SURVEY ANALYSIS and AREA-BASED EDITOR (SABER)

leidos

## END-TO-END HYDROGRAPHIC DATA PROCESSING USING OPEN-SOURCE FILE FORMATS

SABER provides an end-to-end hydrographic data processing solution for large datasets that leverages open source file formats throughout the entire workflow. For multibeam data processing and validation, SABER relies on the Leidos developed and managed industry-standard Generic Sensor Format (GSF) to facilitate all stages of its IHO and NOAA compliant workflow. GSF is a standard deliverable across much of the industry. SABER supports swath and area-based editing via Multiview Editor (MVE) and numerous QA/QC tools to provide the leading GSF correction and validation toolset on the market for both surface vessels and Autonomous Underwater Vehicles (AUV). Area-based editing is supplemented using the Combined Uncertainty Bathymetry Estimator (CUBE) algorithm to facilitate a statistical approach to multibeam data processing and generate NOAA-compliant Bathymetric Attributed Grids (BAG) for corrected gridded deliverables.

In addition to validated GSF and BAG, SABER supports many other geospatial and statistical deliverables, including coverage grids, multibeam imagery mosaics, contours, uncertainty maps and distribution, and selected soundings/features, among others. The majority of the tools that comprise SABER are also available as standalone programs with many configurable options to facilitate customizable batch routines for automated corrections and product generation. SABER supports ingesting the proprietary formats of many leading vendors such as Kongsberg (raw.all and kmall), Teledyne Reson, R2Sonic, and others to get into the GSF-based workflow.

SABER includes a robust algorithm to compute bathymetry from a raw angle and travel time measurements and supporting data, using a Leidos developed vendor-neutral approach. This provides a robust mechanism to correct issues resulting from installation, offset, and timing problems and reduce sound speed artifacts.

SABER provides complete side-scan sonar-processing workflow in XTF/XML to identify, measure, and classify side-scan features then correlate those features with bathymetry in corresponding GSF when applicable. The Leidos Automatic Contact Detection (ACD) algorithm is available for supported systems to automate contact identification using a constant false alarm rate (CFAR) detector and a neural network classifier to reduce operator workload and achieve consistent results across large datasets. SABER ACD provides operator queueing for review and interpretation. Feature/Contact analysis outputs fully comply with NOAA standards and facilitate S-57 electronic chart updates through SABER when applicable. Side-scan products include mosaics, contacts lists in XLM format, and contact/feature correlator sheets.

SABER is designed to efficiently and accurately display, process, and archive very large data volumes associated with hydrographic surveys. SABER provides a standardized processing flow to deliver consistent results and helps streamline the effort required to produce data products in the shipboard environment.
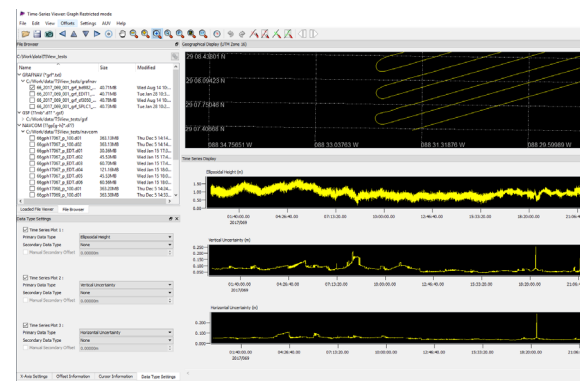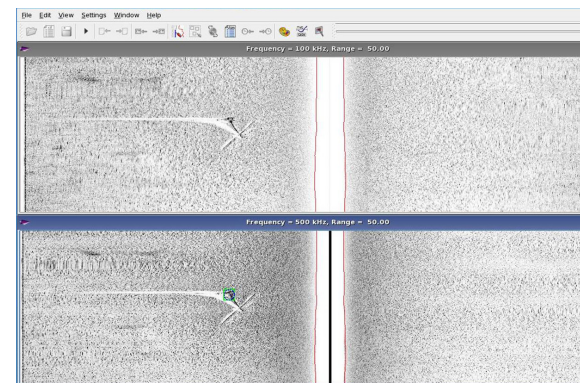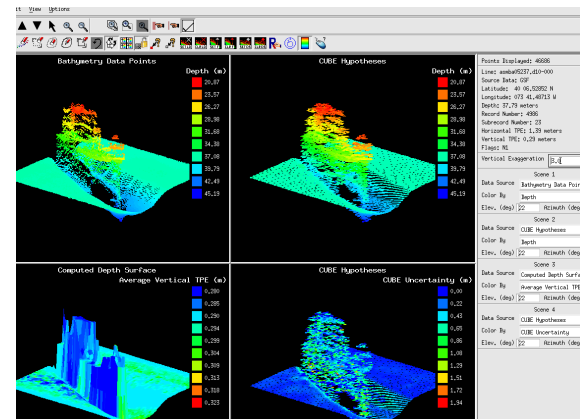
DATA PROCESSING

- ▶ Apply necessary correctors (tides, sound velocity profiles, offsets, and delayed heave)
- ▶ Water level corrector approach includes zoned water levels and ellipsoidal reference survey (ERS) with full support for VDATUM
- ▶ Apply automatic ping and beam flag filtering
- ▶ View/Edit sensor data in a time series using Time-Series Viewer
- ▶ Post-Processing and QA/QC of GNSS data
- ▶ Edit multibeam swath data with MVE

AREA-BASED PROCESSING

- ▶ Replace labor-intensive, line-by-line interactive editing
- ▶ View and edit all data in an entire area simultaneously
- ▶ Retain edits in full-resolution native data files
- ▶ Interface directly with target files and imagery data
- ▶ Seafloor model computed using CUBE

SYSTEM REQUIREMENTS

- ▶ Operating system: Red Hat® Enterprise 7, Windows 10
- ▶ Bash shell
- ▶ Display screen set to at least 1280x1024 at 24-bit depth

DATA ANALYSIS

- ▶ Build, view, quality assurance/quality control, and query gridded depth layers
- ▶ Build and plot sonar coverage grids
- ▶ Distribution analysis for all gridded layers
- ▶ Generate bathymetric contours
- ▶ Generate selected soundings
- ▶ Generate working plots of soundings and contours
- ▶ Sonar imagery contact analysis
- ▶ Complete final editing
- ▶ Create final contours files
- ▶ Create final soundings files
- ▶ Total propagated uncertainty estimation
- ▶ Coverage analysis on bathymetric model

DATA PRODUCTS

- ▶ Plot final contours and track lines
- ▶ Plot final coverage plots
- ▶ Create and plot the smooth sheet
- ▶ Create and plot any profile plots
- ▶ Data model in the form of Bathymetric Attributed Grid (BAG)
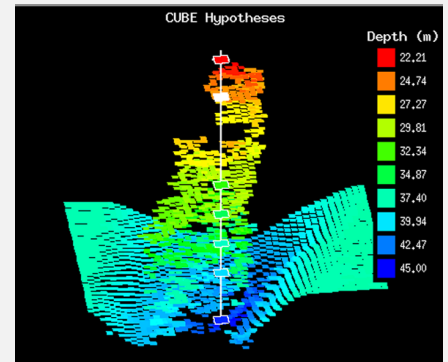
ADDITIONAL FEATURES

- › Total propagated uncertainty estimation
- › CUBE processing
- › Coverage analysis on bathymetric model
- › Ellipsoid Referenced Survey (ERS)
- › Area-based editing
- › Dividing larger survey areas into sub-areas, allowing systematic processing
- › Editing, filtering, and smoothing of position data
- › Correcting for tidal variations, roll/pitch/azimuth offsets, and sensor mounting positions
- › Recalculation of depth data for different sound velocity profiles
- › Recalculation of multibeam alignment calibrations for roll/pitch/azimuth offsets, transducer and antenna mounting positions
- › Graphical display of gridded depth and coverage data for Interactive analysis
- › Interactive and automatic editing of bad soundings
- › Generation of interim and final data products as interactive displays or hard copy plots
- › Generation of interim and final reports that summarize the data and document the processing procedures

FOR MORE INFORMATION

leidos.com/products | leidos.com/contact

leidos