

A Proposal to

The Open Navigation Surface Working Group

for updating the

Bathymetric Attributed Grid

specification with tables and layers for metadata.

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Introduction & Background

The Bathymetric Attributed Grid (BAG) was created to service the needs of the hydrographic community and target the concept of a Navigation Surface on a survey by survey basis. The design incorporates depth, uncertainty, and some metadata for the associated survey, but the ability to provide metadata with an associated geospatial context is limited. Some metadata, such as those attributes associated with S-101 (e.g., Quality of Bathymetric Data) are better described with some geospatial context as some parts of the same survey may have different quality designations. Importantly, these data may describe survey information that are not covered directly by the bathymetric layer. For example, it would be valuable to carry survey wide quality information, even when some of the survey coverage was contributed by side scan. The proposal encompasses two new additions to the BAG:

1. Node Metadata: a metadata table and raster layer pair.
2. Vector metadata: a metadata table with the included vector information.

Each of these additions are targeted toward specific needs but, if implemented as generic types, may be reused for other similar expanded capability later. Each of these targets are briefly outlined here with further detail provided later.

The metadata table and raster layer pair in (1) would serve the needs of a S-101 Quality of Bathymetric Data layer. This information is needed on a node by node basis, but only has one answer per node, and is therefore best provided as a raster layer with the same resolution as the bathymetry. Because the metadata is similar for many nodes, the metadata table could be implemented as a look-up table, with the raster layer providing the keys for the look-up. This would also enable different surveys to contribute to different nodes in a trackable way.

The metadata table with vector information in (2) would serve the needs of the S-101 Quality of Survey layer. Many of these attributes, such as the sounding technique, may have spatial overlap between different vector areas described in the table. The resolution

of this information is less specific however, thus this information would be provided only as metadata and not for action on a node by node basis.

Requirements

1. Spatially keyed metadata included in the BAG.
2. Minimally impact the size of a BAG.
3. Mechanism for likely repeated but node specific metadata as well as regionally generalized metadata within BAG.
4. Leave the current XML metadata unchanged.

Project Description

An overview level layout of the proposed update is given in Figure 1.

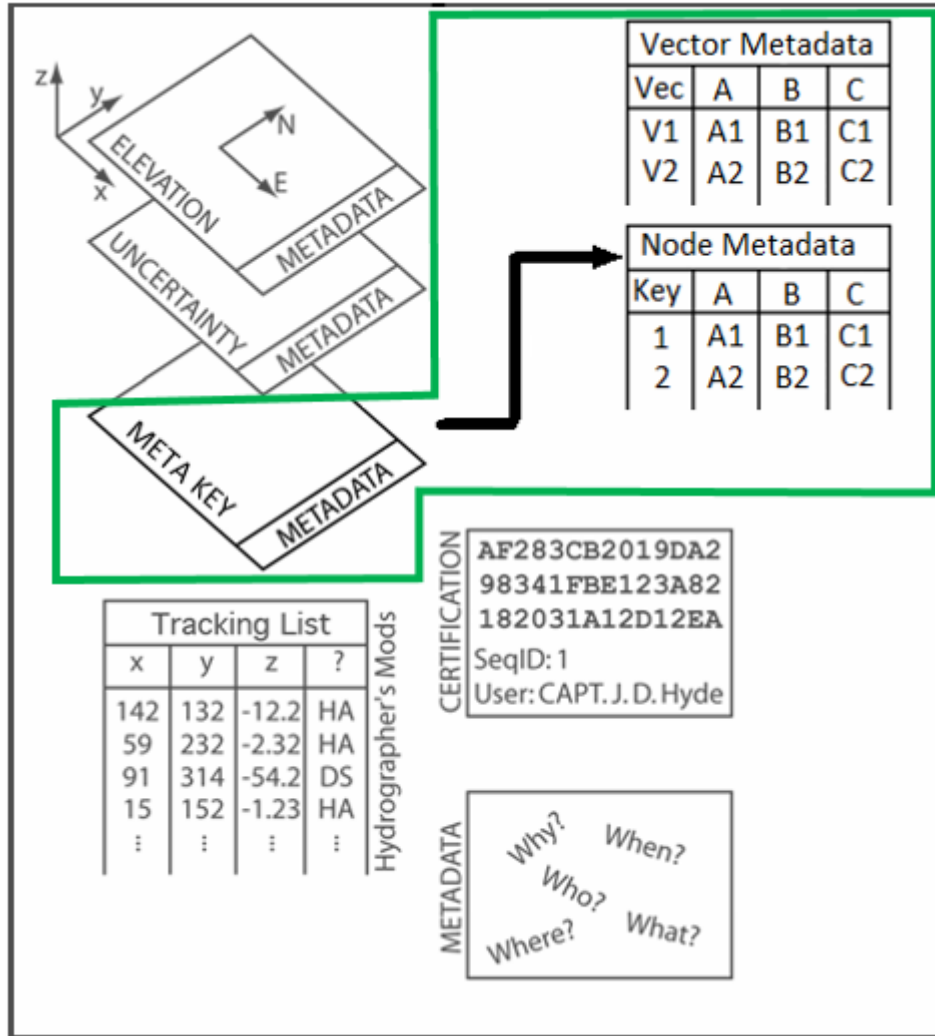


Figure 1 - The proposed updates to the BAG structure

1. Node metadata

Describing metadata on a node by node basis is important when full spatial resolution of the metadata must be maintained. Assuming many of these values will be repeated or grouped, the raster values provide a key or index for the table metadata applicable for each location (Figure 2).

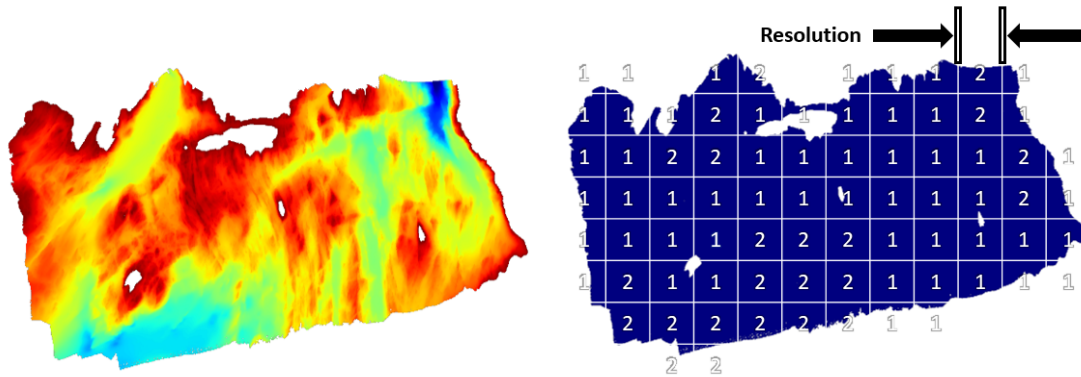


Figure 2 - Left, the elevation layer, right, the node metadata layer with table indices. The resolution of both rasters is the same despite their depiction here for clarity.

The associated table would have a corresponding key and include the attributes values for the node (Table 1).

Table 1. An example of a table corresponding to Figure 2.

Key	Full Seafloor Coverage	Horizontal Uncert	Significant Features	Etc...
1	True	5	True	...
2	False	10	False	...

The table is matched to the relevant raster, and vice versa, through an HDF5 table metadata tag. The envisioned purpose for this information would be to describe the quality of the data at this location.

Because the raster layer corresponds to other raster layers, the georeferencing information for specific BAG should also govern this layer.

2. Vector metadata

When some value is placed on spatially referenced metadata (Figure 3) but the full resolution of the provided raster data is not required, or where there may be overlap between the areas described, a table including vector information for the metadata may be more appropriate (Table 2). In this case the table is stand alone,

and each row in the table depicts a separate entry of vector information. Because the data location is recognized to be inexact, each entry should contain the potential spatial inaccuracy of vector information. The geospatial information is assumed to be in the same reference frame as the rest of the BAG as specified in the metadata.

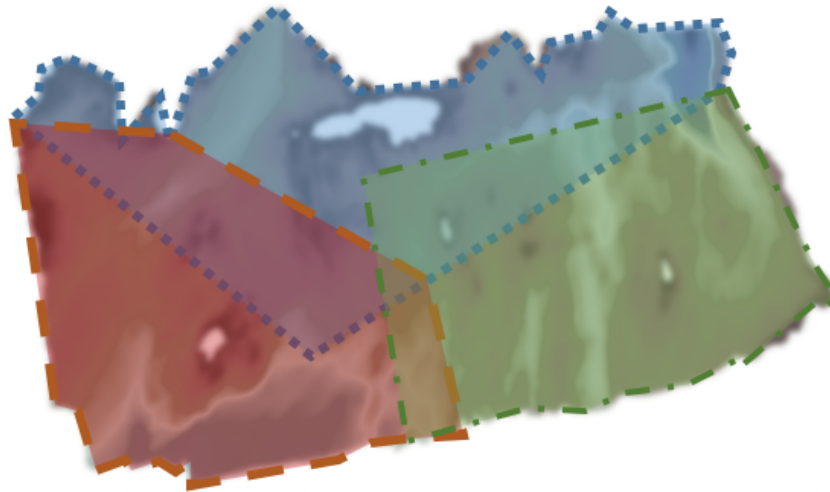


Figure 3. A depiction of three vector layers over bathymetry.

Table 2. An example of a vector metadata table as shown in Figure 3.

WKT	Line Spacing	Technique of Vertical Measurement	Quality of Vertical Measurement	Etc...
POLYGON ((30 10, ...	10	1	1	...
POLYGON ((30 10, ...	20	1	2	...
MULTIPOLYGON (((40 40, ...	20	3	6	...

An underlying assumption of this part of the proposal is that we can efficiently store the desired vector information within the table. This may not be a good assumption. If there are recommendations from members of the working group with experience in describing these types of data we are open to input.

Evaluation Factors

There are, of course, a number of details to be further defined. Some of these are details associated with the specific information, such as what specific bits of metadata mean: the BAG specification has largely avoided specifying too much detail in favor of remaining

flexible. Other decisions would impact encoding and therefore must be considered before a reference implementation is completed. A few of these considerations are listed below for general review.

1. What happens when metadata conflicts? There may be cases where the XML and new metadata fields appear to provide differing information.
2. Should the library expected to interpret the data, or just provide it back to the user? In the former case, this might cause significant disruption (and expansion) to the library.
3. The metadata may describe the survey rather than the specifically provided bathymetry. Is this acceptable?

Final Definition

If these generic types are deemed worthy of consideration a more concrete proposal with specific definitions will follow. Suggestions and feedback are welcome.