.8 The UKHO, through the Civil Hydrographic Programme, is supporting the Isle of Man government in the acquisition of survey data in Isle of Man waters.

Defence Surveys

2.9 The Royal Navy retains a global capability to gather and process hydrographic and oceanographic data for planning and operational purposes. This capability is currently under a program of modernisation with greater use of deployable and automated systems replacing aging, dedicated platforms.

2.10 HMS Protector, the UK's Ice Patrol Ship, is fitted for survey work and carries out hydrographic and oceanographic survey in the Antarctic and South Atlantic regions on a regular basis and can be tasked to other areas as may be required, on transit to and from the UK. Further information on the support role of HMS Protector to the global community of Antarctica and other ships, their equipment and capabilities, can be found on the Royal Navy website (<https://www.royalnavy.mod.uk/>).



2.11 The data gathered by the Royal Navy is all provided to the UKHO and in areas of UK charting responsibility may be used for charting purposes in that region, in line with the UK obligations for safety of navigation. Other defence surveys are purely for UK defence purposes however any navigational safety information detected is extracted for the benefit of mariners across the globe.

The Nippon Foundation-GEBCO Seabed 2030 Project

2.11 Following the signing of a data sharing MoU between the UKHO and the Nippon Foundation-GEBCO Seabed 2030 (SB2030) Project, and a successful data sharing trial with the Southern Ocean Regional Centre, the UKHO are delighted to announce that they are supplying bathymetric survey data for waters to the General Bathymetric Chart of the Oceans (GEBCO). Data shared by the UKHO with GEBCO now totals over 75,000 km², and includes data in the Southern Ocean, Atlantic, Caribbean and Pacific.

2.12 Where the UKHO is the Primary Charting Authority and have the appropriate permissions, the UKHO will continue to share (100m) gridded bathymetry data with SB2030 to help improve the GEBCO grid product. The UKHO is also supportive of other global bathymetry initiatives, such as EMODNET, where we intend to contribute data using the same rules as SB2030.

2.13 In 2022, we entered a technical cooperation agreement with Teledyne Caris and Seabed 2030 which will allow the SB2030 Regional and Global Centres to use the ADMIRALTY GAM service. The ADMIRALTY GAM Service was developed by the UKHO and is a tool that cleans noise in single track bathymetry survey data. This tool will help to improve the speed and human effort associated with processing of bathymetry data. The Admiralty GAM service was released at Ocean Business 2021 and is now also available commercially. The UKHO will also continue to actively engage with associated SB2030 working groups at the IHO and Regional Hydrographic Commissions.

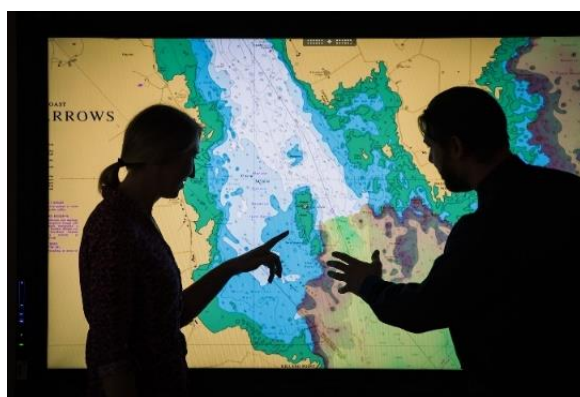
3: Charts

3.1 The UKHO produces and distributes a global portfolio of charts in paper and electronic format. Information and catalogues on the ADMIRALTY Maritime Data Solutions portfolio of products and services are available from the ADMIRALTY website (www.admiralty.co.uk). Information is also provided in the Catalogue of ADMIRALTY Charts and Publications (NPI 31).

3.2 Where possible (and permitted) the UKHO will adopt the products of other Hydrographic Offices for incorporation into its services for the international mariner; this is especially so for digital charts where national produced ENC's are combined alongside UK produced ENC's to form the basis of the ADMIRALTY Vector Chart Service from the UKHO.

Paper Charts

3.3 In July 2022, the UKHO announced its intention to withdraw from the production and supply of paper charts by 2026. Subsequent consultations with a range of stakeholders and feedback from regulatory bodies has highlighted that more time is required to address the needs of those specific users who do not yet have viable alternatives to paper chart products. These conversations have highlighted important factors that need further consideration, and so we have [recently communicated](#) that we will continue to provide a paper chart service whilst mariners need them.



3.4 The paper chart folio, released under the ADMIRALTY brand, comprises over 3,500 charts, 93% of which are metric, 82% are referred to WGS84 or ETRS89, 37% are adopted, and 24% are INT versions. The charts are printed on demand by our global network of ADMIRALTY distributors. They are updated by Notices to Mariners and New Editions and are correct at the time of print.

3.5 Further details of charts published and scheduled for publication will be provided in the supplementary UK National Report to each regional hydrographic commission UK attends.

Digital Charts

3.6 The UKHO was involved with the development of digital charts early on. Improved technology for the updating of paper charts led to the issue of a Raster Navigational Chart (RNC) service (commonly called ARCS charts) in 1996, in advance of completion of ENC standards and ECDIS standards. Most ADMIRALTY paper charts are currently made available as RNCs through the ADMIRALTY Raster Chart Service. The colour separated base images of the paper chart are processed and combined to provide raster digital images in the HCRF format (Hydrographic Chart Raster Format). Because ARCS charts are linked to the paper chart production process, they are updated in synchronisation with them. A weekly Update CD is issued at the same time as the paper Notices to Mariners booklet. The ARCS portfolio is carried on eleven regional CD ROMs.

ENCs

3.7 The UKHO is responsible for ENC coverage of the UK as well as some other parts of the world.

3.8 UK's first ENC services were launched in 2003 and continue to evolve to meet customer requirements. Currently, the UKHO has produced, and published, around 1,800 GB ENCs.

3.9 Updates to ENCs are issued to users as information changes. From 2021, AVCS started to break away from the traditional cycle of weekly batches of updates to issuing them as soon as they are approved for release. Full details of the ENCs published are provided in the IHO ENC catalogue and on the UKHO website, where a downloadable digital catalogue is available.



3.10 In support of the implementation of the mandatory carriage requirement for ECDIS by the International Maritime Organization (IMO), the UKHO launched a new ENC service - ADMIRALTY Vector Chart Service (AVCS) - in April 2008. The service now comprises more than 19,000 ENCs, produced by more than 70 Hydrographic Offices around the world. To improve continuity of coverage, the UKHO sought Coastal State approval for the production of interim "infill" ENCs based on UK paper charts. New ENCs were then produced to fill gaps in existing coverage around the world and improve coverage of the top 2000 ports (based on deadweight tonnage) and the main routes between them. AVCS now covers all of the world's significant ports. These infill ENCs are gradually being withdrawn as Coastal States issue and maintain their own coverage.

3.11 The UKHO, in partnership with IC-ENC, continually checks that all of its ENCs meet the requirements of the IHO standards; including edge-matching, masking, assignment of the correct compilation scale, geodetic datums, and the application of technical coding according to the IC-ENC recommendations.

3.12 From the outset the UKHO identified certain issues affecting the quality, coding, and updating of some ENCs. The UKHO compares ENCs with ADMIRALTY paper charts. Where any differences are found, we refer them to the producer nation for comment or resolution. The ADMIRALTY Information Overlay (AIO), which can be displayed over ENCs on compatible ECDIS, was developed as a way to share such information with all end users. Unresolved differences are coded as numbered ENC Preliminary Notices to Mariners (EPNMs) and show as shaded polygons on the ECDIS display which the user can interrogate for more detail. Temporary and Preliminary Notices to Mariners (T&P NMs) for ADMIRALTY paper charts are also coded in the AIO, where the information is not already contained in the displayed ENC.

3.13 To further improve safety by delivering ENC updates to vessels more quickly, the UKHO gives customers the option to receive their data as soon as it is ready for release, instead of in weekly batches. The ADMIRALTY Digital Delivery Service (ADDS) was launched in 2021 and will become the delivery method for future ADMIRALTY data services to further reduce delays in getting information to vessels.

ENC Distribution

3.14 The International Centre for ENCs (IC-ENC), operated by UKHO, is a Regional ENC Coordinating Centre with 50 Members and a global folio of almost 12,000 ENCs, which makes up well over half of the global ENC folio. IC-ENC operates across four regional offices, based in the UK, Australia, Brazil and United States. IC-ENC appoints and manages Value Added Resellers and Distribution Partners to distribute ENCs for its 50 Members and provide end-user services to ECDIS equipped vessels and non-ECDIS vessels. Further information can be found on the IC-ENC website (www.ic-enc.org).

4: Publications

Paper Publications

4.1 The UKHO produces a worldwide portfolio of ADMIRALTY Nautical Publications in digital and paper formats. The portfolio includes Sailing Directions, Tide Tables, Lights Lists, List of Radio Signals, the Nautical Almanac, Weekly Notices to Mariners, the Annual Summary of Notices to Mariners, and the Mariner's Handbook, together with a number of catalogues and a range of miscellaneous and technical publications.

4.2 New Editions of Tide Tables, Lights Lists, List of Radio Signals, Nautical Almanac, the Annual Summary of Notices to Mariners and ADMIRALTY Catalogue are produced annually. For other publications, New Editions are produced according to priority and the amount of change to the data within each publication. Between New Editions, updates for publications that are considered to require urgent distribution, are issued in weekly Notices to Mariners. A section in the Mariner's Handbook (NP100) and the publication "How to Keep your ADMIRALTY Charts up-to-date" (NP294) explain how to apply these updates to the relevant products.



Full details of the ADMIRALTY publication range and their status can be found on the ADMIRALTY website (www.admiralty.co.uk).

Digital Publications

4.3 The UKHO produces a range of ADMIRALTY Digital Publications which are digital versions of ADMIRALTY paper Nautical Publications to support the IMO mandate of ECDIS. These publications provide mariners with additional functionality, are subscription-based and automate the task of updating through Notice to Mariners.

› **ADMIRALTY e-Nautical Publications (AENP):** e-Book versions of ADMIRALTY Sailing Directions and reference publications. The UKHO is now working on a fully digital version of the ADMIRALTY Sailing Directions that will replace the e-NP versions.

› **ADMIRALTY Digital List of Lights (ADLL):** Digital versions of ADMIRALTY Lights publications.

› **ADMIRALTY TotalTide (ATT):** Digital versions of ADMIRALTY tidal publications.

› **ADMIRALTY Digital Radio Signals (ADRS):** Digital versions of ADMIRALTY radio signal publications.

4.4 These publications are accepted by the UK MCA and many other national maritime safety authorities as being equivalent to the paper Nautical Publications and thus meet SOLAS carriage requirements.

4.5 The main advantages that the ADMIRALTY Digital Publications have over their paper equivalents for the mariner includes providing additional functionality and minimising the time taken and human errors of updating.

4.6 Digital Notices to Mariners are available in several forms including:

› A facsimile (pdf) copy of the paper notices (published on the ADMIRALTY website)

› A searchable NM service available on the ADMIRALTY website and through (<http://www.ukho.gov.uk/nmwebsearch/>)

› An electronic courier services where customised datasets of NM text, blocks and tracings are provided directly to ships at sea by Licensed ADMIRALTY Distributors.

4.7 The ADMIRALTY Digital Catalogue (ADC) can be downloaded free from the ADMIRALTY website (www.admiralty.co.uk). It includes details of all paper and digital charts and publications and is updated weekly. It is a useful tool to check chart coverage within the region, and to show the latest edition dates of both charts and publications.



5: Web Map Services

5.1 A Web Map Service (WMS) is the most widely used and simplest form for displaying GIS data on the web. It uses a standard protocol from the Open Geospatial Consortium (OGC) which describes how to serve any georeferenced map/chart images over the Internet. It provides data as a visual representation through the internet with basic querying options, enabling users basic zooming, panning and assisting organisations to serve GIS data as images with quick rendering speeds. WMS uses an HTTP interface, most often an Application Programming Interface (API).

5.2 As part of the WMS Services, the UKHO has built, and continues to build, several API offerings which include:

› ADMIRALTY Vector Chart Service (AVCS) Online: it is a shore-based version of the world's leading maritime chart service designed to support shore-based maritime decision-making, such as vessel tracking, voyage planning and Accident and Emergency incidents. It is not to be used for navigation. It provides world-leading coverage with images from over 18,000 AVCS ENC's across the globe, including all available scales just like AVCS used on ships. It has got similar functionality as ECDIS, including display controls and pick reports where users can select a feature for more information. Like AVCS, ENC images are automatically updated when ENC updates are published.

› APIs: the UKHO builds a range of APIs for users to meet their regulatory and planning needs. These APIs include the regulatory APIs for users to meet Safety of Life At Sea (SOLAS) carriage compliance for users to retrieve their much-needed Product Permits, Keys and Schedules for AVCS, ADP and ARCS. Other APIs include APIs accepted and used by the UK MCA, other national maritime safety authorities such as Port Authorities and national Search and Rescue agencies. These APIs are for non-navigation purposes and are mainly used as aid to navigation planning.

6: Maritime Safety Information (MSI)

6.1 The UKHO, on behalf of UK, acts as NAVAREA I Coordinator for the World Wide Navigational Warning Service (WWNWS) of the Global Maritime Distress and Safety System (GMDSS). Close links are maintained with National Coordinators and other NAVAREA Coordinators to ensure relevant information is exchanged and broadcast as necessary. Any information received at the UKHO which may require distribution is immediately passed to the respective NAVAREA Coordinator on a 24-hour basis.

6.2 The UK fulfils its requirements under SOLAS Chapter 5 and IMO resolution A706(17) to broadcast navigation warnings in line with the Joint IMO/IHO/World Meteorological Organisation (WMO) Manual on Maritime Safety Information.

6.3 The UK contributes at international forums that consider MSI matters, including IHO WorldWide Navigational Warning Service Sub-Committee (WWNWS) and numerous IMO Committees and Sub-Committees. UK currently provides the Chair and Secretary of the IMO International NAVTEX Co-ordinating Panel.

6.4 Notices to Mariners. Assistance with promulgating Notices to Mariners and other paper and electronic chart correcting material should also be encouraged through co-operation with other hydrographic offices in the region if required. The current ADMIRALTY weekly Notices to Mariners are now supplemented by daily updates; these are available on the [ADMIRALTY website](#).

7:C-55

7.1 The UK is committed to providing regular updates to the C-55 entries for UK home waters and its overseas territories to the IHO publication C-55 (Status of Hydrographic Surveying and Nautical Charting).

7.2 The UK also provides assistance to other coastal states to update C-55 entries where the UKHO retains the primary charting responsibility: recognising that local input remains critical to the maintenance of C-55 as an up to date and authoritative reference document.

8: Capacity Building

8.1 The UK fully supports the IHO Capacity Building Sub-Committee (CBSC) strategy, particularly its emphasis on getting Phase 0, I and appropriate Phase 2 capacity in place to enable coastal states to meet their obligations under SOLAS Chapter V Regulations 4 and 9. The UK will continue to contribute resources to both CBSC initiatives and to providing bilateral assistance.

8.2 The UKHO has a post dedicated to International Capacity Building. Its key aims are to ensure that capacity building is properly considered in the UKHO activity and that the UKHO's capacity building activities are fully coordinated. It acts as the initial point of contact for the UKHO involvement in IHO capacity building activities, including UK involvement in regional hydrographic commission initiatives and IHO CBSC activities.

8.3 The UKHO has participated in numerous technical visits and workshops, in many RHC regions.



Training provided by the UKHO - International Training Academy (ITA)

8.4 The International Training Academy drives forward the continuous skills and knowledge development of our global network through world-class training. Continuously listening to our stakeholders the ITA ensures that the design of curriculum aligns to the real-world need for continuous maritime training. The international training team is the foundation of the International Training Academy, its wealth of experience, knowledge and skills working within hydrography, cartography, education and training ensures that world-class, relevant training is delivered either in country or online. Details of all UKHO awarded training opportunities currently offered by the ITA are provided on the [UKHO website](#) or by contacting internationaltraining@ukho.gov.uk

Training is offered in the following areas:

- › Marine Cartography.
- › Navigational Safety.
- › S-57 Compilation.
- › S-100 Introduction and Conversion.
- › Hydrographic Data Processing.
- › Chart Awareness.
- › ENC Production, Validation and Verification.

8.5 The UKHO has been recognised by the International Advisory Board as meeting its S-8B Standard of Competence for Nautical Cartographers - Category B. The advisory board comprises the Federation Internationale des Geometres (FIG), the International Hydrographic Organisation (IHO), and the International Cartographic Association (ICA). The Category B status is awarded to programmes 'which provide a practical comprehension of nautical cartography for individuals with the skills to carry out routine nautical cartographic tasks' (S-8 Third Edition Standards of Competence for Nautical Cartographers).

The aim of this course is to provide a practical understanding of nautical cartography and the skills and techniques needed to carry out routine nautical cartographic tasks. It includes processing hydrographic data into a published form. The course is highly practical, providing a detailed understanding of the compilation and production of paper and electronic charts using CARIS software. This course is predominately carried out at the UKHO, with elements that can be completed in country.

On successful completion of this 21 week course our delegates are issued with the globally recognised certificate of programme completion in the following subject areas:

- › Fundamentals of Charting
- › Geospatial Fundamentals
- › Compilation
- › Geospatial Concepts
- › Product Construction
- › Hydrography and Special Purpose Charting
- › Data Assessment and Product Maintenance



8.6 The UKHO provides two annual CAT B accredited nautical cartography training opportunities to Foreign Government Hydrographic Office (FGHO) students. These are the International Hydrographic Organisation-NIPPON Foundation Geospatial Marine Analysis and Cartography (IHO- NF GEOMAC) Project course which is funded by the Nippon Foundation and the newly established UKHO course. Applications for the Nippon Foundation course are by responding to the IHO Circular Letter. The UKHO invites participants to its version of the course as part of bilateral arrangements.

8.7 All of our training courses can be delivered at the UKHO's world class training facility, or for larger groups the training team can conduct courses in the organisation's offices overseas. In addition, the training team can tailor bespoke courses to meet specific needs through a detailed training needs analysis.

Royal Navy Training in Hydrography, Meteorology and Oceanography

8.8 The Royal Navy's Maritime Warfare School, through a dedicated HM Training Unit in Plymouth delivers courses which are nationally and internationally certified, with accreditation provided by the International Hydrographic Organisation (IHO), the World Meteorological Organisation (WMO), The University of Plymouth, the National Vocational Qualification (NVQ) Council, and the Institute of Marine Engineers, Scientists and Technicians (IMarEST).

8.9 Courses include the 14 week hydrographic element of RN Officers' combined HM training, FIG/IHO Category B course. After four years' experience, of which a minimum of 2 years will be at sea, officers wishing to become specialists in surveying return to FOST HM for the HM Advanced Survey Course (HMAS). The HMAS Lasts for 22 weeks but has recently diverged from the IHO Category A requirements, retaining its traditional syllabus which meets the Defence requirement.

8.10 Both courses are open to attendance by overseas personnel (military and civilian) and applications are encouraged for these highly competitive courses.

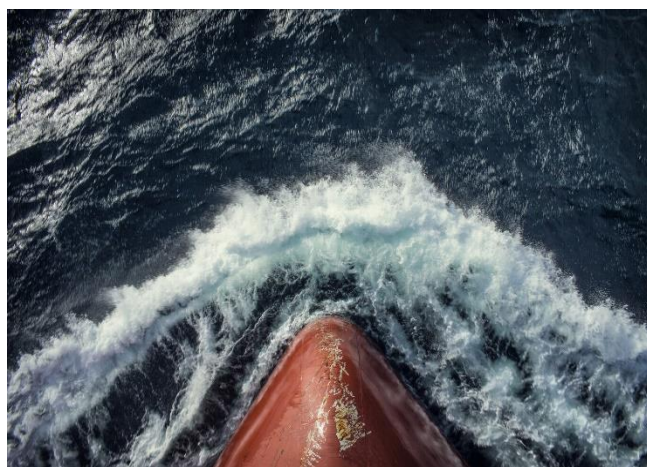
8.11 There is scope to deliver customised training for overseas naval and civilian students in Hydrographic Survey Planning, Data Gathering and Data Processing as well as initial Data Management to meet the needs of developed and developing Hydrographic Offices. Such courses can, by mutual agreement, involve both training at the UKHO and at FOST HM.

9: Oceanographic Activities

9.1 The UKHO's Ocean Environment Team maintains databases of oceanographic information collected by the Royal Navy or obtained during exchange with other nations. Data exchange is an important source of data and so the UKHO are always keen to discuss new exchanges. The UKHO has participated in the United Nations (UN's) International Oceanographic Data Exchange (IODE), to work with the international oceanographic community. On behalf of the Royal Navy, the UKHO has made periodic releases of data to international data centres including US NODC, for inclusion in the World Ocean Database, and British Oceanographic Data Centre (BODC).

9.2 The UK national repository for oceanographic data collected for scientific purposes, including data from UK-sponsored research cruises anywhere in the world, is British Oceanographic Data Centre (BODC) (<https://www.bodc.ac.uk/>); it is funded by the Natural Environment Research Council (NERC), and Located in Liverpool. The main centre for scientific oceanography is the National Oceanography Centre (NOC) in Southampton (<https://www.noc.soton.ac.uk/>).

9.3 Global sea levels are monitored as part of the GLOSS project, by the Permanent Service for Mean Sea Level (PSMSL). This operation is based at the National Oceanographic Centre in Liverpool.



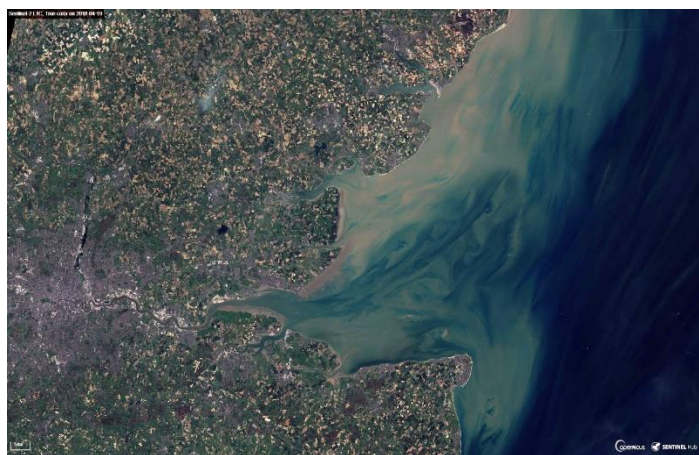
9.4 The UKHO participates on, and Chairs the IHO Tides, Water Levels and Surface Currents Working Group (TWCWG). Part of the WG activities involve Member States activities and experiences with long term [permanent] 'National' Tide Gauge Networks.

9.5 The UKHO is not directly tasked with owning and operating these at the UK national level- this is the remit of the National Tidal and Sea Level Facility (NTSLF, www.ntsfl.org), previously operated by the UK Environment Agency with a recent (summer 2021) contract to maintain and upgrade the National Tide gauge Network (NTGN) being awarded to the commercial company OceanWise (<https://www.oceanwise.eu/>).

9.6 However, under the auspices of the Overseas Territories Seabed Mapping Programme (OTSMP), the UKHO has been working to establish permanently installed tide gauges in some of the UK Overseas Territories. As well as being an essential part of the OTSMP work, they form an integral and important contribution to global sea level monitoring networks which are instrumental for the scientific study of long term sea level rise. In addition, they can form part of tsunami warning networks and also provide essential observations for use in coastal inundation (storm surge) modelling studies. It is the UKHO's intent to further expand this network under the various hydrographic programmes.

I 0: Spatial Data Infrastructures

I 0.1 Status of MSDI. The UKHO is actively developing the concept of Marine Spatial Data Infrastructure (MSDI) in line with the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) Integrated Geospatial Information Framework (IGIF).



I 0.2 Relationship with the National Spatial Data Infrastructure (NSDI). The UK does not yet have a recognised NSDI however, the UK government's Geospatial Commission was established in 2017 with partner bodies consisting of several national geospatial agencies, including the UKHO. This Commission is focused on unlocking the value of geospatial data within the UK and published the [UK Geospatial Strategy](#) in 2023.

I 0.3 Involvement in regional or global MSDI efforts. The UKHO is an active member of the UN-GGIM, representing the UK on the UN-GGIM Working Group on Marine Geospatial Information and leading UK input

into the UN-GGIM-Americas Caribbean Geospatial Development Initiative (CARIGEO). The UKHO is a strategic member of the Open Geospatial Consortium (OGC) and sponsors projects under the Federated-MSDI Initiative. Most notably, in partnership with the IHO, UN-GGIM and World Bank, the UKHO led the development of the [IGIF-aligned MSDI Maturity Roadmap](#) which enables governments to better harness the geospatial data that supports their nations' socio-economic development. Other sponsorship examples have included a S-121 pilot study to develop a standard for the exchange of Maritime Limits and Boundaries, and research into marine data integration in the Caribbean region. The UKHO is a member of the IHO MSDI Working Group (MSDIWG). The UKHO also Chairs the South-West Pacific Hydrographic Commission (SWPHC) MSDIWG, the Southern African and Islands Hydrographic Commission (SAIHC) MSDIWG, Vice-Chairs the Meso American and Caribbean Hydrographic Commission (MACHC) MSDIWG and is represented on the Baltic Sea and North Sea Hydrographic Commission (BS-NSHC) MSDIWG. The UKHO has also provided briefings on MSDI to other RHCs which do not yet have MSDIWGs.

I 0.4 National implementation of the Shared Data Principles - including any national data policy and impact on marine data. The UKHO is a lead sponsor of the Marine Environment Data Information Network (MEDIN) which coordinates the delivery of INSPIRE obligations to Findable, Accessible, Interoperable and Reusable (FAIR) principles.

The UKHO also continues to produce ENC's to the IHO S-57 standard which contains a defined structure for metadata and the modelling of maritime related features. Work is ongoing to transition to the future IHO S-100 standards.

1 0.5 MSDI national portal. The ADMIRALTY Marine Data Portal from the UKHO continues to grow and develop. As the organised gateway to our non-navigation data and services, it gives users easy and timely access to marine location-based information from seabed to surface to aid decision making. The portal allows users access to several free-of-charge datasets and services mainly covering the UK territorial waters, as well as access to premium data sets which can be purchased.

1 1: Autonomous Navigation

1 1.1 The UKHO have been engaging with several industry experts and project initiatives surrounding Maritime Autonomous Surface Ships (MASS) to try and understand the navigation data needs as momentum gathers in this area.

1 1.2 In the past these organisations used traditional navigation products (such as ENCs and paper charts), however these products required various work arounds or adjustments for compatibility and suitability with autonomous vessels.

1 1.3 The UKHO is proactively working with a number of organisations such as Thales, Atlas Electronik and TGP Polaris, discussing the issues with current products and services, and provided data to stimulate discussions about what they see as gaps in the current offering, and identify the new products going forward. In our work with industry operators, the UKHO have supplied data to facilitate discussion and allow operators to explore what the future navigation service might look like.

1 1.4 The establishment of the Maritime Autonomous Surface Ships (MASS) Navigation Project Team (MASS PT) was approved at Hydrographic Services and Standards Committee (HSSC) 13th meeting following a proposal by the United Kingdom, Norway and Singapore, to address Maritime Autonomous Surface Ships (MASS) requirements on navigation data and services.

1 1.5 Within the 2-year remit the project team has conducted an extensive gap analysis of the S-100 standards and has made several recommendations to address these gaps to the relevant Working Group and Project Team chairs to ensure S-100 is fit for purpose for both manned and unmanned navigation. HSSC 15 extended the MASS Project Team for a further 12 months to further engage with industry representatives. The intention is to propose the project team becomes a permanent Working Group at HSSC 16.

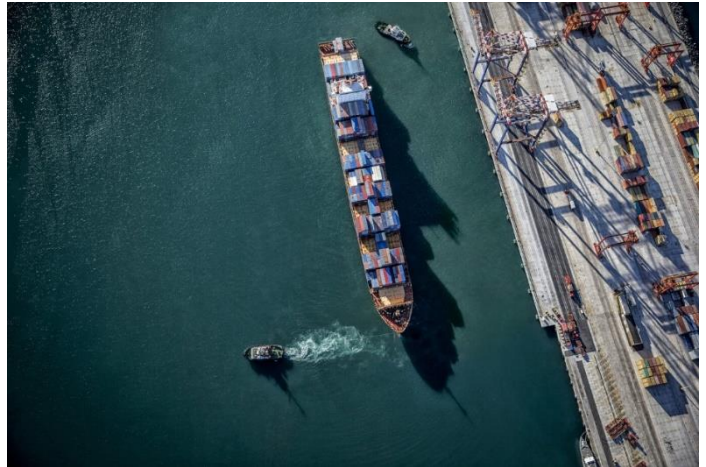
1 2: Other Activities

Alexander Dalrymple Award

1 2.1 Every year in celebration of the IHO World Hydrography Day, the UKHO presents the Alexander Dalrymple Award in recognition of outstanding dedication and contribution to international hydrography. It is named after Alexander Dalrymple who established the UKHO in 1795 and thus regarded as a leading figure in the history of the development of hydrography within the UK.

Astronomical Observations

1 2.2 Founded in 1832 under the Admiralty Board, His Majesty's Nautical Almanac Office (HMNAO) was formerly part of the Royal Greenwich Observatory and became part of the UKHO in 2006. HMNAO is a small multi-disciplinary team of scientists whose purpose is to provide celestial navigation solutions and provision astronomical data and information to address a wide range of use-cases and its audience includes astronomers, mariners, aviators, surveyors, the armed forces, law enforcement, media, various special interest groups and the public.



12.3 The HMNAO's current portfolio includes:

- almanacs for astronomers, mariners, land surveyors and aviators
- sight reduction tables for navigation
- celestial navigation software (NavPac)
- consultancy services, such as expert witness testimony for the police and legal profession
- provisioning of astronomical datasets such as:
 - timings of the rising/setting of the Sun & Moon and twilight periods
 - planetary positions, configurations, and phenomena
 - phases of the moon
 - eclipses, equinoxes, and solstices.

12.4 Applied astronomy research activities are underpinning further developments towards future navigation and data services, including:

- Investigating possibilities for increasingly automating celestial navigation
- to mitigate the increasing weaponisation of GNSS (such as GPS) technologies
- to reduce the dependency on human involvement in celestial navigation
- to support future autonomous shipping
- Development of tactical decision aids (TDAs) to support the Defence community.

12.5 Much of HMNAO's data provisioning has been via a web presence, however, that is currently being re-engineered to provide a more flexible infrastructure that will provide the foundation for more digital services in the future; in the interim temporary arrangements are in place to make data available and to facilitate requests.

Broader UK Government Work

12.6 The UK Member State, consisting of the UK, the Overseas Territories and Crown Dependencies, was successfully audited in Oct 2021 against the IMO Instrument Implementation Code's (IIC) and Mandatory IMO Member State Audit Scheme (MIMSAS). The UKHO, in its key Public Task role in the delivery of the UK's SOLAS obligations, was an integral part of this highly successful audit.

12.7 The UK Government has published (Aug 2022) the 2022 National Strategy for Maritime Security (NSMS). The NSMS is a multi-department strategy signed by 5 Secretaries of State and endorses the newly established UK Centre for Seabed Mapping (UK CSM), led by the UKHO as a cross- government strategy commitment. [Link to the NSMS can be found here.](#)

12.8 For the first time in UK Government Strategy, seabed mapping and hydrography are formally recognised as being critical components of the UK's societal, economic, and environmental security (a State must understand what its physical marine domain looks like to claim, administer, protect, and use it effectively and sustainably). The NSMS recognises that more needs to be done to increase the amount of seabed mapping data in the UK, Crown Dependencies and Overseas Territories.

UK Centre for Seabed Mapping

12.9 In 2022, the UK created the UK Centre for Seabed Mapping.

12.10 It has been established to better coordinate the 30+ UK government organisations involved in seabed mapping to improve outcomes, data and knowledge of the oceans. In the future we will also invite industry and academia to participate.

12.11 It is not intended to build any new infrastructure - the UKHO simply plan to provide some leadership and a secretariat function to the existing community, and better coordinate any seabed mapping activity taking place around the UK and globally, to improve the standards, access and availability of data to inform all decisions and actions in the ocean domain.

12.12 Since June 2022, there has been good progress, with 30 organisations signing up to formal membership of the centre and meeting regularly to align plans and objectives. The UKHO have created an online global planning portal and begun work on the feasibility of a unified national specification.

12.13 The UK's Joint Nature Conservation Committee continues its work in the Overseas Territories, providing technical assistance to support biodiversity and wider environmental management strategies and scientific advice. Their UK Government aid funded programme, Natural Capital in the Caribbean and South Atlantic Overseas Territories, uses economic assessments and analysis, spatial mapping and satellite data to provide an assessment of natural capital in a few the UK's Caribbean and South Atlantic Overseas Territories.

The UKHO's International Activities

12.14 The UK is a longstanding member of the IHO and the UKHO is the leading UK Government coordinating body. The UKHO coordinates the UK's three yearly participation at the IHO Assembly, and yearly membership participation at the IHO Council.

12.15 The UKHO actively contributes to the work of IHO Committees, Working Groups, Project Teams and RHCs to progress the development of standards and inter-regional cooperation and coordination matters, which includes further development of regional capacity building.

12.16 The UK contributes to the work of many Regional Hydrographic Commissions and the Hydrographic Commission on Antarctica, which is a special Hydrographic Commission for governments acceded to the Antarctic Treaty. The UK currently chairs numerous IHO Working Groups and RHCs; further detail can be found on the relevant IHO webpages.

12.17 Due to the UKHO's technical expertise, the UKHO engages with and supports other international bodies and organisations in the maritime domain.

Conclusion

The UKHO continues its commitment to carrying forward hydrographic activities through the work of the IHO's Regional Hydrographic Commissions, and notes that each commission has its own particular opportunities and challenges.

The UK has a strong commitment to many regions, through its primary charting responsibilities, and through its continuing interest in developing regional hydrographic self-sufficiency through capacity building measures. The UK, through the UKHO and the national maritime administration (MCA), continues to pursue opportunities to improve access to bathymetric data gathering in waters around British Overseas Territories, particularly to support long-haul deep-sea traffic.

There remains a continuing challenge to link the scarce local data gathering resources into a broad programme of prioritised products.

With a diverse range of shipping interests across the world, improving the effective distribution of hydrographic publications and updates remains paramount.

One area which has remained constant for the UKHO, and indeed the wider hydrographic community, is our commitment to serving the needs of the mariner. The UKHO continues to enable safer navigation by revising and maintaining existing paper and electronic portfolios of charts and publications; and introducing New Adoptions, New Charts, New Editions and New Cells, where appropriate. The UKHO will continue to do this whilst it transitions from paper and electronic charts to a full digital catalogue.



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