NORTH ATLANTIC TREATY ORGANISATION

(NATO)

ANNEX C

to

ADDITIONAL MILITARY LAYERS

GRIDDED SEDIMENT – ENVIRONMENT SEABED BEACH

PRODUCT SPECIFICATION

Version 1.0, 26th July 2005

Produced and issued by the United Kingdom Hydrographic Office under the direction of the geospatial Maritime Working Group of the NATO Geographic Conference.

ANNEX C

NETWORK COMMON DATA FORM (NET CDF) IMPLEMENTATION OF GRIDDED SEDIMENT - ENVIRONMENT SEABED & BEACH PRODUCT SPECIFICATION

Document Control

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C.1 AML GS-ESB NetCDF Format and Structure

C.1.1 References

This document requires reference to the following documents;

1. STANAG 7170 Additional Military Layers
2. Additional Military Layers, Gridded Sediment Environment Seabed & Beach, Product Specification
3. NetCDF version 3.6.0-p1 dated 18 February 2005
4. The COARDS convention
5. NetCDF best Practice
6. The Network Common Data Form standard and a number of netCDF libraries and documentation are available for download at the following address; http://www.unicar.ucar.edu/packages/netcdf/
7. The COARDS convention is accessible at the following address ftp://ftp.unidata.ucar.edu/pub/netcdf/Conventions/COARDS

C.1.2 Document Structure

This document defines the implementation of Additional Military Layer (AML), Gridded Sediment - Environment Seabed Beach (GS-ESB) in conformance with the Network Common Data Form (NetCDF) standard. The document has been constructed in conformance with the COARDS convention and follows what is currently defined as best practice within the NetCDF community.

AML GS-ESB data files may be accompanied by an optional ASCII file containing general information, this file will be called “readme.txt”

C.1.3 Global attributes

The data file contains a series of global attributes that satisfy the requirements of GS-ESB AML and COARDS.

C1.3.1 AML GS-ESB mandatory metadata

production_agency = "text string"
dataset_name = "text string"
edition_number = "text string"
release_date = "coded string CCYYMMDD”
product_specification_description = "enumerated"
product_specification_version = "text string"
spatial_scale_band = "enumerated"
data_quality = “text String”
completeness = "text string"
coverage = "text string"
ido_status = "enumerated"

protective_marking = "enumerated"
owner_authority = "enumerated (NATO country code)"
caveat = "text string"
copyright = "text string"
grid_type = “text string”

For Example

production_agency = "United Kingdom Hydrographic Office"
dataset_name = "Gridded Geoacoustics"
edition_number = "1.0"
release_date = "20050729"
product_specification_description = "GS-ESB"
product_specification_version = "1.0"
spatial_scale_band = "4"
data_quality = “green”
completeness = "Complete"
coverage = "Global"
ido_status = "UK/US"
protective_marking = "CONFIDENTIAL"
owner_authority = "GBR"
caveat = "N/A "
copyright = "© British Crown Copyright 2004. All rights reserved"
grid_type = “domain”

C1.3.2 AML GS-ESB non-mandatory metadata

data_source = "text string"
orig_auth = "text string"
data_type = "text string"
image_file = "hyperlink"
text_file = "hyperlink"
reference = "text string"
supporting_info = "text string"

For example

data_source = "HFBL/LFBL"
orig_auth = "NAVOCEANO"
data_type = "Geoacoustic Properties"
image_file = "N/A"
text_file = "N/A"
reference = "N/A"
supporting_info = “N/A”

C1.3.3 Additional Attributes required by NetCDF implementation

description = "text string"
convention = "text string"

For example;
description = "GS_ESB AML example"
convention = "COARDS"

Coordinate value ordering:
The coordinate values of a coordinate variable must be either monotonically increasing or monotonically decreasing. However, the coordinate values need not be evenly spaced. Missing values are not permitted in coordinate variables.

Coordinate Variable Attributes:
If a coordinate variable contains longitude, latitude, depth, elevation, date, or time values then the units attribute is mandatory; it is used to determine the orientation of the coordinate variable. Since coordinate variables may not contain missing values the attributes "_FillValue " and "missing_value" may not be used with coordinate variables. "scale_factor" & "add_offset" will not be used with coordinate variables.

C.1.4 Specific attributes

C1.4.1 Dimensions

This section describes the encoding AML GS-ESB. The gridded geoacoustics dataset is three dimensional, as follows:

Dim No.	Dimension name	Unit of Measure
1	n_layer	Sediment Layer
2	latitude	decimal degrees
3	longitude	decimal degrees

Each dimension is also a co-ordinate variable, which implies some restrictions over normal variables, as described in section C1.3.3, from the COARDS convention.

C1.4.2 Variables

The gridded geoacoustics dataset has three coordinate variables (each dimension is also a coordinate variable and mandatory). It also has up to thirteen data variables (only 7 of which are mandatory).

Coordinate Variables	Dimensions
n_layer	n_layer
latitude	Latitude
longitude	Longitude

Mandatory Data Variables

Data Variables	"units"	Dimensions
HF_bottom_loss	No Units	latitude, longitude
LF_bottom_loss	No Units	latitude, longitude
layer_thickness	m	n_layer, latitude, longitude
TWTT	s	n_layer, latitude, longitude

sediment_density	kgm^{-3}	n_layer, latitude, longitude
relative_soundspeed	No Units	n_layer, latitude, longitude
absorption_coeff	dB/?	n_layer, latitude, longitude
soundspeed_gradient	s^{-1}	n_layer, latitude, longitude

Non-mandatory Data Variables

Data Variables	**"units"**	**Dimensions**
soundspeed_curvature	$m^{-1}s^{-1}$	n_layer, latitude, longitude
absorption_coeff_grad	dB/?/m	n_layer, latitude, longitude
porosity	%	n_layer, latitude, longitude
shear_soundspeed	ms^{-1}	n_layer, latitude, longitude
shear_absorption	dB/?	n_layer, latitude, longitude
quality	R,A,G	latitude, longitude

Attribute Variables

The following attributes apply to all physical properties variables

long_name = "text string"
units = "text string"
scale_factor = "floating point"
add_offset = "floating point"
missing_value = "integer"
_FillValue = "integer"

For example

long_name = "two way time travel"
units = "s"
scale_factor = "0.0010"
add_offset = "0.15"
missing_value = "-32000"
_FillValue = "-31999"

The "long_name" attribute allows for a more informative description of the variable than can be conveyed using the variable name. "long_name" will always be a text string.

The "units" attribute describes the units of the 'unscaled' data (i.e before "scale_factor" and "add_offset" have been applied or after the data has been unpacked and these storage constraints have been removed.) The "units" attribute is a text string and should conform to the COARDS conventions.

"scale_factor" and "add_offset" allow the data to be scaled from floating point to integer values to optimise storage. The "scale_factor" value will vary depending on the precision quoted in the data. Values quoted using 3 decimal places will require a scale factor of 0.0010 to be held as integers without losing information. Attributes are held as strings and therefore not scaled hence the offset only applies to data held in variable arrays.

The variables “missing_value” and “_FillValue ” hold the values which indicate that data should be present but is not available and that data should not be present, as follows;

No Data maps to “missing_value” (in GS-ESB always -32000)
Not Applicable maps to “_FillValue” (in GS-ESB always -31999)

Empty fields are not permitted in NetCDF.

C.2 File Naming

AML GS-ESB will follow the file naming convention specified below.

Format

XXXEnc123.nc

Where

XXX = the three-letter NATO country code of the producer (NATO STANAG 1059)

E = the first character of the three-letter AML product identifier. As defined, the overall basic AML service would be made up of nine products:

M – MFF (Maritime Foundation and Facilities)
E – ESB (Environment, Seabed and Beach)
R – RAL (Routes Areas and Limits)
L – LBO (Large Bottom Objects)
S – SBO (Small Bottom Objects)
C – CLB (Contour Line Bathymetry)
I – IWC (Integrated Water Column)
N – NMB (Network Model Bathymetry)
A – AMC (Atmospheric & Meteorological Climatology)

n = 'Spatial Scale Band' values are given below.
1 - 20 degrees or coarser
2 - 5 degrees
3 - 1 degree
4 - 30 minutes
5 - 6 minutes
6 - 1 minute
7 - 30 seconds
8 - 6 seconds
9 - 1 second or finer

c = the security classification code:
N – COSMIC TOP SECRET
W – FOCAL TOP SECRET
T – TOP SECRET
S – SECRET
C – CONFIDENTIAL

R – RESTRICTED

U - UNCLASSIFIED

123 = product specific alphanumeric identification. This is dependent upon the geographical partitioning of the product and is at the discretion of the producing authority.