HYPACK
a xylem brand

Sounding Better!

HYPACK 2019: Changes Since HYPACK 2018

HYPACK SHELL

- **Color Scheme** dialog replaced by a SETTINGS-COLOR SCHEME menu selection.

CENTRAL STORAGE IN THE HYPACK STORE

Select files that would be commonly used across multiple projects now default to the HYPACK store. Files stored outside of the HYPACK® install folder (C:\HYPACK 20xx) are now immune to the effects of the Windows® uninstall/install processes, and need not be reinstalled when you update to a newer HYPACK® release.

In HYPACK® 2019, the HYPACK Store folder collects the following:
- **Chart licenses and permits** for such encrypted formats as ARCS, and S63.
- **ACOA and NOAA charts**.
- **Web Map files** (See Also "Charts from Web Servers"):
    - Geo-referenced PNG image downloads,
    - Web Map Server information
    - Web Map Queries.
- **Target Classification Database** ("Target Classification Database Upgrade")

GRAPHICS MODE

The graphics mode options are now part of the configuration for each Map window. The Mode menu in each Map display offers three choices:
- **2D (GDI)** support continued. It draws faster, but supports transparency only in raster charts.
- **2D Mix** (default) and **3D Mix** use a combination of OpenGL and GDI drawing routines. OpenGL supports object transparency for select chart features, such as matrix (*.MTX), channel (*.CHN) and filled border (*.BRD) files. GDI provides superior text quality.
   **2D Mix** draws more slowly than the 2D GDI option.

INSTANT PROFILES OF MATRIX FILES

When your Area Map displays a matrix file, you can use the Instant Profile tool to generate a display of the soundings in profile: just click the icon and drag the tool across a matrix file in the Map window. The profile along that line appears in the Instant Profile window, which appears as a separate window, but can be docked in the shell.

A similar feature is also available in the TIN MODEL module. ("Instant Profiles in TIN MODEL")

FIGURE 1. *Sample Instant Profile Window*
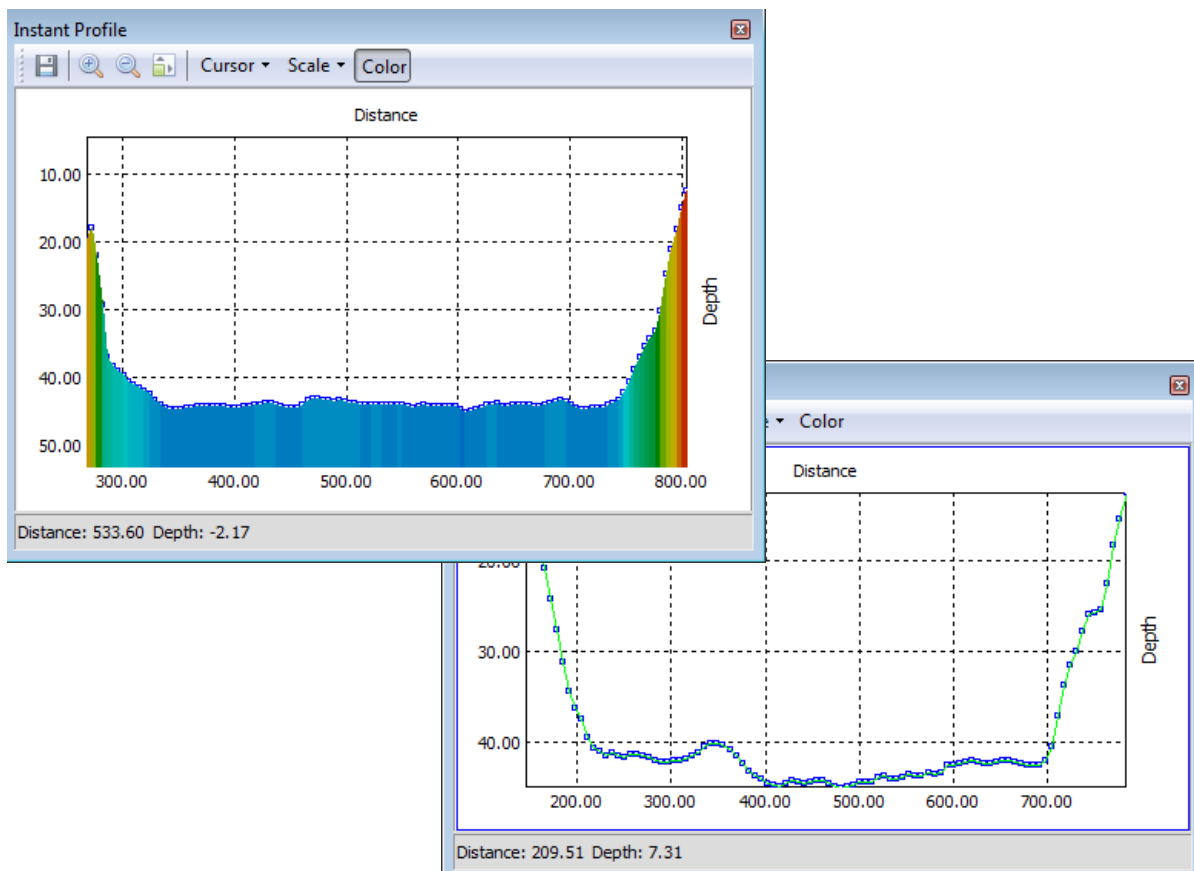
TARGETS

HYPACK® 2019 has improved compatibility between the HYPACK® Shell, the Targets Database and the Target Classification Database.

TARGETS DATABASE

- **Enable/Disable status synchronizes with the HYPACK® Project Items list** when you close the TARGET EDITOR.

- **Add, modify or delete the image associated with the target** using new buttons in the image preview.
- **Target Classification Name** has been added as a Target Attribute.
- **Bug fix:** Adding Target Classification images in the Target Comparison dialog produces no error.
- **Export T84** feature restored.

TARGET CLASSIFICATION DATABASE UPGRADE

- **Added to the Side Scan menu.**
- **Moved to the HYPACK store** providing continuity across projects and new HYPACK® installs.
- **Modified to SQLite database**, improving speed and capabilities. Affected programs include the following:
  - Target Editor
  - Shell
 - TARGETING AND MOSAICKING

PREPARATION

CHARTS

BSB CHART BORDERS

In the Charts tab of the Control Panel, the **Hide Border** raster option uses the border polygon points as a filter condition to show or omit the annotation information outside the chart edges when converting the image to the active project geodesy.

FIGURE 2. *BSB Image—Without a Border (left) and With a Border (right)*
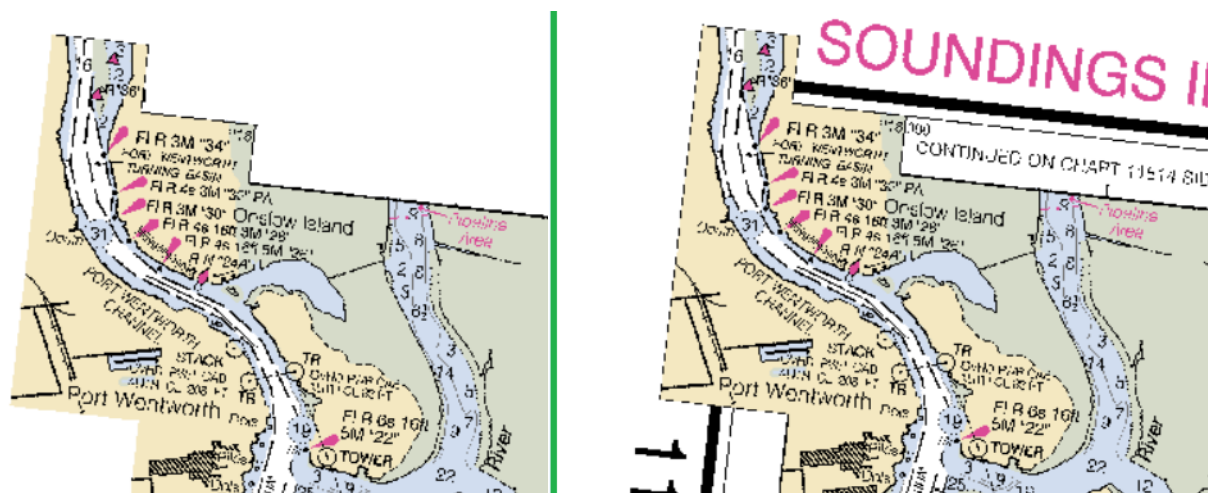
EXPORTING GEOREFERENCED TIF CHARTS OF MATRIX FILES

The export to TIF feature quickly converts enabled matrix files from your project to georeferenced TIF charts:

**FIGURE 3.** *MTX to TIF Conversion*

1. In the Project Items list, **enable the matrix files** that you want to export.
2. **Select one or more matrix files** to export:

Tip: **To multiselect files,** hold the Ctrl key and select multiple individual files or hold the Shift key and click on the first and last file in a range of consecutive files

3. **Right-click on your selection and select Export to TIF.** For each selected matrix, HYPACK® automatically generates a TIF chart, using the matrix file root name and loads it as a background chart in your project.

CHARTS FROM WEB SERVERS

- **Proxy settings to cross firewalls.** Implemented *only for web map server routines*.
- **Filters for server and layer lists in the Web Maps panel.**
- **Web Map (geo-referenced PNG charts)**: Download routines have been modified.
- **NOAA and ACOE Charts:** Download processes have been merged onto Web Maps panel.
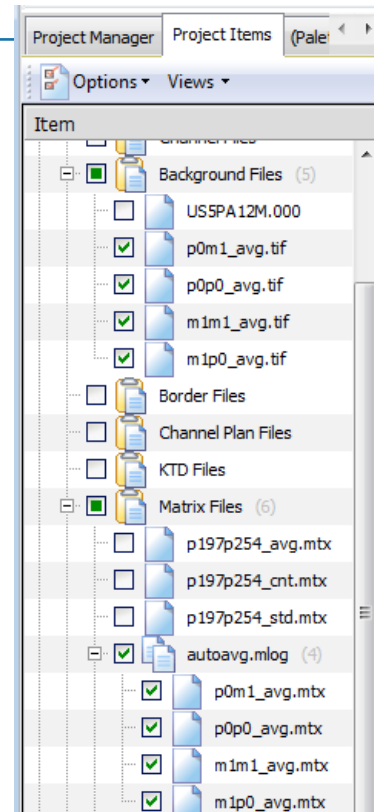
FILTERING LAYERS AND SERVERS IN THE WEB MAPS PANEL

In the Web Maps panel, you can filter the display items to more quickly find what you need.

Search fields: Just enter part of the server or layer name to reduce the corresponding list to only those items containing your input.

To remove a Search field filter, click the 'X' in the Search field.

Search fields appear in two locations:
- **The Web Maps panel search field** affects only the servers.
- **The WMS Filters dialog** (OPTIONS-FILTERS) enables you to filter both servers and layers.

FIGURE 4. *WMS Filter Dialog*
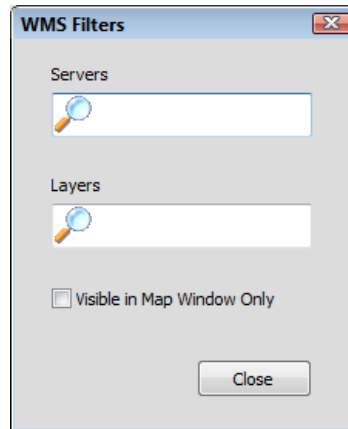
The **Visible in Map Window Only** option in the WMS Filters dialog lists ACOE and NOAA charts based on the current area in your Map window, updating as you zoom or pan in the map. It does not affect web map server lists.

LOADING GE-REFERENCED PNG IMAGES FROM WEB MAP SERVERS

The HYPACK® install includes a small selection of web map servers from which you can download digital charts with an Internet connection. From the Web Maps panel, you can add servers, view or modify their properties, and remove servers from the list that are not useful to you.

You can create a web map query (*.WMQ) to download georeferenced PNG files from satellite images available on the Web servers configured in the Web Maps panel. HYPACK® stores the query criteria and the chart (*.PNG) files in the HYPACK store folder anticipating that you may use them in multiple projects.

NOTE: As in HYPACK® 2018 and earlier, you can load georeferenced PNG files as other background charts using the right-click menu in the Project Items list. In this case, you must store the PNG file together with its georeferencing information (PGW files).

FIGURE 5. *Filled Matrix Overlaid on the Georeferenced PNG*
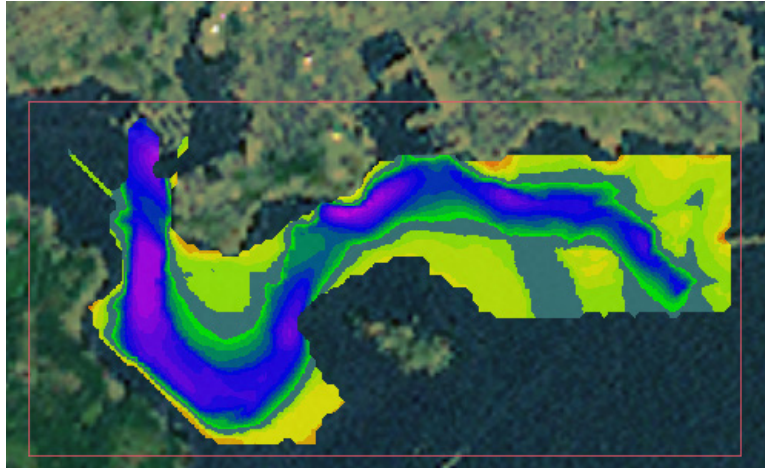
1. **Open the Web Maps panel and download the server catalog information.**
2. **Create a Web Map Query.**
3. **Enable the WMQ in your project.** When you first enable the query, HYPACK® downloads the related PNG images to the HYPACK store and displays them in your Map window.

NOTE: The initial download process can take significant time depending on the number and size of the charts, the resources in your computer, and the quality of your Internet connection. After the initial download, HYPACK® loads the charts almost instantaneously from the HYPACK store.

WEB MAP QUERIES

A Web Map Query (*. WMQ) generates georeferenced PNG files from satellite images available on Web servers. It includes all of the information required for HYPACK® to retrieve the chart files according to user-define parameters:

- Server
- Location
- Layers
- Chart scale

When you create a web map query (*.WMQ), it appears in the Project Items list representing the collection of PNG charts using the scale, layers and area designated in the query.

NOAA ENC AND RNC

Download processes have been merged onto Web Maps panel:

- The **Visible in Map Window Only** option in the WMS Filters dialog lists ACOE and NOAA charts based on the current area in your Map window. (It does not affect web map server lists.)
- **To zoom the map to the extent of a selected chart**, right-click on a chart in the Web Maps panel and select ZOOM SELECTED.
- **To download charts,** select one or more charts you need in Web Maps panel, right-click on the selection and select DOWNLOAD SELECTED. HYPACK® saves the charts to the HYPACK store\NOAA\Enc\ChartName and lists them in the Background Charts folder of the Project Items list.

GEODESY

- In the **GEODETIC PARAMETERS**, the New Zealand zones are updated to GRS80.
- **GRID CONVERSION:** Expanded to 3 decimal places to support higher resolution TOPO data.
- **PROJECT CONVERSION:** Retains additional data that may be included in an XYZ file (eg. RGB, intensity, Seabed ID, etc.)
- **GEODETIC LIST:** Reads NMEA style Lat Lon (dddmm.mm).
- Convergence incorporated in multibeam system calibration in the 64-bit HYSWEEP® EDITOR.

LINE EDITOR

- **Import XY waypoints:** In the File Open dialog in the LINE EDITOR, you can import the XY positions of an XYZ file to define a multisegmented line. If you have waypoint coordinates for more than one line, you must repeat the process for each line in the line set. *The XY positions in the import file must be in order* from start line to end line.

IMPORTANT: If you are importing waypoints for more than one line, import each line *in order*.

- **Exports ECDIS WG format in an Excel spreadsheet**. (First and last waypoint of each line only in Lat/Lon format.)
- **Updated import/export of GPX files**:
  - **When importing a GPX file**, the LINE EDITOR is now compliant to the GPX standard, and automatically preferences routes over tracks . *GPX output from earlier versions of HYPACK® are no longer supported.*
  - **When exporting to GPX**, the LINE EDITOR creates both a route and a track with the line information included.
- **Loiter at End option in MavLink mission file.** When you select both the End at Last Waypoint and Loiter at End options, the mobile actively maintains its position at the last waypoint. Otherwise, the mobile may drift with wind and currents.

ADVANCED CHANNEL DESIGN

- Improved support for importing DXF (3DFACE entities).

BORDER FILE DISPLAYS

- **Area and Perimeter Displays**: The BORDER EDITOR displays the perimeter and area of the current border in the status bar.

FIGURE 6. BORDER EDITOR

- **Area Units:** For hydrographic surveys, area units match the survey units in the GEODETIC PARAMETERS. For topographic surveys, select EDIT-AREA UNITS and your prefered units— acres or hectares. The calculations in the status bar update accordingly.

- **Border Fill:** You can display border file areas with a color fill in the HYPACK® Map window. The fill option applies to all border files in the display, but you can configure the transparency of each file individually.

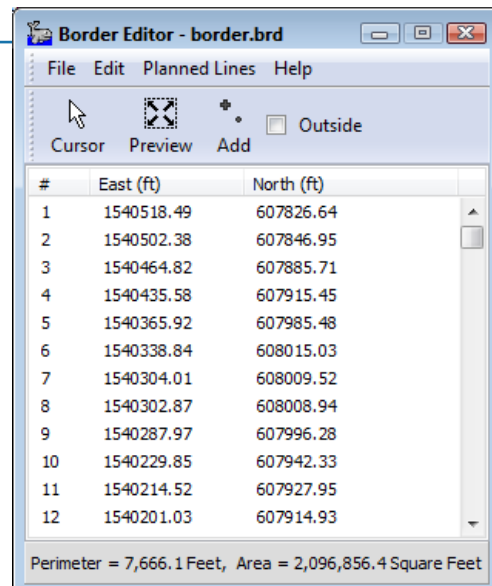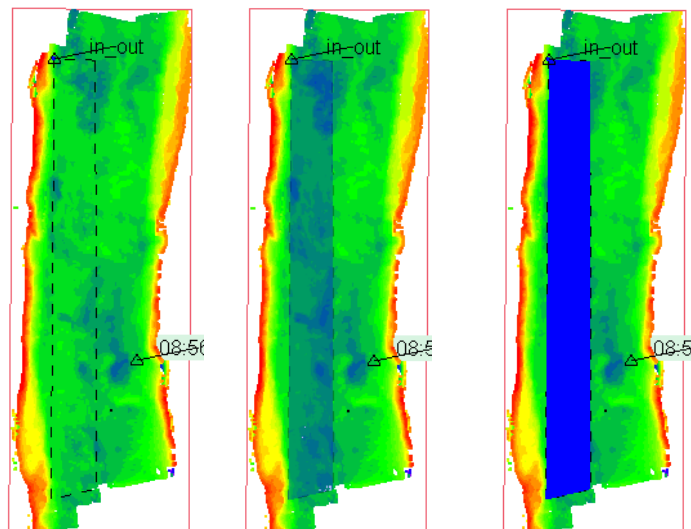 The border fill feature applies only in 2D Mix and 3D Mix mode.

FIGURE 7. Border Fill—No Fill (left), Transparent Fill (center), Opaque Fill (right)

CORRECTIONS

WIRELESS IMPORT OF AML BASE X2 SOUND VELOCITY PROFILES

Download sound velocity profiles directly from the AML Base X2 into HYPACK® via Wi-Fi, conveniently eliminating the need to run cables or additional software programs to import sound velocity casts to HYPACK®. All you need to do is connect throughthe Wi-Fi on your PC. (See AML Base X2 SVP Integration in HYPACK)

Import procedures are available in the SOUND VELOCITY and HYSWEEP® SURVEY programs:

- **In SOUND VELOCITY,** the sound velocity data imports to the spreadsheet with the date, time and position (in X,Y based on project geodesy) of the cast. You can then save the profile data to a HYPACK® Sound Velocity Corrections (*.VEL) file for use in post-processing.
- **In HYSWEEP® SURVEY**, the AML Base X2 driver reads the wireless data input for you to import using the AML Base X2 Control in the Tools menu. HYSWEEP® SURVEY uses the selected cast for real-time displays, and embeds the cast information into the (raw multibeam) HSX files logged after import.

TIDE CORRECTIONS

- **MANUAL TIDES:** When you import tide correction data, the program checks both time and date when checking for duplicate records. This change is important in multi-day projects.

PROJECT HARDWARE CONFIGURATIONS

- **All hardware configuration files are stored in the project folder.** Historically, the HYSWEEP® and Side Scan hardware configuration information has been stored in the \Hypack 20xx\Projects folder. In HYPACK® 2019, these files are stored in the the \Hypack 20xx\Projects*ProjectName* folder. This method assures that the multibeam or side scan hardware settings are correct when you change projects, *even when there are different devices or device settings*, or if you move the project folder to a new hard drive location or computer. This information is also included in the Copy Project and Transfer Projects processes.
- **Confirmation required to omit logging data:** If you choose the Do Not Record option, HARDWARE displays a warning and asks for confirmation of your intentions.

HYPACK® DRIVERS

- **ADCP.dll:** Corrected calculation for multitransducer depths.
- NEW! **Advanced Navigation.dll**: KVH GEO FOG 3D DUAL INS
- **EchoLogger.dll:**
  - Support for dual frequency mode
  - Updated to report pitch and roll, and to receive NMEA strings from the device, which is faster than the echogram mode.

- Switches to NMEA mode automatically unless an Acoustic Data mode was previously selected on the device.
- **Hysweep.dll:** Changed pitch and roll to degrees, and heave to work units. I also switched the depth being output from the driver to the depth1 value in the HYSWEEP_INFO structure as opposed to depth2.
- **Magnet.dll:** Added models supported.
  - GEM Systems GSMP-35UC
  - JW FishersPulse 12 Magnetometers.
  - Ocean Floor Geophysics Self-Compensating Magnetometer
- NEW! **MavLink.dll:** This new driver will track the status of an autonomous vehicle that supports the MAVLINK protocol.
  - Mission upload adds support for loitering at the end of the mission.
  - Can upload mission from HARDWARE (without SURVEY) if connection settings are correct.
  - Can download current mission from the MavLink device.
  - Reports when GPS is disconnected, which prevents starting a mission.
- NEW! **MDL.dll:** Relative positioning for the MDL Fanbeam.
- **NOAATides.dll:** Real-time tides downloaded from the NOAA website. Requires Internet connection.
- NEW!**PureMag.dll:** PURE magnetometer, XLI-PWA
  - Records the 9 channels as SMI Records.
  - Writes a .txt file with the RAW file name in the RAW folder with the device output. This is in case PURE wants to process in a thrid-party software.
  - Data configurable in the Data Display window.
- **Rossmart.dll:** Support added for UDP packets that contain echograms for 2 channels.
- **SeaRobotics.dll:** Added time and distance estimation features.
- **Sontek_M9.dll**: Added suppport for Parani Modem which connects to the Sontek M9.
- **Towfish.dll:** Added support for Silecmar and SCC Smart Ver. 3 cable counters.
- **Towfish_simple.dll:** Uses SHOM Layback calculation method.
- **Trackman.dll:** Added calibration routine (drv-236)
- **WindDriver.dll:** Added support for NMEA and Wind Observer II messages.
  - **NMEA**: $WIMWV,<ANGLE>,<R(el)/T(heoretic)>,<Speed>,<K(km/s)/M(m/s)/N(kts)/S(mi/hr)>,<A(valid)/V(invalid)>*hh<CR><LF>
  - **WindObserverII**: //wind 0x2A,<Heading><Wind Speed>,<unit>,(<SpeedofSound>,)(<Temp>,)<Status>,0x3<ChkSm>\r\n

HYSWEEP® DRIVERS

- NEW! **AML Sound Velocity Profiler**
- NEW! **Advanced Navigation INS (Network)**
- NEW! **Advanced Navigation INS (Serial)**
- **Imaginex DT102** modified to support 720 beams.
- **Kongsberg drivers:** Support for KMALL format
- **Newton Underwater Laser**

- NEW! **Quanergy M8 Laser**
- **Velodyne driver**: Logs quality codes instead of angles. This allows for easy filtering in MBMAX64 using the Minimum Beam Quality filter.
  - 0: Reserved for no data or bad data
  - 1: abs(Angle) >= 14 degrees
  - 2: abs(Angle) < 14 degrees
  - 3: abs(Angle) < 12 degrees
  - 4: abs(Angle) < 10 degrees
  - 5: abs(Angle) < 8 degrees
  - 6: abs(Angle) < 6 degrees
  - 7: abs(Angle) < 4 degrees
  - 8: abs(Angle) < 2 degrees
- **WASSP DRX** extended to parse side scan.

DATA ACQUISITION

HYPACK® SURVEY

- **Toggle Tracking Icon in the area map.** The toolbar displays the current tracking method. After you set your preferred tracking method in the Orientation and Tracking dialog, you can quickly toggle between this setting and "No Tracking" using the Toggle Tracking icon, Ctrl+T, or select SETTINGS-TOGGLE TRACKINGfrom the menu.

SURVEY LOG

- **Option to launch SURVEY LOG automatically** with SURVEY (PREFERENCES-START WITH SURVEY).
- **Columns are user-configurable**. (PREFERENCES-CONFIGURE COLUMNS)
- **Saves PDF as selectable text elements**.

SHARED MEMORY OUTPUT

- **Added KP fields to mobiles if the KP driver is active**. (Since kp.dll reports to a shared memory block, Shared Memory Output can be updated to retrieve this value for each supported mobile.)

HYSWEEP® SURVEY

- Wireless Import of AML Base X2 Sound Velocity Profiles

INCREASED LOGGING CAPACITIES

- **Increased beam limit** from 1440 to 2048 to support R2Sonic dual Head UHD sonar.
- **Added datagrams for topographic mm resolution.** HYSWEEP® SURVEY logs to 3 digit (after decimal) resolution.
- **Sidescan mosaic** updates based on the device and frequency from first waterfall window. More useful than interleaved frequencies of previous versions.
- **Option to omit logging side scan data** in the Logging Options dialog (FILE-LOGGING OPTIONS).
- **Supports simultaneous logging of Snippet and TruePix data.**
- **Manufacturer's Beam Coding extended to LIDAR:** HYSWEEP® assigns a sounding quality based on quality codes received from the multibeam echosounder or LIDAR. The Profile window color-codes soundings based on quality: high = blue, marginal = yellow, bad = red. These quality codes may also be used to filter data in post-processing.

  Define the following limits based on information from your device manufacturer:
  - **High Quality Limit:** All soundings greater than or equal to this value are assumed good.
  - **Marginal Quality Limit:** All soundings less than this value are assumed bad.
 - **Show Bad Soundings:** Selects display of bad sounding data.

BEWARE! *There is no way to recover or reconstruct unlogged data.*

LIDAR DISPLAY FILTERS

In earlier releases, the Ranges tab of the View Options dialog controlled the extents of the Topographic window display. In HYPACK® 2019, the Laser Filters tab provides additional display filters that primarily affect the Topographic Laser and Real Time Cloud displays. You can also enable some options to be adjustable using your cursor in the display.

In the Ranges tab, the ranges defined by the Port and Starboard Offset Limits and the Minimum and Maximum Range Offsets are graphically represented in the Topographic Laser window by the lines on the right and left ends of the profile view, and by two circles in the map view, respectively.
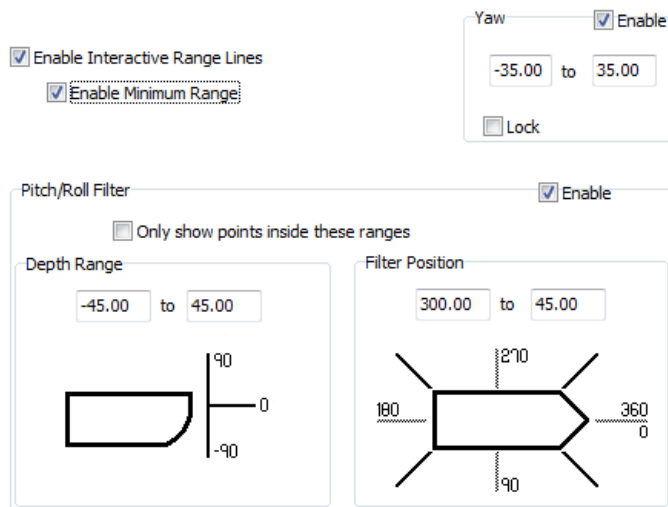
FIGURE 8. *Topographic Laser Window*
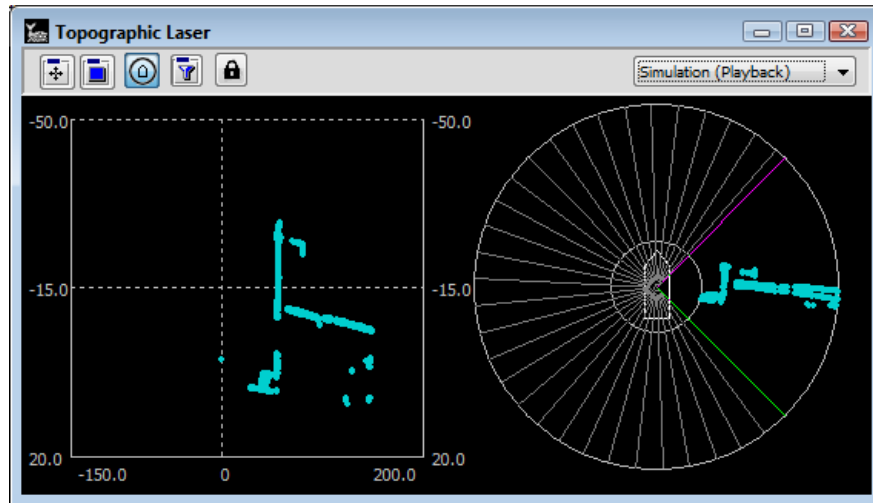
Options in the Laser Filters tab, enable you to use your cursor in the Topographic Laser window to adjust the ranges:

FIGURE 9. *View Options—Laser Filters Tab*

- The **Lock icon** on the toolbar, locks the window display to prevent inadvertently changing the filter settings or the overhead view state.

- **Yaw** filter is a horizontal range in degrees within which the map view of the Topographic Laser window displays points; the filtered area is denoted by gray spokes.

  Check the **Enable** option and enter the angle range you want to display.

  The **Lock** option fixes the size of the range. When you use your cursor in the graphical display, the full range rotates.

- **Yaw** filter is a horizontal range in degrees within which the map view of the Topographic Laser window displays points; the filtered area is denoted by gray spokes.

- The **Pitch/Roll** filter requires two ranges: one for depth and one for position around the vessel.

NOTE: The Yaw and Pitch/Roll Position filters are mutually exclusive. For example, if the Yaw range is -45 to + 45, but the Pitch/Roll Position filter is 0-180, only the data from 0 to 45 is drawn.

IMPORTANT: The filter ranges set in the Yaw and Pitch/Roll Laser Filters *do not filter the motion of your survey vessel*; in fact they have nothing to do with your vessel motion. In this case, the terms are meant to help describe the areas around your vessel where there might be data out of your range of interest.

SIDE SCAN SURVEY

AUTO TVG SMOOTHING

The smoothing option provides better results where attenuation is more severe or uneven, which is often the case if your side scan has minimal onboard pre-processing features.

FIGURE 10. *Auto TVG Smoothing—Before (top) and After (bottom)*
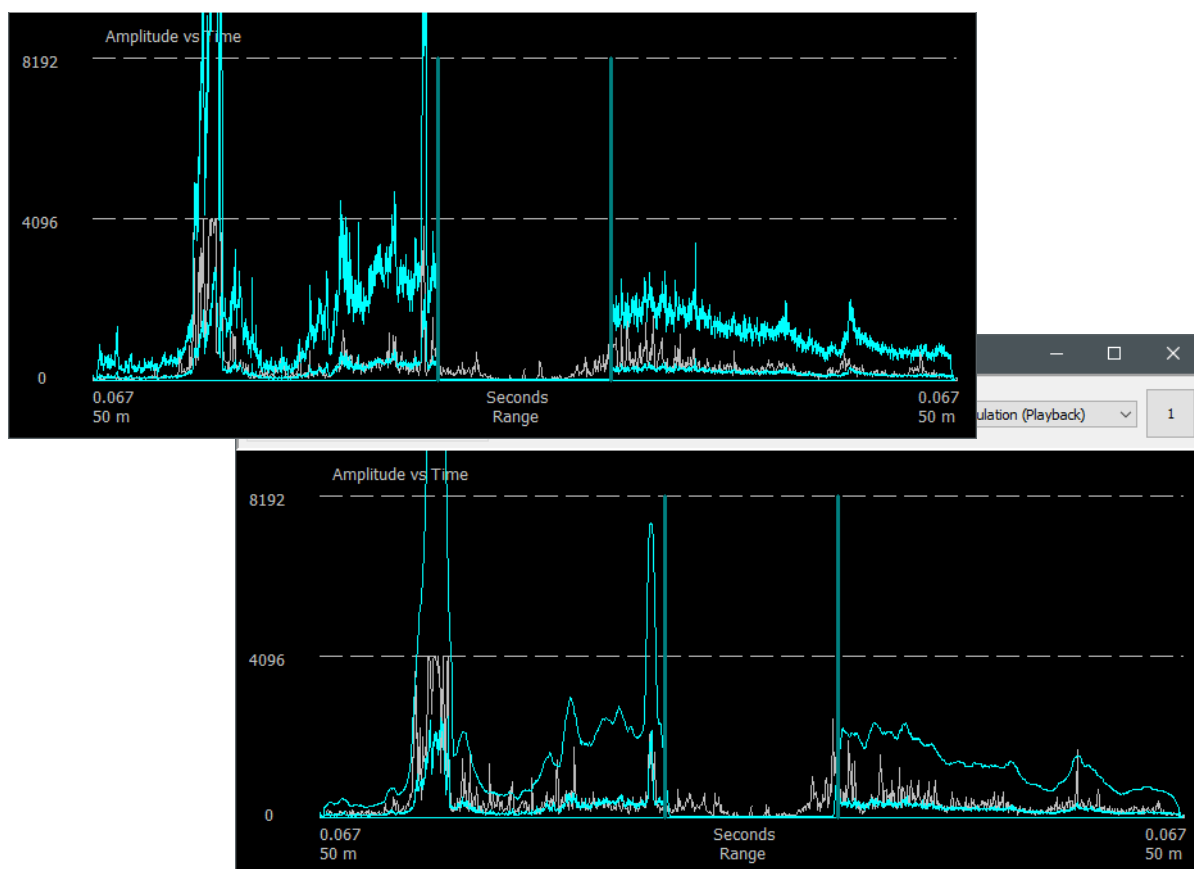
DOWNSAMPLING OPTIONS IN SIDE SCAN SURVEY AND TARGETING AND MOSAICKING

The number of samples per ping vastly exceeds the pixels available in the waterfall display, so the side scan programs must downsample the data. Dividing the number of samples evenly between the number of pixels, we must then decide the value that best represents the set of samples for each pixel.

The downsampling method, together with the color palette, affect the brightness of the waterfall displays and the mosaic generated in TARGETING AND MOSAICKING (HYSCAN).

The **Waterfall Downsampling Method** drop-down list provides several options:

- **Maximum** value sample. This is what was used in previous versions of TARGETING AND MOSAICKING. This will produce a brighter overall image.
- **Minimum** value sample. The waterfall would be dimmer overall with this method.
- **First** sample in the set. This is potentially one of the more accurate downsampling methods, but might not look the nicest.
- **Average** of the samples in each set. This produces a smooth looking waterfall, but you might clip some peaks or valleys, and you may be using a value that doesn't exist anywhere in this sample set.
- **Median** of the samples in each set. This option may be preferable because it produces a very similar image to the one using the average value, and uses an actual value from the set. The median value is more intelligently selected than minimum, maximum, and first.

For a more complete explanation, see "Side Scan Waterfall Downsampling" in the September 2018 issue of *Sounding Better!*.

OPTIMIZE IMAGERY CAPTURED AT EACH TARGET SITE.

- **User selected display frequency:** When logging dual-frequency systems, you can select which frequency is used to draw the Side Scan Waterfall. The image captured with each target uses the same frequency settings.
- **The Side Scan Controls for color and gain are now accessible from the Targets dialog**. This enables you to adjust the display for each target site screen capture.

REAL TIME MOSAIC

- **User selected display frequency:** When logging dual-frequency systems, you can select which frequency is used to draw the Side Scan Waterfall. The Real Time Mosaic uses the same frequency.
- **Ruler** moved to draw above the waterfall display.

POST-PROCESSING

- **SORT:** Uncheck All option.
- **SB Selection:** Draw Template option is now on the toolbar.
- **Side Scan Merge Mosaic**: A new 64-bit version automatically launches on 64-bit machines for faster processing times.

SBMAX64

- **Zoom extents** honors the X coordinates of the template.
- **Added Spike Filter preview lines in the Profile window**. Replicates the same feature in the SINGLE BEAM EDITOR.
- **Defaults to save to HS2x format**.

CLIPPING SOUNDINGS TO A BORDER FILE

In the Survey window, you can clip your soundings using a border file. The position of the In/Out point in the border file is unimportant in this case. Tell the program where to delete soundings relative to the border by clicking the corresponding button.

FIGURE 11. Border Dialog
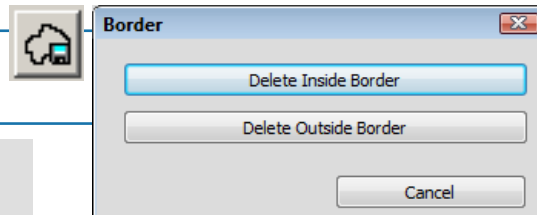
FIGURE 12. Trimming to a Border File—Before (left) and After (right)
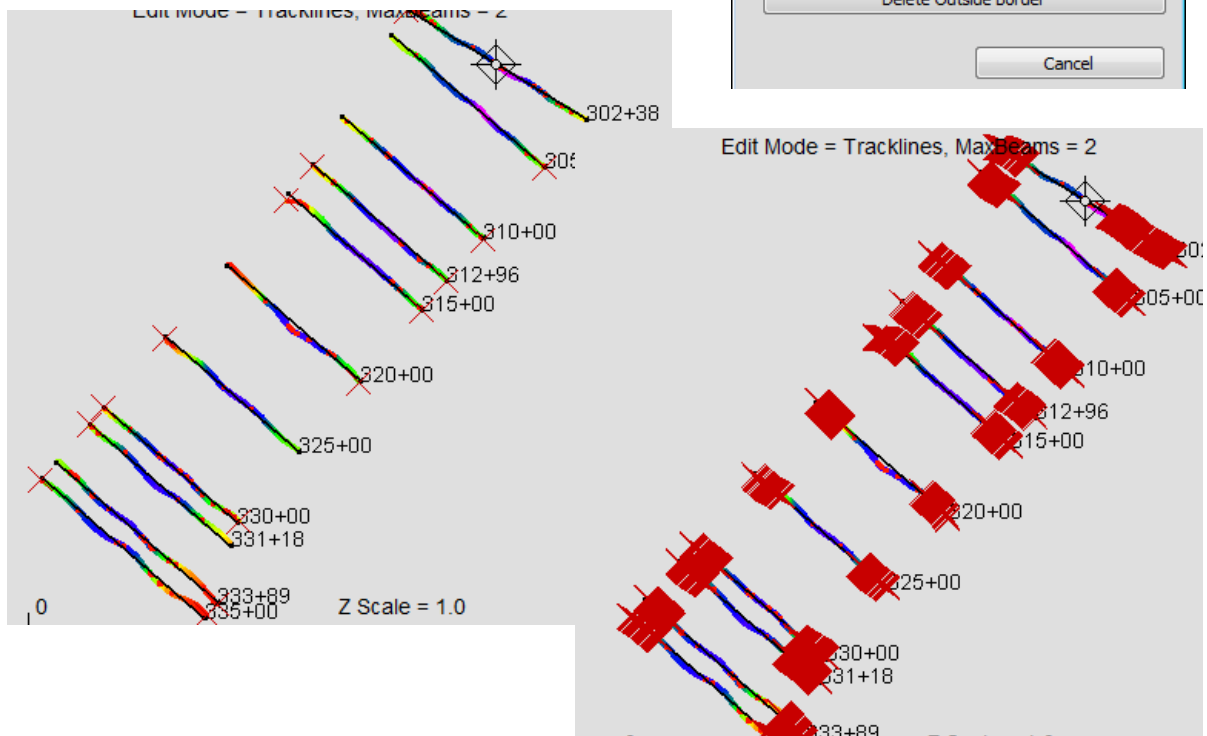
DIGITIZING

In HYPACK® 2018, the Echogram window only displayed one frequency, and when the Profile window showed both frequencies, the Echogram defaulted to Depth 1.

In HYPACK® 2019, The depth profile display settings are synchronized with the Profile window settings. When both frequencies are displayed, use the **Digitize** option in the Echogram window to choose which frequency you want to digitize.

FIGURE 13. *Echogram Displays bot h Frequencies*
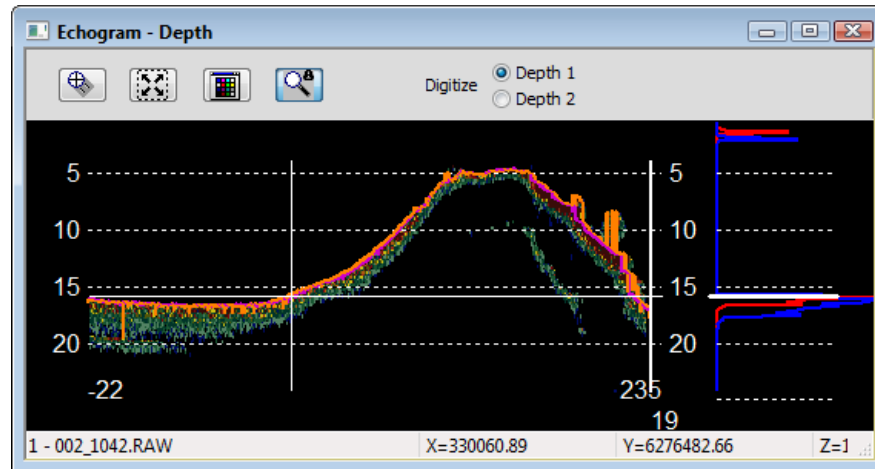
MAGNETOMETER EDITOR

- **Support for editing PURE Magnetometer data:**
  - Displays 9 SMI records.
  - Data Display configurable for 9 channels.

64-BIT HYSWEEP® EDITOR

- **Increased beam/ping limit from 1440 to 2048.** Data logged to more than 1440 beams/ping cannot be saved to the 32-bit HS2 format, which still supports only 1440 beams.
- Download data from AML Base X2 profiler to the spreadsheet program to apply to current data and generate a VEL file.
- **Improved dual head displays**.
- **Export options:**
  - **XYZ, time options**: XYZ, timetag and XYZ, epoch
  - **XYZ-Beam Angle**: This would be very handy when comparing bathymetric data to RTK ground shots.
  - **LAS/LAZ format**. Particularly useful for LIDAR data.
- **Exports the Bathymetric Attribute Grid (BAG)** file type is the standard for the National Ocean Service (NOS) hydrographic data files. BAG files contain XML metadata and two Layers in a matrix format—one of Elevation and another Uncertainty. Also contained is a list of post file creation edits to the data.

NOTE: **BAG files require an unrotated matrix**; therefore, *you must clear the Rotate to Survey Line matrix option* accessed from the Survey Tab of the Read Parameters dialog.

SUPPORT FOR MULTIFREQUENCY DISPLAYS

- **Select frequencies displayed.** When you load raw multifrequency (HSX) files, all frequencies are enabled initially. You can then select one or more frequencies to display (EDIT-MULTIPLE FREQUENCIES). When you load the edited HS2 or HS2x files, the frequencies enabled upon save are enabled.
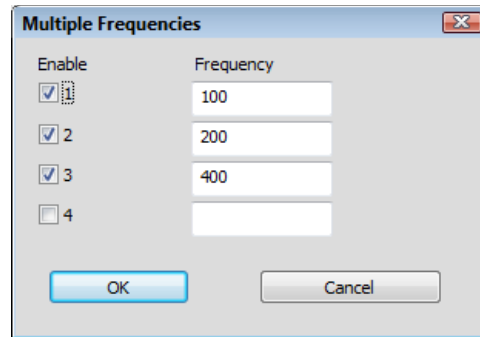
IMPORTANT: The edited HS2X (and HS2) files save all frequencies, regardless of your display settings. *XYZ files save only displayed frequencies.*

- **Color by Frequency option**: All edit windows show soundings colored by frequency except the Survey and Imagery windows.

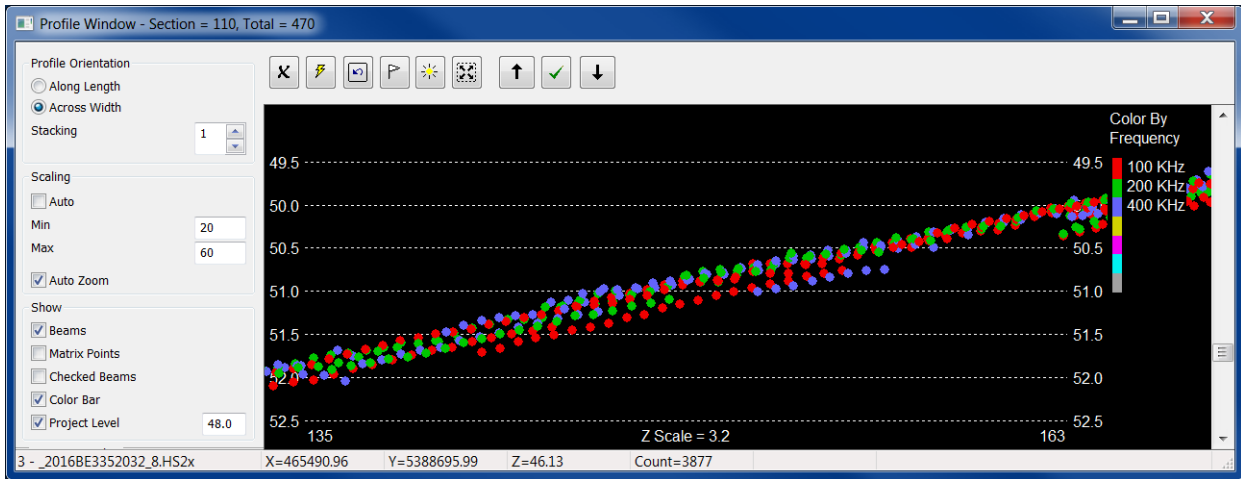**FIGURE 14.** *Color by Frequency—Map View*
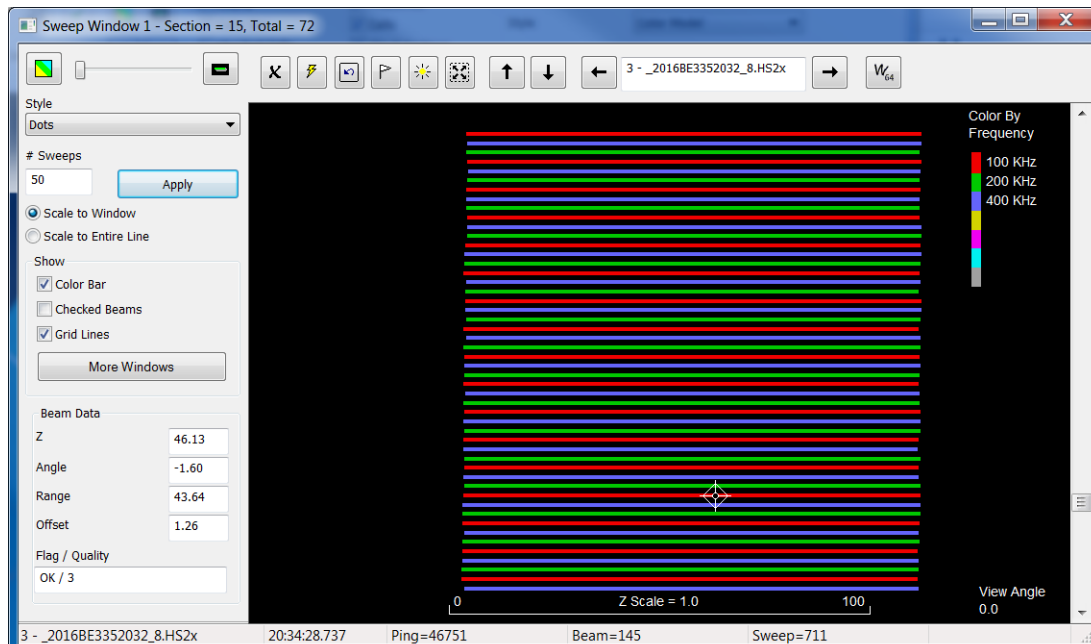
FIGURE 15. *Color by Frequency—Profile*

IMPROVED EXPORT OF PIX4D IMAGE METADATA (PHOTOGRAMMETRY)

HYPACK® LIDAR data and the corresponding photographic images captured by HYPACK® SURVEY can be exported to 3rd-party Photogrammetry programs to produce RGB point cloud files, color-coded according to the colors in the image files, as well as orthomosaic geo-TIF files derived from the captured images of your project area.

You can then load both output file types back into HYPACK® to provide a high-resolution representation of your project area. In the HYPACK® CLOUD program, you can display the point cloud using the RGB colors to show to display it in realistic colors. Including the geo-TIF as a background chart further enhances the display.

NOTE: At this time, the Orthomosaic geo-TIF is only useful in HYPACK® if it is derived from images shot from overhead as from a drone. Images shot from the side can be used to create a geo-TIF; however, it cannot be used as a HYPACK® chart file.
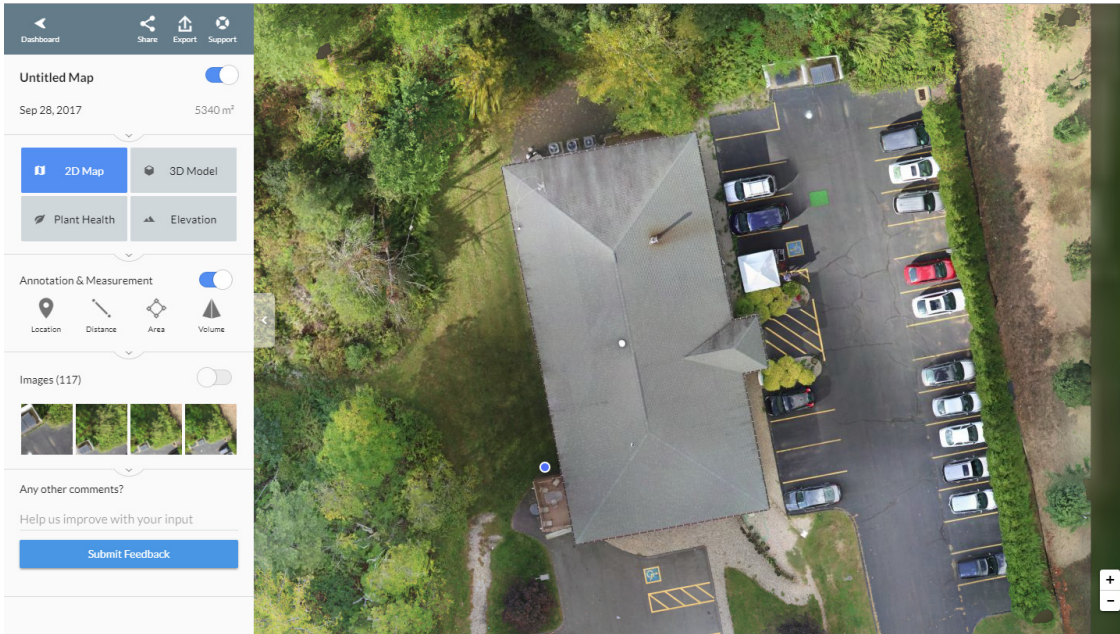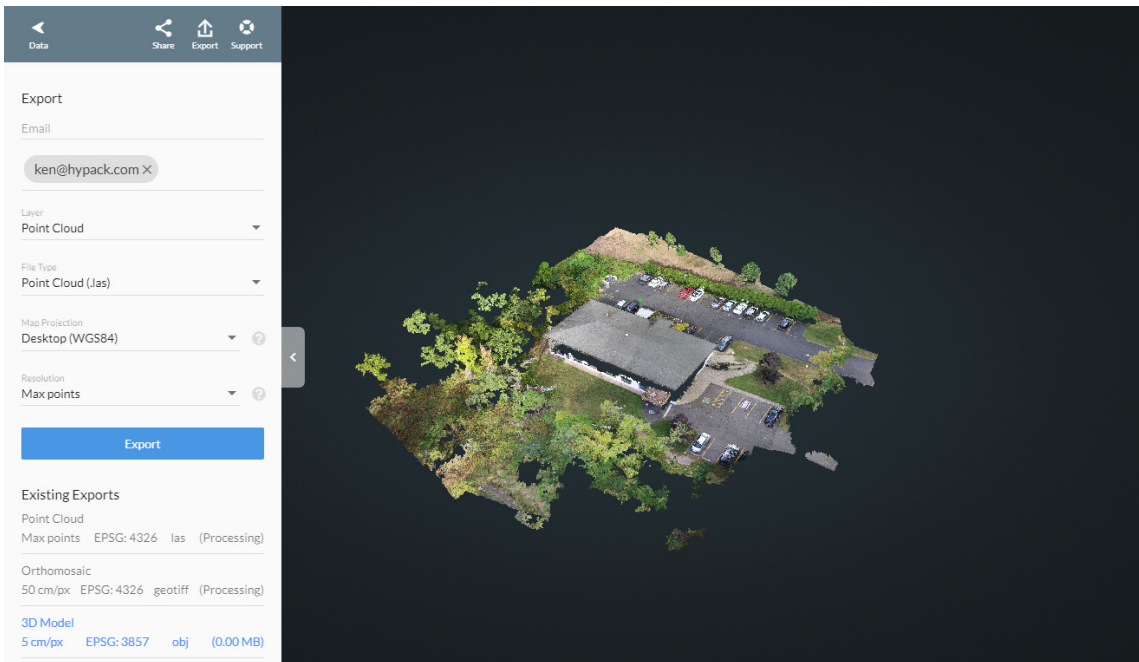
FIGURE 16. *Geo-TIF Output*

FIGURE 17. *Point Cloud Calculated from the Images in DroneDeploy*

SUPPORT FOR GRID CONVERGENCE

The **Apply Grid Convergence** (in the Sonar Processing options, Read Parameters, Processing tab), automatically calculates and applies the grid convergence based on the positions in your data to give you grid north. Alternatively, you can patch test at your project site to incorporate yaw into your patch test results.

IMPORTANT: *You must use the same method to correct for grid convergence when you process both your patch test and survey data*; otherwise, the editor can not apply the same corrections.
Additionally, *if you do not apply grid convergence, and there is significant distance between your patch test location and your project site, you must recalibrate your system at the project site* so the yaw correction accounts for the grid convergence at your site.

Tip: If you always use the Apply Grid Convergence option, it doesn't matter where your site location is, and your edited data will be always be accurately corrected.

NEW BEAM ANGLE TEST

NEW! The 64-bit HYSWEEP® EDITOR now includes two Beam Angle Tests:

- **Beam Angle Test** focuses on beam numbers (as in beam 1, 2, etc.) and beam angle relative to the sonar frame. Where the sonar is mounted vertically, the beam number correlates to the angle relative to vertical.

- **New Beam Angle Test** adds the option to use angle relative to the sonar to support rotated head and dual sonar installations where there is no correlation between beam number and vertical angle. This test also separately graphs the results for the beam angles on either side of zero.

The results appear in the Comparison and Details tabs and in two test reports.

FIGURE 18. New Beam Angle Test Comparison Graph—Statistics Calculated for Beams Less than the Beam Angle Limit (left) and for Beams within 2.5 degrees of the Beam Angle Limit (right)
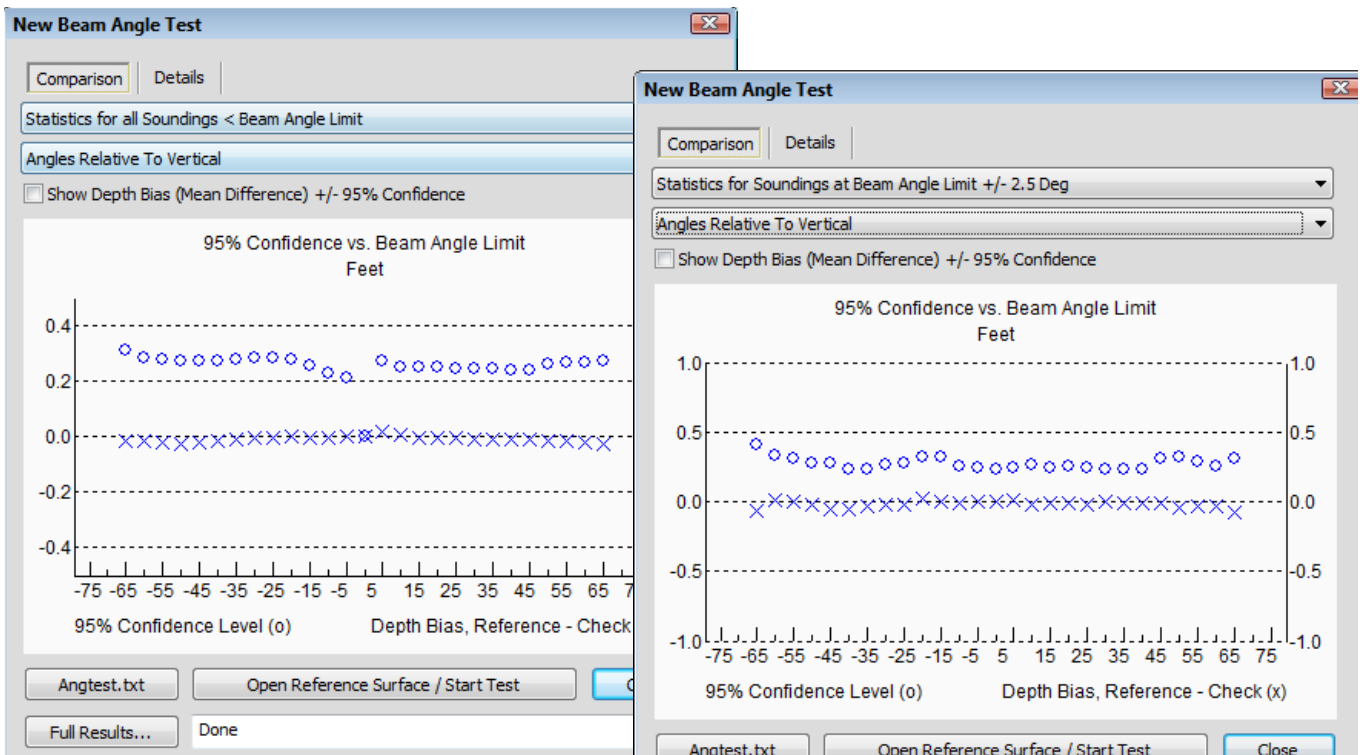
OVERLAP COUNT

Overlap is defined as areas sounded by multiple survey lines. If a location is sounded by a single line, there is no overlap (0X). If sounded by two lines, there is 1X overlap, etc.

You can select Overlap Count in the Selection drop-down to color-code a matrix display with a legend that interprets the colors.

You can also export Overlap Count to the Z-value of an XYZ (1 point/matrix cell) or matrix file. From the Save Survey dialog, select Overlap Count from the MTX Selection drop-down.

**FIGURE 19.** *Data Displayed Using Overlap Count*
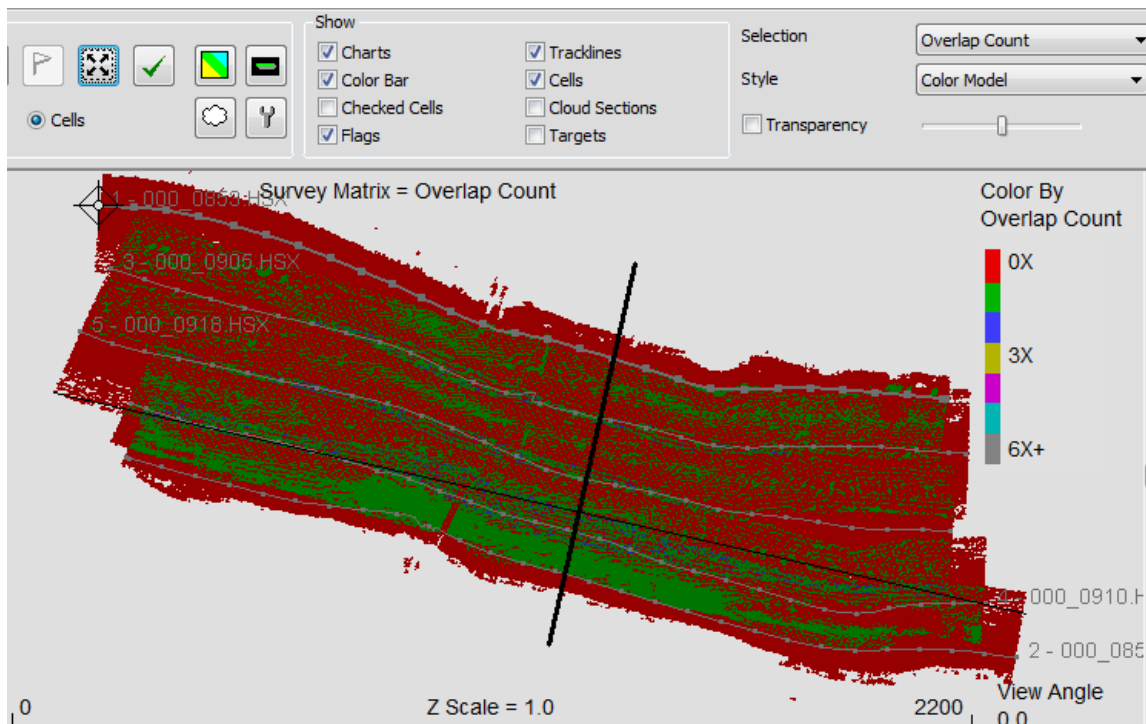
TARGETING AND MOSAICKING

- Auto TVG Smoothing
- Downsampling
- **Flip XTF Channels option:** Some XTF files reverse the channels such that the nadir appears on the bottom of the swath in the Towfish Altitude window. In this case, reload your data and check the Flip XTF Channels option in the Advanced tab of the Read parameters.

FIGURE 20. *Reversed XTF Channels—Incorrect (left), Correct (right)*
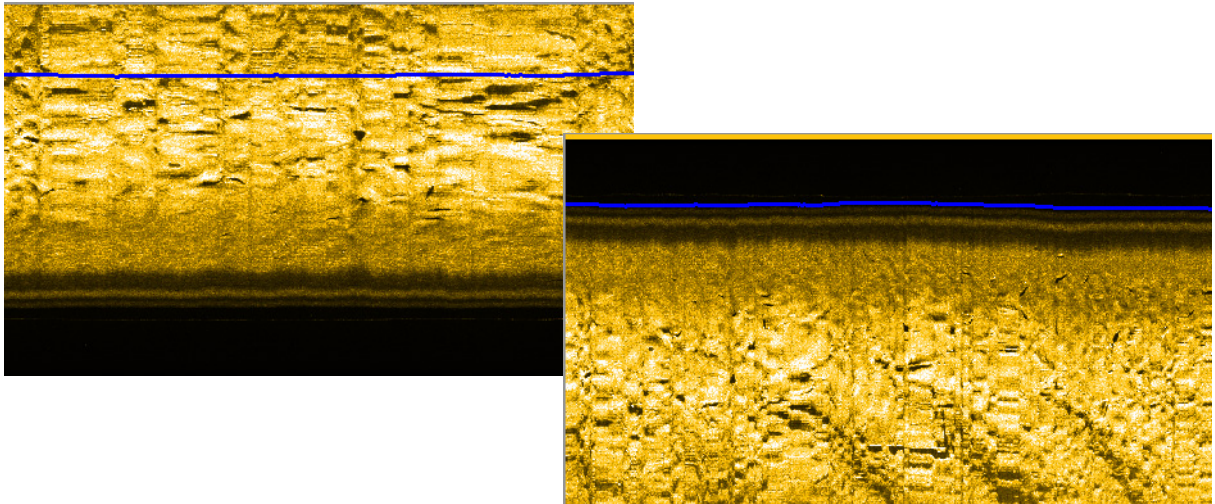
- **Multifrequency support:**
  - **Display multiple frequencies simultaneously in the bottom track and waterfall displays.**
  - **Separate gain settings for each frequency** in multifrequency data.
  - **Choose frequency for the real-time mosaic**.
- **Adjust color and gain settings for target screen captures.** Access the Side Scan Controls from the Target dialog for this purpose.

FIGURE 21. *Target Captured Image—No Gain, Gold (left), Angled Varied Gain, Rust (center) and Basic Gains, intensity (right)*
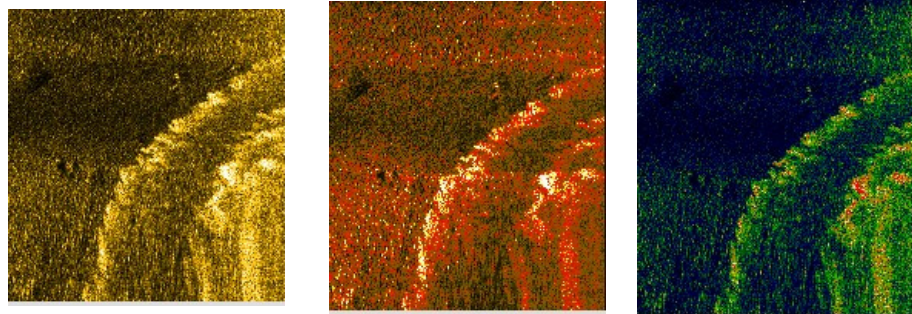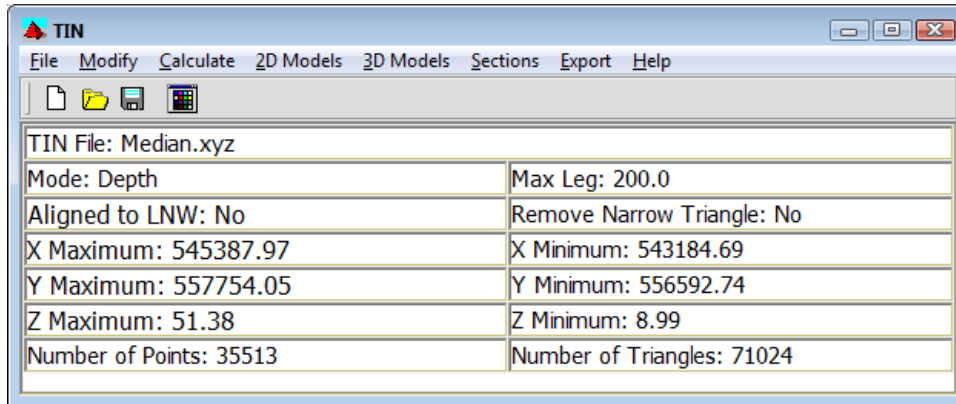
FINAL PRODUCTS

TIN MODEL

- **Add report information to the TIN Shell display**.

FIGURE 22. *TIN Shell*

- **Where survey surface meets template:** In Annotation mode, the profile displays show the bottom depth at the cursor position in the status bar.

  If your model includes template information, when your cursor approaches where the bottom and template intersect, it snaps to that point to show the exact intersection position.

- **Added surface area calculations in Philadelphia Predredge volumes** adds Area Above Design and Area in Overdepth calculations for each segment of the channel.

- **TIN-to-CHN volumes includes Fill Area.**

- **Volume reports translated to French** when French language is selected.

INSTANT PROFILES IN TIN MODEL

An **Instant Profile** is the profile view along a user-defined path across a 2D TIN model. You can draw an Instant Profile in any 2D model display. In this case, no other profiles are viewable. If you need to recreate exactly the same profile display at a later time, you can save the path to a planned line file (*.LNW).

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FIGURE 23. *Instant Profile in TIN MODEL*
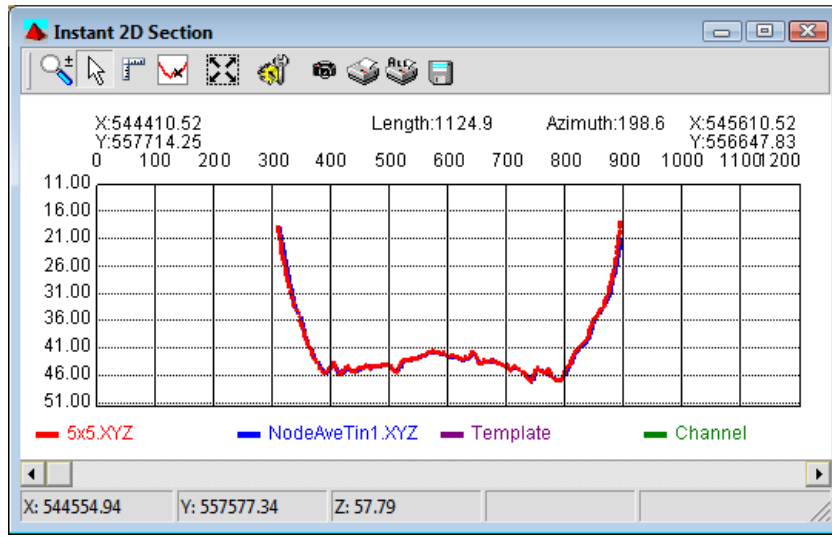
To reload the instant profile, use the exported planned line file as the Section file for your TIN Model, then select SECTIONS-2D SECTIONS.

SLOPE MEASUREMENTS IN 2D PROFILES

In 2D models, the status bar always shows the current XYZ position of the cursor.

In past HYPACK® releases, a click and drag of the cursor also displayed the distance and azimuth of the cursor path. Now, in the 2D Sections displays, you can measure distance and slope in a similar manner:

In the 2D Sections display, click the measure icon then drag the cursor along the slope. The status bar displays the change in the horizontal and vertical position, and the slope between the start point and the current cursor position.

STOCKPILE VOLUMES

Stockpile volumes is like a TIN-to-TIN calculation, but it requires only one survey surface; the other surface is calculated from a border file (*.BRD). The program uses the TIN depth at each waypoint of the border file, then generates a TIN surface using the resulting XYZ positions.

IMPORTANT: When you construct the border file, clear the Outside option so TIN MODEL references the area *inside* the border.

The stockpile calculations represent the difference between the surface derived from the border file, and your survey data. The Stockpile method calculates volumes and areas above and below the border surface, so you can calculate the volumes of both stockpiles and basins. It also calculates volumes for more than one border file at a time.

For this comparison between your survey surface and one or more border files, TIN MODEL requires only the surveyed surface in the Initial Data dialog. You can then specify one or more border areas in the Volume Calculation dialog.

In the following example, the Beach.Brd surrounds an area of higher elevation, while the Channel BRD surrounds the deeper center channel area.

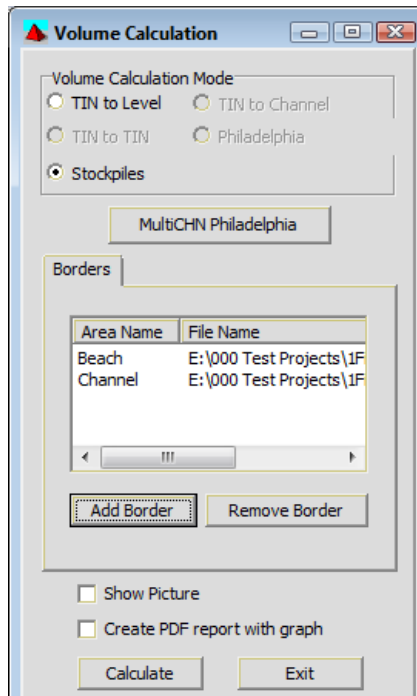**FIGURE 24.** *Sample Volumes Calculation Dialog*

FIGURE 25. *Sample Stockpile Report*

```
Tin Stockpile Volumes
Volume unit: Cubic Yard
TIN File: E:\000 Test Projects\1FinalProducts\Sample_Beach\Edit\Afters.log
Border          Material        Material Area   Void Volume     Void Area       Perimeter
-------------------------------------------------------------------------------------------
Beach           27855.2         169965.9        26.2            3635.7          2167.8
Channel         1434.6          37195.4         10535.9         165243.8        2202.1
-------------------------------------------------------------------------------------------
Total           29289.9         207161.3        10562.1         168879.5        4369.9

        BorderAvg Pile Height  Avg Base Elev  Max Height      Max Base Elev   Min Base Elev
-------------------------------------------------------------------------------------------
Beach           3.2             5.5             9.7             7.8             3.1
Channel         0.7             -2.1            4.8             5.2             -10.8
-------------------------------------------------------------------------------------------
Average  |      1.3             1.7             7.2             6.5             -3.8
```

ADDED XYZ EXPORT OPTIONS

- **TIN-to-Level Comparisons:** You can export the heights of the nodes in your TIN surface and a user-defined level at each node. Select the TIN-to Level option and enter the desired Level value. The following example outputs an XYZ where the Z represents the sounding height above or below 5.

**FIGURE 26.** *Sample TIN-to Level Export*
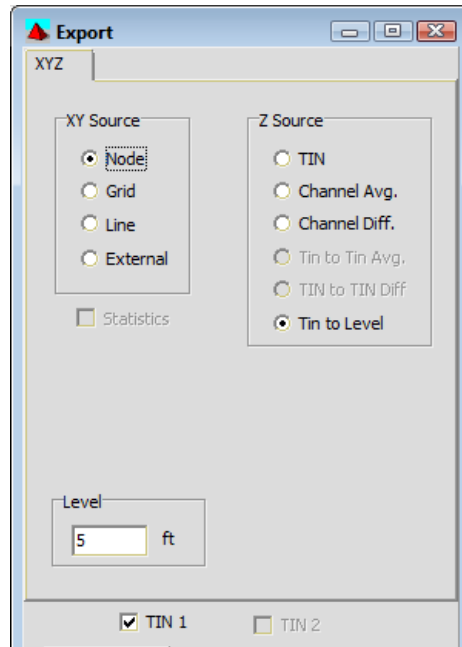
- **External XY Source:** You can export soundings at each XY position from another XYZ file. When you load only a single TIN surface, there are two Z output options:
  - **TIN:** TIN depth
  - **TIN to Ext Diff:** Difference between the external XYZ and the TIN surface.

The number and arrangement of your output soundings depends on the number and arrangement of the External XYZ Reference file.

Select the External XYZ Source option, and enter the file from which the program will read the horizontal positions.

FIGURE 27. *Sample Export Using External Positions—TIN Depth (left), External Difference (right)*
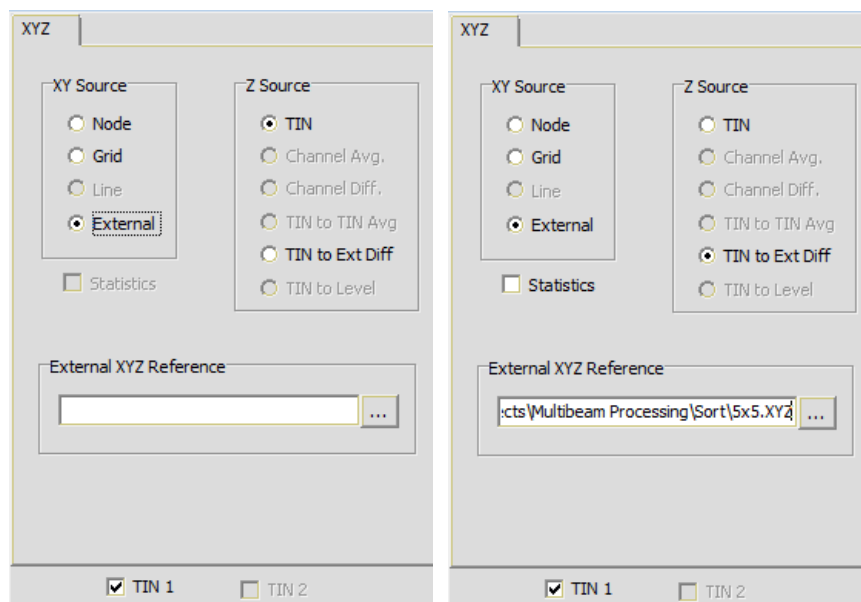
When you have also loaded an Additional TIN surface, you can export average or difference of the TIN depths at each XY position from your External XYZ Reference.

FIGURE 28. *Exporting TIN-to-TIN Average (left) or Difference (right) at the External Positions*
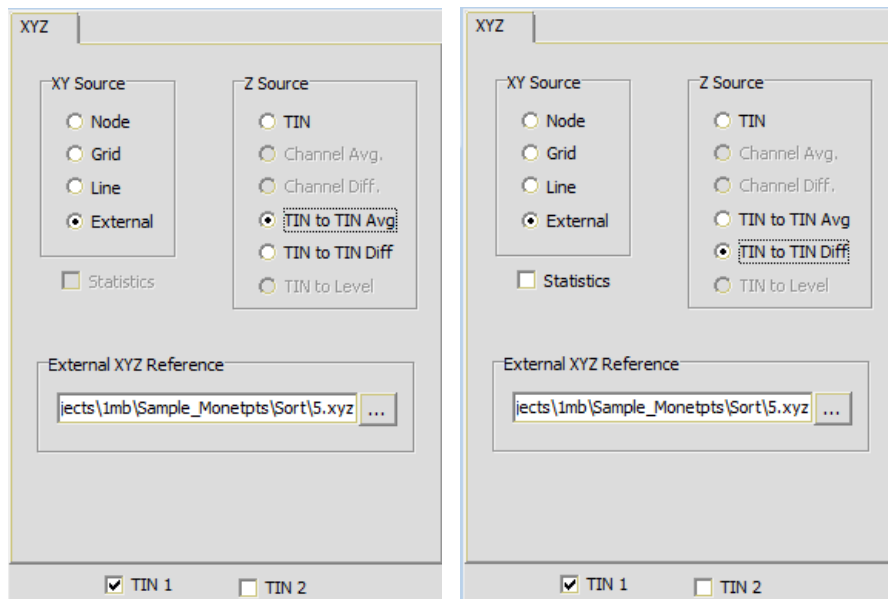
MODIFIED MATRIX EXPORT

The TIN MODEL program can read an existing matrix file or create a new one, and fill the cells with the data from your TIN Model. The soundings from a single-surface TIN model are saved as survey depths in the matrix. If you include an Additional File in your TIN Input, the depths from the second surface are saved as dredge depths.

FIGURE 29. *The Matrix Export Dialog*
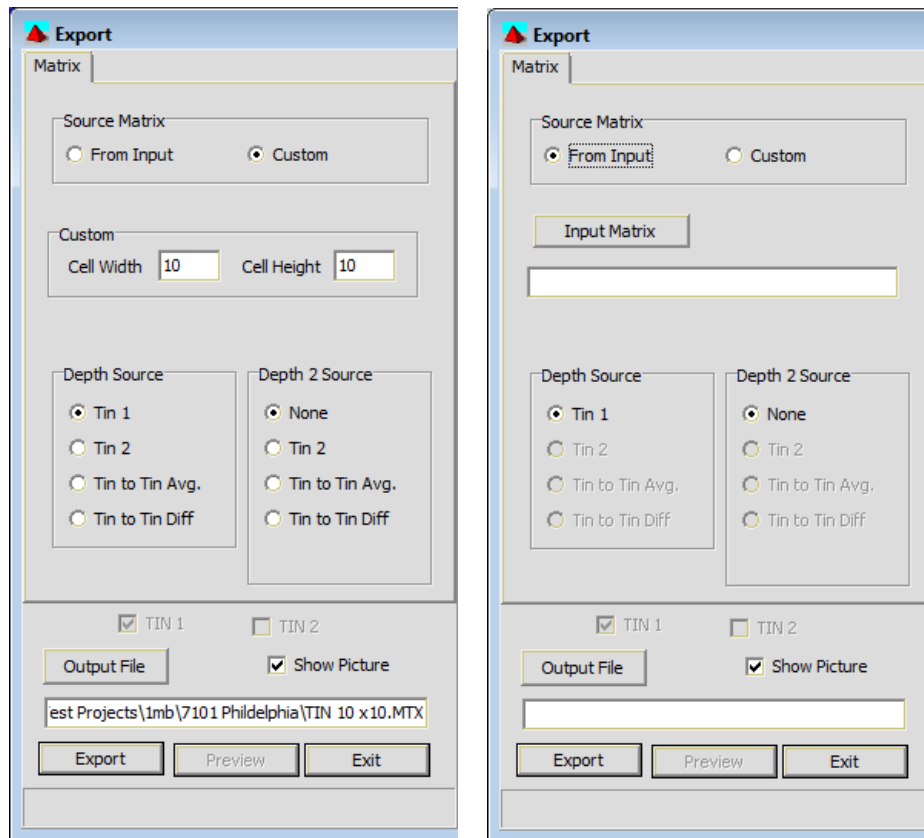
CROSS SECTIONS AND VOLUMES

- Volume reports translated to French when French language is selected.

UTILITIES

SURVEY STATISTICS

NEW! SURVEY STATISTICS is designed to compare the soundings of two edited (EDT or HS2X), or XYZ data sets. The program compares each sounding in the primary file, with the closest point from the comparison file that falls within a user-defined radius. It then shows the points that have been compared and reports the statistical results in a textual report and in a histogram graph. An optional PDF report includes the combined statistics.

- **Numeric Statistics:** The Report tab shows the distribution of the comparison differences.
- **Histogram:** The Histogram tab graphs the same statistical data.

FIGURE 30. *Sample SURVEY STATISTICSÒ Report Tab (left), Histogram (right)*
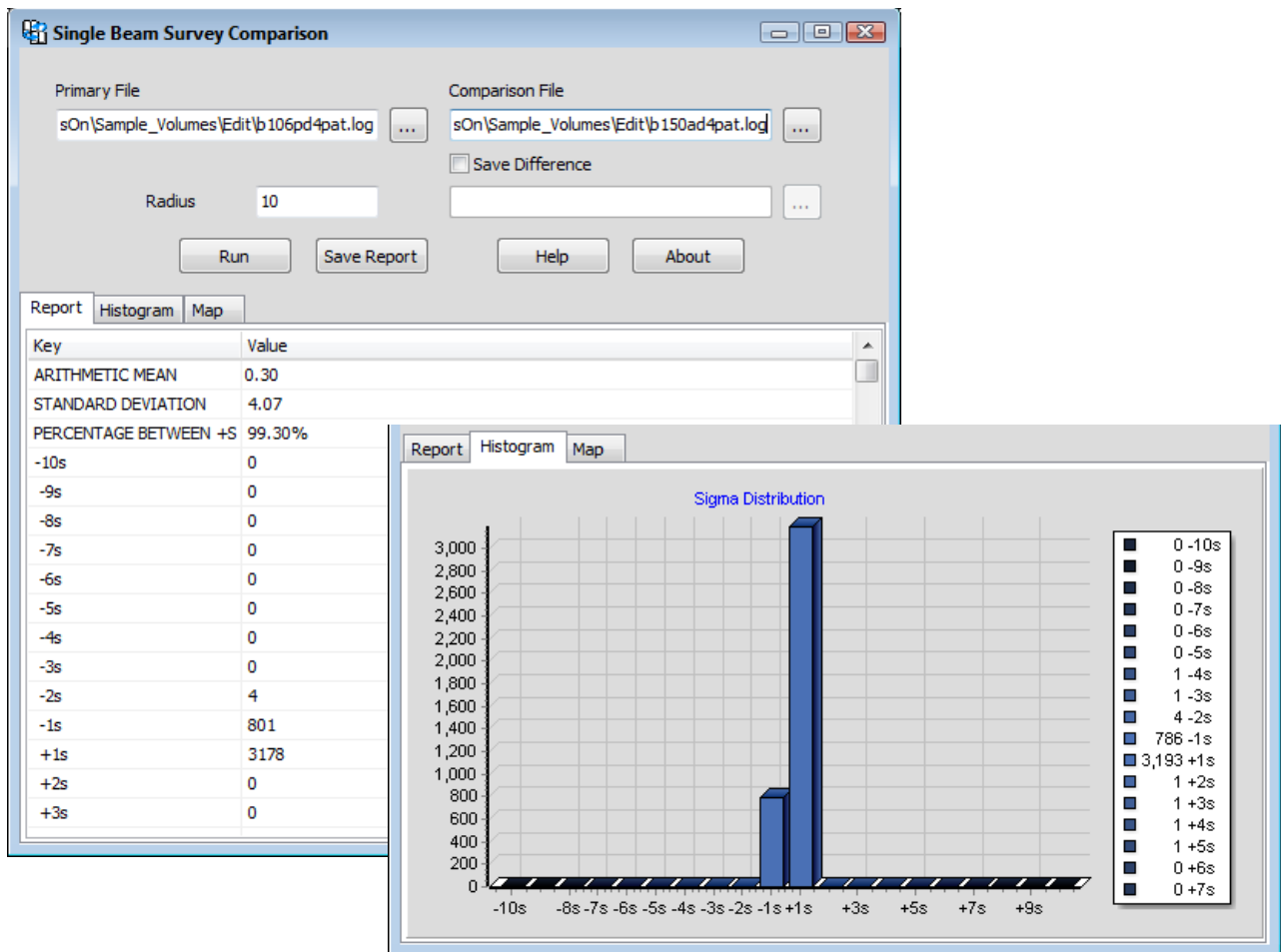
- **PDF Output: To output the statistical analysis to PDF format**, click [Save Report] and name your output file.
- **Map Tab:** The map display shows how the soundings have been compared:
  - **Red:** Soundings from the comparison file that are included in the statistics.
  - **Black:** Soundings from the comparison file that were not the closest point to a sounding in the primary file so they are not included in the statistics.
  - **Blue:** Points in the primary file without a comparison point within the user-defined radius.
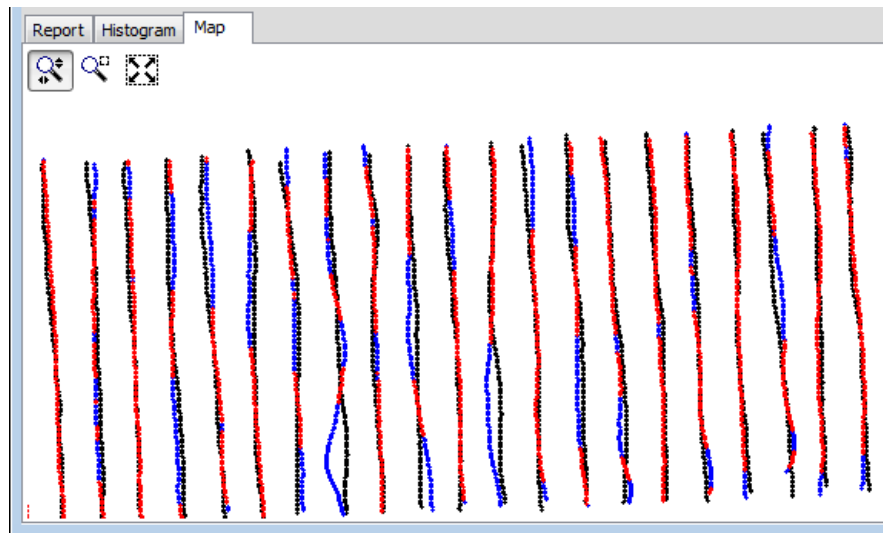
You may also export an XYZ file representing the depth differences of each point comparison.

DATA SPLITTER/JOINER

- **Automatically merges files** with a minimum distance of 5 meters and 5 seconds between their beginnings and ends. This prevents small gaps between consecutive files.
- **Supports data split based on time or file size**. To prevent any data gaps, you can configure the output files to overlap a small amount. Just enter the split criteria and click [Apply]. The DATA SPLITTER-JOINER shows the proposed output. You can then use the cursor to reposition the end points of the defined segments, and to delete unwanted segments.
    - **To output files based on file size**, open the Size tab and enter the maximum output file size, and the amount (seconds of acquisition) consecutive files should overlap.
    - **To output files based on time**, open the Time tab and, enter the maximum acquisition time span represented in each output file, and the amount (seconds of acquisition) consecutive files should overlap.

FIGURE 32. *Splitting Files by Sizes (left) and Time (right)*
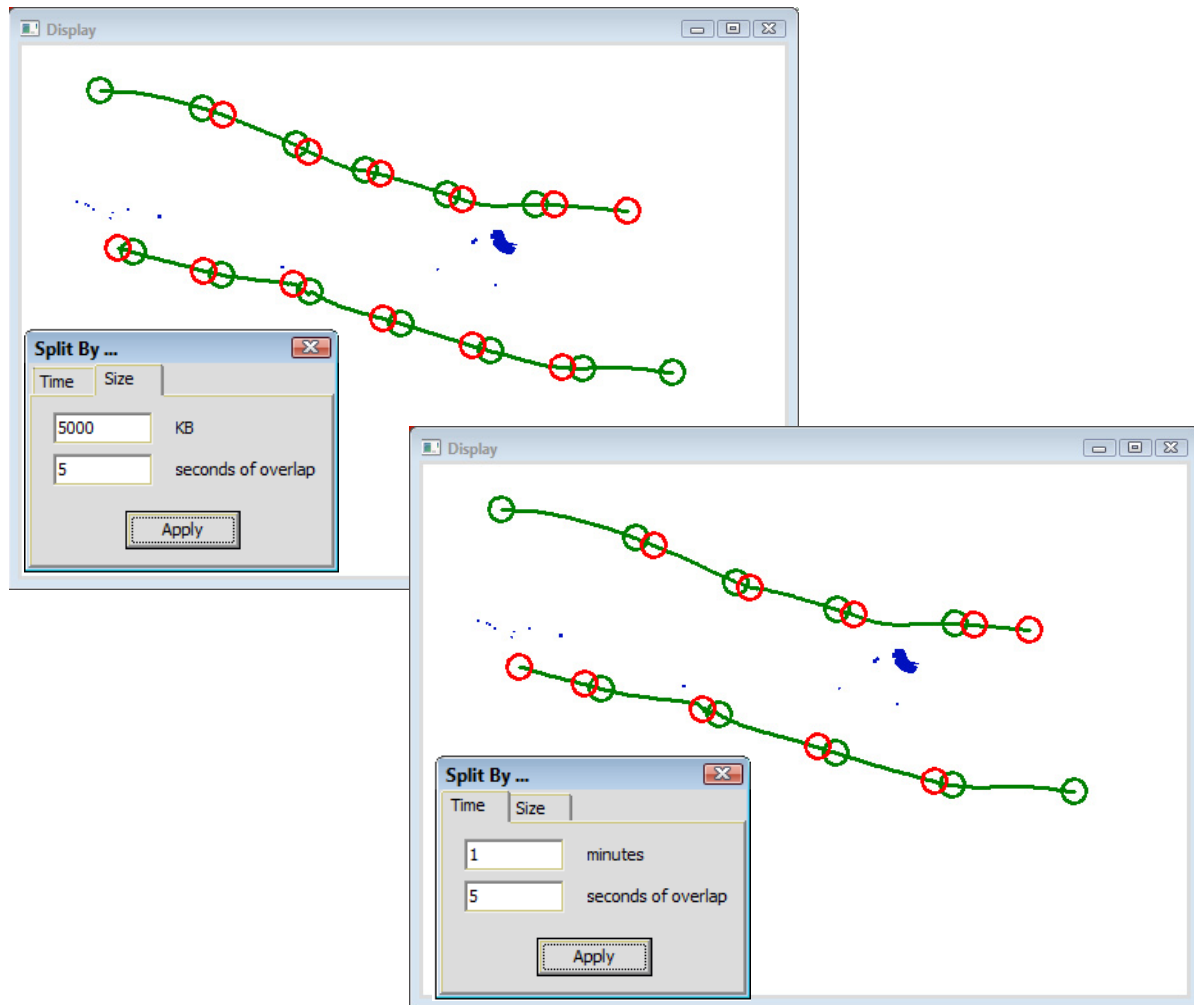
STATISTICS

- **Reads the center beam of HS2/HS2X format files.** Supports SonTek HydroSurveyor when used as a single beam echosounder.

DATA CONVERTER

- **Added large depth limit sonar flag to MBI records** if maximum depth is greater than 655.
- **Increased first beam angle and angle increment of MBI tag in HSX header to 3 decimal places** instead of 1 for Imagenex bathymetric file conversions.
- **Converts pressure to depth**. It looks like his conversion assumes salt water, not fresh.

CLOUD

- **Option to uniformly adjust Z:** Using EDIT-ADJUST Z VALUES you can vertically shift, invert, or multiply the Z value in your CLOUD data.
- **If Z values are changed, the program prevents overwriting the original edited data files.** You can only save Z-adjusted data to XYZ, LAS or PTS format.
- **Define and display a pipeline in the context of your XYZ sounding data** using a specially constructed pipeline file. The pipeline file is for display purposes only. It is not editable within CLOUD.

FIGURE 33. *Sample Pipeline with Survey Data Cloud*
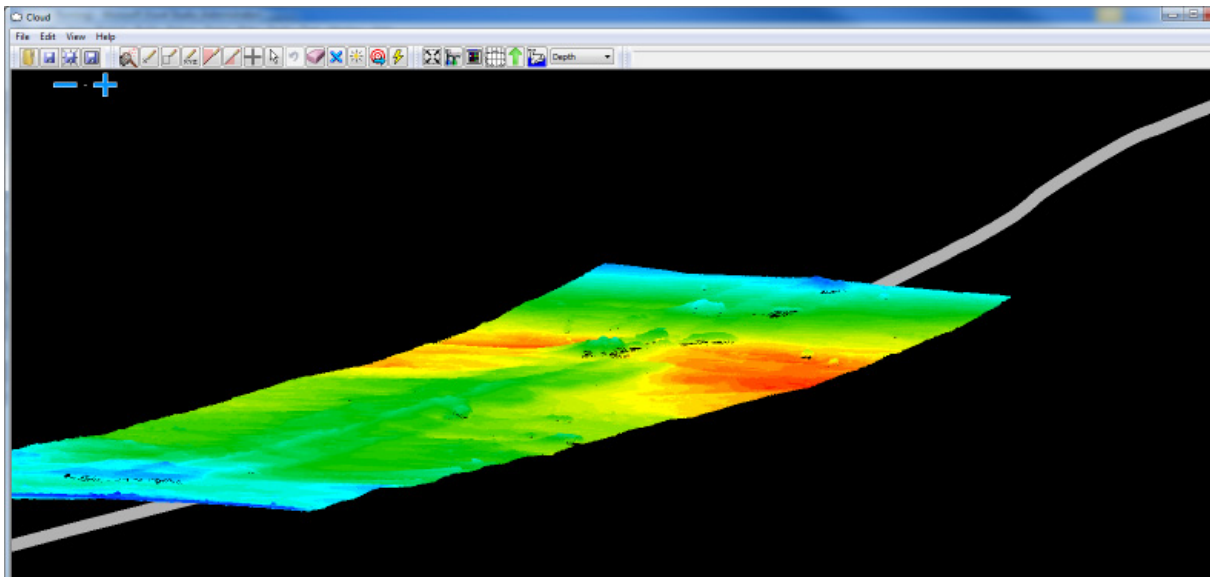
- **Optimizes sounding colors for the current data range.** Select VIEW-SET COLOR RANGES TO DATA.
- **Improved implementation of chart display configuration**.
- **Faster drawing** method in the Cloud Grid Control window.
- **Extended precision in the Information panel** to 2 decimals.

ACDP PROFILE

- **Exported CSV file** can include X,Y, Lat Lon, and Cell Vertical Velocity

RAW DATA ADJUSTMENTS

REINSTATED! The RAW DATA ADJUSTMENTS program makes changes to Raw Data Files collected in the SURVEY program. The program reads your raw data files, either one-by-one or via a catalog (*.LOG) file. It creates new data files in the same directory that it reads from, and saves each file with a new, user-defined extension. It also automatically creates a new catalog file (*.LOG), using the same extension with the root of the catalog name.

FIGURE 34. *Data Adjustments*
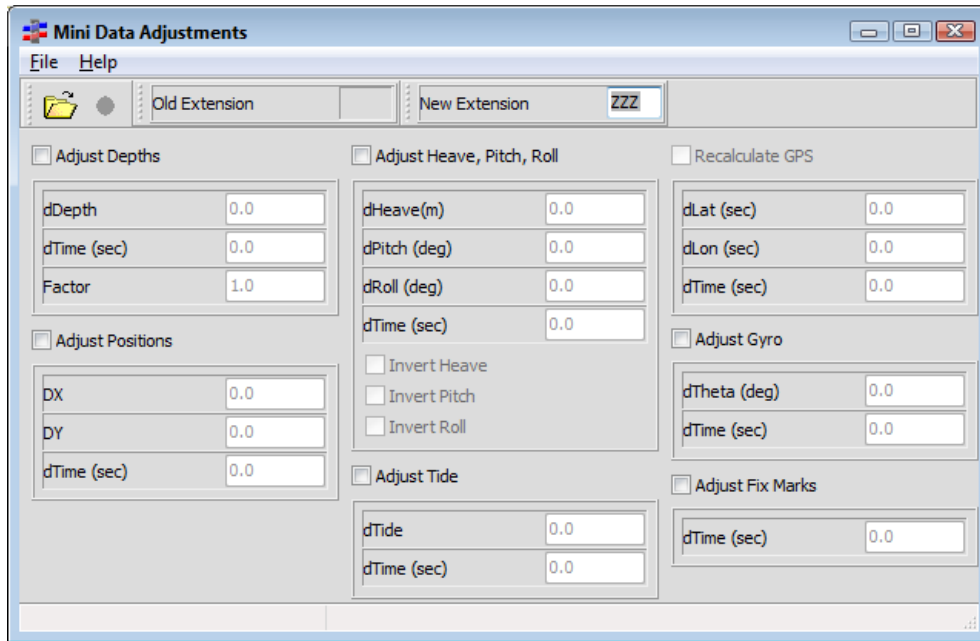
You can adjust the following items:

Positions
- Add an offset to the X or Y coordinates.
- Adjust the time stamp of the position records.

Gyro
- Adjust the gyro angle (in degrees).
- Adjust the time stamp of the gyro records.

Heave-Pitch-Roll
- Adjust the heave, pitch or roll (or more than one of these).
- Adjust the time stamp of the depth records.

Depths
- Adjust the depth by multiplying by or adding a user-defined constant.
- Adjust the time stamp of the depth records.
- Recalculate Range-Azimuth
- Re-calculate your range-azimuth data. It requires the old station X-Y and reference azimuth and the new station X-Y and reference azimuth.
- Adjust the time stamp of the position data.