

**Tutorial Title:**           **Analysis and Management of Georeferenced Bathymetry and Oceanographic Data in a Marine Geographic Information System**

### **Continuing Education Units and Professional Development Hours**

**Instructor(s):**           **Karen Hart ~ Senior Hydrographic Consultant at CARIS USA**

### **Overview:**

Oceanographic data can cover a broad range of data types, from seafloor bathymetry to chemistry of the water column to sea surface temperature. Visualizing these data - together - should be an important goal for scientists wishing to really understand the ocean environment from the seafloor to the sea surface. The use of a marine geographic information system coupled with management of various types of oceanographic data in a spatial database allows scientists and professionals to compile, process, and analyze many different data types at once.

### **The course will include:**

CARIS intends to demonstrate this ability in a workshop by using our Bathy DataBASE software for compilation, analysis, management, and visualization of the following spatial data types.

- bathymetry (surfaces and point clouds),
- water column imagery including georeferenced gas seeps and dangers to navigation,
- slope analysis maps used for geomorphology,
- sediment analysis maps with data collected using remote sensing techniques, and
- Georeferenced oceanographic data such as dissolved oxygen and carbon dioxide, primary production, temperature, salinity, etc.

### **Introduction**

- Introduce workshop and personnel
- Workshop overview and topics

### **Raster Data display**

- Introduction of software to use
- Bathymetry data
  - Bathymetry from hydrographic survey
  - Water column imagery (point cloud) displayed in 3D - natural gas seeps
- Oceanographic spatial data
  - CTD point clouds with various attributes (dissolved oxygen, light percentage, depth, salinity, temperature, pH, etc.)
  - NetCDF formatted data of temperature and salinity
  - Sediment type gridded data
  - Other data types

- Show different types of data together in a spatial marine GIS - data correlation with existing bathymetry
  - Display in 3D
  - Display over bathymetry if available
  - Display over ENCs if available

#### Management of raster data in a database

- Software introduction
- Explanation of database (PostgreSQL)
- Data analysis - oceanographic and bathymetric data
  - Data attribution and querying of metadata
  - Import/Export of data

#### Vector data products and Oceanographic data model

- Vector data products
  - Contour generation of data layers (isolines of salinity, temperature, sediment type, etc.)
  - Vector current information (overlaid on bathymetry)
- Oceanographic data model
  - Creation of a data model for oceanographic data types
  - Data model would allow for creation of Marine Information Overlays (MIOs) and possibly specific Additional Military Layers (AMLs)
  - Expected discussion

#### **Biography:**

Karen Hart is a Senior Hydrographic Consultant at CARIS USA and has been with the company for 7 years, providing specialized consulting and training to clients in the United States and abroad. Prior to joining CARIS, she worked as a Marine Scientist/Hydrographer for 6.5 years at SAIC. She has an MS degree in Oceanography and a BS degree in Geology.