



**Data Visualization for
Crowdsourced
Bathymetry
Tools Workshop March 2026**



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Crowdsourced Bathymetry

Data Visualization

Presentation Overview

- Data Extraction & Processing
- ArcGIS: Editing tide-corrected CSB data
- ArcGIS: Generating CSB data shapefiles
- QGIS: Editing tide-corrected CSB data
- QGIS: Participant Data visualization

IHO Crowdsourced Bathymetry Working Group

Sort

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Crowdsourced Bathymetry Manual...

Created as an output of the Crowd Sourced Bathymetry Working Group Work Item G Work Item Contributors - Haley Davis, Kristin E...

★ Created 1 month ago

✎ Updated 1 week ago



Data Visualization

Data Extraction & Processing Overview

Raw CSB Data to Visualization-Ready Outputs

- Extract data directly from the NCEI / IHO DCDB
- Use the CSB Processing Tool in Pydro Explorer
 - Correct raw CSB data for tides

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Crowdsourced Bathymetry

Data Visualization

CSB Data Extraction from NCEI/DCDB



Accessing Raw Crowdsourced Bathymetry Data

- IHO DCDB / NOAA NCEI Viewer
- Enable the Crowdsourced Bathymetry Files layer
- Filter data by:
 - Geographic area
 - Date range
 - Trusted Node (Provider)
 - Platform name (vessel)
- Extract CSB Point Store Data (do *not* create grids)
- *Data are delivered via email download link, typically within minutes.*

The screenshot displays the IHO DCDB/NOAA NCEI Viewer interface. The top header includes the IHO logo and the text "International Hydrographic Organization". Below the header, there is a "Layers" panel on the left and a map on the right showing the "Labrador Basin". The "Layers" panel has a dropdown menu set to "IHO DCDB/NOAA NCEI". Under this menu, several options are listed with checkboxes: "Multibeam Surveys", "Multibeam Survey Footprints", "Multibeam Bathymetry Mosaic", "Single-Beam Surveys", "Single-Beam Sounding Density", "NOAA Hydrographic Surveys" (with sub-options "All Surveys with Digital Data" and "Surveys with BAGs"), "BAG Shaded Relief Imagery", "Crowdsourced Bathymetry Files" (checked), and "U.S. Bathymetry Coverage and Gap Analysis". A red box highlights the "Search CSB Files" button. To the right of the "Layers" panel is a "Search Crowdsourced Bathymetry Files" dialog box. This dialog box contains several search criteria: "Date of Data Collection" (Start and End dropdowns), "Date Added to Database" (Start and End dropdowns), "Provider" (dropdown), "Platform Name" (dropdown), and "Platform ID" (dropdown). There is also a checked "Zoom to Results" option. At the bottom of the dialog box are "Reset", "Cancel", and "OK" buttons.

Crowdsourced Bathymetry

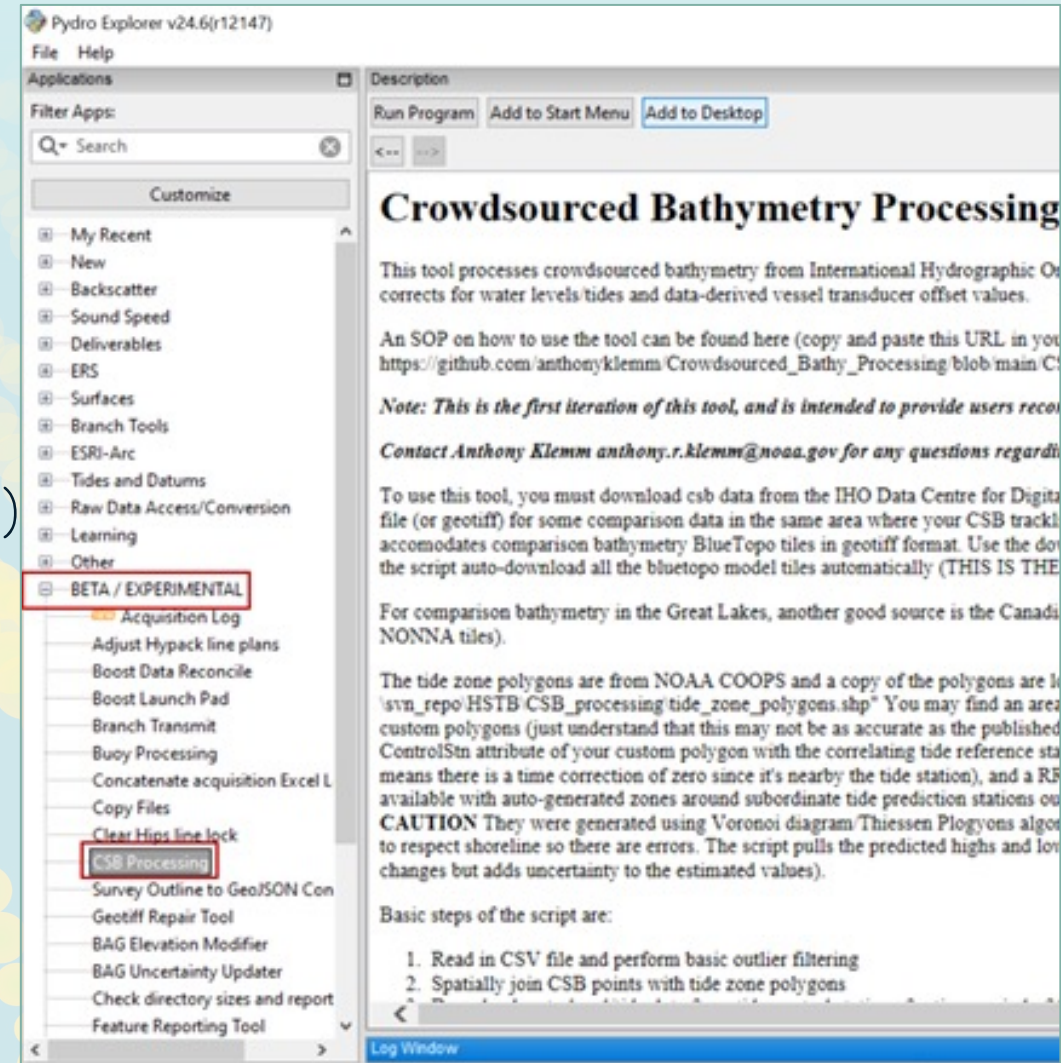
Data Visualization

Tidal Correction Using Pydro
Applies:



Tidal corrections
Data-derived transducer offsets
Output format: GeoPackage (.gpkg)
Supports:
U.S. Discrete Tide Zoning models (Recommended)
Global tide model (AVISO + FES2022b) for international waters

The resulting .gpkg file becomes the input for all visualization.



Data Visualization

Purpose of Data Visualization

- Enable interpretation of tide-corrected CSB data
- Support data sharing with program participants and stakeholders
- Provide outputs in formats suited to different user needs
- Facilitate quality review and participant engagement

Data Visualization

Data Formats & Sharing Considerations

- KML files: Often too large to manage effectively
- Recommended format: Shapefiles (.shp)
 - Widely supported
 - Easy to visualize in QGIS and ArcGIS
 - Suitable for sharing with participants

GIS Software Options

- ArcGIS Pro
 - For Trusted Nodes with ESRI licenses
- QGIS
 - Free, open-source alternative
 - Suitable for both editing and visualization

Crowdsourced Bathymetry

Data Visualization

ArcGIS Pro: Editing Tide-Corrected CSB Data

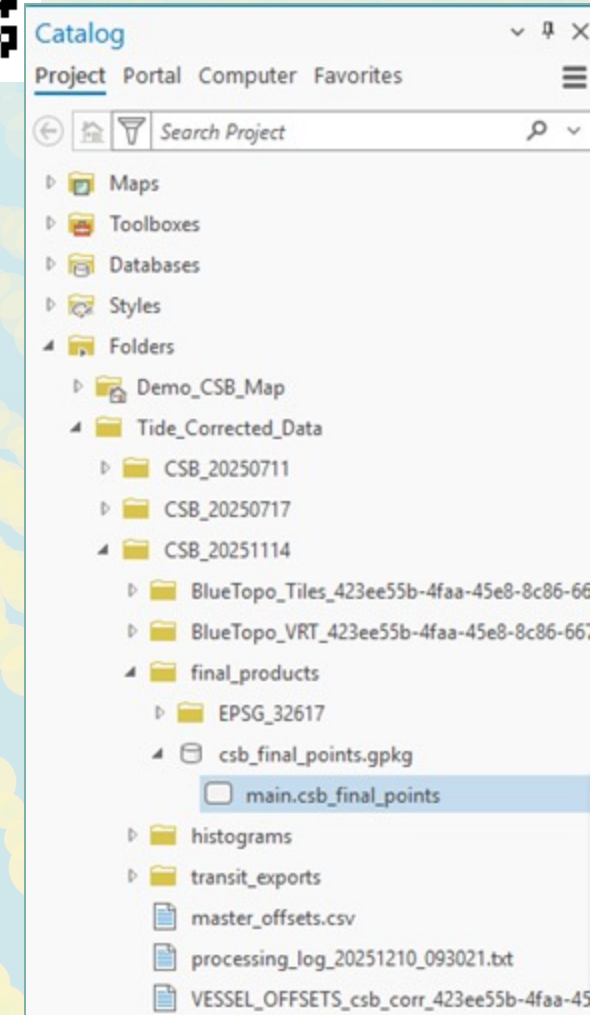
- Create a new ArcGIS Pro map project
- Add the folder containing Pydro tide-corrected outputs
- Load the **GeoPackage (.gpkg)**
- Add **main.csb_final_points** to the map
- Export features to create a working feature class
- Verify attribute table contains:
 - latitude, longitude, depth, time, platform_name



csb_demo X

Field: Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy

OBJECTID *	Shape *	lon	lat	time	platform_name_x	provider	depthfinal
1	Point	-82.68297	27.713537	20240419 17:49:56	COMIT 2	COMIT USF	-1.082071
2	Point	-82.68297	27.713537	20240419 17:49:58	COMIT 2	COMIT USF	-1.092071
3	Point	-82.68297	27.71354	20240419 17:49:59	COMIT 2	COMIT USF	-1.044731
4	Point	-82.68297	27.71354	20240419 17:50:00	COMIT 2	COMIT USF	-1.064731
5	Point	-82.68297	27.71354	20240419 17:50:01	COMIT 2	COMIT USF	-1.224731
6	Point	-82.68297	27.71354	20240419 17:50:02	COMIT 2	COMIT USF	-1.054731
7	Point	-82.68297	27.71354	20240419 17:50:03	COMIT 2	COMIT USF	-1.084731



Data Visualization

ArcGIS Pro: Generating Participant Shapefiles

- Use Select by Attributes to filter by `platform_name`
- Create a new layer from selected features
- Convert feature class to shapefile
- Zip shapefile for:
 - Participant delivery
 - Upload to ArcGIS Online CSB portals



The screenshot displays the ArcGIS Pro software interface. The top ribbon includes tabs for Project, Map, Insert, Analysis, View, Edit, Imagery, Share, and Help. The 'Share' tab is active, and the 'Select By Attributes' tool is highlighted with a red box. Below the ribbon, the 'Contents' pane shows a list of layers, with 'csb_demo' selected. The 'Select By Attributes' dialog box is open, showing the following configuration:

- Input Rows: csb_demo
- Selection Type: New selection
- Expression: Where platform_name is equal to COMIT 4
- Or: platform_name is equal to inellas County)
- Buttons: Load, Save, Remove
- SQL toggle: On
- Invert Where Clause: Unchecked

Data Visualization

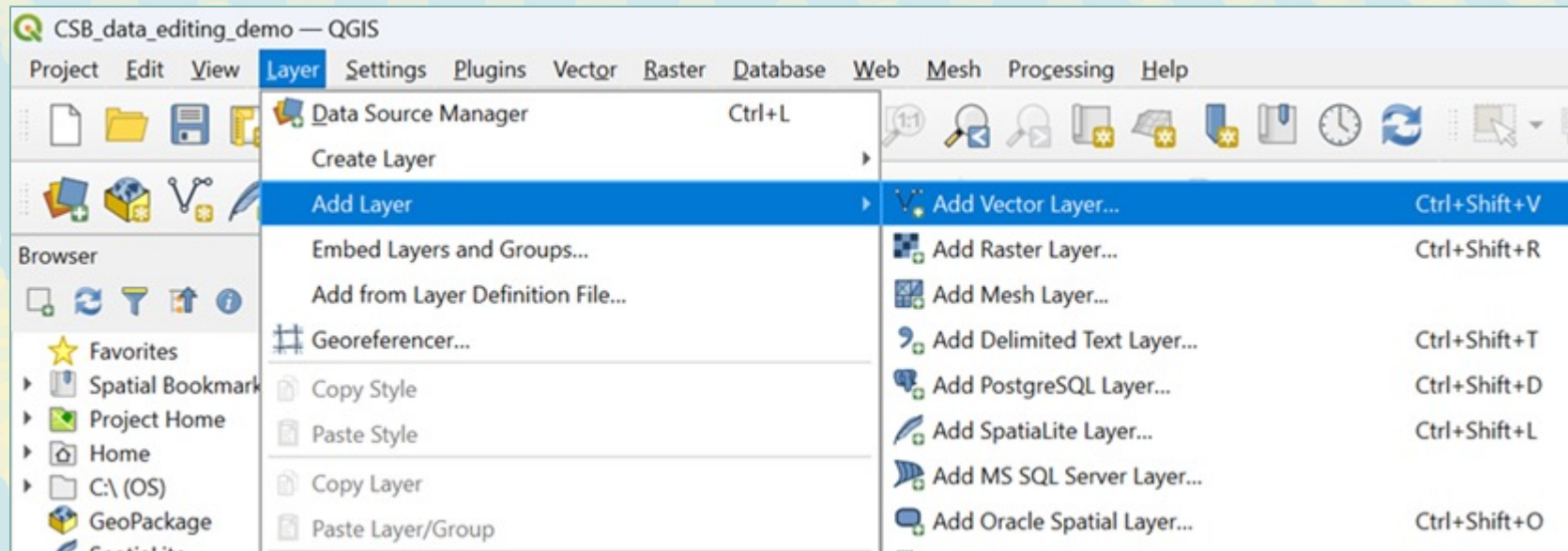
Why Participant-Specific Shapefiles Matter

- Allows tailored data delivery
- Protects data clarity and ownership
- Simplifies participant review and reuse
- Supports upload to public or internal CSB portals

Data Visualization

QGIS: Editing Tide-Corrected CSB Data

- Create and save a new QGIS project
- Add vector layer from tide-corrected .gpkg file
- Open attribute table to verify required fields
- Filter data by participant using **platform_name**



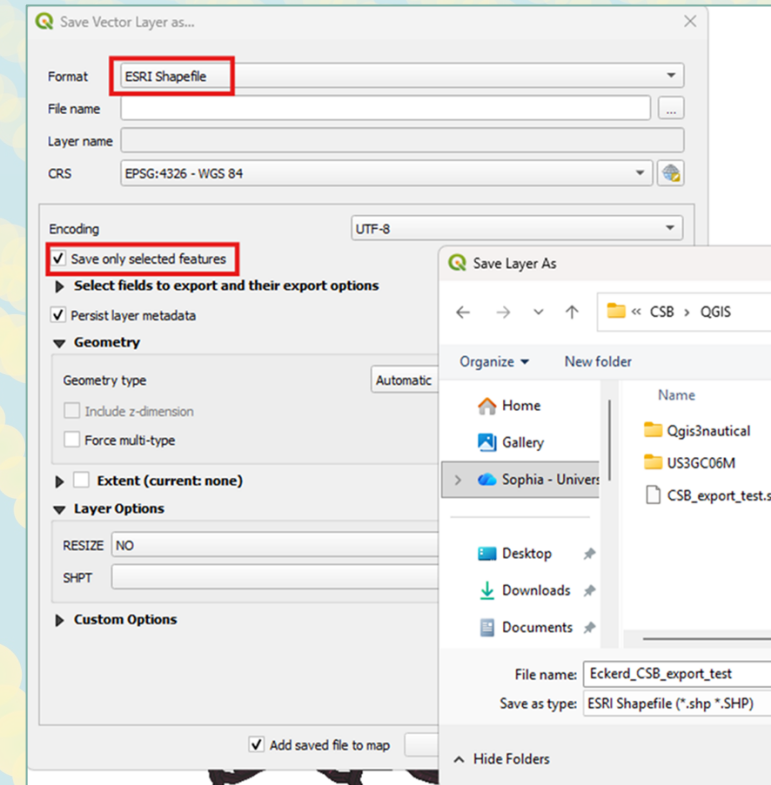
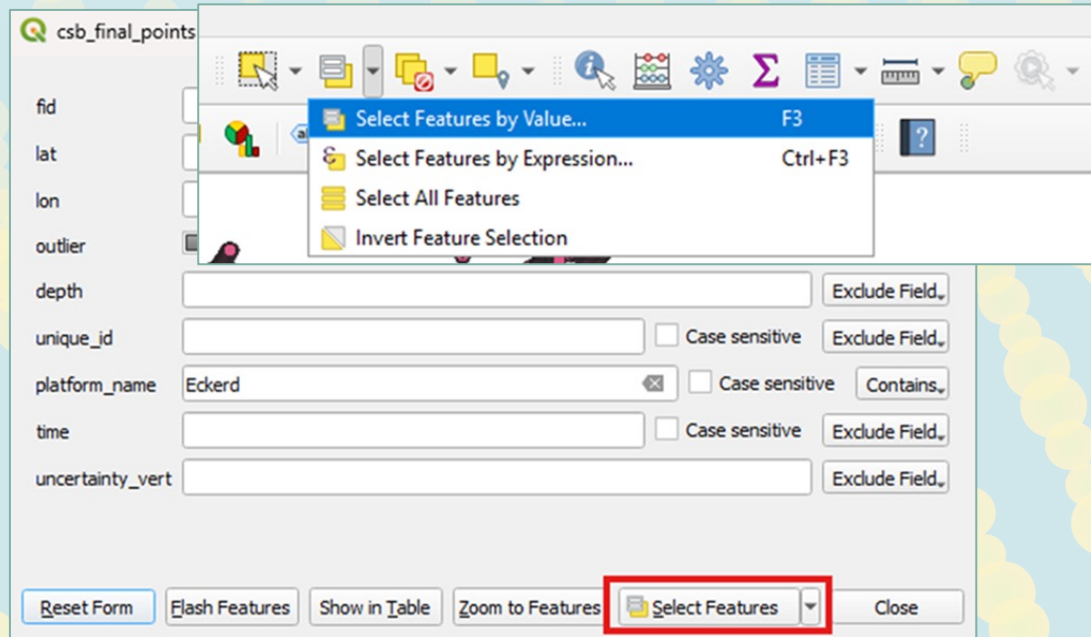
Crowdsourced Bathymetry

Data Visualization

QGIS: Exporting Participant Shapefiles



- Select features by value (participant-specific)
- Export selected features as:
 - Format: Shapefile
 - Option: "Save only selected features"
- Result: Shapefile ready for distribution

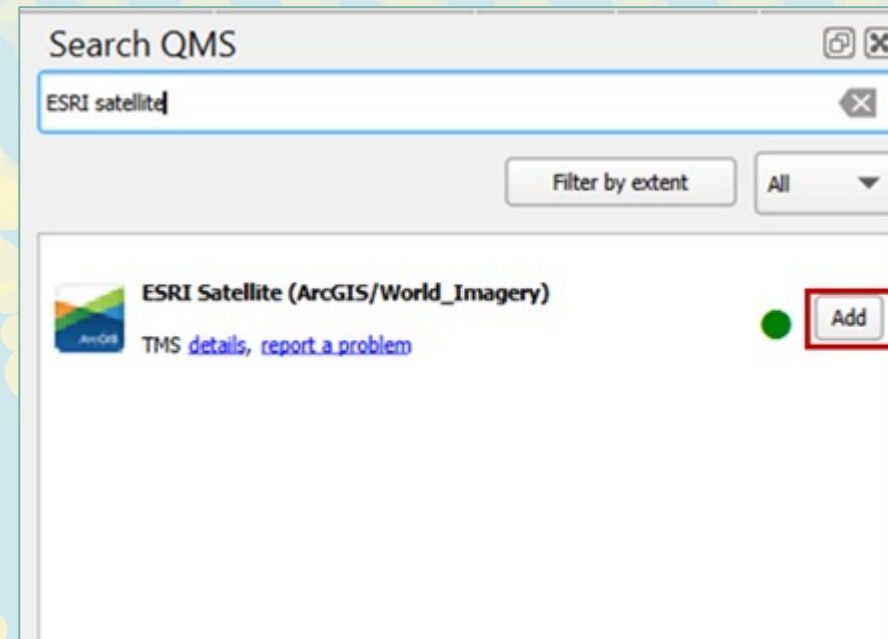
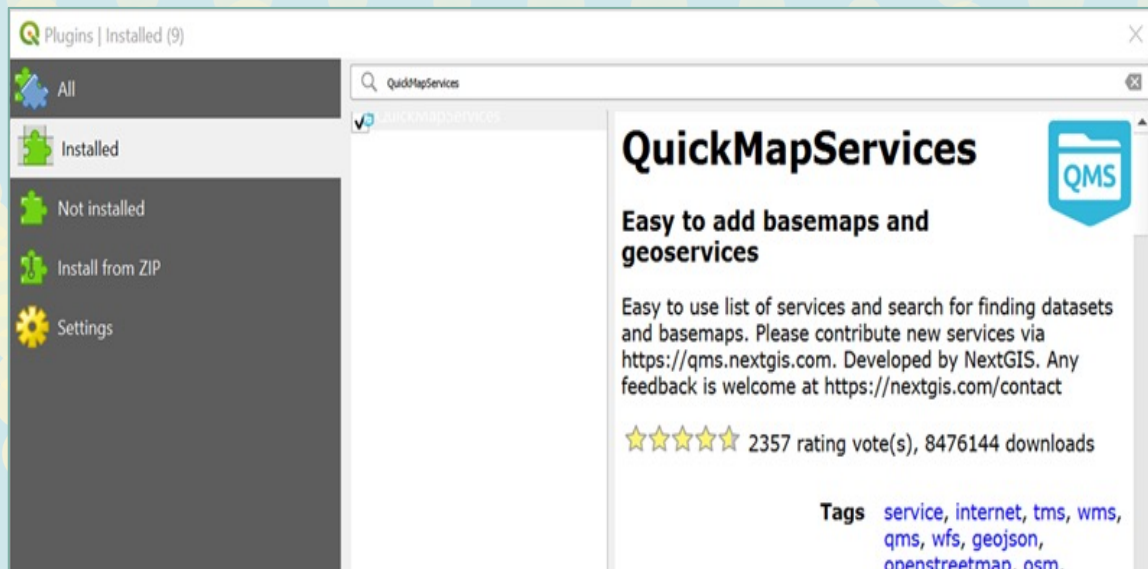


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Data Visualization

QGIS Participant Visualization Tutorial: Setup

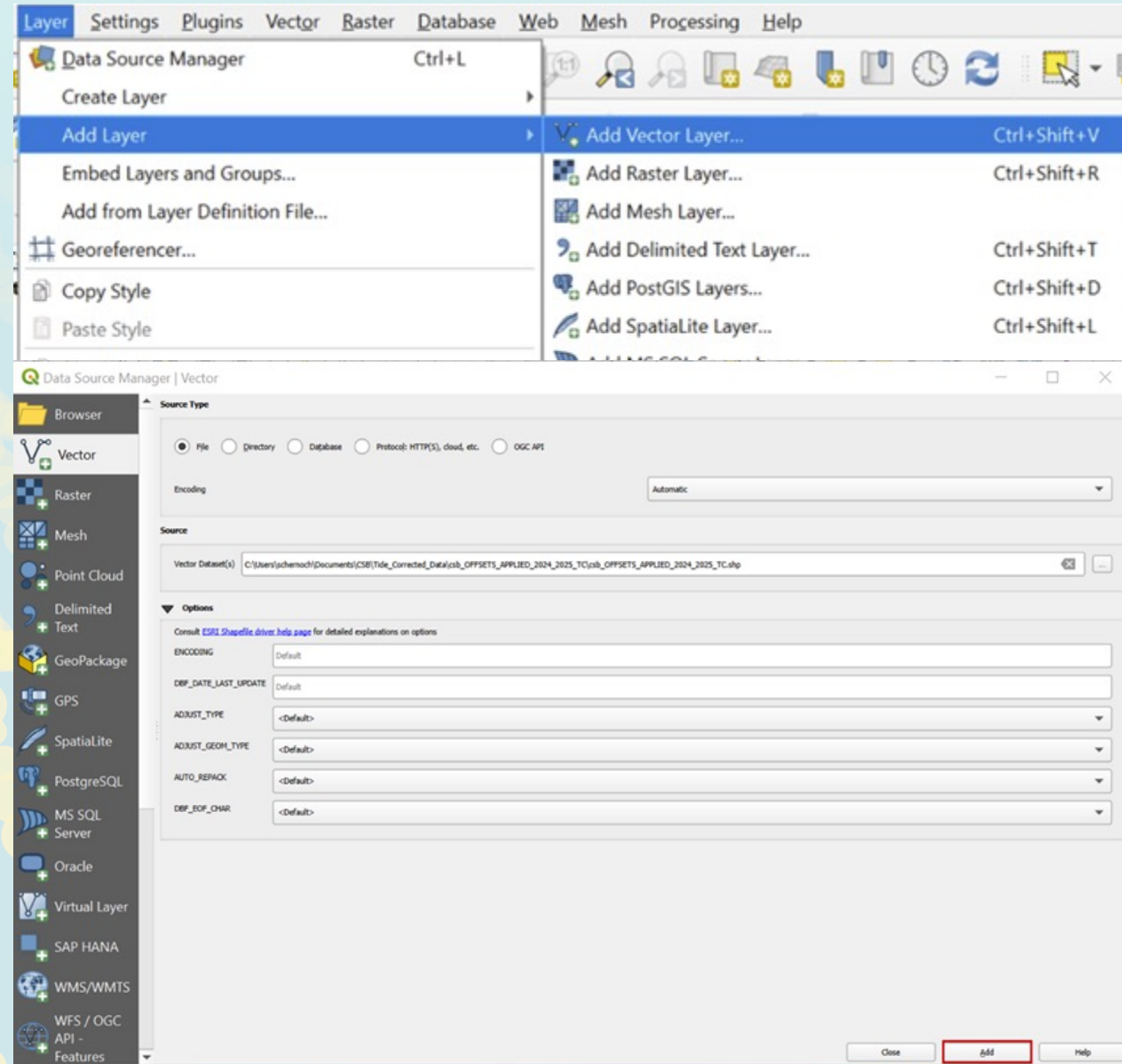
- Install QGIS (free, open-source)
- Create a new project
- Install QuickMapServices plugin
- Add ESRI Satellite (World Imagery) basemap
- Enable Layers panel



Data Visualization

Visualizing CSB Shapefiles in QGIS

- Add tide-corrected CSB shapefile
- Open Layer Properties → Symbology
- Use Graduated symbols:
 - Value: depth
 - Color ramp: YlGnBu (inverted)
- Adjust symbol size and transparency

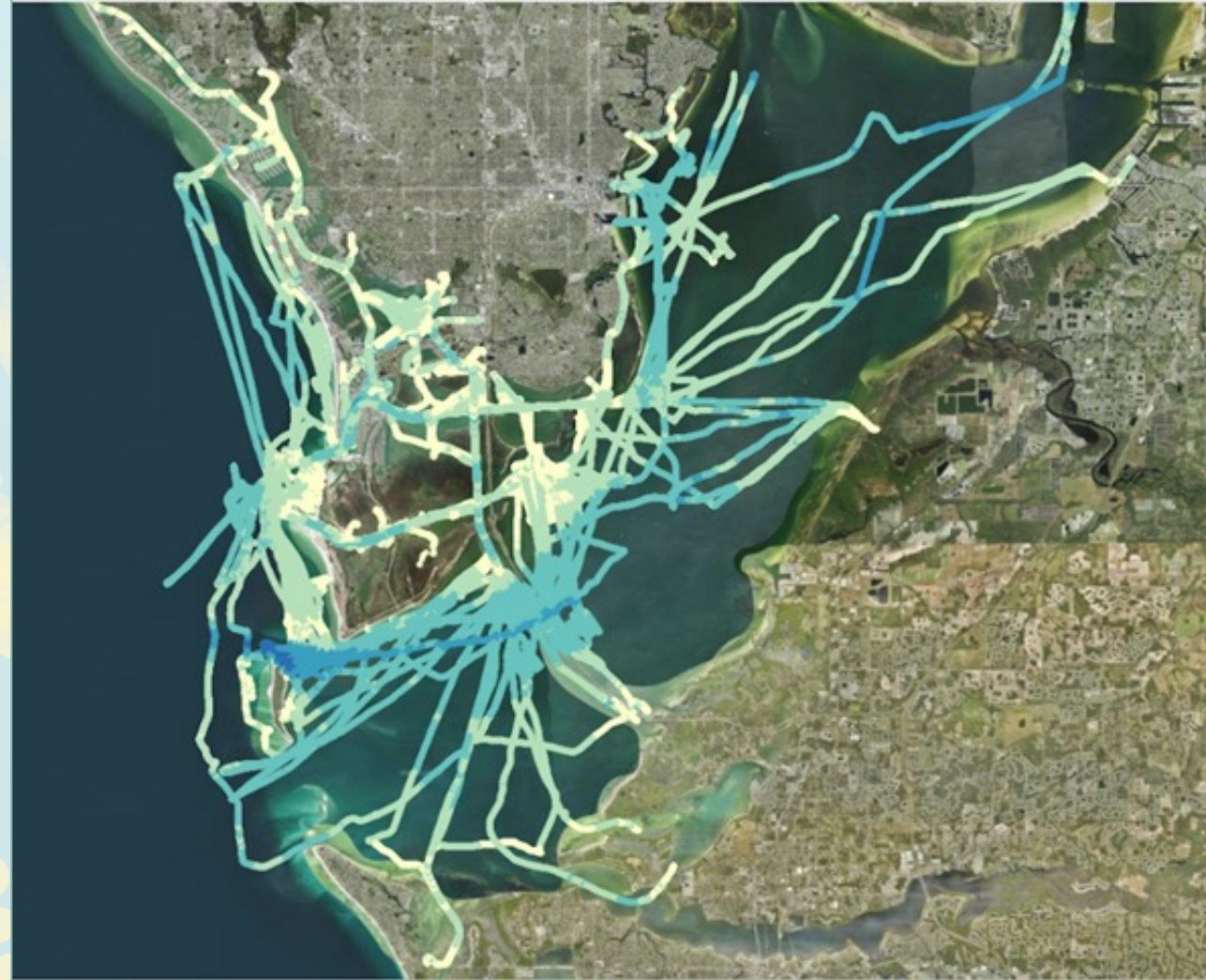


Crowdsourced Bathymetry

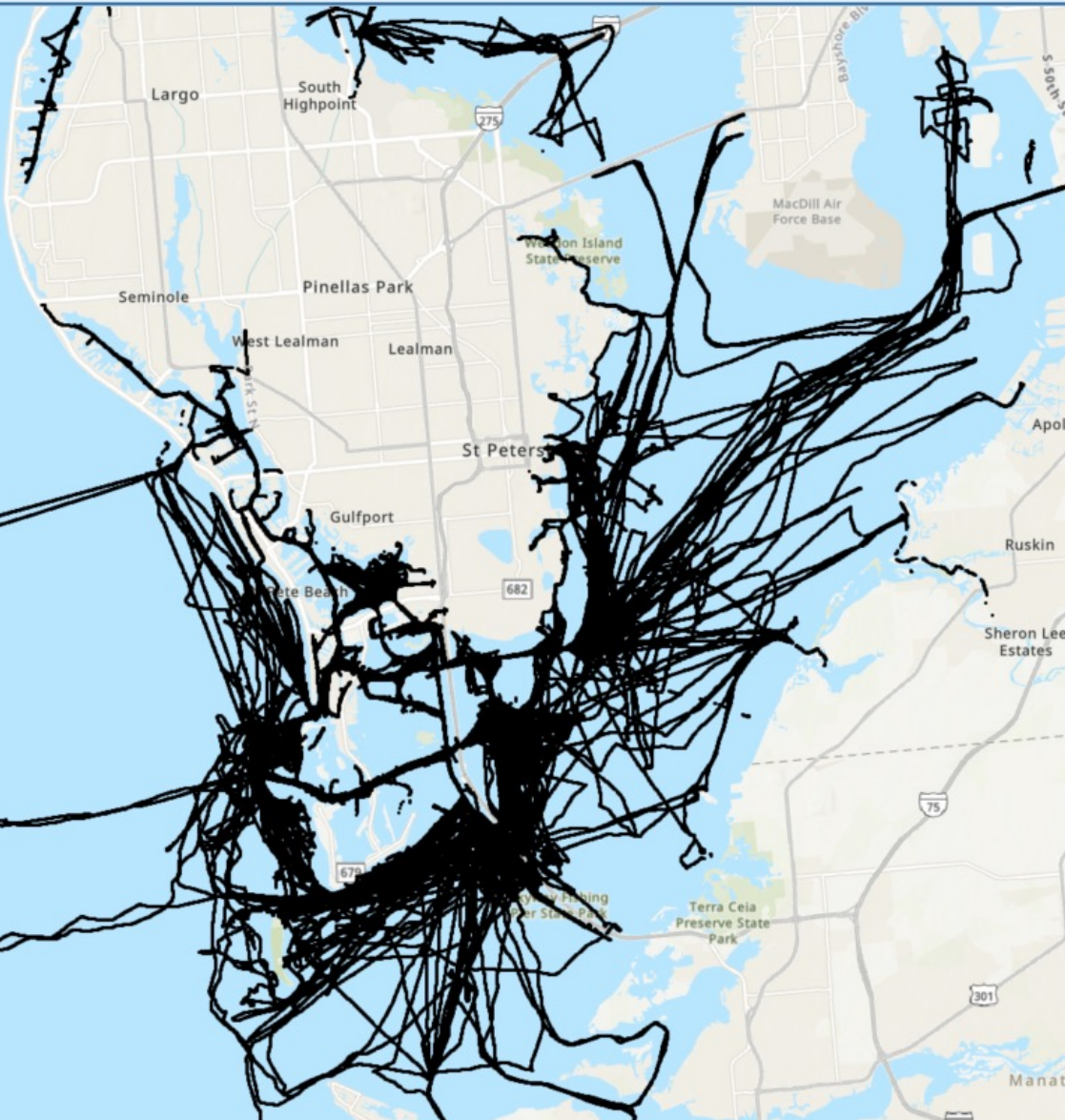
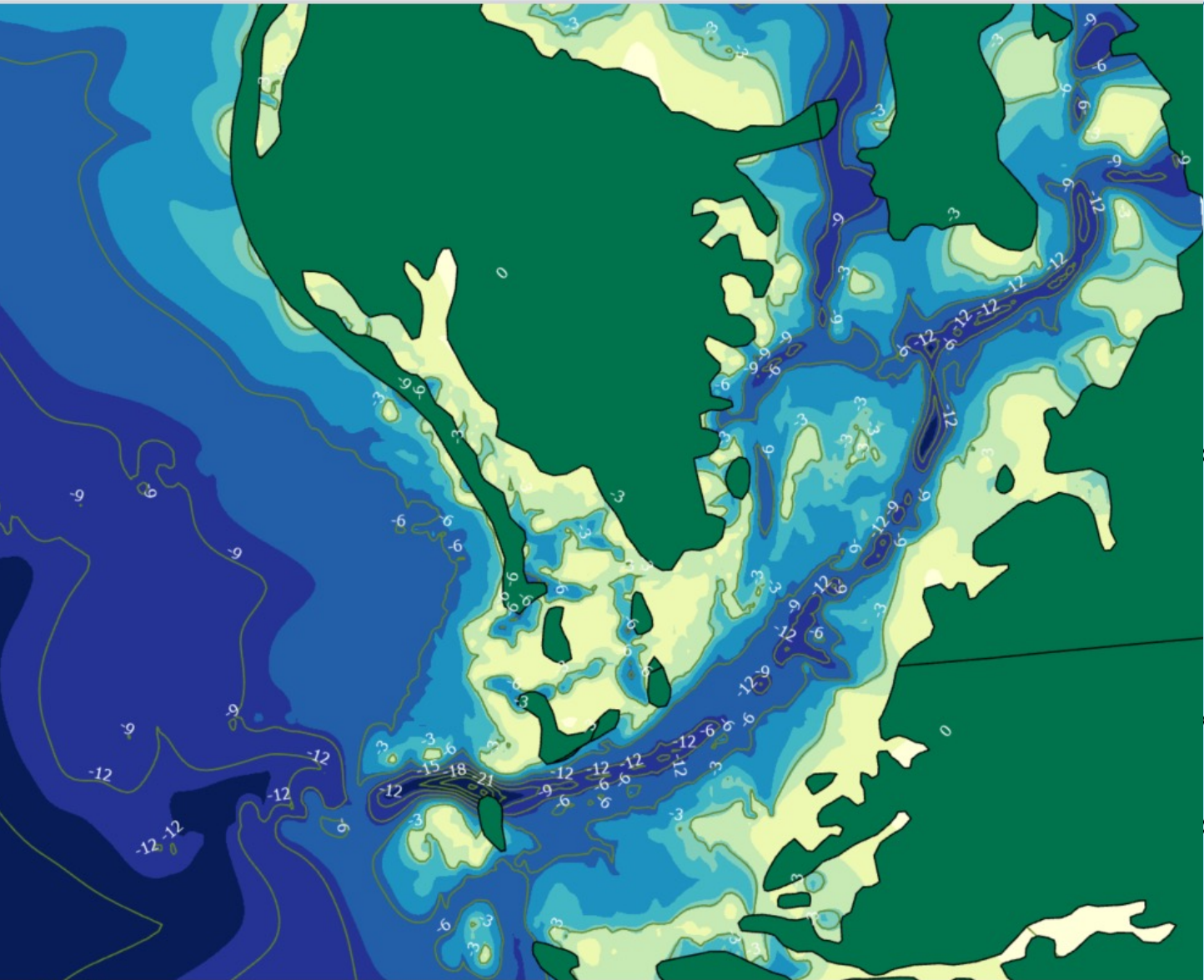
Data Visualization

Visualization Outcome

- Clear, depth-based symbology
- CSB points overlaid on satellite imagery
- Easy interpretation of bathymetric patterns
- Supports participant engagement and QA review



Data Visualization

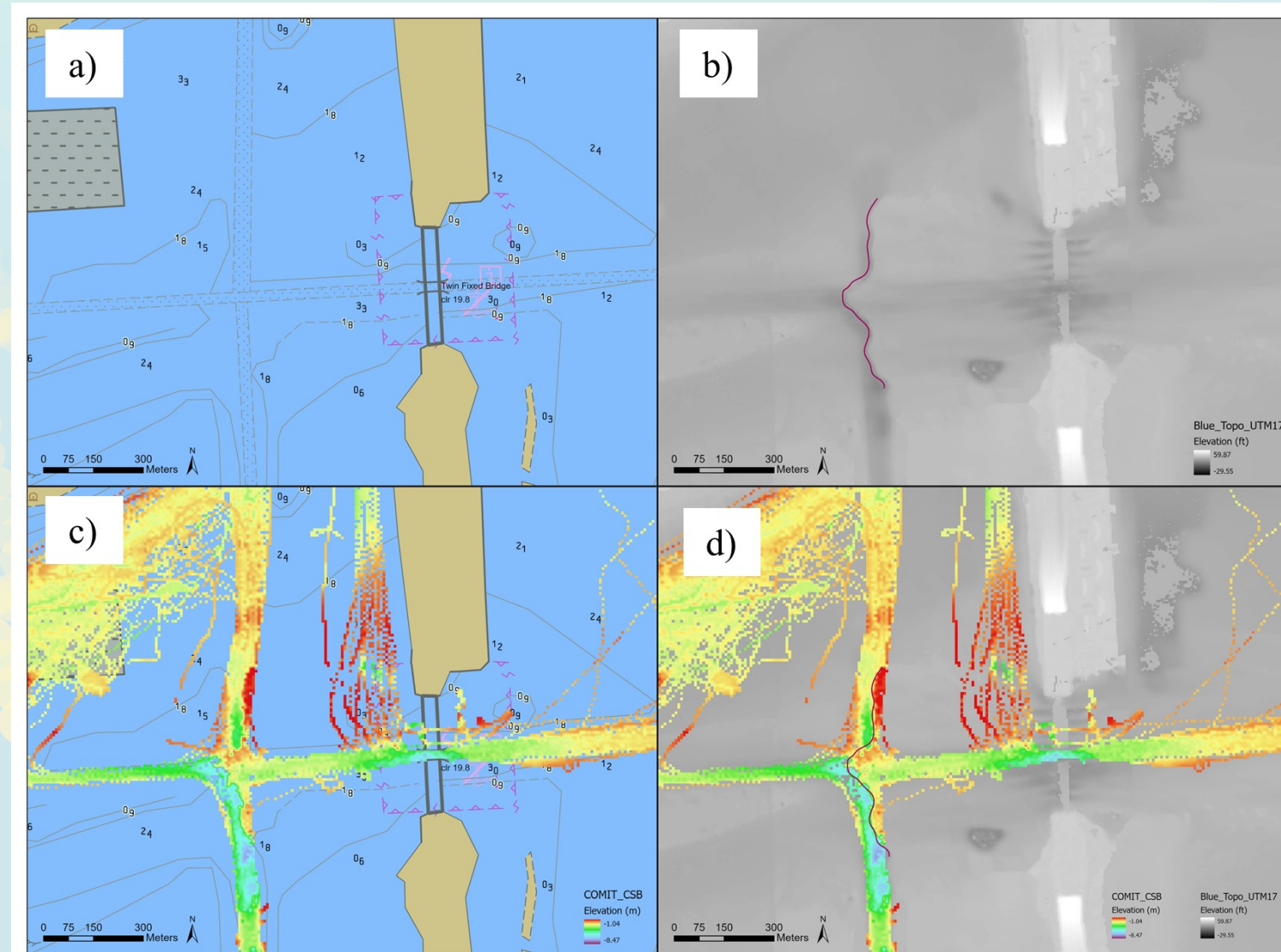


Crowdsourced Bathymetry

Data Visualization

Optional: ENC Overlay

- CSB data can be compared with NOAA ENC charts
- Charts available via NOAA Interactive Catalog
- QGIS supports S-57 ENC display
- Useful for validation and contextual analysis



Crowdsourced Bathymetry

Data Visualization

