NATO AML Handbook

Additional Military Layers

Information superiority in the maritime environment

Edition 4 August 2016

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Additional Military Layers

Foreword
by Captain Martin Jones Royal Navy, Head of Joint Geospatial Intelligence, UK MoD

The foreword in the previous Additional Military Layers (AML) Handbook, which describes the need for relevant, timely information and the intelligence derived from it as critical enablers to success in conflict or its prevention, are enduring principles and still fundamental to success in operations. Information Superiority, if well managed and exploited, is a domain which enables smaller forces to deliver a much greater effect – it is the ultimate force enabler. Maritime geospatial information (GI) is vital to all levels of warfare from strategic decision making through operational planning to the tactical conduct of operations. As part of the NATO Recognised Environmental Picture (REP) it is crucial that an authoritative source of maritime GI is available. In financially constrained times it is also optimal that maritime GI is considered within co-production agreements following clear guidelines and protocols to ensure efficiency in coverage, resolution and interoperability. The NATO Geospatial Maritime Working Group (GMWG) has a vital role to play in establishing policy and guidance over AML and this will ensure decisions and operations are conducted on the same maritime GI product, increasing effectiveness of forces operating in the maritime environment.

The AML concept which was created specifically to support interoperability in a digital era has come of age. AML supports maritime operations whether from the sea, on the sea, under the sea or over the sea. It supports a broad customer-focused requirement covering objects, features, attributes and scale to deliver a variety of effects and the concept drives away the need to refer back to a host of legacy products from numerous sources, often in books and via paper overlays.

AML has been created to support both command and control and digital navigation systems to provide the best situational awareness available as a smart product in vector and gridded variants. AML significantly contributes to all maritime operations.

This new edition of the handbook will help the reader to understand the concept of AML, but will hopefully also inspire the reader to engage with the AML producers to drive forward the concept to better support maritime GI and enable the successful conduct of operations. As Allies move towards a data centric concept for maritime GI support, the lessons derived from AML will be vital. This edition also includes details of current developments including the NATO Geospatial Information Framework (NGIF) and the new generation of AML known as the Defence Maritime Geospatial Exchange Model (DMGEM). These developments build on contemporary standards and reflect the emergence of Spatial Data Infrastructures (SDI) nationally and within NATO.

Any comments or feedback are encouraged and should be directed to the UKHO by email to aml@ukho.gov.uk.

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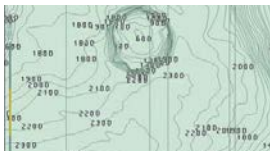
August 2016



NATO AML Handbook

Additional Military Layers

This NATO AML Handbook provides general information about AML, including a brief explanation of the products and benefits to users. It is produced by the United Kingdom Hydrographic Office (UKHO) on behalf of NATO and replaces the AML Handbook which was last revised in January 2012.

The Handbook is held, maintained, configuration controlled, published and distributed in digital format. Users are welcome to produce hardcopy versions for own use and for wider distribution, but should be aware that such hard copies will not be updated.

Your contributions and comments are valued. To make contributions or comments on the Handbook, or to request further information, please email aml@ukho.gov.uk.

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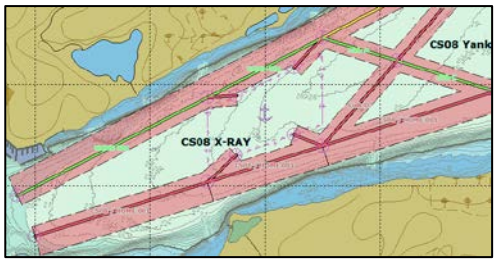


1. Introduction

Specialist maritime geospatial information for Defence has been provided in the form of a wide range of paper overlays or modified charts for many years. With the move to digital products, AML has been designed to provide this maritime geospatial information to the defence user in an efficient and standardised digital format. AML provides defence customers with a unified, interoperable product for the enhancement of situational awareness and operational effectiveness. **AML is not a navigation product** and all navigation decisions must be made with reference to the primary navigation product such as an Electronic Navigational Chart (ENC), however, the picture AML conveys greatly enhances understanding of the maritime operational environment.

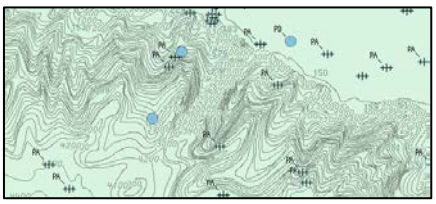
AML is defined in NATO STANAG 7170 as:

''...a unified range of digital geospatial data products designed to satisfy the totality of NATO non navigational maritime defence requirements''.[1]

This handbook provides an overview of the AML concept and layers. It highlights the benefits of AML, how they are used, the types of datasets and other important details. This handbook does not provide detailed technical information on AML Product Specifications or AML production.

Fig 1.0
Conceptual view of showing a number of AML layers combining to provide an enhanced view in support of situational awareness within Warship ECDIS (WECDIS).

[1] STANAG 7170 – AML Edition 3 (Sept 15)



2. Why AML?

AML enhances knowledge of the maritime and littoral environment increasing operational effectiveness and the probability of success in military operations and humanitarian missions.

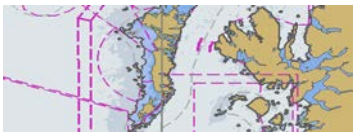
AML displays a range of features which can be selected for the specific mission in hand. This negates the need to consult environmental information provided in a variety of books, paper charts and overlay products.

2.1. AML Advantages

- Delivers enhanced operational effectiveness through information superiority
- Supports the planning and decision making process
- Provides a tactical advantage by enabling better exploitation of the environment
- Delivers attributed and searchable data – a large volume of information about maritime features is available but a limited selection can be displayed when the user needs it, reducing clutter on the screen
- Allows efficient production leading to faster availability and delivery of digital data through network enabled capabilities
- Provides selected data that can be rapidly displayed with navigational data and other user data sets
- Allows the fusion of environmental maritime information (geospatial, meteorology, oceanography) with operational information to deliver value added information in support of tactical decision making and the COP (Common Operational Picture)
- Delivers non-system specific data
- Provides data governed by NATO endorsed standards delivering improved interoperability both nationally and with key NATO allies
- Usable in the NATO standardised navigation and situational awareness system WECDIS and in C2 systems both ashore and across a wide range of platforms

AML production gives significant benefits over paper chart production as follows:

- The AML concept is that each feature is published only once. This is in contrast to paper products where it is necessary to repeat the publishing of the same features in different products with combinations of features to suit specific missions
- Much more information can be made available to the user but not necessarily displayed on the screen simultaneously. This reduces the need to publish a large range of paper sheets to ensure clear visibility of features
- Updating and promulgation of the updated information is quick and efficient



3. AML Description

3.1. Design and Standards

AML is a unified range of digital geospatial data sets designed to meet the needs of all users. It is not tied to any particular software, manufacturer or proprietary exchange standards therefore maximising interoperability within NATO and other collaborative organisations.

The International Hydrographic Organization's (IHO) S-57 Transfer Standard for Digital Hydrographic Data is currently used for vector data sets. GRIB and NetCDF formats are used for gridded data.

AML consists of groups of feature types collated into specific datasets.

Developments in standards within various bodies have led to a new initiative to develop AML in line with contemporary IHO, Defence Geospatial Information Working Group (DGIWG) and Open

Geospatial Consortium (OGC) standards all based on the underlying ISO (International Organization for Standardization) 19100 series. These developments are described in section 12.

3.2. Vector Products

In vector data, objects are represented by points, lines or areas. Each object is described in terms of a feature class indicating the object type, its attributes and a geographical position. Appropriate application software enables users to manipulate the data in a variety of ways, for example:

- by selecting and displaying a subset of the feature classes in the product
- by making selections based on the attribution of certain feature classes

This helps to reduce clutter, emphasising the features that are important to the user.

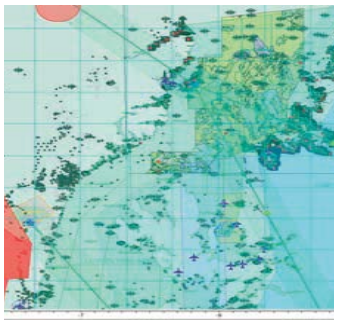


Fig 2.0

Here information from RAL, LBO and ESB is displayed together resulting in a cluttered picture that is difficult to interpret. *(Viewer – Tenet HUGIN Chartlink)*

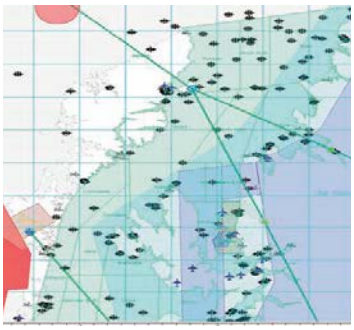


Fig 2.1

Removal of ESB and some elements of RAL that are not of current specific interest results in a much clearer view. *(Viewer – Tenet HUGIN Chartlink)*

Features can contain links to additional text and picture files which enables a great deal of additional information to be accessed as required without permanently cluttering the screen.

All vector data is delivered conformant to the IHO's S-57 Transfer Standard for Digital Hydrographic Data, generally known as the S-57 format.

3.3. Gridded Products

Gridded AML products show the spatial and sometimes temporal variation in an environmental feature. For instance, gridded products can represent a large number of observations collected over a long period giving the user information about the environmental parameters that may be expected at a particular time of year. Gridded information may be presented to the user in a variety of ways, including isolines derived from the grid and colour banding. Alternatively the data may be used by a specific system for computational purposes without directly representing the data to the user through a Graphical User Interface (GUI).

4. NATO Approved Product Specifications

Vector - Version 1.0 (November 2001) and Version 2.1 (November 2005)

- Contour Line Bathymetry (CLB)
- Environment, Seabed and Beach (ESB)
- Large Bottom Objects (LBO)
- Maritime Foundation and Facilities (MFF)
- Routes, Areas and Limits (RAL)
- Small Bottom Objects (SBO)

The specifications for both versions and a summary of the differences between the versions can be found at www.ukho.gov.uk/Defence/AML/Pages/Home.aspx

Vector - Version 3.0 (August 2008). This version combines the 6 vector specifications into a single product specification. Version 3.0 also extends the content of AML in the following areas:

- Additional land features and attributes from Vector Map VMAP
- Ice features and attributes from World Meteorological Organization (WMO) ECDIS Ice Objects v4.0
- Additional air features and attributes
- Incorporates changes made to IHO S-57 3.1.1
- Generic attributes SCAMIN and SCAMAX
- Extra attribution on Marine Management Areas

AML v3.0 identifies certain layers or data themes that represent logical groupings of data types but these are not explicitly defined in the Product Specification. The identified layers are:

- **AML** Additional Military Layers – Generic
- **TSB** Territorial Sea Boundaries
- **FAI** Flight Aeronautical Information. This can be broken down into:
  - **CFI** Civil Flight Information
  - **MFI** Military Flight Information
- **PEA** Practice and Exercise Areas
- **MMA** Marine Management Areas
- **QRT** Q-Routes
- **SBO** Small Bottom objects for MCM Mine Counter Measure
- **LBO** Large Bottom Objects for ASW and MCM
- **CLB** Contour Line Bathymetry for different users/warfare scenarios
- **AMP** Amphibious Warfare Data
- **ICE** Ice Data
- **MTD** Mine Tactical Data
- **SED** Sediment
- **LND** Land Background Data
- **NCD** Nautical Chart Background Data
- **MNI** Military Nautical Information of relevance to navigation scenario

Gridded

- Atmospheric and Meteorological Climatology (AMC) - Version 1.0 (November 2004)
- Integrated Water Column (IWC) - Version 2.2 (June 2006)

Product specifications previously under development

- Network Modelled Bathymetry (NMB) – this work has since been superseded by the IHO S-102 Product Specification and the intent is to incorporate this specification within future AML developments
- Gridded Sediment Environment Seabed and Beach (GS-ESB) – draft specification has been made available but is not a NATO endorsed specification

Product specifications in development

- AML+ Maritime Vector Layers – as part of a new generation of AML an initial vector specification based on the IHO S-100 standard and built on AML 3.0 is currently being developed

5. Product Descriptions (as defined in AML v1.0 and v2.1)

5.1. Contour Line Bathymetry - CLB

CLB is a vector scaled product. It includes spot soundings, depth areas and more depth contours than those shown on standard navigational charts.

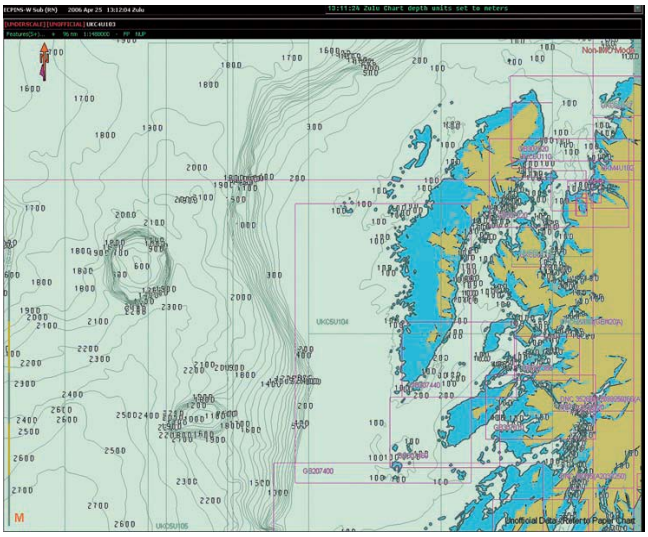


Fig 3.0
Scale band 4 (1:1,000,000) Contour Line Bathymetry west of Scotland. Useful for planning (*Viewer - OSI ECPINS v5.0.3)*

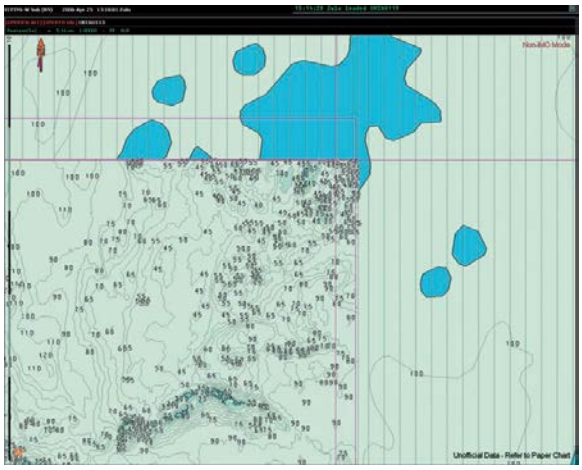


Fig 4.0
Lower left - detailed bathymetry in the Minch at Scale Band 6 (1:50,000), compiled at survey scale for tactical use. Compare with the Scale Band 4 data to the north and east.
(Viewer - OSI ECPINS v5.0.3)

5.2. Environment, Seabed and Beach – ESB

Designed to provide the user with information about the sea bed and beach areas, ESB is of particular value in support of mine counter-measure activities and amphibious operations. It is a vector scaled product including:

- Composition and thickness of multiple sediment layers including bedrock
- Acoustic/physical properties
- Slope
- Mine Counter Measures (MCM) areas
- Sand waves
- Trawl scours
- Vegetation
- Beach – full map/chart at very large scale, or as an overlay to standard mapping/charting
- Low resolution seabed information to support Anti Submarine Warfare (ASW)

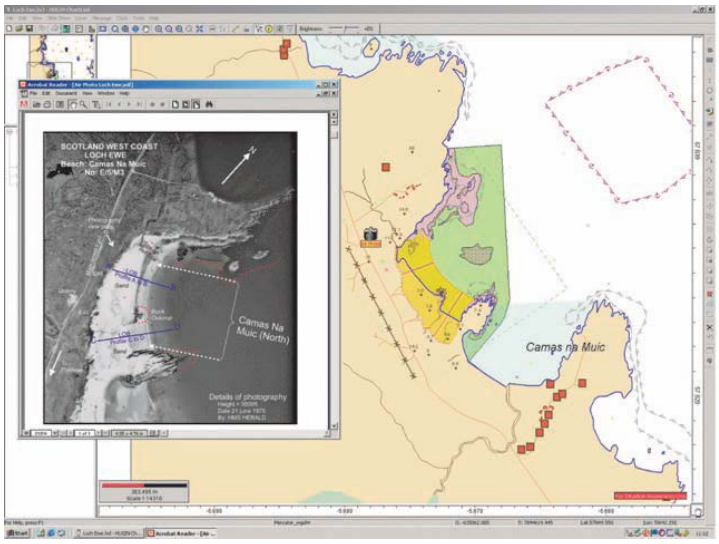


Fig 5.0
Beach information from ESB displayed with MFF. Aerial photography from a linked external file is also displayed. *(Viewer – Tenet HUGIN Chartlink)*

5.3. Large Bottom Objects – LBO

LBO is an un-scaled vector product showing all objects on the sea bed larger than 5m in any dimension. LBO includes:

- Wrecks (charted and uncharted)
- Rocks
- Obstructions
- Seabed installations

Each bottom object includes full attribution beyond that shown on a standard chart making the data useful for submarine and anti-submarine operations and for mine warfare applications.

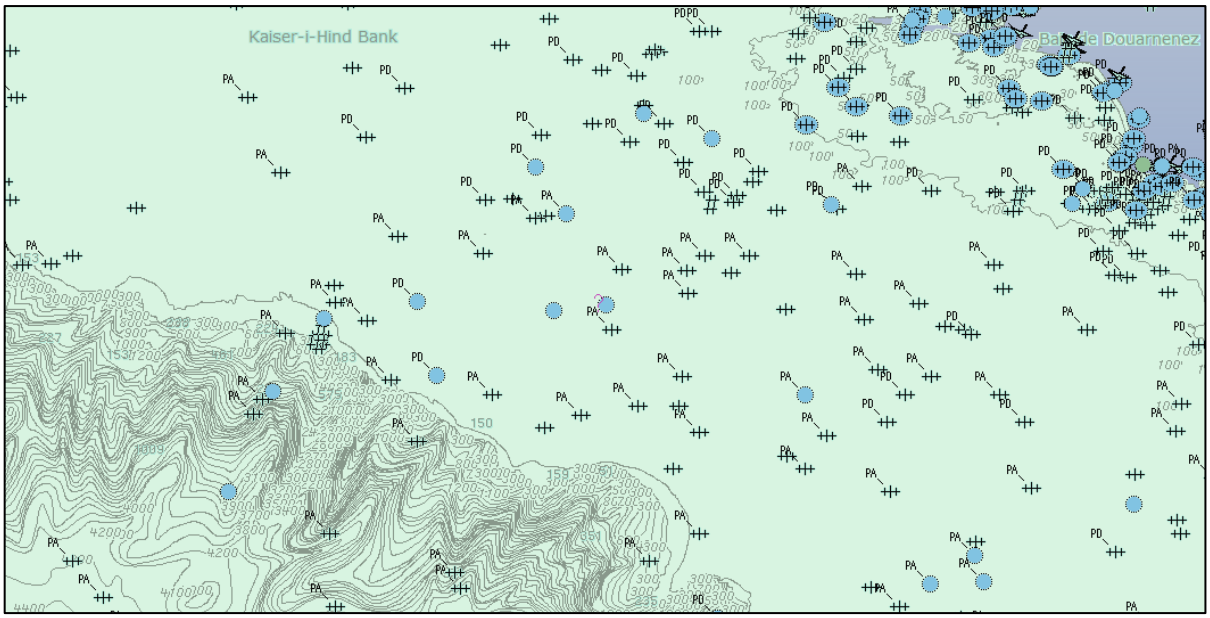


Fig 6.0
Features from LBO displayed alongside CLB
(Viewer – SevenCs SeeMyENC)

5.4. Maritime Foundation and Facilities – MFF

MFF is a vector scaled product designed to provide a suitable reference background and context similar to that provided by raster nautical charts. Features included in MFF are:

- Coastline
- National land boundaries and major cities
- Main ports, harbour locations and facilities
- Major lights and buoyage
- Magnetic information
- Tidal information

Tactical Information included in MFF is:

- Radar reflective entities such as offshore platforms, buoys, beacons
- Communication facilities and coverage
- Pipeline and cable information
- Fishing activity
- Oil, gas and mineral production information
- Ice limits
- Search and rescue information
- Miscellaneous sea bed obstructions that cover a significant area

Although in some instances ENC may be used to provide this background content, MFF has a number of specific advantages;

- MFF can be schemed as a regular grid and therefore covers the entire area of interest instead of areas only of navigational interest
- AML is not encrypted using the S-63 encryption scheme and therefore can easily be loaded into a range of C2 systems
- AML may not be subject to the same copyright constraint as ENC data

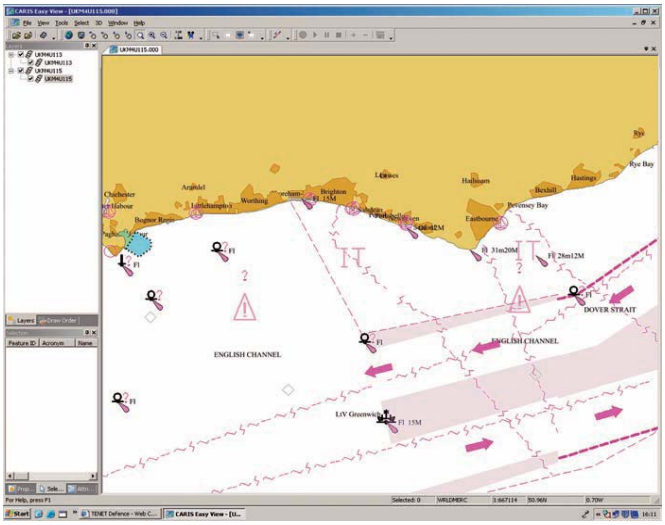


Fig 7.0

Scale band 4 MFF *(Viewer - CARIS Easy View)*

5.5. Small Bottom Objects - SBO

The SBO vector dataset is useful for Mine Counter-Measures, Amphibious and route lead-through operations. It is un-scaled and includes all known bottom contacts that are smaller than 5 metres, i.e. mines and mine-like contacts.

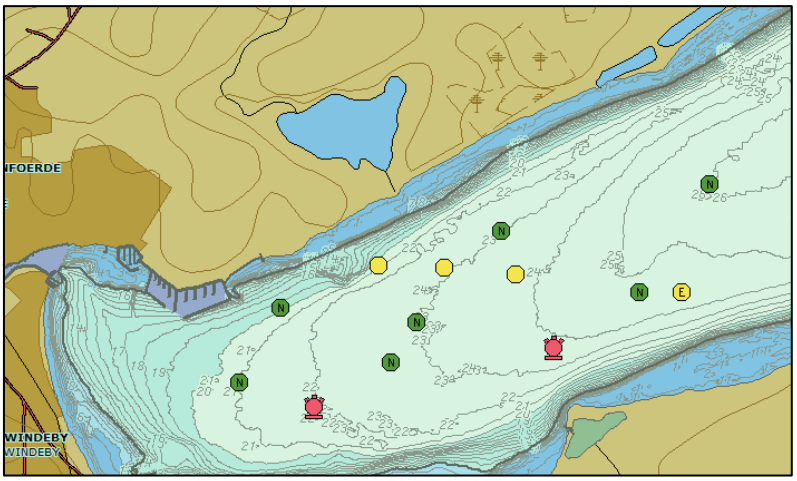


Fig 8.0

Fictitious sample Small Bottom Objects displayed alongside LND AML data displayed according to the draft AML Portrayal Specification.
(Viewer – SevenCs SeeMyENC)

5.6. Routes, Areas and Limits – RAL

RAL, an un-scaled vector product, contains features useful for a wide variety of planning and operational purposes. It includes the following type of features:

- Territorial Waters Limits – EEZ (Exclusive Economic Zone), fishery limits, contiguous zone, continental shelf areas, straight territorial baselines and territorial sea areas
- Military Practice Areas – danger areas, PEXA (Practice and Exercise Area), safe bottoming areas, testing and evaluation ranges
- Q routes
- Restricted areas e.g. historic wrecks, minefields, safety zones
- Submarine transit lanes
- Swept areas
- Waypoints/reporting/calling-in points - NAVAIDS, helicopter reporting points, rendezvous locations, reporting/radio calling-in point

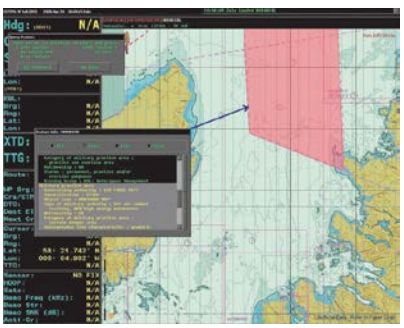


Fig 9.0

RAL with a military practice area highlighted and its attributes displayed. (Viewer – OSI ECPINS).

5.7. Integrated Water Column – IWC

The purpose of IWC, a gridded dataset, is to provide marine climatological data to describe the likely conditions found within the water column. Information includes:

- Temperature and salinity
- Ocean Current distribution
- Marine mammal distribution

IWC is delivered in the netCDF format.

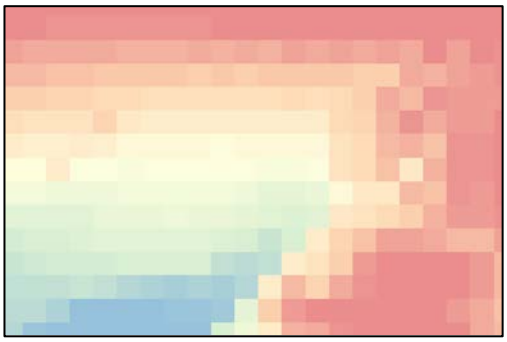


Fig 10.0 IWC Marine Mammal distribution

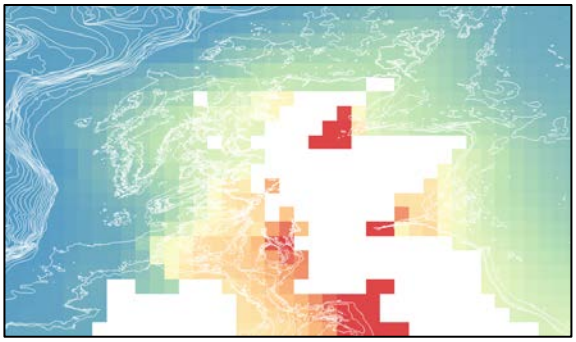


Fig 10.1 IWC Salinity including CLB for context (viewer - QGIS (formerly Quantum GIS))

5.8. Atmospheric and Meteorological Climatology – AMC

AMC data describes the meteorological and climatological conditions to assist with operational planning. It is a gridded dataset including the following historical information:

- Wind speed, direction and frequency
- Air temperature
- Relative humidity
- Dew point
- Pressure
- Cloud cover
- Visibility
- Probability of meteorological phenomena

AMC is delivered in the GRIdded Binary (GRIB) format.

5.9. Network Model Bathymetry – NMB

Although it was originally intended to develop a formal Network Model Bathymetry Product Specification this work has not been completed. Subsequently the IHO has developed a gridded bathymetry Product Specification known as S-102. This is recommended to be used until a formal AML+ Product Specification developed from S-102 is available. S-102 uses the Bathymetric Attributed Grid (BAG) format as defined by the Open Navigation Surface (ONS) project using a Hierarchical Data Format (HDF-5) encoding.

5.10. Gridded Sediment - Environment Seabed and Beach - GS-ESB

The GS-ESB product contains geo-acoustic properties of the sediment layer in a gridded form.

It is currently a draft product specification only implemented within UK systems.
It is a draft specification which is not endorsed by NATO however it is used by some nations.
GS-ESB is delivered in the NetCDF format.

6. Cell Naming

Versions 1.0 and 2.1 of AML use an 8 character cell name followed by a 3 character extension. The name of the AML cell conveys some information about the contents, but the catalogue is useful to identify its location.

The first two characters identify the producer nation.
The third identifies the product type i.e. C = CLB, E= ESB etc.
The fourth is the scale band i.e. 1-9 (0 for un-scaled products).[2]
The fifth is the classification i.e. U = Unclassified, R = Restricted.
The remaining 3 characters can be composed of any valid character and ensure the uniqueness of the cell name.

Cell Name example:

NOC6RA3B.000

- This is a Norwegian produced cell (**NO**)
- Contains Contour Line Bathymetry (**C**)
- Has been produced at Scale Band six (**6**)
- Has a classification of Restricted (**R**)
- Has the unique designator **A3B**
- Is a base cell (**000**)

Version 3.0 of AML is not constrained to 8 characters and has a greater flexibility in terms of its content.

In all versions the 3 character extension signifies the update number of the cell in exactly the same way as an ENC. For base cells this will always be “000”.

7. Production Specifications

While the product specifications and their annexes define the content and structure of AML products, determining the final detailed nature of a product involves a detailed interpretation of the product specifications. For example, the CLB product specification does not specify the contour interval to be used. In order to ensure that products produced by different agencies within the coalition are consistent, an initial Production Specification has been written. Please contact UKHO for this document.

8. Portrayal of AML

Previously symbology had been explicitly excluded from STANAG 7170. It is still recognised that specific display specifications for different applications may be required. However, reflecting the recognised need for a default portrayal for AML within end user systems such as WECDIS the GMWG has published an AML Portrayal Specification in January 2016.

This specification is developed from the IHO S-52 display for ENC and adopts symbols from other specifications such as APP-06 and Mil Std 2525. It is provided as a .dai file to allow easy integration in WECDIS systems. Currently it is limited to vector AML products but supports versions 1.0, 2.1 and 3.0. This specification is primarily aimed at WECDIS systems but may support consistent display within C2 systems and in Web Services.

[2] See Para 10 for more details

Further details of this specification which can be obtained on request from UKHO by emailing aml@ukho.gov.uk can be found on the AML web pages.

9. Metadata

Metadata is information about data, for example describing the protective marking, source, reliability, scale or use constraints of the data. In AML this is described at two levels:

- Dataset Metadata – this is the meta information describing a data product as a whole (i.e. type of product, classification)

- Feature Meta Information – this is meta information encoded within the data as meta features or meta information attributes. For example 'Data Coverage' is a meta feature that defines the geographical area covered by the product. 'Sounding Accuracy' is a meta attribute which enables each depth to be tagged with an estimated error.

9.1. Data quality

It is important to understand that AML contains data from many different sources which will have different quality criteria. Users must make use of the metadata in order to understand the origins of the underlying source data and therefore any limitations in the appropriate use of AML products. Metadata within AML products can be found on individual features or on Meta features such as M_QUAL and M_COMP, these define information such as completeness or source data quality for a defined area. A set of recommended verification checks have been developed from the IHO S-58 standard and should be used to ensure that AML Products conform to the Product Specifications.

10. Scale

10.1. Vector Scale Bands

Some Vector AML products (LBO, RAL, and SBO) can be considered as being un-scaled because they contain only features that are points or regular geometric shapes. CLB, ESB and MFF contain features such as coastlines and contours which are generated in a more generalised way at smaller scales. These products are therefore prepared for use within a range of scale bands intended for different purposes. For example CLB can be produced in several different scale bands for different levels of application:

- Tactical and Strategic Planning
- Ocean Operations
- Detailed tactical operations e.g. mine counter measures and amphibious operations

The table below summarises the AML scale bands and the typical scale range they are intended to be displayed at.

AML Scale Band	Data Scale	Range of Intended Data Display Scales
1	1:100,000,000 or smaller	<1:40,000,000
2	1:25,000,000	1:10,000,000 to 62,500,000
3	1:5,000,000	1:2,000,000 to 12,500,000
4	1:1,000,000	1:400,000 to 2,500,000
5	1:250,000	1:100,000 to 625,000
6	1:50,000	1:20,000 to 125,000
7	1:10,000	1:4,000 to 25,000
8	1:2,500	1:1,000 to 6,250
9	1:600 or larger	>1:1,500

In practice, products are typically produced in two or three scale bands.

10.2. Gridded Scale Bands

There can be a variation in the spatial grid interval for gridded products, which depends on the purpose of the dataset or the density of the source data. Some gridded AML products include values that vary throughout the year, and specifications for these products make provision for data to be presented at a number of temporal intervals e.g. quarterly or monthly.

Scale Band	Data Computation Grid Size	Data Usage Grid Size
1	20° or coarser	8° or coarser
2	5°	2° to 12.5°
3	1°	24’ to 2.5°
4	30’	12’ to 1.25°
5	6’	2.4’ to 15’
6	1’	24’’ to 2.5’
7	30’’	12’’ to 1.25’
8	6’’	2.4’’ to 15’’
9	1’’ or finer	0.4’’ to 2.5’’ or finer

Grid sizes are given in Degrees (°) Minutes (’) and Seconds (’’) of arc.

11. AML Production within NATO

Several NATO and other nations have the capability to produce AML and others are in the development phase.

NATO Nations implementing AML	Other NATO Nations interested in AML	Partner Nations implementing AML
Belgium Canada Denmark France Greece Germany Italy Netherlands Norway Poland Spain Turkey UK	Estonia Portugal Romania USA	Australia Finland Ireland Sweden

NATO Nations are producing AML of national waters for their own force and NATO exercise purposes. In addition the AML Implementing NATO nations are involved in a collaborative NATO AML Co-Production Programme (NACPP) to provide NATO and NATO Command Structure (NCS) with AML of areas of NATO operational interest. This programme will produce Scale Band 4 AML of CLB, MFF, ESB, LBO and RAL. In due course, the NACPP may be extended to include larger scale AML and AML required to meet emerging NATO areas of operational interests and requirements.

11.1. AML Versions across NATO

It was originally intended that all producers of AML would adhere to the same product version across NATO, however, this has proved impractical. For example, UK has remained with version 1.0, but other nations are producing in both 2.1 and version 3.0. Although producers can generally produce all versions, the requirements of specific legacy systems drive the need to produce earlier and sometimes multiple versions.

11.2. ACO Geospatial e-Catalogue

The ACO Geospatial e-Catalogue, maintained by SHAPE, contains details of geospatial data and products that nations are willing to make available for NATO use, which includes AML. NATO AML producing nations are encouraged to provide details to SHAPE of national AML available for NATO use at the lowest NATO releasability level possible, normally B1 or lower.

12. Current AML Developments

Currently work is in progress to develop a new generation of AML product specifications. This reflects wider developments and the limitations of the current specifications. Importantly the new standards being developed should be more flexible and aligned to COTS software and delivery via Web Services. This work is conducted by the DMGEM Technical Panel within the GMWG and in liaison with DGIWG, the IHO and other bodies.

12.1 Wider developments

Reflecting developments in geospatial technologies such as Web Services various activities within civil and military standards bodies are underway to develop contemporary standards for geospatial information largely building on the ISO TC211 19100 series of standards. These follow the shift from traditional products towards vector data and delivery via web services.

These developments include those within the IHO, developing the S-100 standard to provide a contemporary and flexible framework for hydrographic information. The Open Geospatial Consortium (OGC) develops and drives standards which geo enable the web. Within NATO the NATO Geospatial Information Framework or NGIF has been published and is being further developed to realise NATO geospatial policy using these new standards.

12.2 DMGEM

The Defence Maritime Geospatial Exchange Model (DMGEM) is a framework developed by the GMWG to address the need for a contemporary set of standards and specifications aligned with IHO and NATO NGIF. It will provide an overarching STANAG and subordinate product specifications that support situational awareness within maritime navigation and C2 systems, but also by leveraging NGIF support wider C2 systems including delivery via web services.

12.3 AML+

AML+ is the name for a new generation of AML product specifications within the DMGEM Framework. These define the detailed content, structure and display of maritime geospatial information. Initial work on a Maritime Vector Layers specification has begun based on IHO work and AML 3.0 content. Building on the existing AML definition AML+ is defined as;

"a unified range of digital geospatial data products designed to satisfy NATO non-navigational maritime defence requirements, which is an evolution of Additional Military Layers, and that is aligned with contemporary geospatial standards, including the NATO Geospatial Information Framework"

12.4 NGIF

NGIF is a major piece of work being led strategically by NATO's Joint Geospatial Standards Working Group (JGSWG) and technically through the Defence Geospatial Information Working Group (DGIWG) (which is working in support of NATO) to deliver a set of common geospatial information standards across NATO.

NGIF is intended to realize the principle of 'operating off the same map' by developing a common data model from which digital and hardcopy products can be created. It will ensure that products can be delivered across the NATO Networked Enabled Capability (NNEC) utilising a Service Oriented Architecture (SOA) approach. NGIF provides an opportunity to exploit maritime geospatial data alongside other domains (i.e. air and land) to present one unified view to the NATO Warfighter.

13. AML and the Recognised Environmental Picture (REP)

For every NATO led operation, a NATO Common Operational Picture (NCOP) is developed to provide NATO commanders and their staff with a shared situational awareness on which to base operational decisions during the life-cycle of the crisis. This consists of a range of components including logistics, fire control, intelligence and the dynamic operational environment within a geospatial framework. The REP will be a component of the NCOP and is defined in NATO policy document MC 0632.

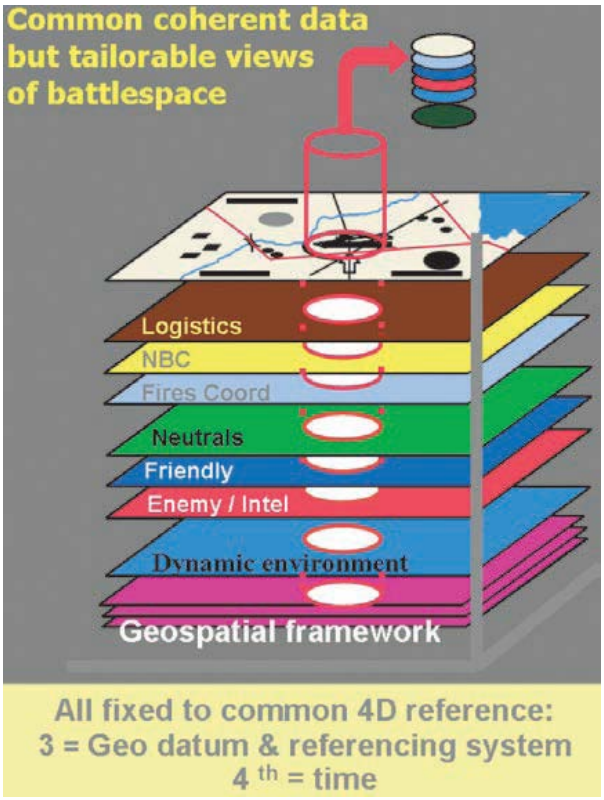


Fig. 11.0

The Common Operational Picture

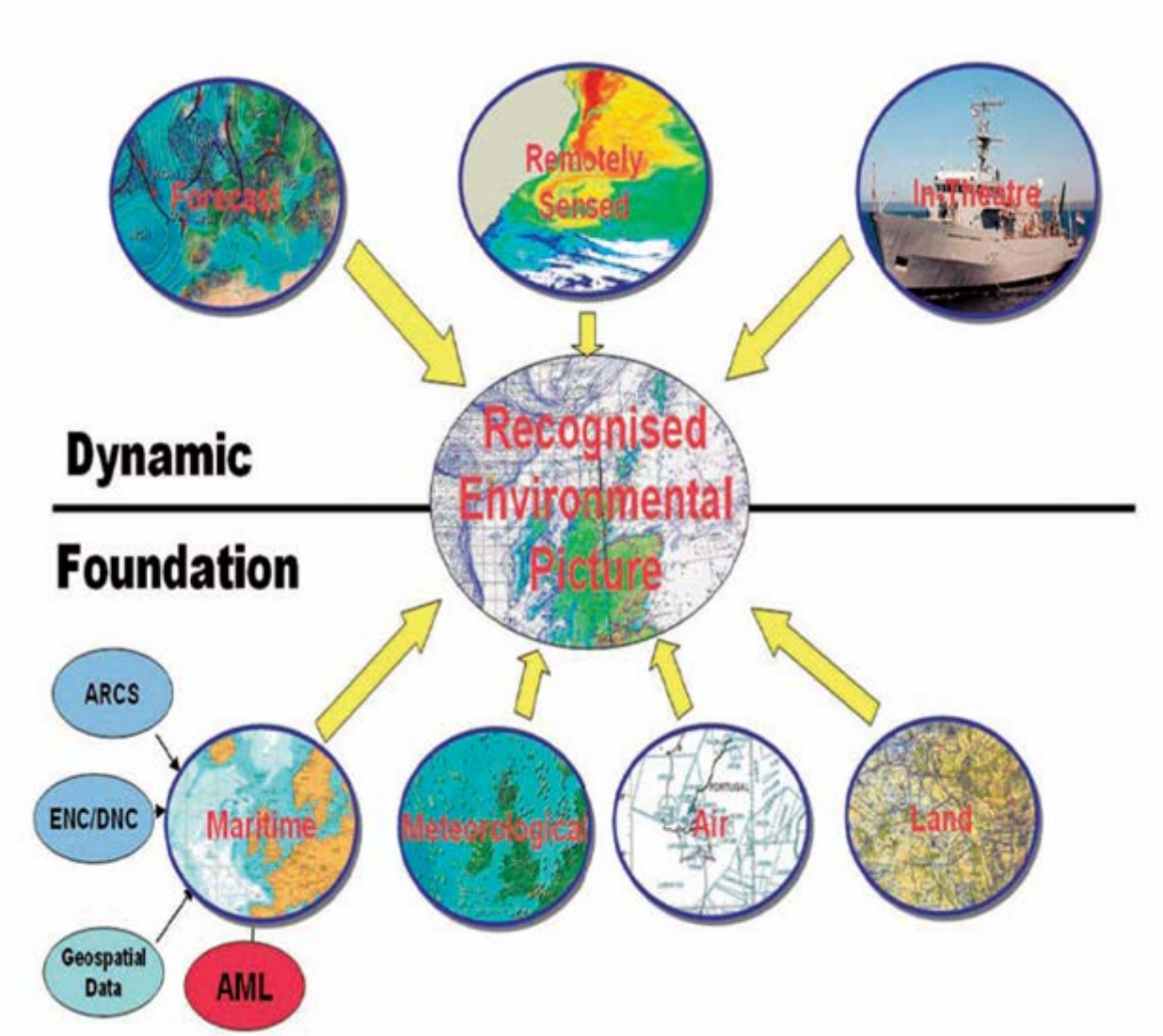


Fig. 12.0
Components of the Recognised Environmental Picture

13.1. Definition

The Recognised Environmental Picture is defined as a “complete and seamless depiction of geospatial, oceanographic and meteorological information designated for the planning and conduct of joint operations in a specific area at a specific time and which supports the unity of effort throughout the battle space”. Each operation will have its own designated REP, specific to the operating area. This concept seeks to provide seamless, accurate, relevant, coherent and timely environmental information for decision superiority, enabling cross system interoperability between nations and NATO.

The REP will be the complete assemblage of environmental information needed for the war fighter to plan and conduct operations. This will include all geospatial, oceanographic and meteorological data. From these data fields, only the most relevant at the time will be viewable and displayed on the NCOP or used by systems to drive a process or for command decision making. Thus each REP will be unique, and although the products available for display may be from a standard list, that which is used for decision making depends on the situation and dynamic developments in the operation. The REP combines dynamic data with a foundation of static and quasi-static data. Data may be

unmodified from geospatial or METOC sources or a fused product combining several sources of information into a new product. In the maritime domain, AML data contributes towards the REP along with ENCs, ARCS and imagery.