CARIS
Ping-to-Chart Solution™
for the Caribbean

Addressing the Caribbean Charting Requirements

12th Meso American & Caribbean Sea Hydrographic Commission Meeting

December 2011

Basseterre, St. Kitts

Summary

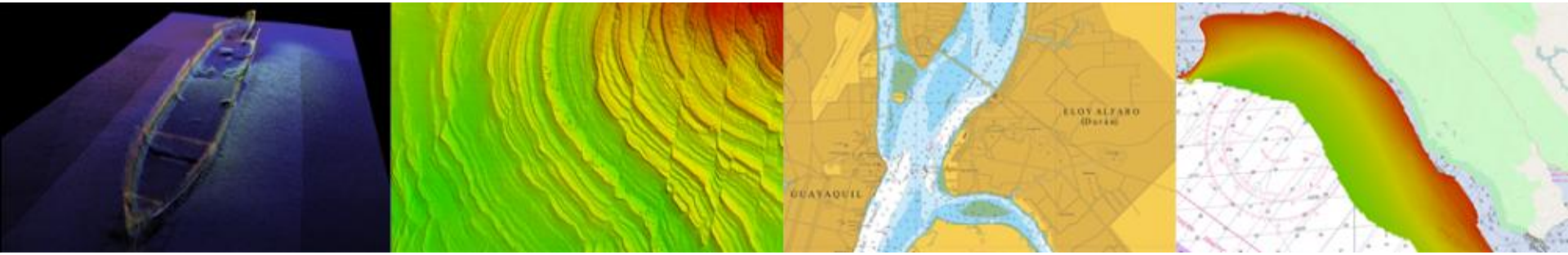
- Over 30 Years in the GIS Software Development Business
- Successful CARIS installations in over 85 countries
- 170 employees in total between Canada, Netherlands, USA, Australia and the UK
  - Developers (85), Project Management (5), Sales (10), Marketing (5), Tech Support (35), QA testers (10), General (20)
- Industry leading team of Technical Support professionals with industry experience and academic backing
- 20+ Alliance Companies in other countries
- ISO 9001:2008 certified
- Focused on the use and development of GIS standards
  - OGC, ISO/TC 211, IHO, ONSWG, MSDIWG

caris
www.caris.com

Ping-to-Chart™ Solution

- CARIS is the only organization able to offer the marine community a complete and streamlined GIS solution from Ping-to-Chart
  - i.e. data processing through to chart production and subsequent distribution of the marine information and chart products
  - Seamless data transfer and interoperability

Processing **Analysis** **Production** **Discovery**



caris
www.caris.com

CARIS Ping-to-Chart Workflow

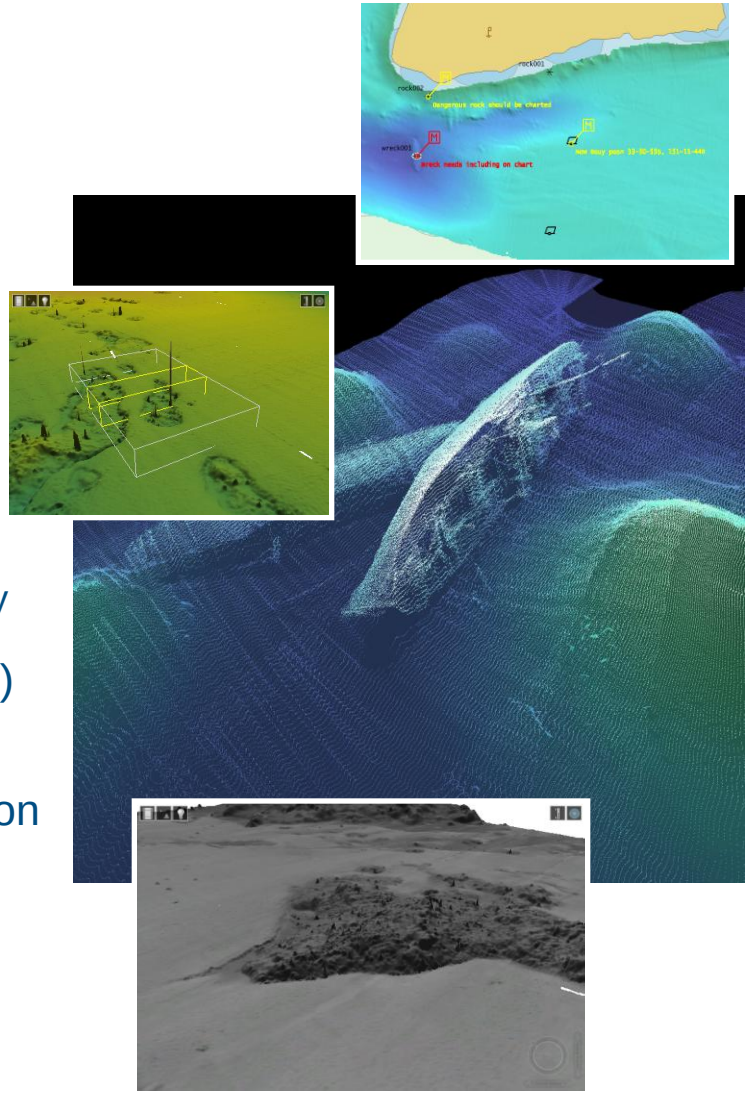
PROCESSING	ANALYSIS	PRODUCTION	DISCOVERY
CARIS HIPS and SIPS	CARIS Bathy DataBASE	CARIS S-57 Composer	CARIS Spatial Fusion® Enterprise
CARIS Notebook	CARIS BASE Editor	CARIS HPD	
	CARIS Engineering Analysis Module	CARIS LOTS	

WORKFLOW MANAGEMENT

caris
www.caris.com

Processing

- **Capture Survey / Field Observations as S-57 Objects**
  - Wrecks, Buoys, Coastlines, etc. captured as S-57 data from live GPS data logging or digitizing tools
- **Improve Acquisition to Processing Ratios**
  - Achieve 1:1 data acquisition to processing ratio, or better
  - Efficiently process bathymetry and imagery
    - MBES, SBES and LiDAR bathymertry
    - SSS and MBES Backscatter and Time Series Imagery
  - Utilize proven algorithms and corrections (e.g. SVC)
  - Optimize efficiencies through statistical modeling, automated corrections and seamless 3D visualization
  - Scalable technology provides 64-bit OS support, multithreaded processes and DEM / Mosaic technology for tens of billions of grid nodes



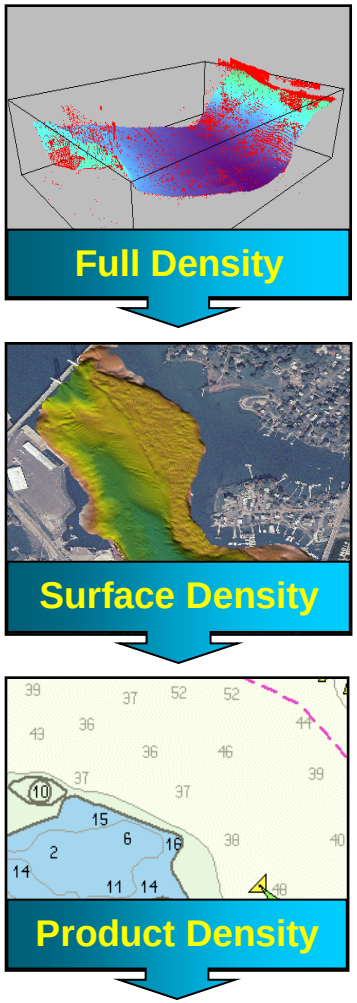
caris
www.caris.com

CARIS Ping-to-Chart Workflow

PROCESSING	ANALYSIS	PRODUCTION	DISCOVERY
CARIS HIPS and SIPS	CARIS Bathy DataBASE	CARIS S-57 Composer	CARIS Spatial Fusion Enterprise
CARIS Notebook	CARIS BASE Editor	CARIS HPD	
	CARIS Engineering Analysis Module	CARIS LOTS	

WORKFLOW MANAGEMENT

Bathymetric Densities



Full Density

- Complete set of raw and processed data from all sensors. Data cleaning. Data processing (e.g. tides, svp corrections, …). And value-added data (e.g. TPE generated for every sounding)

Surface Density

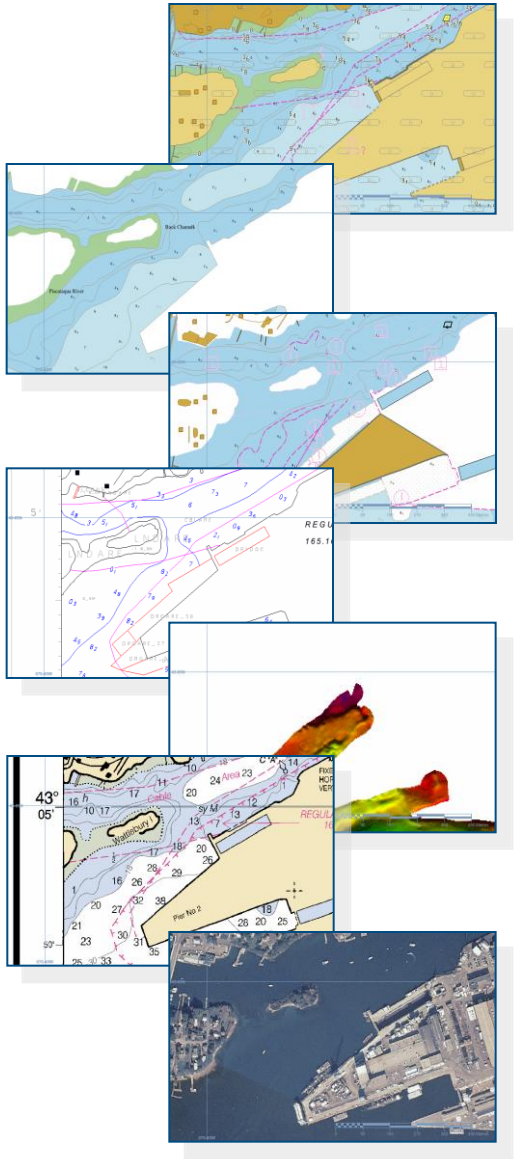
- Nodes (points), with attributes. Density needs to reflect spatial resolution of the sonar… too high, unnecessary nodes… too low, seafloor detail is lost

Product Density

- Soundings, optionally with attributes. Density adjusted to needs of the product.

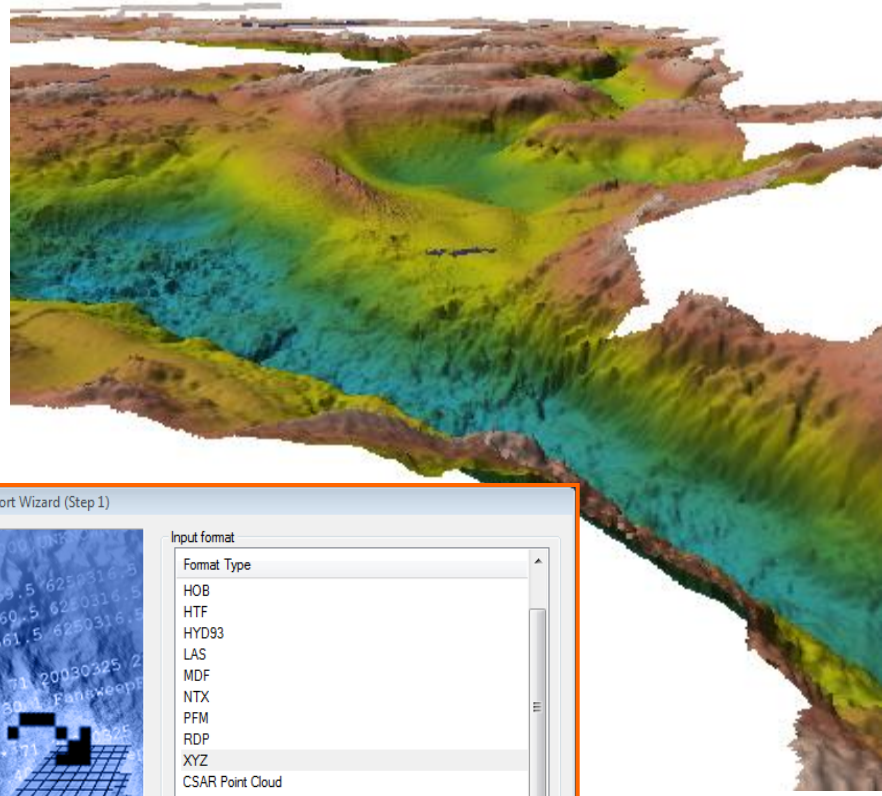
Data Sources

- Geo-referenced Background
  - Raster
    - GeoTiff, TFW, IGA, BSB, HCRF, ECW, CRL, MrSID, JPEG2000 and others….
  - Vector
    - S-57, CARIS Map, SHP, DXF, DWG, SAF, DGN, HOB, and others…
  - URL
    - Web Mapping Service (WMS), ECW / JPG2000



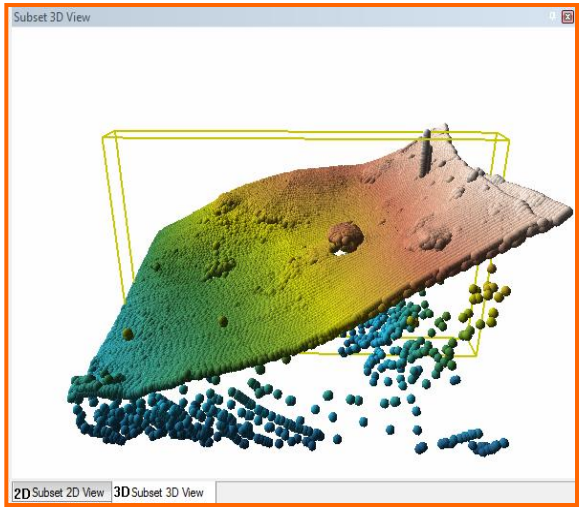
Data Sources

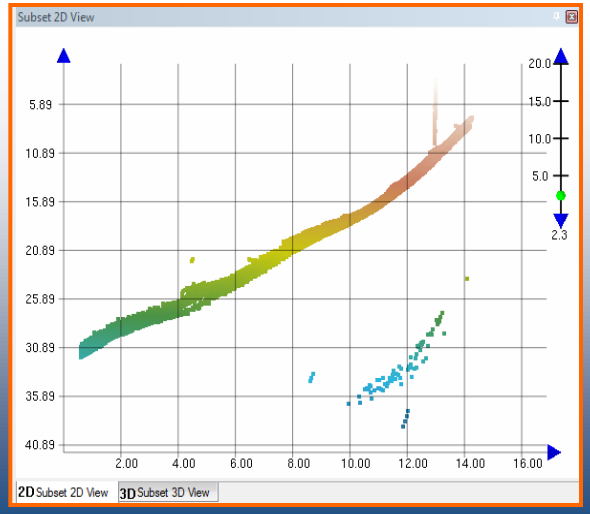
- Natively open:
  - CARIS BASE Surfaces (e.g. produced with CARIS HIPS and SIPS)
  - BAG Surfaces (produced by CARIS or other software vendors)
  - USGS DEM
- Import bathymetry data sources from:
  - CRS, GSF, HOB, HTF, HYD93, LAS, MDF, NTX, PFM, RDP, XYZ, CSAR Point Cloud, ESRI ASCII Grid



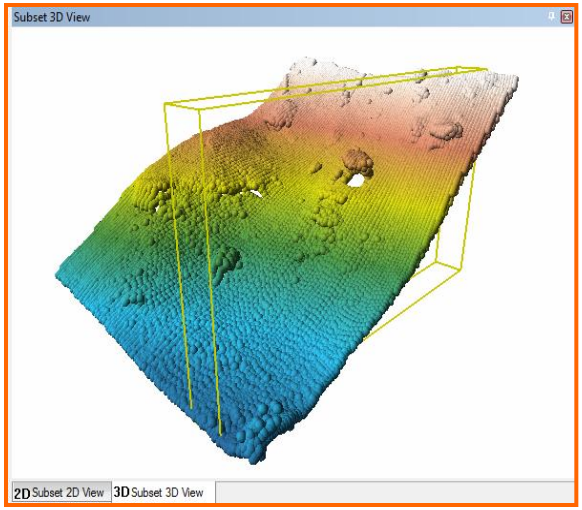
Sounding Sources…and More Sources

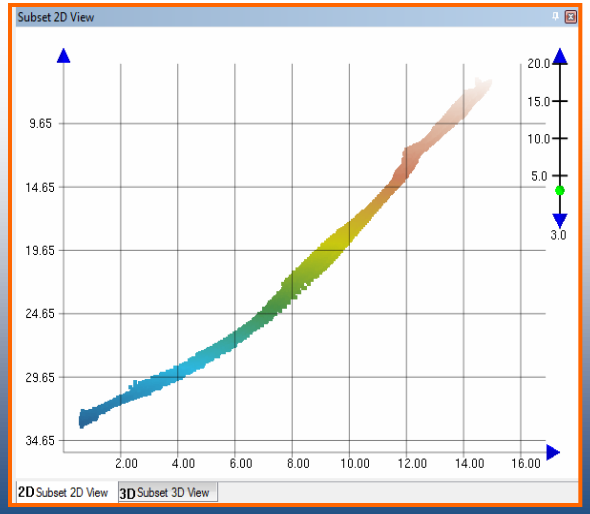
- **Not Validated**





- **Validated**

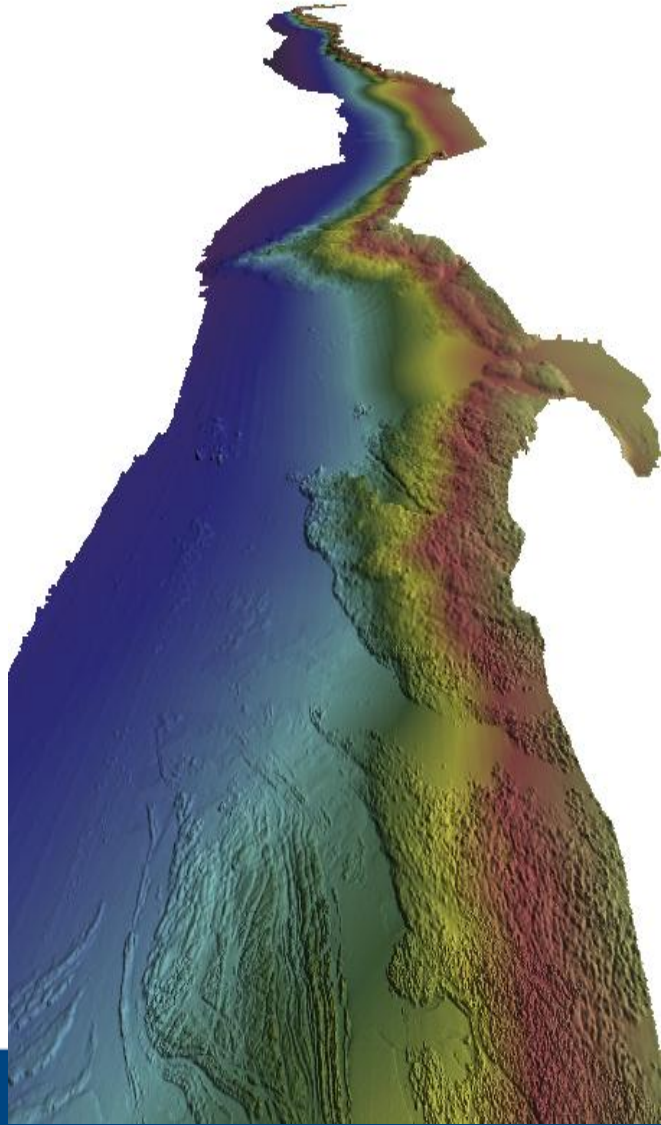




CSAR Framework

- **C**ARIS **S**patial **AR**chive (**CSAR***) Framework
  - CARIS technology framework
  - Provides substantial benefits to CARIS products for efficient storage, handling and rapid visualization of ‘large’ volumes of bathymetry data

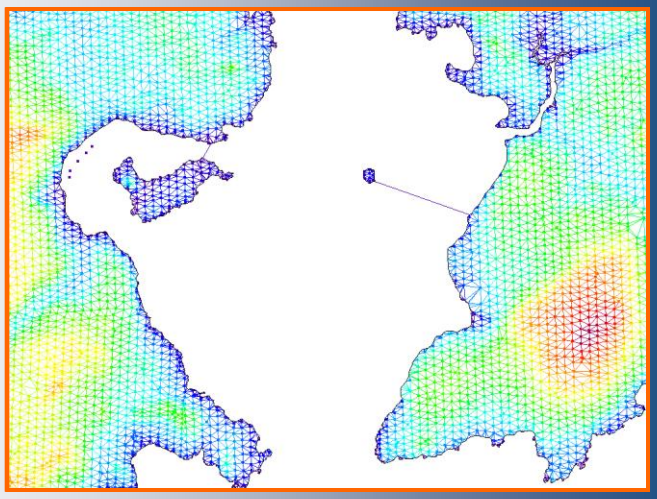
Pronounced “Cesar”

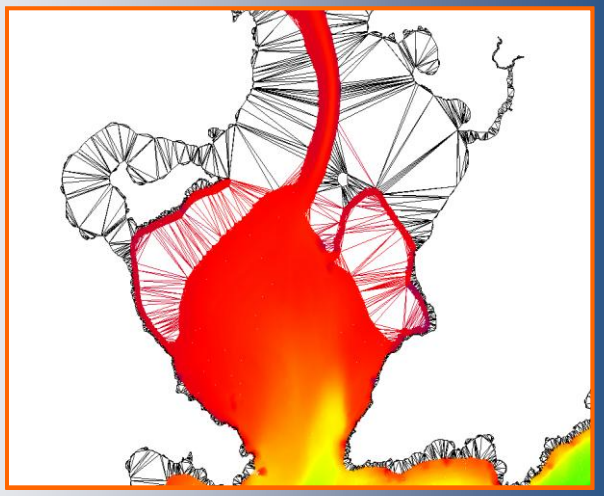


BASE Manager / Editor

TIN Creation and Manipulation

- Create TIN from Sounding Set
- Prepare and manipulate TIN model
  - Remove Long / Hull Edges
  - Auto Generated TIN Editor layer
  - Apply Vector objects to TIN from Feature Layer or TIN Editor Layer
    - Breaklines or points to insert known depths (e.g. low water line)
    - Coverage polygons to control TIN extents (boundary or holes)
- Interpolate Surface from TIN
  - Options for Linear or Natural Neighbor Interpolation



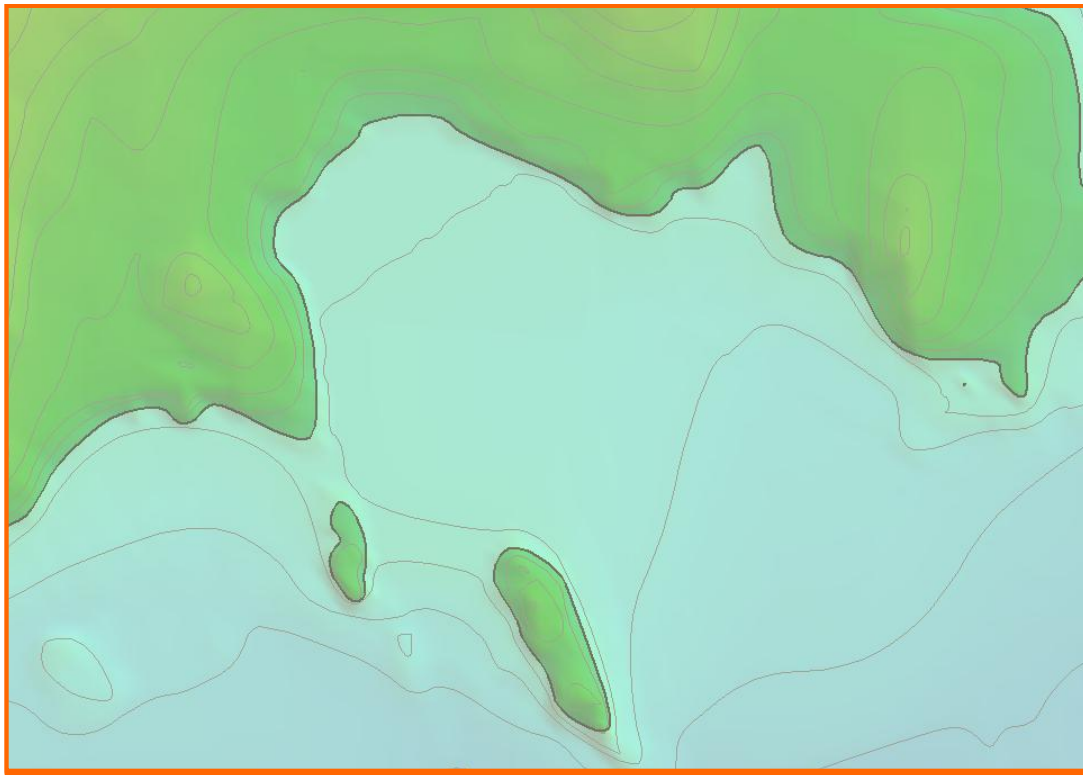


caris
www.caris.com

BASE Manager / Editor

Bathymetry Products

- Depth Contours and Depth Areas
  - Created from BASE Surface or TIN
  - Created as properly attributed, S-57 objects
  - Produce smooth contours
    - Contour Smoothing tool
    - Produce from Generalized Surface (detail appropriate for particular chart scale)
  - Topology on-the fly

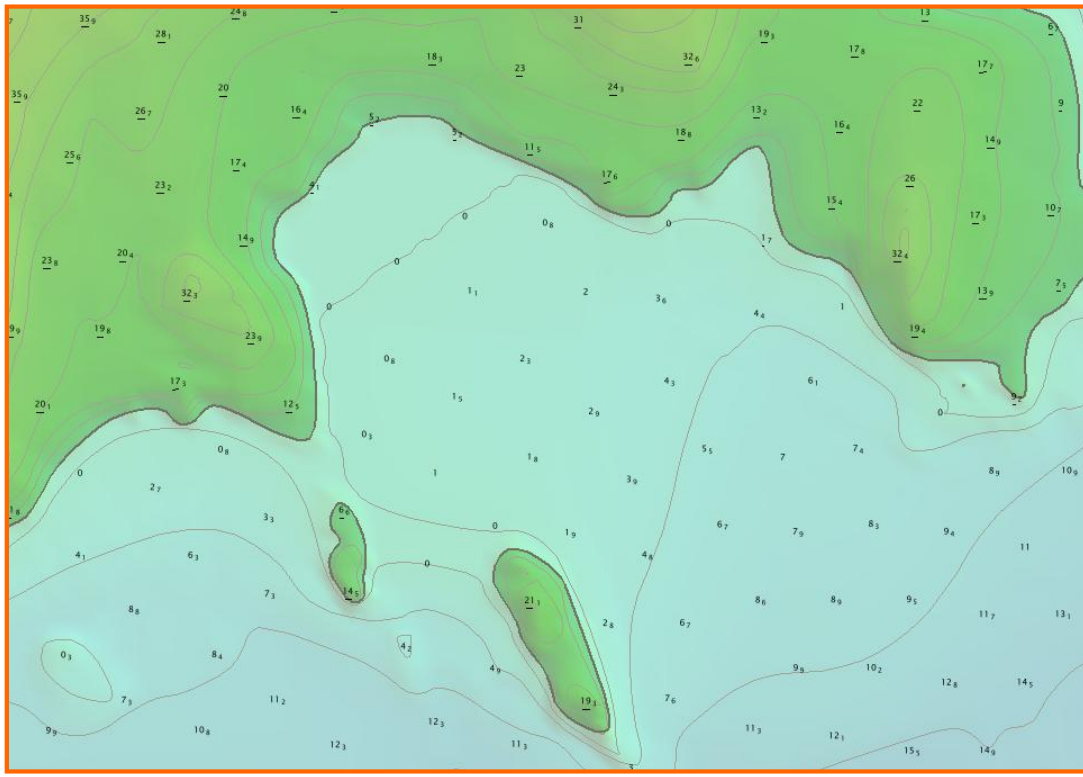


- Meet requirements for various nautical products:
  - Paper Chart, ENC, IENC, bENC, AML, etc.

BASE Manager / Editor

Bathymetry Products

- Soundings
  - Created from Sounding Set or BASE Surface
  - Created as properly attributed, S-57 objects
  - Filter sounding selection by attributes
  - Map source data attributes to Sounding object attributes
    - e.g. Uncertainty to SOUACC

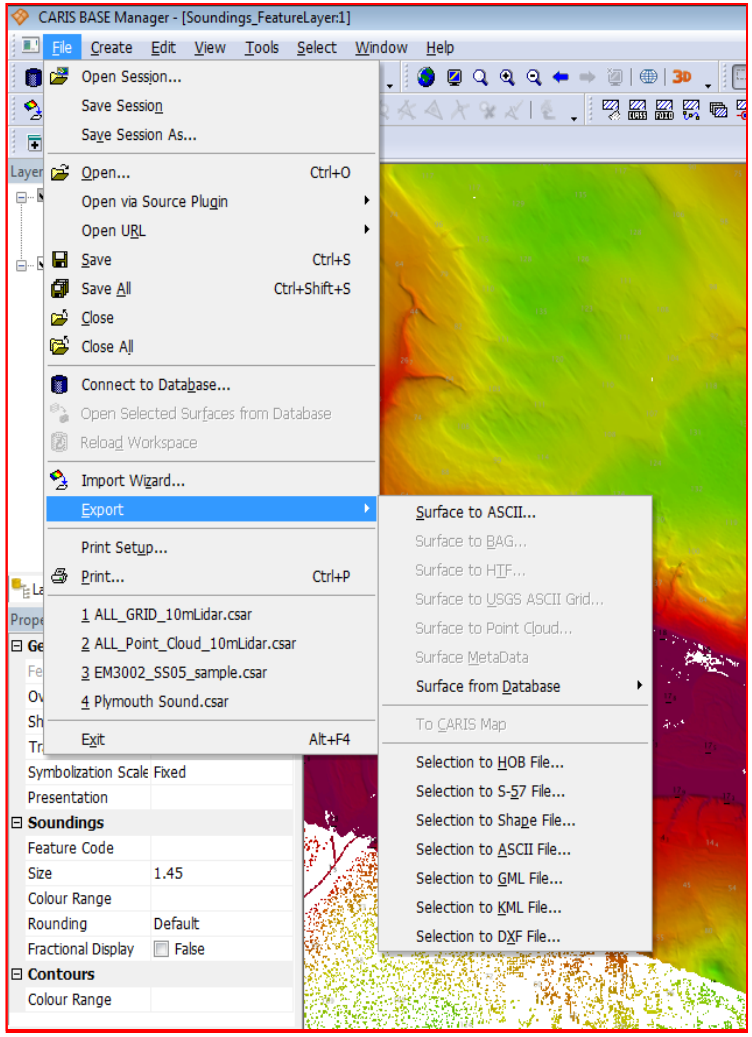


- Meet requirements for various nautical products:
  - Paper Chart, ENC, IENC, bENC, AML, etc.

BASE Manager / Editor

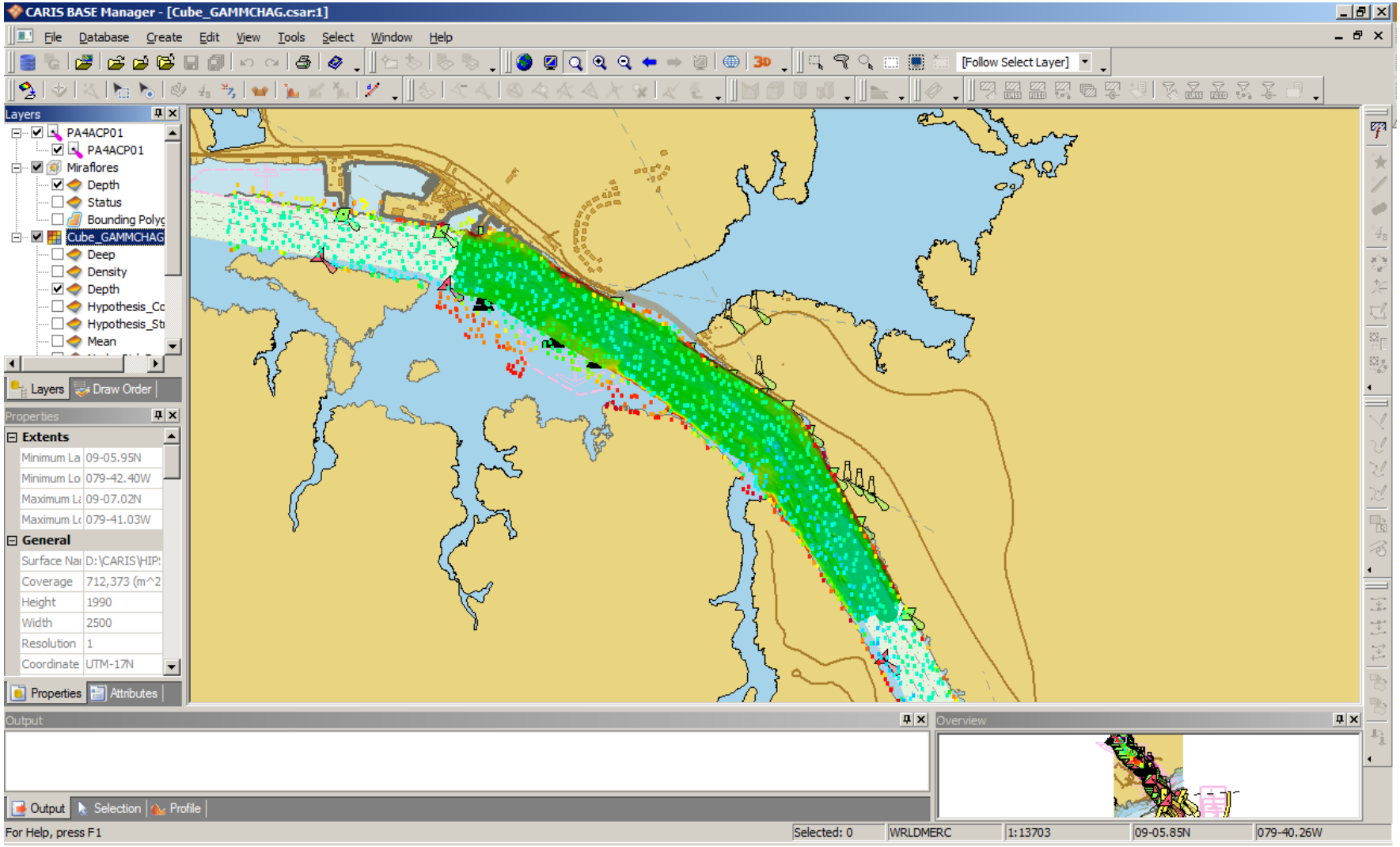
Data Exports

- Export BASE Surfaces and/or Sounding Sets to:
  - ASCII, BAG, HTF, KMZ
- Export BASE Surface and Sounding Set Metadata
- Export Vector objects to:
  - CARIS Map, S-57, Shape, GML, KML
  - ASCII with accompanying ISO 19115 metadata



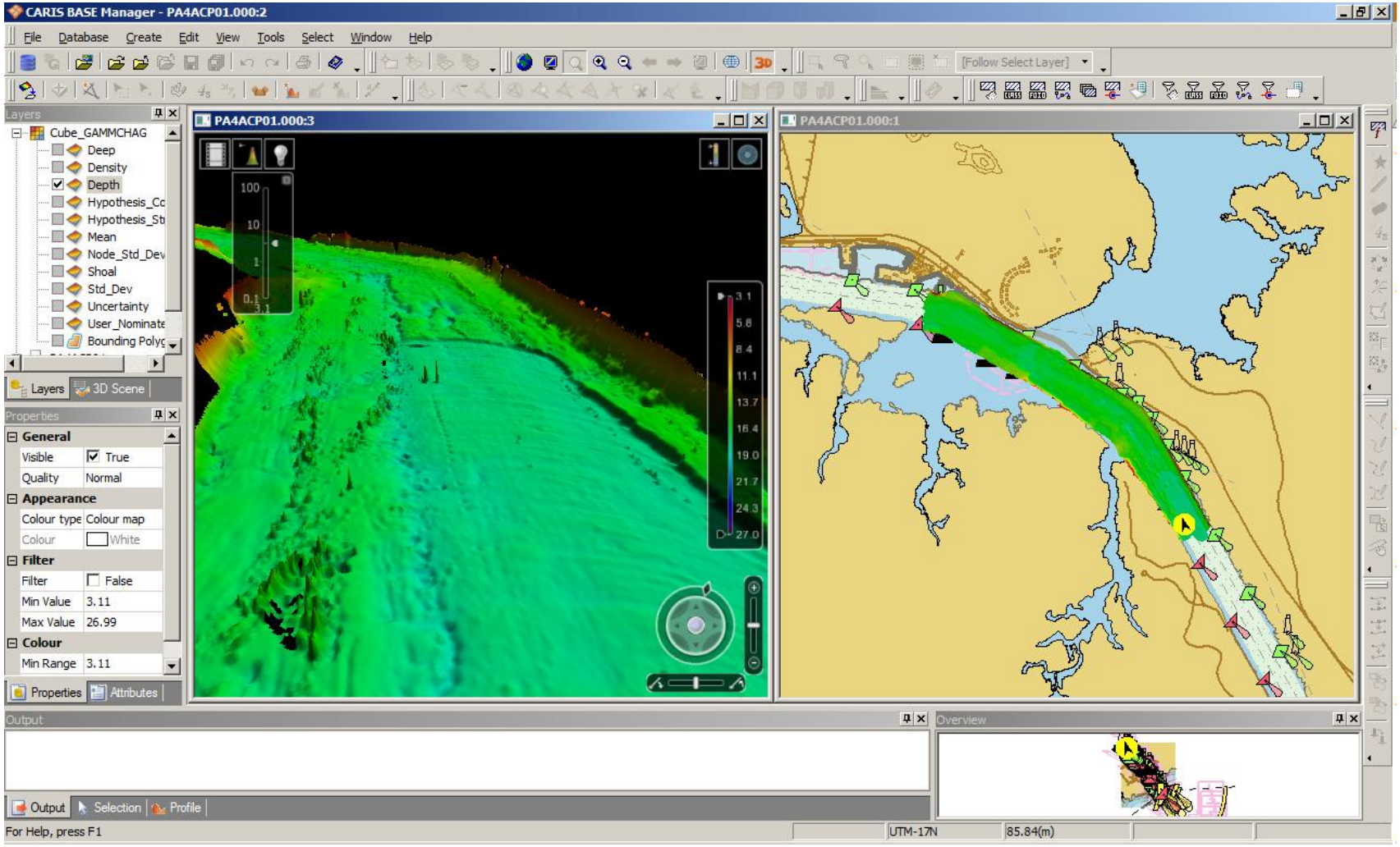
caris
www.caris.com

Panama Canal



caris
www.caris.com

Panama Canal



caris
www.caris.com

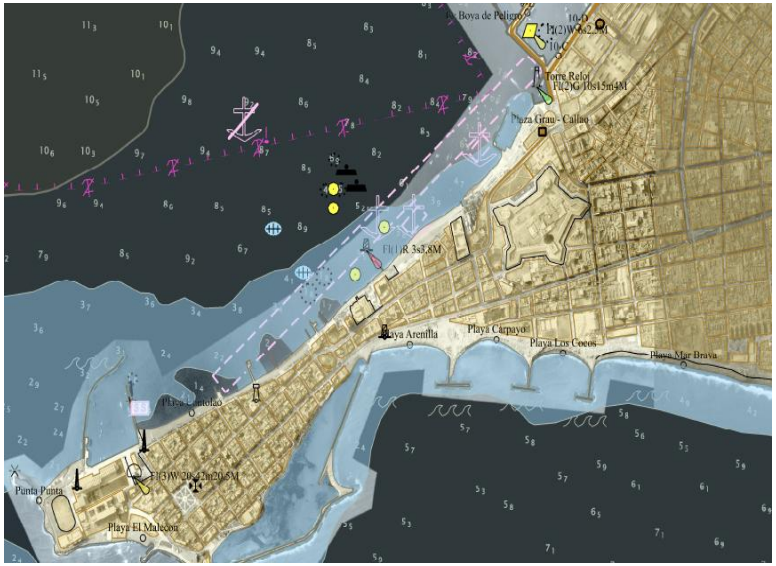
CARIS Ping-to-Chart Workflow

PROCESSING	ANALYSIS	PRODUCTION	DISCOVERY
CARIS HIPS and SIPS	CARIS Bathy DataBASE	CARIS S-57 Composer	CARIS Spatial Fusion Enterprise
CARIS Notebook	CARIS BASE Editor	CARIS HPD	
	CARIS Engineering Analysis Module	CARIS LOTS	

WORKFLOW MANAGEMENT

Production

- **Next-Generation Chart Production**
  - Create, manage and update multiple electronic chart products
    - S-57 ENC, IENC, MIO and others
  - Solutions positioned to adopt S-100 product specifications as they are finalized by IHO
  - Integrate data from wide range of GIS sources
  - Workflow driven production with sophisticated digitizing and object creation tools
  - Comprehensive Quality Control
    - IHO S-58 specifications
    - Supports user definable checks
    - Advanced error identification and repair tools



Key Features

- Uses the latest CARIS technologies for Importing, Mapping, Editing, Quality Assurance and Export
  - Shared with EasyView, BDB, HPD

- Easily create multiple electronic dataset formats
  - ENC (3.1, 3.1.1 and 3.1.2)
  - AML (1.0, 2.1 and 3.0)
  - IENC (International 2.0, 2.1 and USACE 4.0)
  - Marine Information Overlays (MIO)
  - Bathymetric MIO (bMIO)
  - Users can easily modify, create and add new dataset formats
  - DNCs with S-57 Composer DNC Module

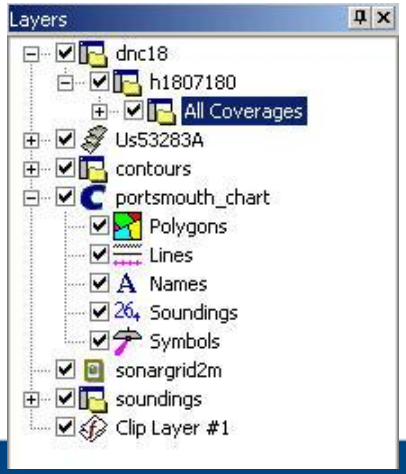
More Features

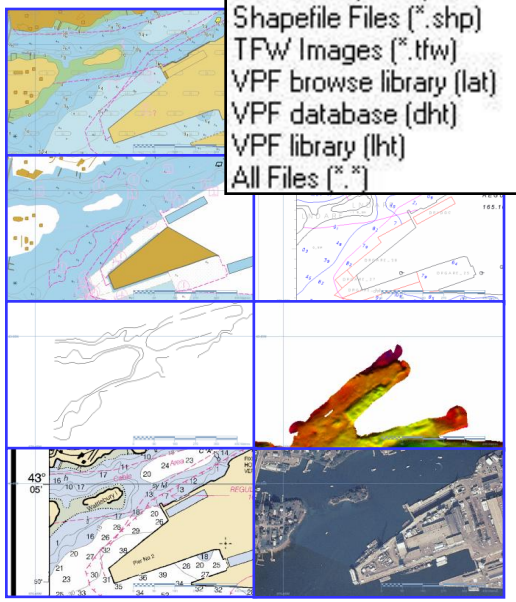
- Topological relationships automatically maintained
- Full suite of spatial and object editing tools
- Rapid product creation & update with project workflows
  - Easy updating of existing data
  - Simple creation of S-57 Exchange Sets
- Ready for the IHO S-100 standard, the future of S-57

Support For Many Data Formats

- Open a wide range of file types
  - Vector
    - S-57, VPF, CARIS, HOB, DXF, DGN, SHP ...
  - Raster
    - BSB, HCRF, CRL, ECW, GeoTIFF, TFW, JPEG2000, MrSID ...
- Grab background geometry or digitise from raster
- Re-project data on-the-fly
- Apply transparency levels

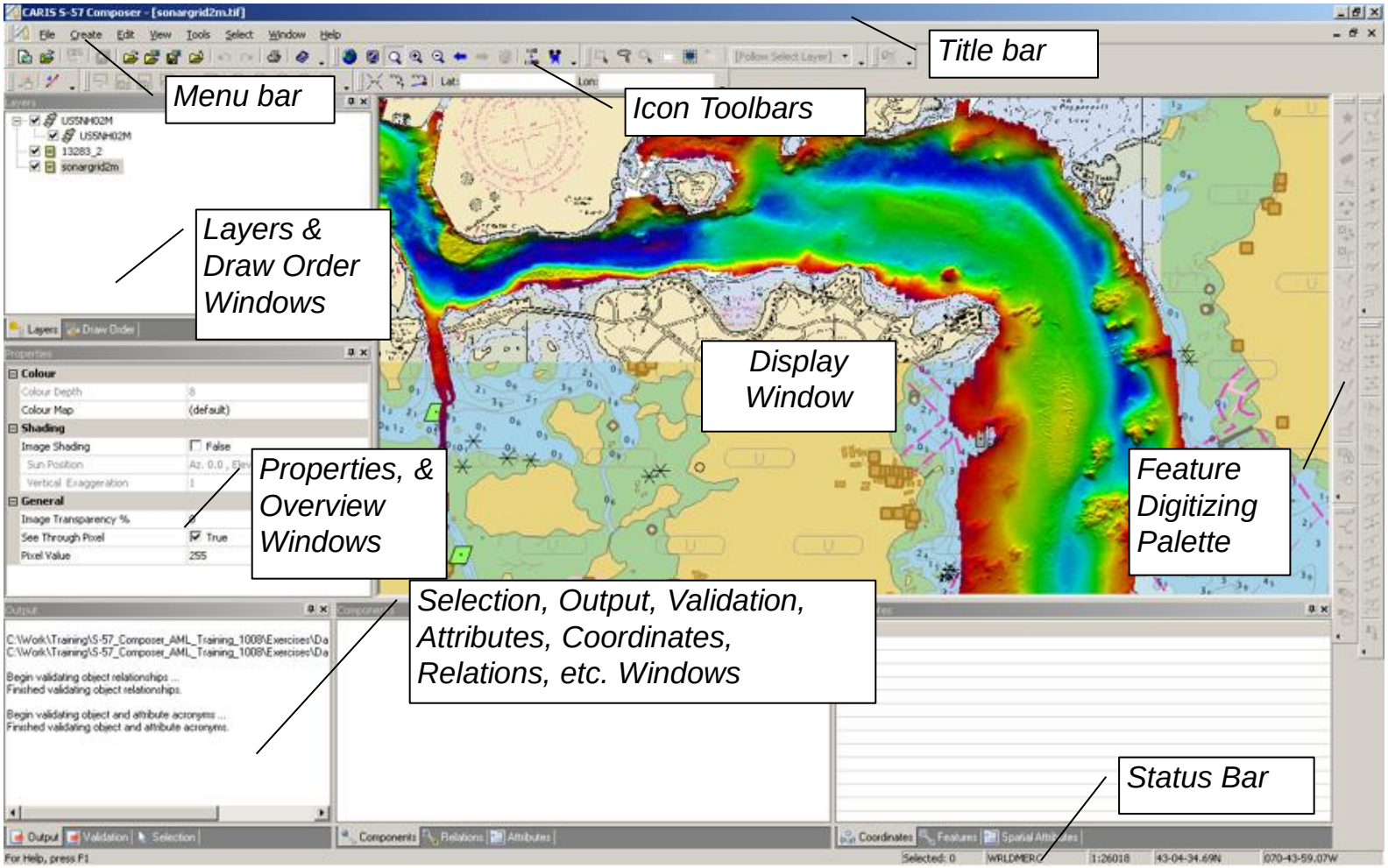
AutoCAD File (*.dwg; *.dxf)
BSB Images (*.kap; *.cap)
CARIS Files (*.des)
CARIS SAF Files (*.saf)
CRL Images (*.crl)
CRLW Images (*.crlw)
DGN Files (*.dgn)
ECW Image (*.ecw)
GeoTIFF Images (*.tif)
HCRF Images (*.chr)
HOB Files (*.hob)
IFF Files (*.iff)
IGA Images (*.iga)
Jpeg 2000 Image (*.jp2)
S-57 Files (*.000)
Shapefile Files (*.shp)
TFW Images (*.tfw)
VPF browse library (lat)
VPF database (dht)
VPF library (lht)
All Files (*.*)





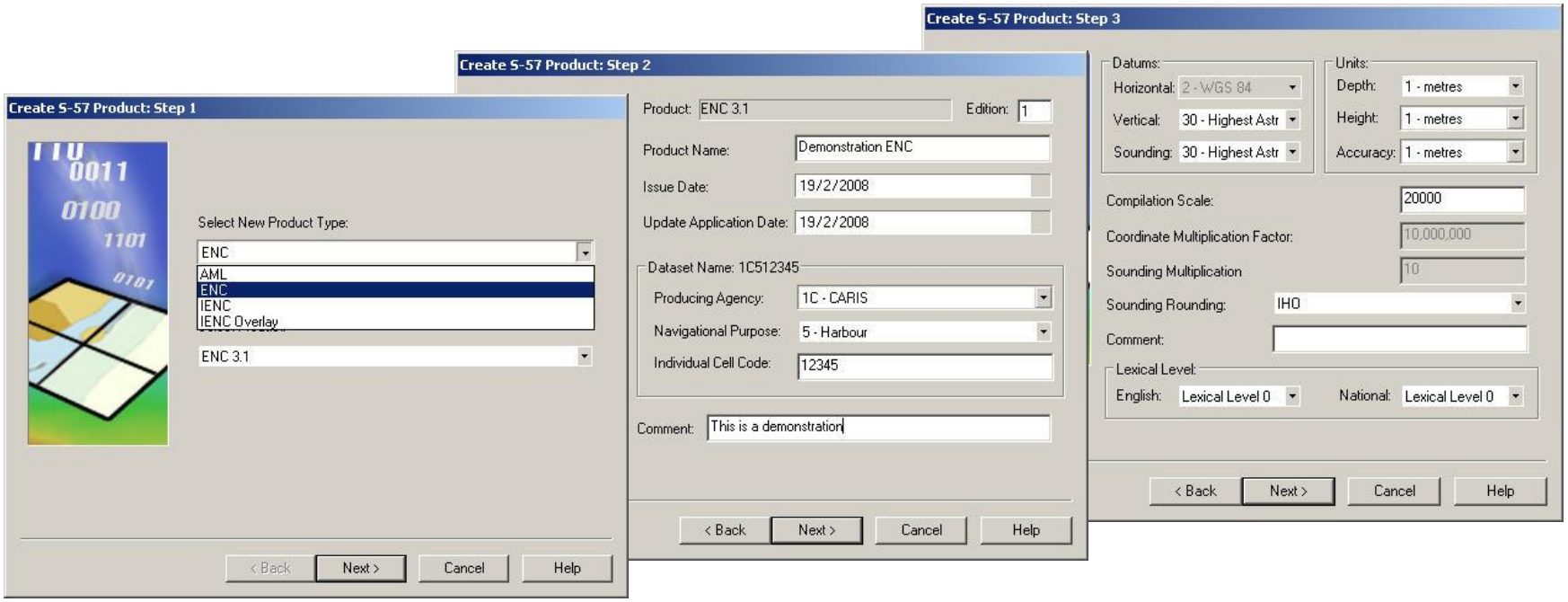
caris
www.caris.com

CARIS S-57 Composer User Interface



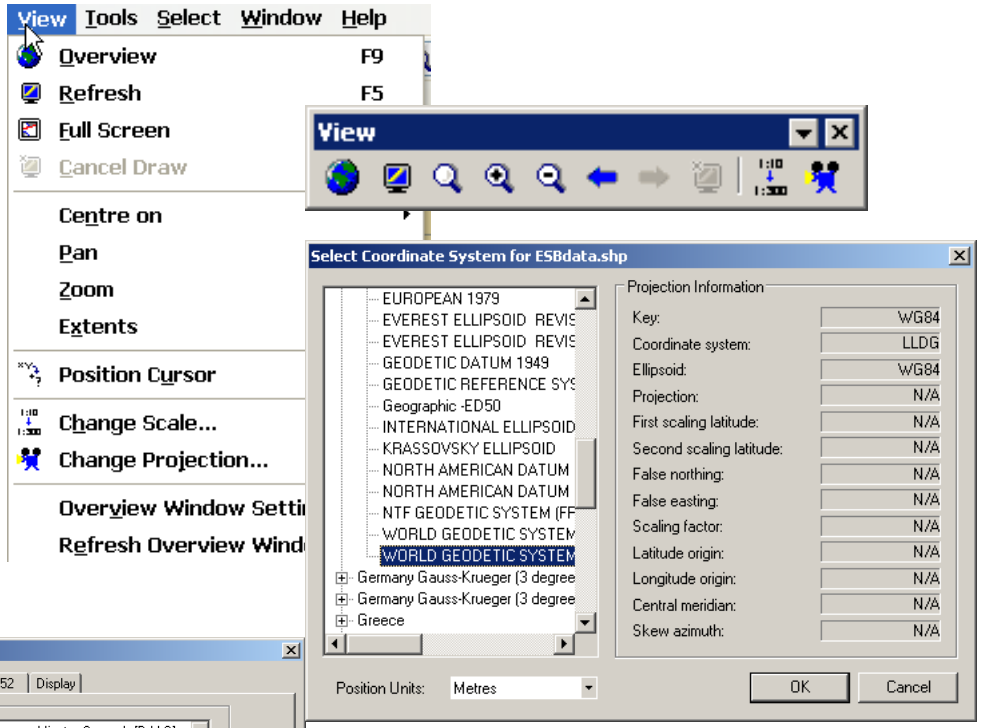
Product Based

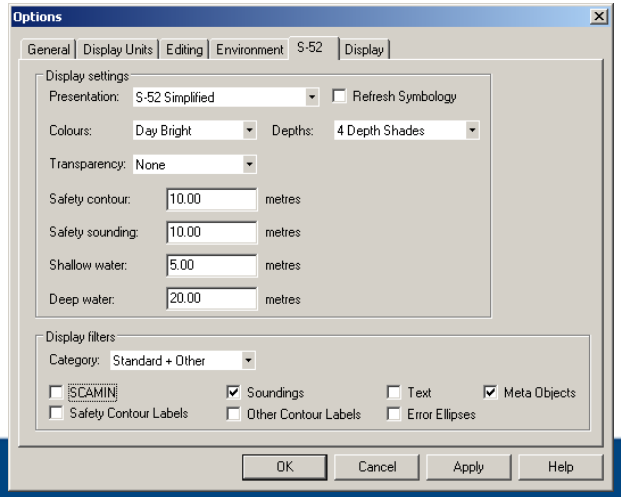
- Easily create new Product datasets using a wizard
- Default file storage simplifies dataset management
- Export directly to S-57 Exchange Set or update existing

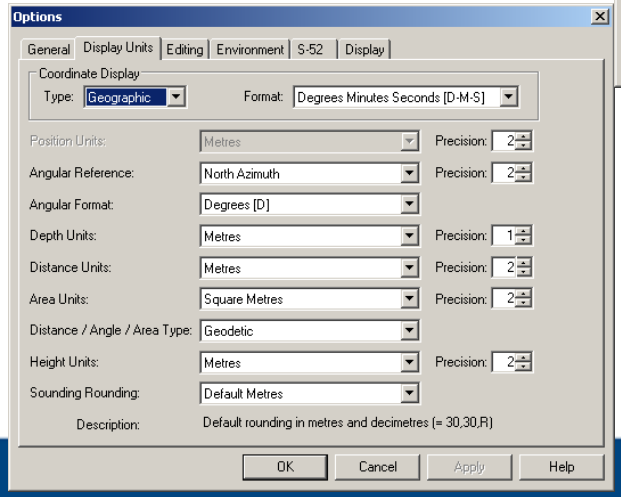


Viewing and Display Tools

- Viewing tools & icons
  - Zoom, pan, change scale
  - Overview, centre on…
  - Re-project data on-the-fly
- Control the display
  - S-52 settings, Display units



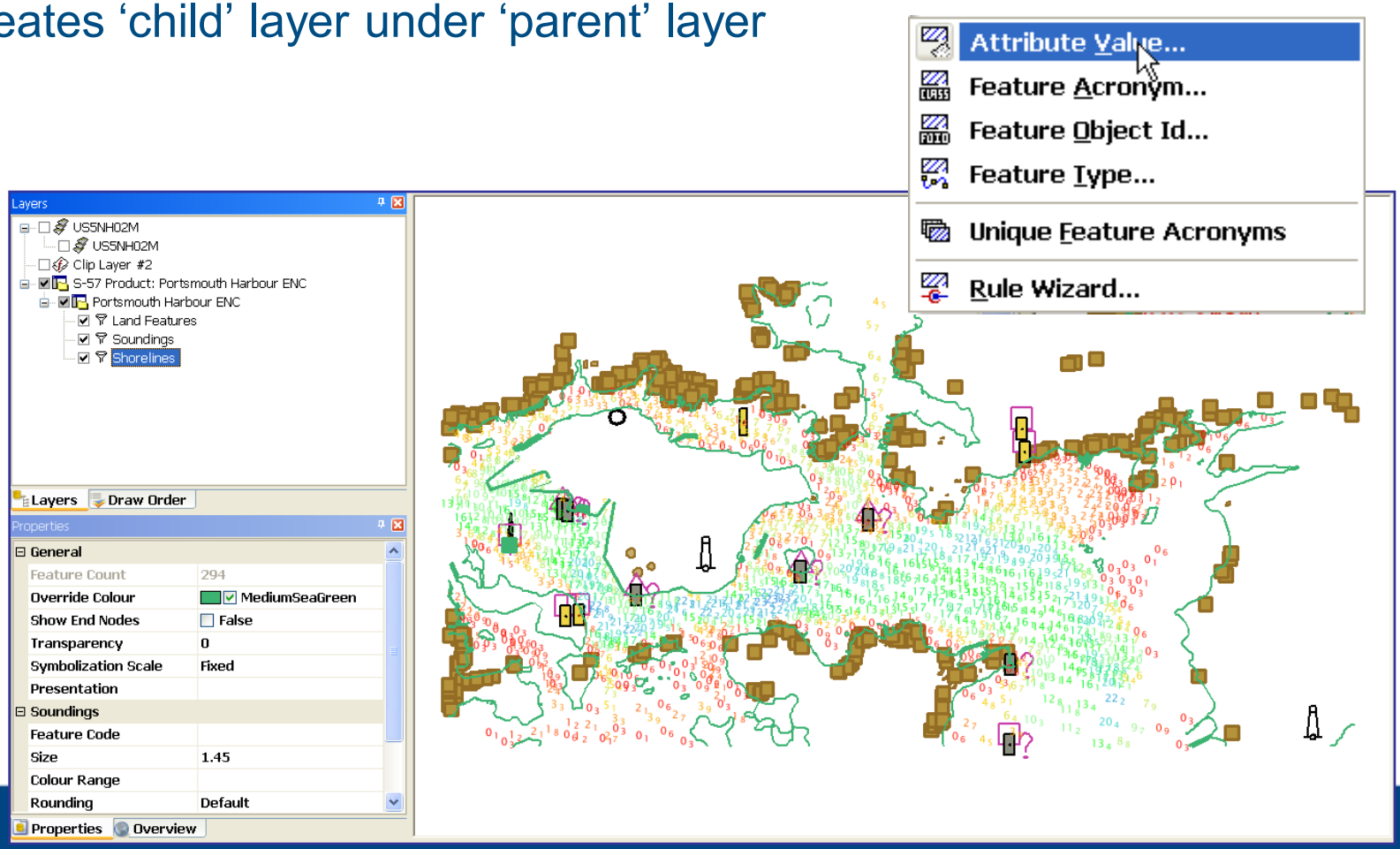




caris
www.caris.com

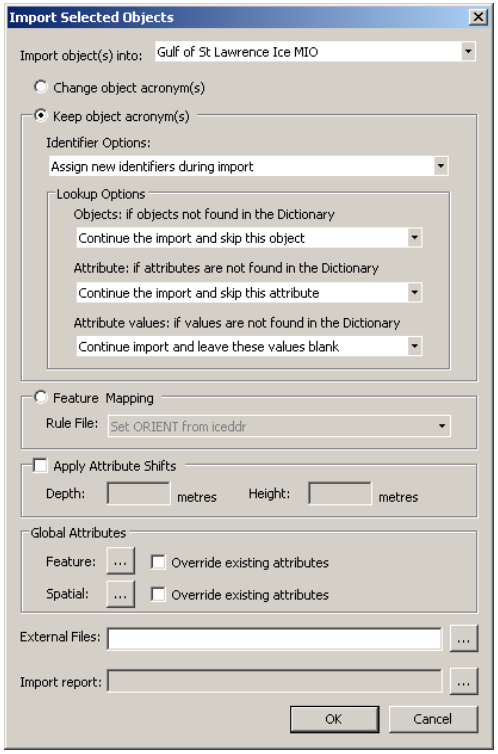
Filter the Display Window

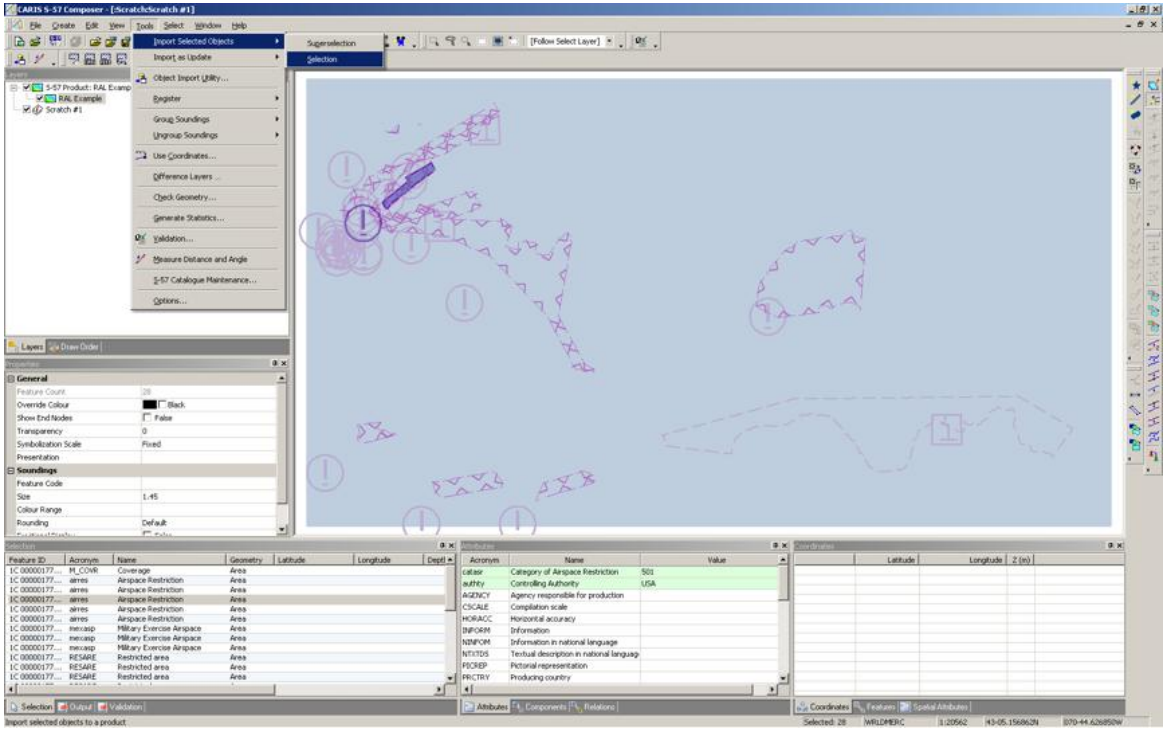
- Create filtered layers showing features of interest
  - by Feature Acronym, Type, Attribute Value, ‘Rule Wizard’
  - creates ‘child’ layer under ‘parent’ layer



Import New Data: From External Files

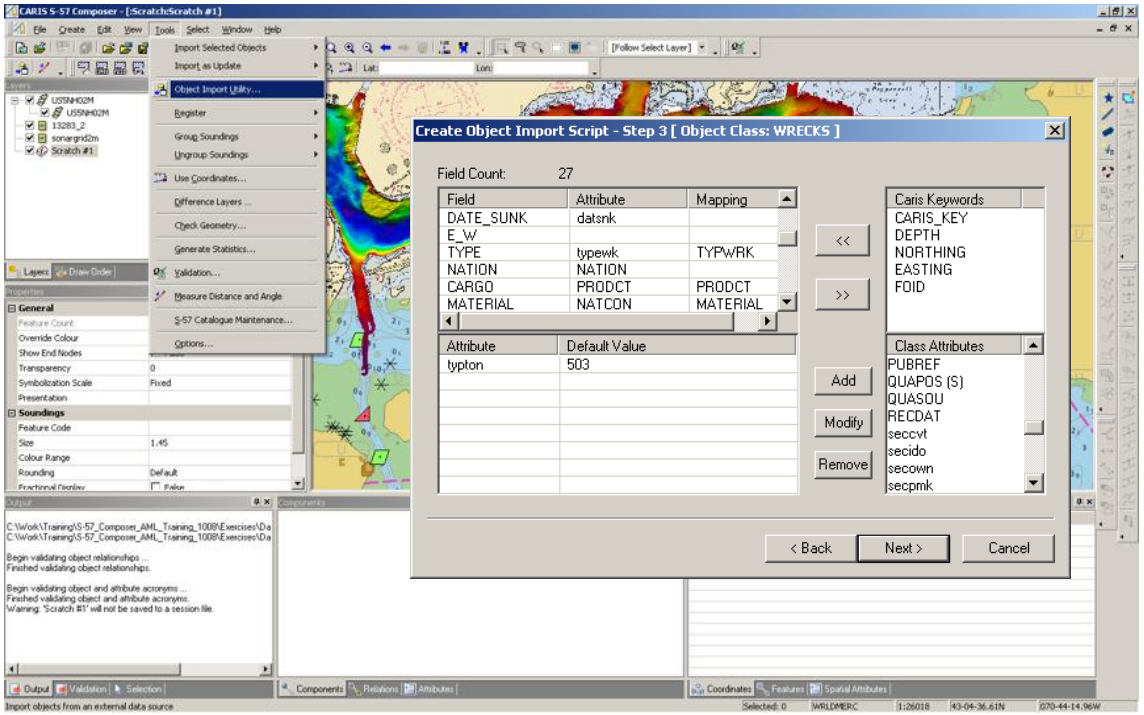
- Import selected features from backdrop files
  - files in S-57 or vector formats: CARIS, SHP, DGN, DXF…
  - select features, identify layer to import to, optionally select a feature mapping rule, apply filters, etc., then import

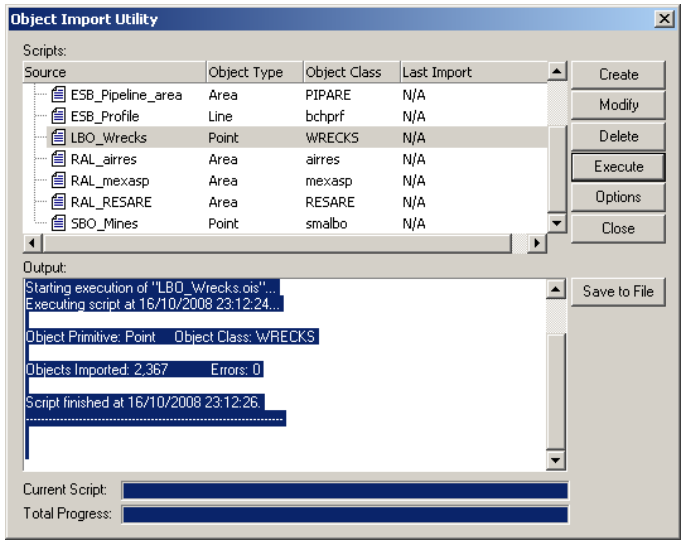




Import New Data: From Text Files/Databases

- Import data from Text files/ODBC/SHP files
  - for lists of lights, navaids, wrecks, etc…
  - map entries to matching product object/attributes





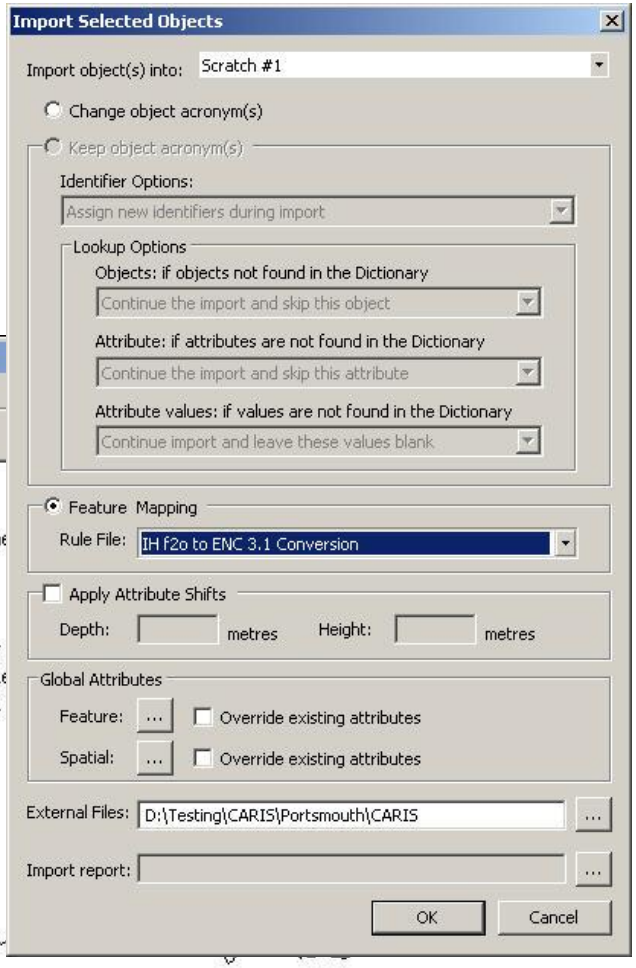
Import and Map to DNC

- User customisable mapping files
  - ENC > DNC and reverse
  - AML 1.0 > 2.1
  - GML to S-57

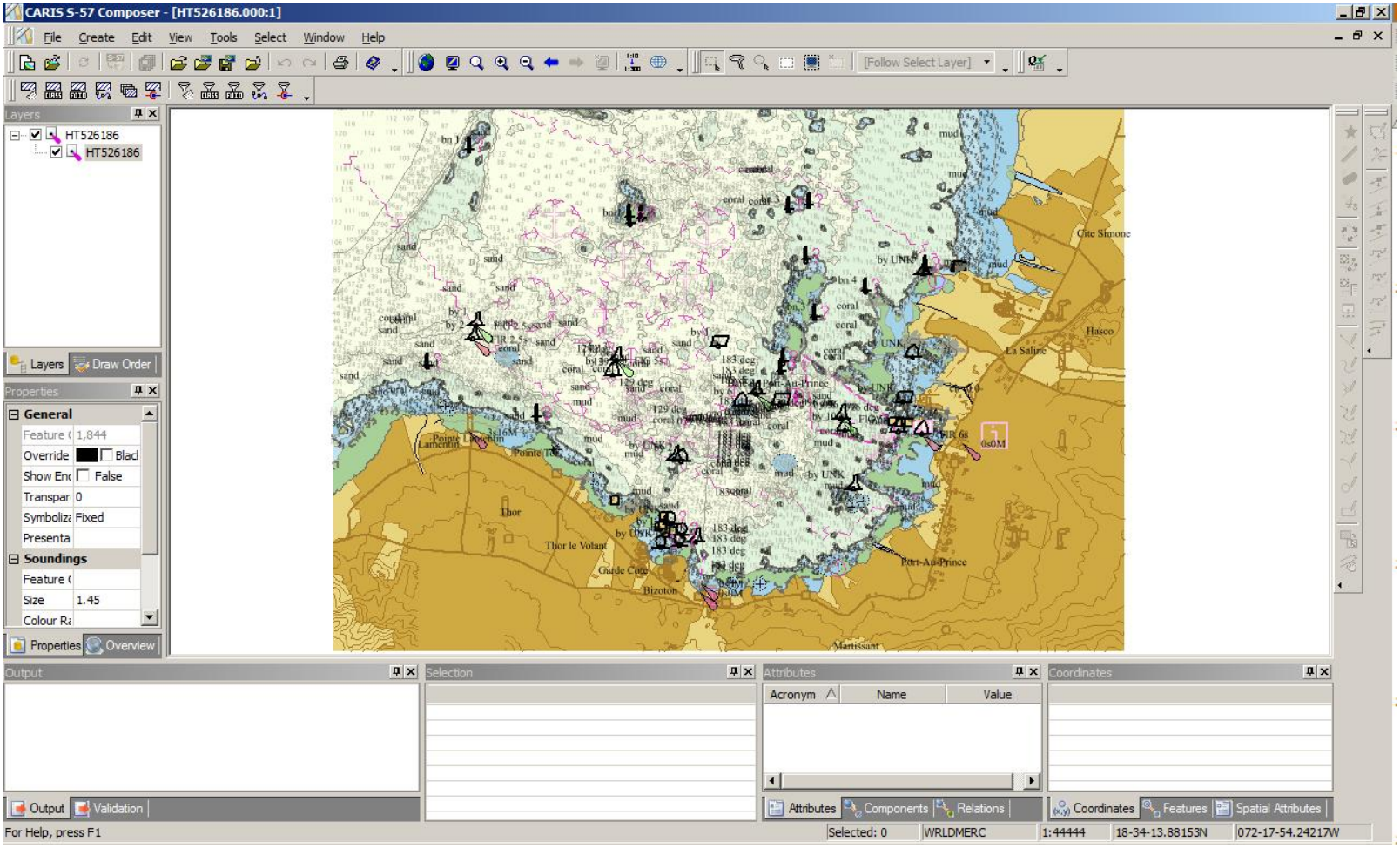
dnc2enc.xml - WordPad

File Edit View Insert Format Help

```
<?xml version="1.0" encoding="UTF-8" ?>
<ObjectToObjectConversionTable Version="1.0" FromType="GO" ToType="GO">
    <ConversionTableInfo Version="1.0" FromProduct="DNC" ToProduct="ENC" Name
        CreationDate="20060501" CreatedBy="CARIS">
        <Edits></Edits>
    </ConversionTableInfo>
    <!-- This mapping table maps between DNC and S-57 ENC" Value="3.1 (using
    <!-- The global attribute mappings can be used to map attributes from one
    <!-- regardless of the object it is being mapped to.  The attributes can
    <!-- object/attribute section. -->
    <AttributeMappings></AttributeMappings>
    <!-- The second section holds the object to object mappings. -->
    <ObjectMappings>
        <Object Acronym="AHO50">
            <MapObject>
                <MapObjectAcronym Acronym="FORSTC" />
                <CopyAttributeValue ToAcronym="OBJNAM" FromAcronym="NAM" />
```



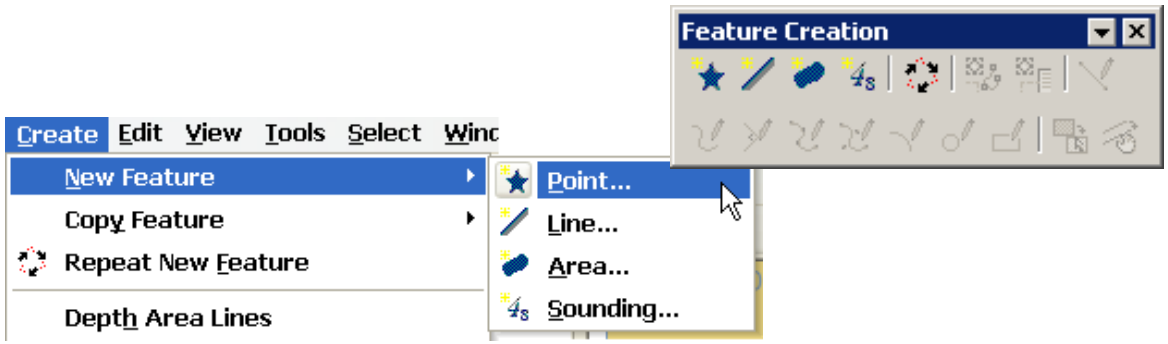
HAITI DNC > ENC

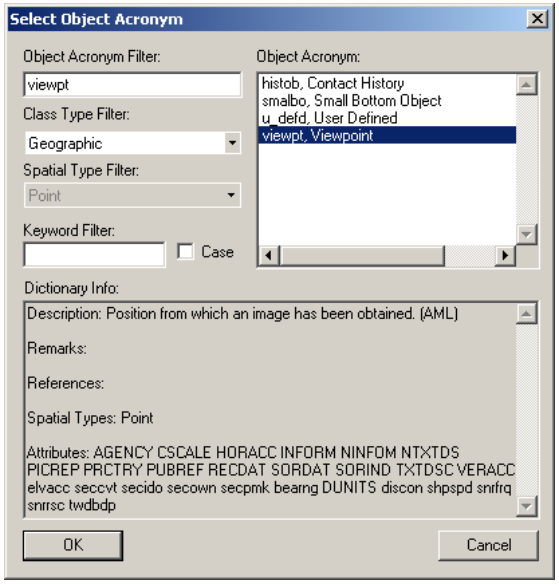


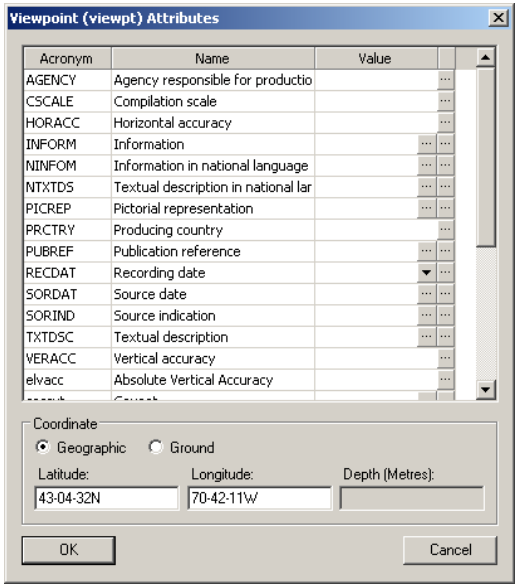
DNC H1610880 Port Au Prince, Haiti Converted to ENC

Digitise New Features: Describe

- Add new features to a S-57 Composer Product
- Select the
  - data type
  - object acronym
  - attribute values

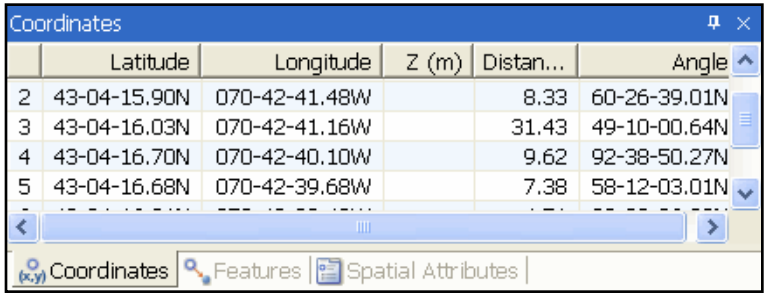


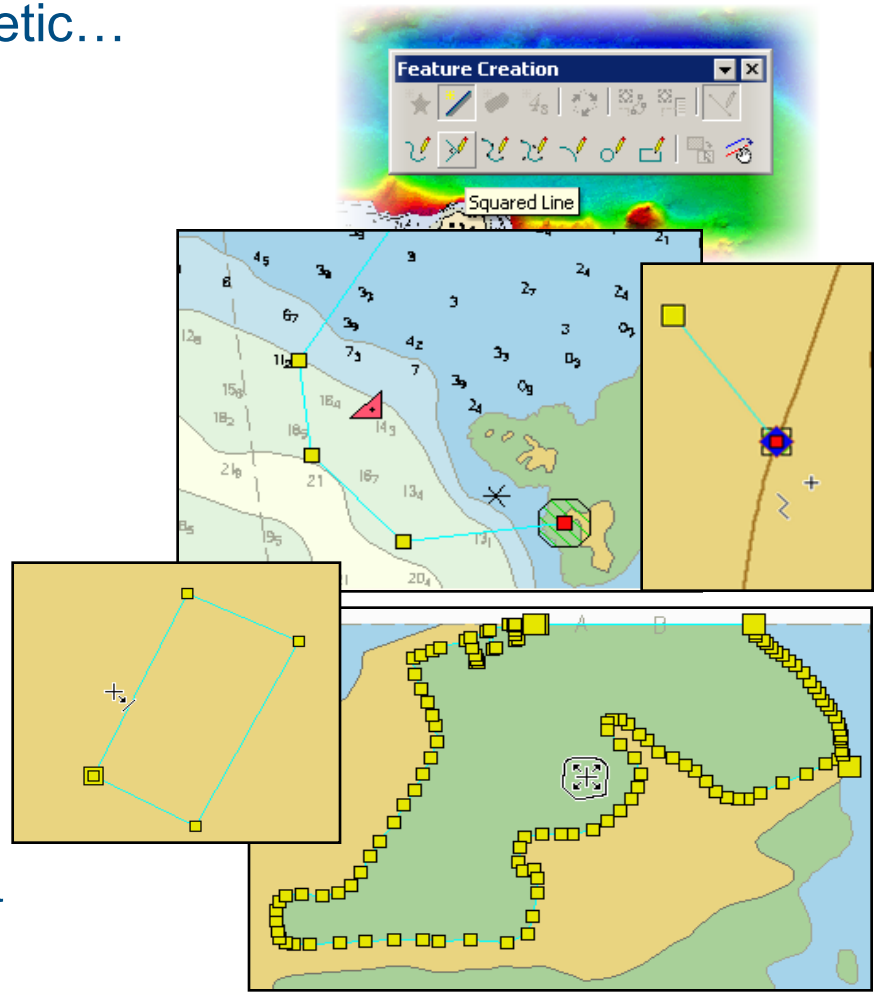




Digitise New Features: Define Location

- Position new features in the product – select
  - line type: straight, curved, geodetic…
  - digitize interactively, or
  - snap/intersect to other data, or
  - enter coordinates

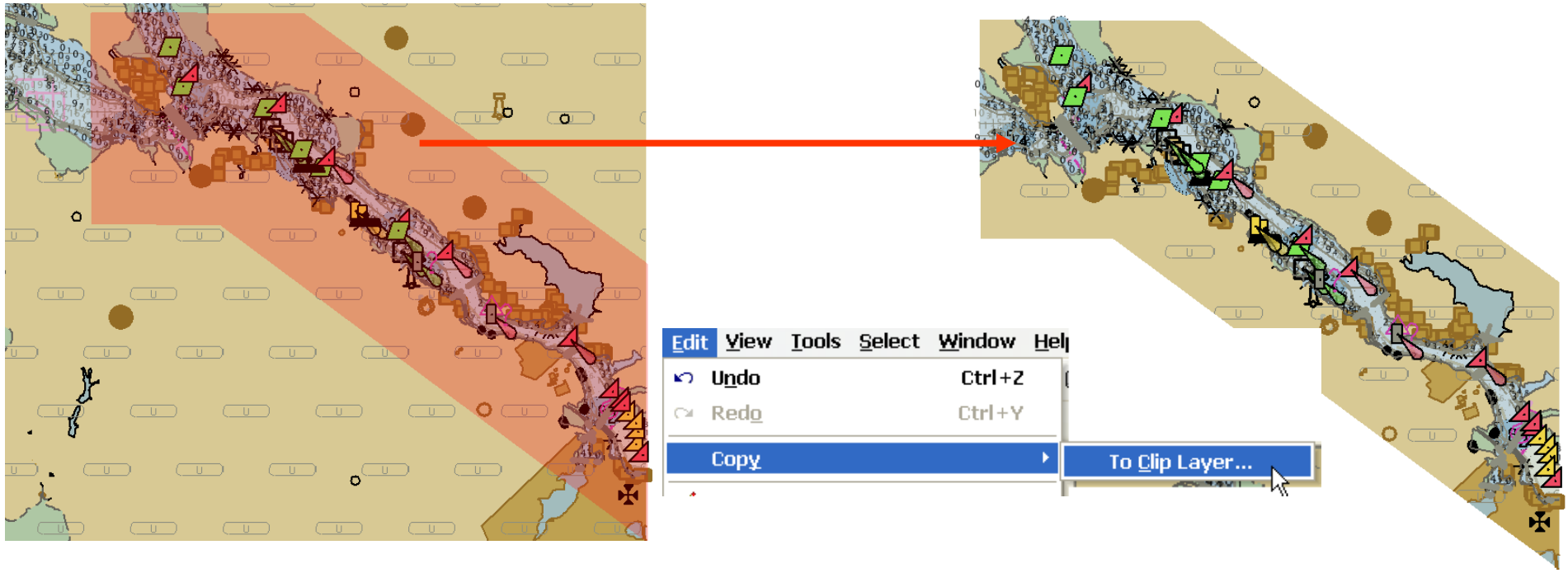




- Other options
  - grab existing line, or
  - grab existing closed shape/area

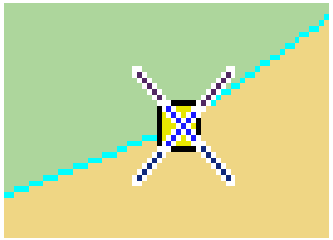
Import New Features: Clip and Copy data

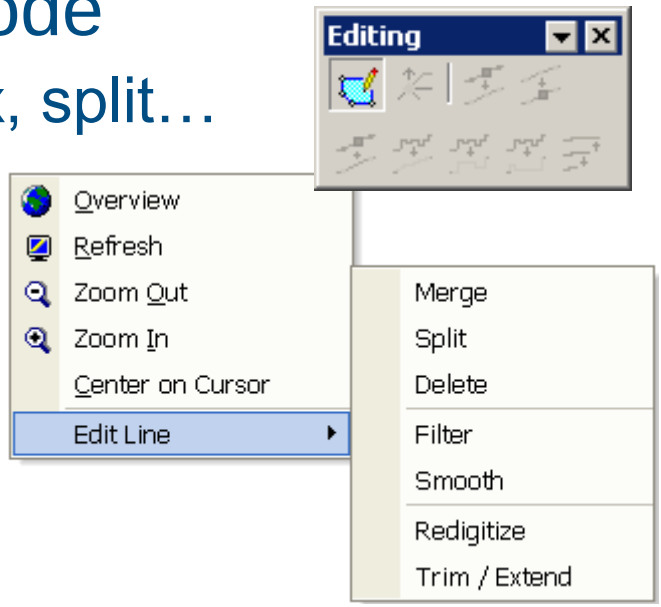
- Import all features in a selected area
  - copy and clip them to a scratch layer for further processing
  - import the required features to the new product



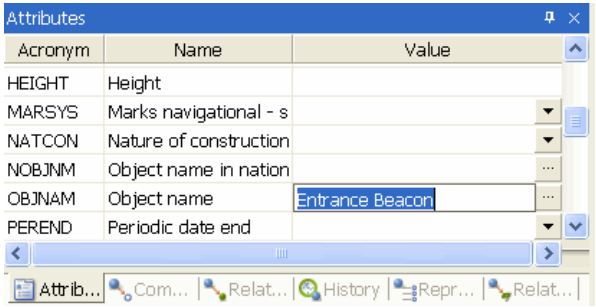
Modify Product Features: Edit Mode

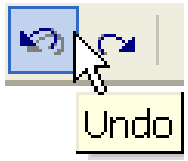
- Select a feature, start Edit Mode
  - spatial: add/move/delete vertex, split…





  - attributes: edit values in panel

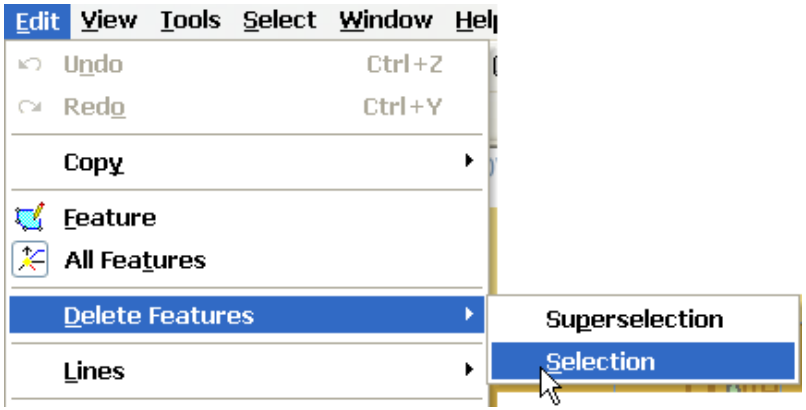


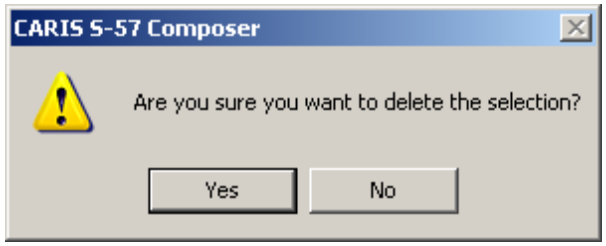


  - Undo/Redo edits before saving

Delete Unwanted Features

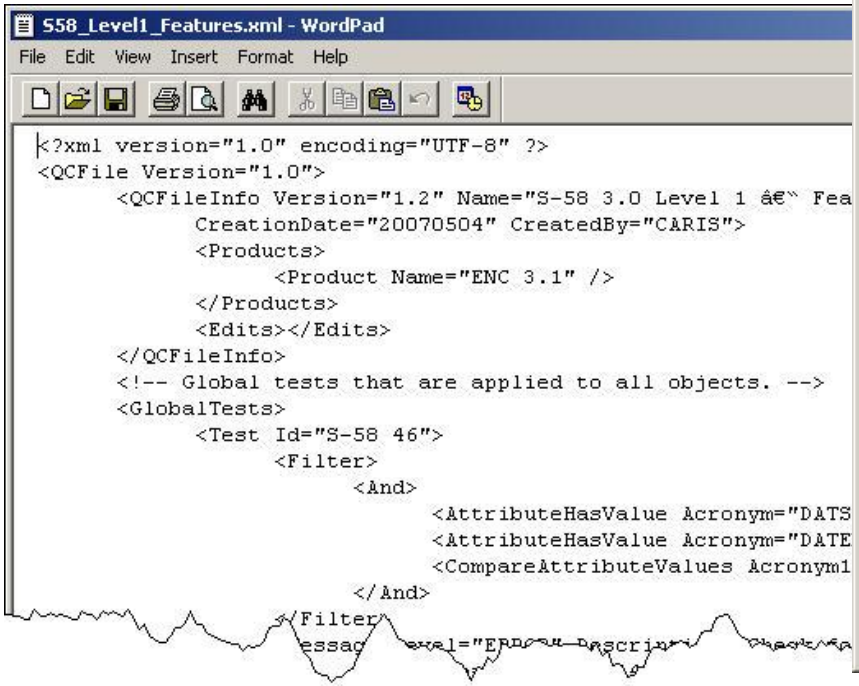
- Remove any features from products
- Select the features to delete
  - Select interactively, By Filter…
  - Confirm the deletion
  - Use Undo to correct mistakes
- Save the changes
  - Features are removed

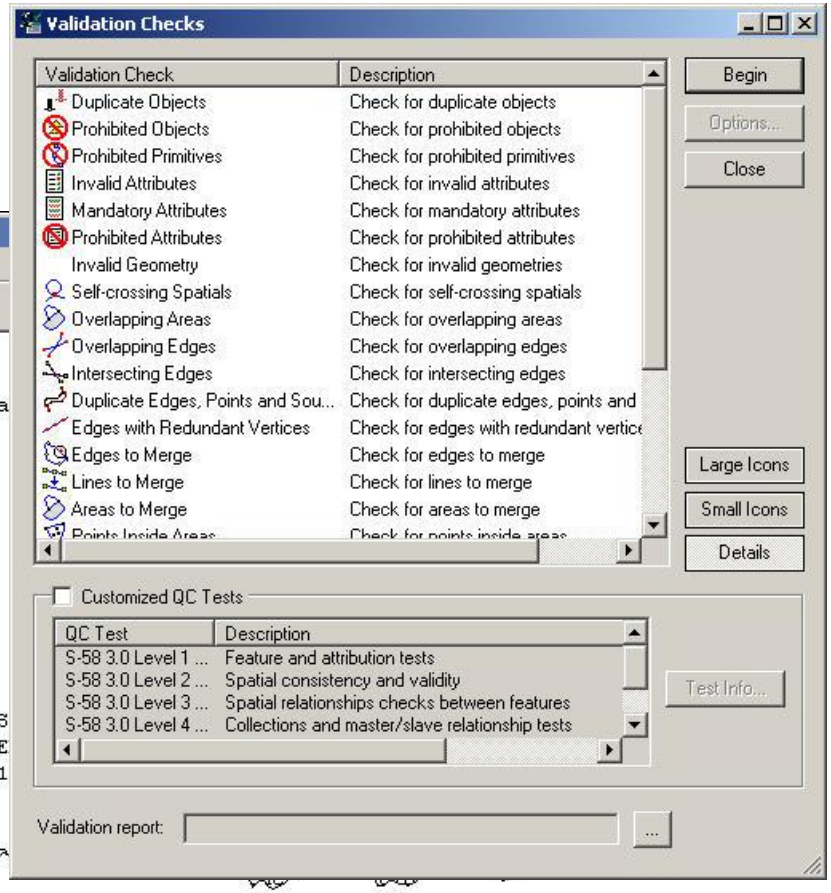




Validation

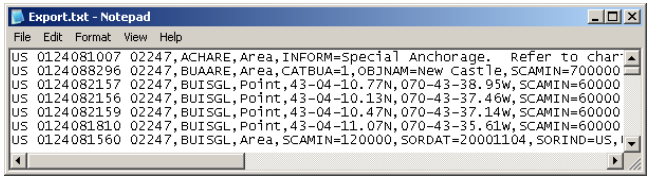
- Validation Tests
  - S-58 and User customisable XML
  - DNC specific tests

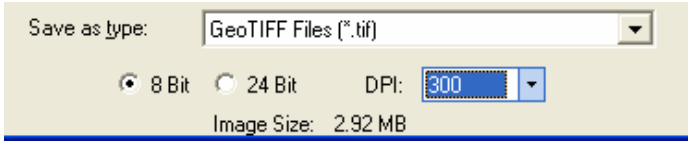


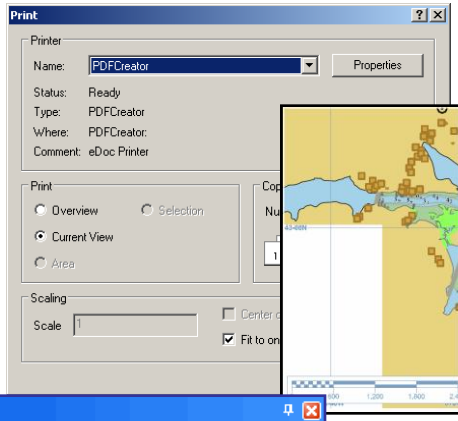


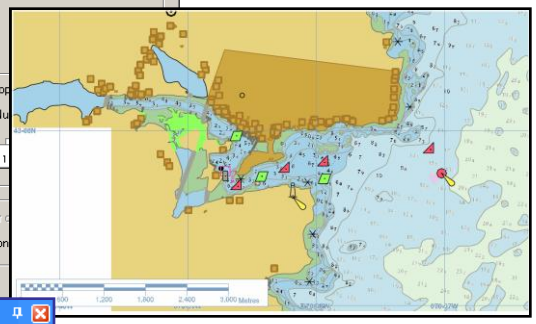
Export Selected Features Options

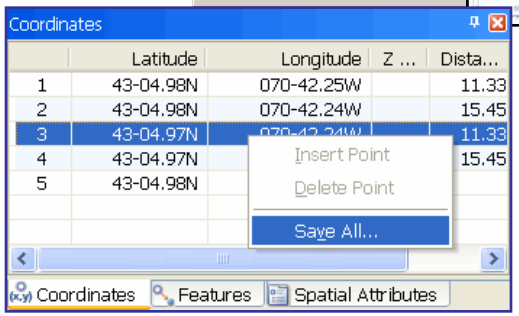
- Export selected features as
  - text: ASCII
  - vector: HOB, SHP, GML, KML
  - raster: GeoTIFF
- Print product contents
  - to any print device
- Save the contents of windows
  - Product properties
  - Output, Selection
  - Attributes & Coordinates
  - Validation & Output





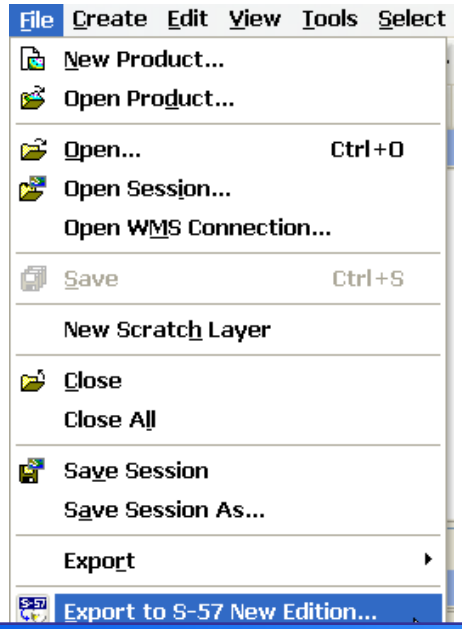


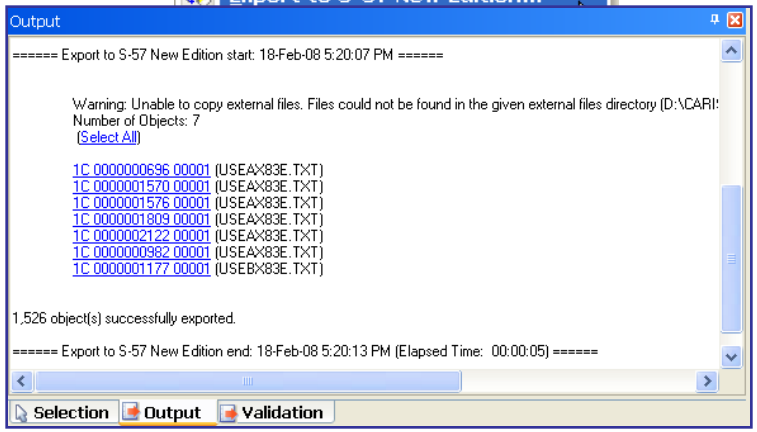




Create S-57 Exchange Set

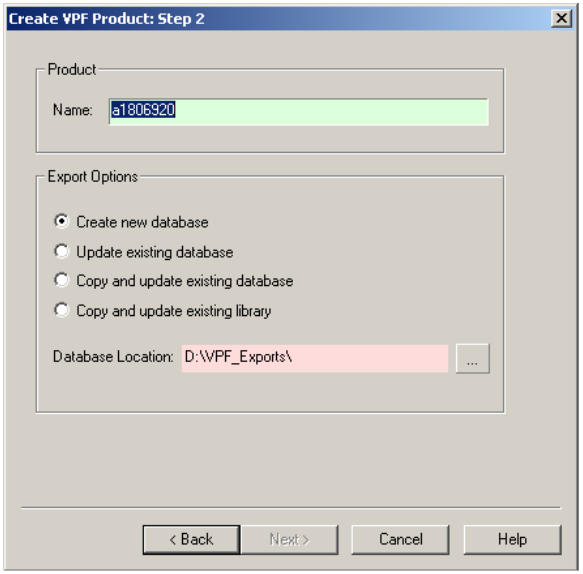
- Export finished product to create an S-57 Exchange Set
  - Information was provided when the product was created – no further details required
  - Review the Output messages
- Optionally open this newly created S-57 file as a new backdrop in S-57 Composer
- The Product (PRD) file records the S-57 file was exported

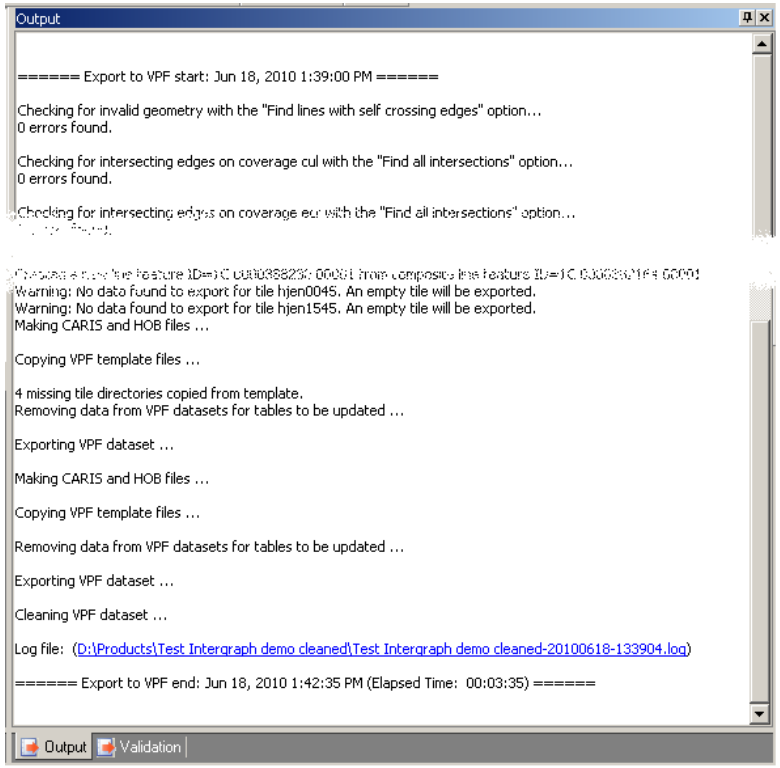


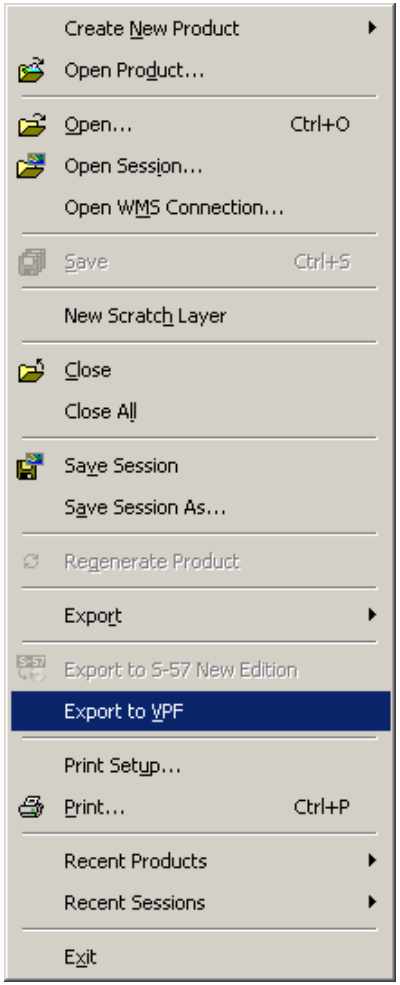


caris
www.caris.com

Create or Update DNC

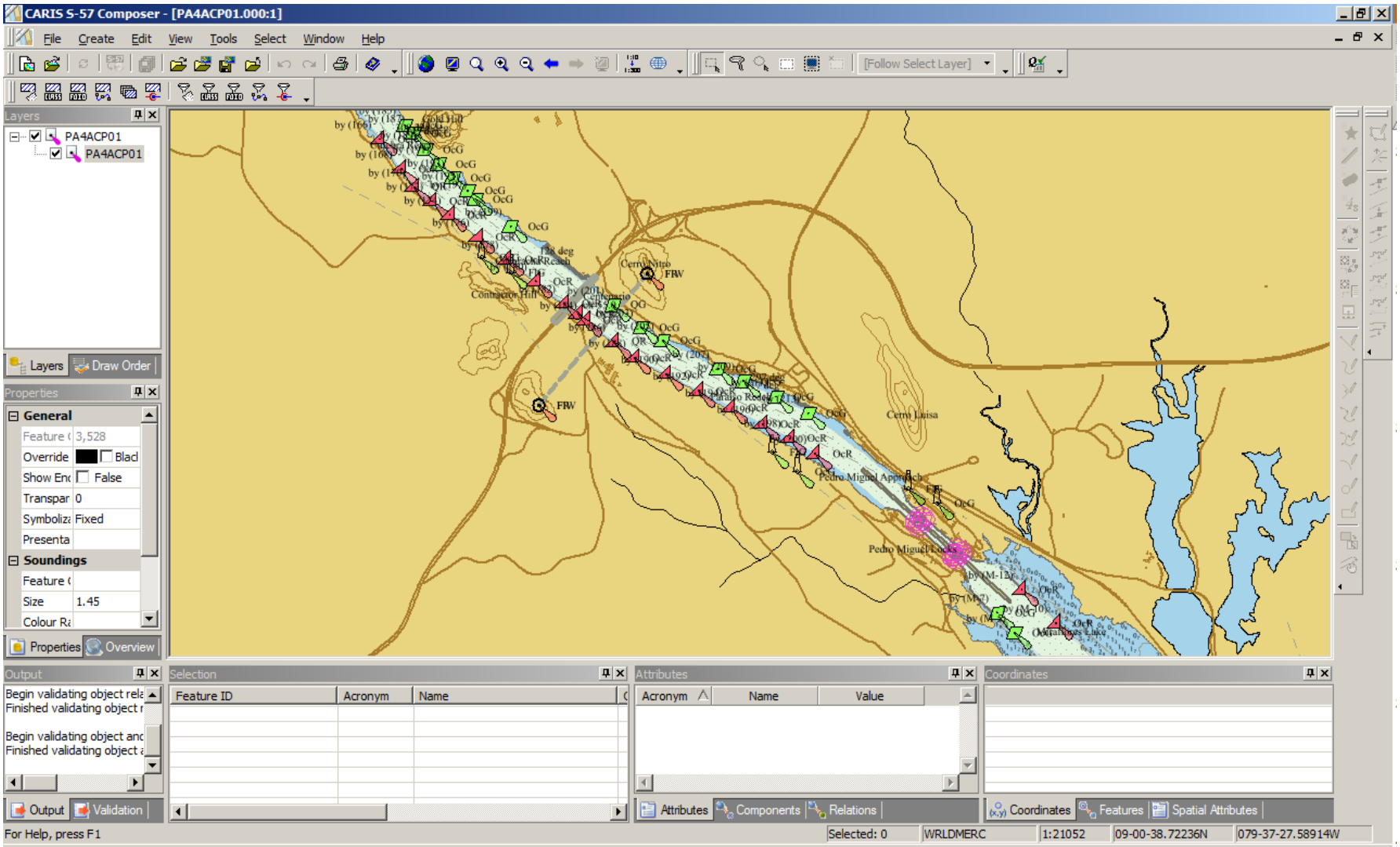






caris
www.caris.com

Panama Canal



caris
www.caris.com

Paper Chart Composer

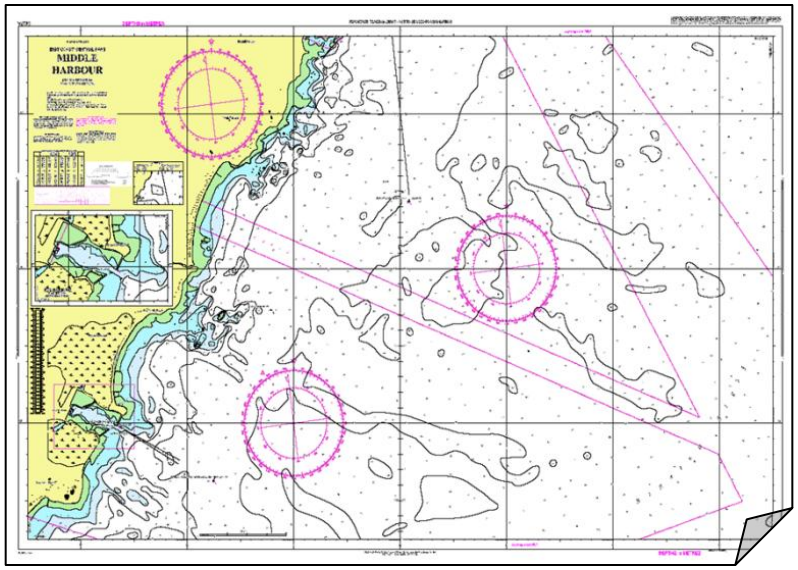
Next Generation Desktop Paper Chart Production

What is CARIS Paper Chart Composer?

- CARIS Paper Chart Composer is a new interactive graphical program for making INT1/INT2 compliant paper charts and other custom chart products.
  - Developed using well established CARIS HPD enterprise solution technology
  - Operates in two modes:
    - Standalone (Desktop): charts are stored in single SQLite file, or
    - Database-connected (Enterprise i.e. HPD): charts are stored in an Oracle database
  - Currently in development and will be:
    - Technology upgrade to CARIS GIS for desktop paper charting
    - Replacement to existing CARIS HPD Paper Chart Editor application

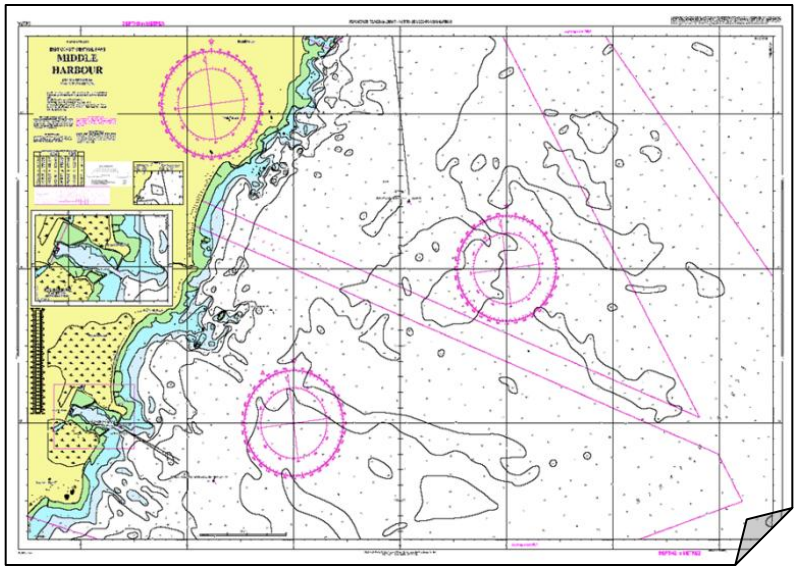
Paper Chart Composer Workflow

1. Open Vector Source Data
2. Define Chart Layout and Content
   - Charts, Sheets and Panels – metadata and content
3. Add Borders, Scale Bars and Grids
4. Compile Chart Content
   - Import, Add & Edit chart data
   - Text & Annotation options
   - Presentation & Masking
   - Quality Control
5. Print/Export Chart



Paper Chart Composer Workflow

1. Open Vector Source Data
2. Define Chart Layout and Content
   - Charts, Sheets and Panels – metadata and content
3. Add Borders, Scale Bars and Grids
4. Compile Chart Content
   - Import, Add & Edit chart data
   - Text & Annotation options
   - Presentation & Masking
   - Quality Control
5. Print/Export Chart



INETER - Nicaragua

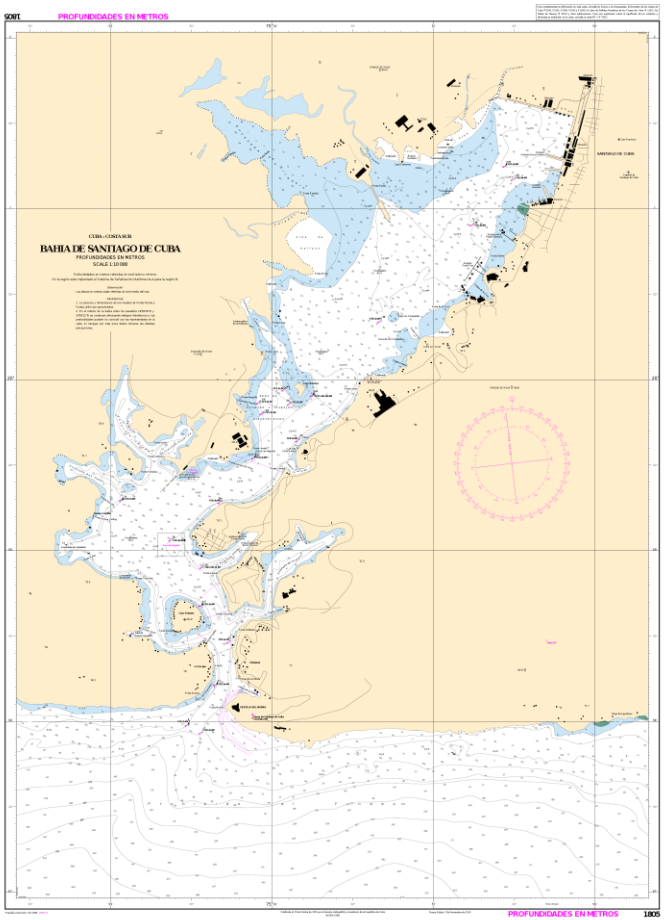
- Project to produce the first nautical charts of Nicaragua

- Port of Corinto
  - Largest port on the Pacific coast of Nicaragua
  - Paper chart with new bathymetric information

- Plans to produce more Paper Charts and ENCs

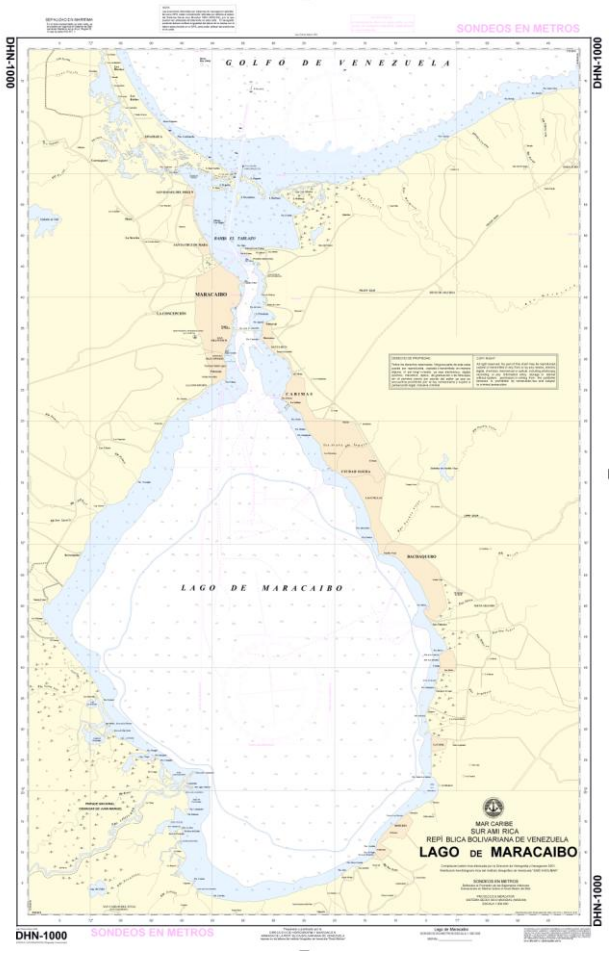
CUBA

- Implementation of Ping to Chart Solution in 2010
  - CARIS HIPS&SIPS
  - CARIS Notebook
  - CARIS BASE Editor
  - CARIS GIS Professional
  - CARIS S-57 Composer
- Training
  - 4 weeks in 2010
  - 1 week in 2011



Venezuela

- Combined Ping to Chart Solution
  - Desktop
  - Enterprise Solution
- CARIS Software
  - HPD
  - S-57 Composer
  - HIPS&SIPS

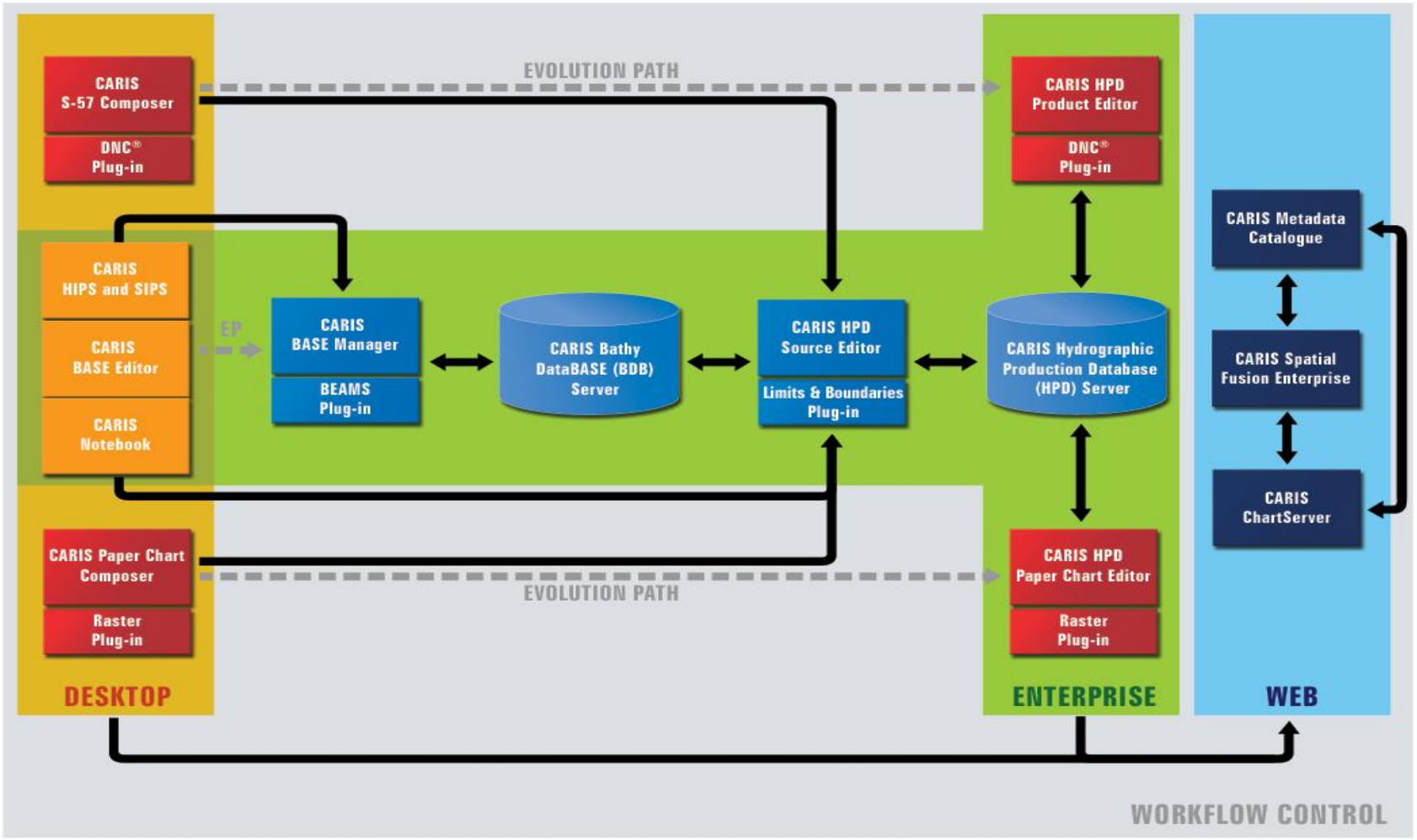


Mexico

- Migration from traditional production to the Hydrographic Production Database
  - BDB and HPD integration to improve workflows.

- New ENC and Paper Charts produced with HPD
  - From new sources and existing ENCs
  - New ENCs have been validated by IC-ENC

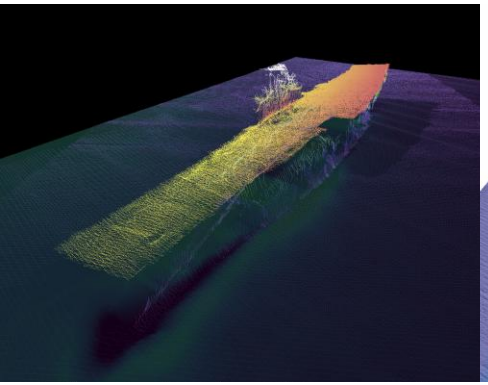
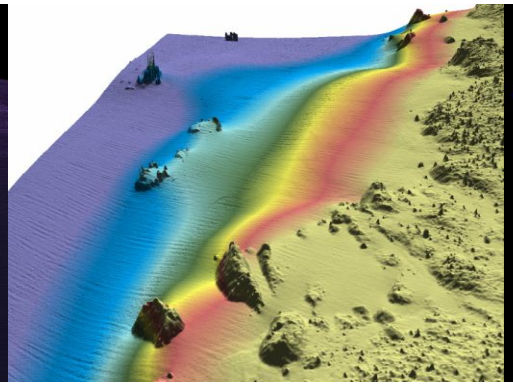
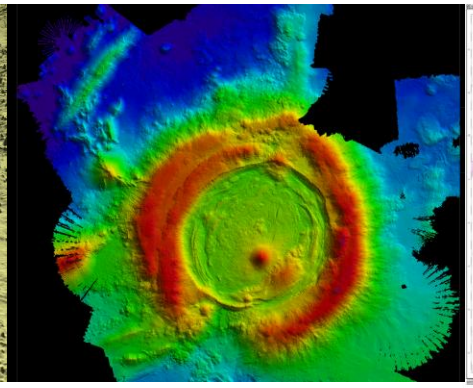
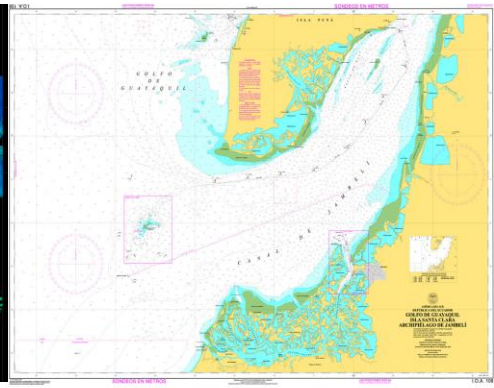
System Evolution in Mexico



caris
www.caris.com

Summary

- CARIS has over 30 years experience as a GIS software provider
  - Specializing in Marine GIS Solutions
- Focused on the use of industry standards, interoperability, and maintaining a close working relationship with the maritime community
- Solutions developed to meet the specific needs of the marine industry and increase efficiency for optimal return on investment

caris
www.caris.com

User Community


Connect with Us
caris
www.caris.com
CARIS | THE MARINE GIS EXPERTS