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Single beam in Hypack

HYPACK 2022

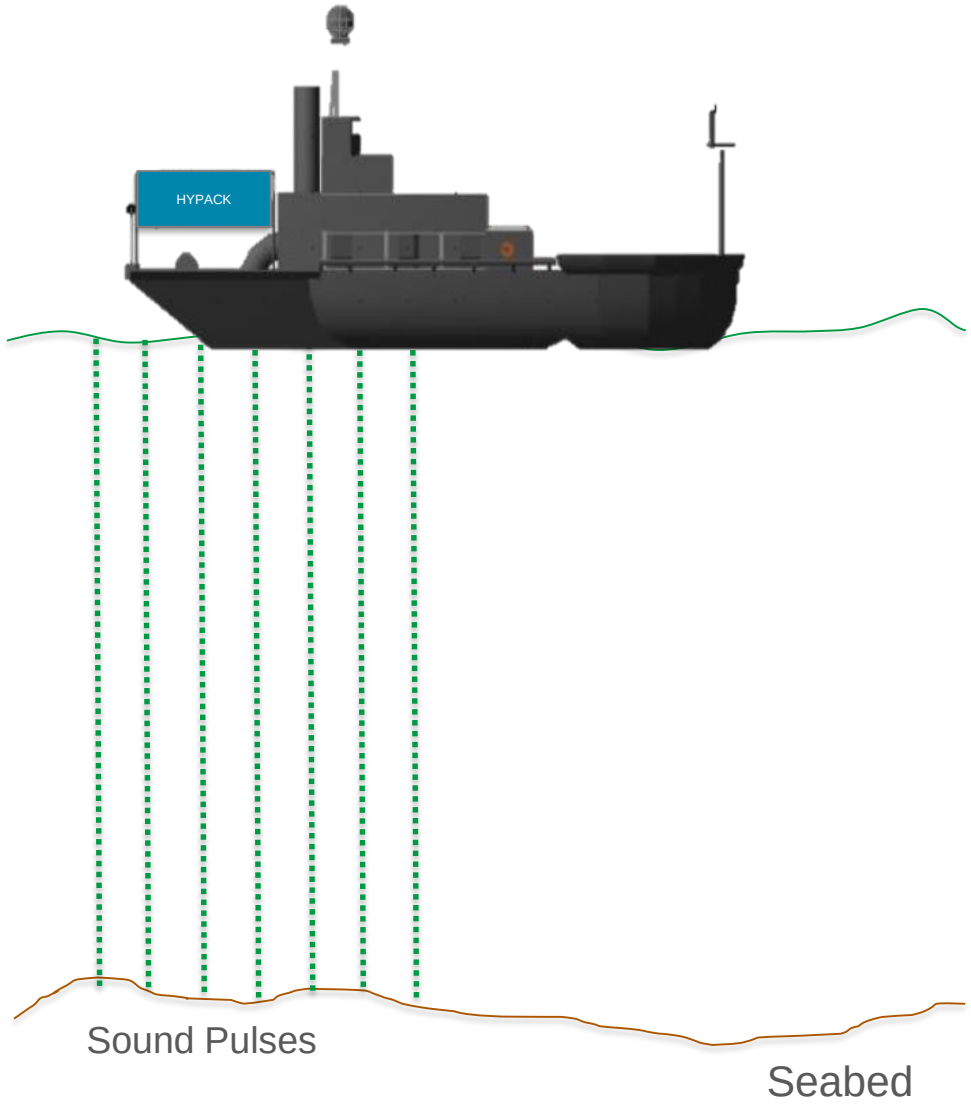
Single Beam Echo Sounder

Measure travel time from the sonar to the reflected Seabed.

The SBES can only take one measurement at a time, hence the Single Beam.

The system typically “pings” several times per second.

Speed of Sound * Time = Distance

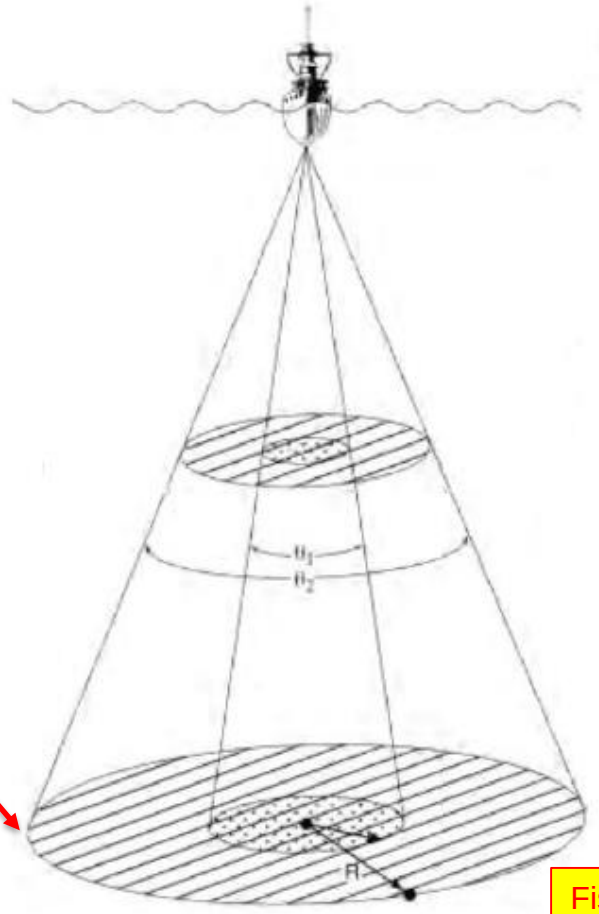


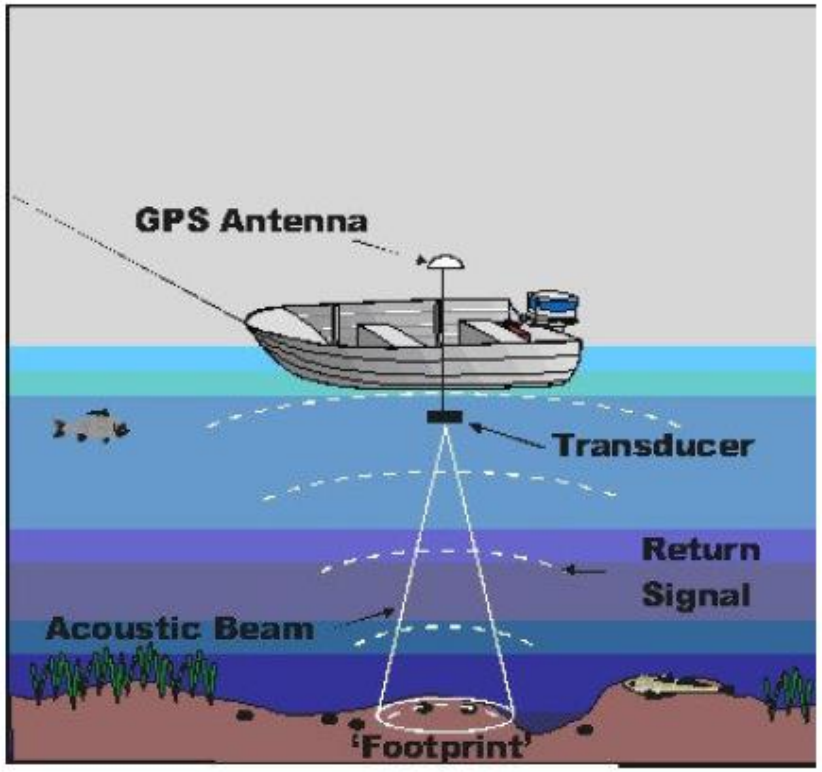
SBES – Beam Characteristics

As beam width increases the footprint on the seabed increases as well.
The sounding is the strongest return within that area

	20’	40’
3 degree	1.0	2.1
5 degree	1.7	3.5
8 degree	2.8	5.6
45 degree	14.1	28.3

Footprint Radius



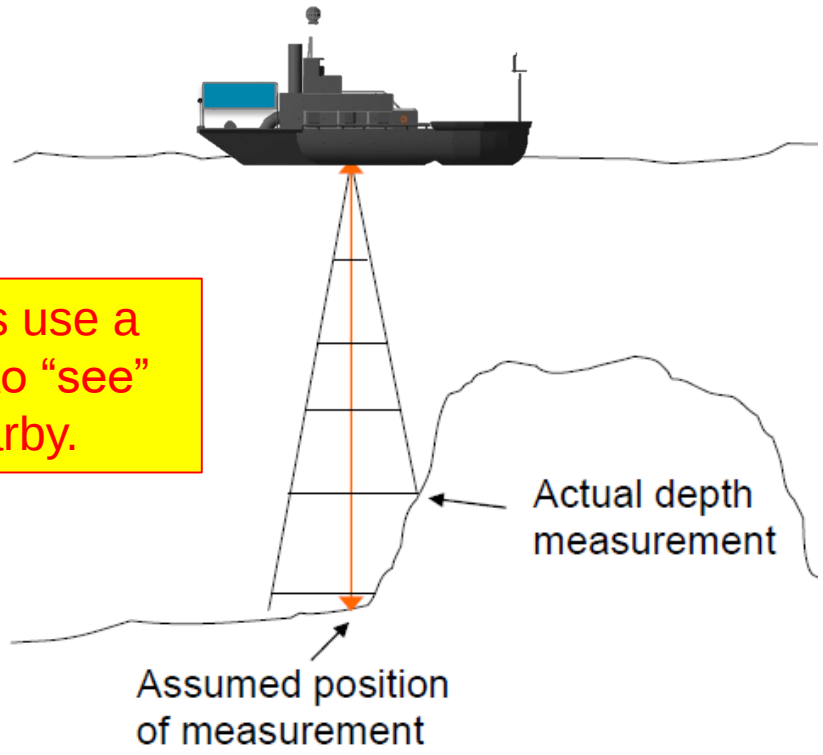


Fish Finders use a wide angle to “see” any fish nearby.

SBES – Beam Characteristics

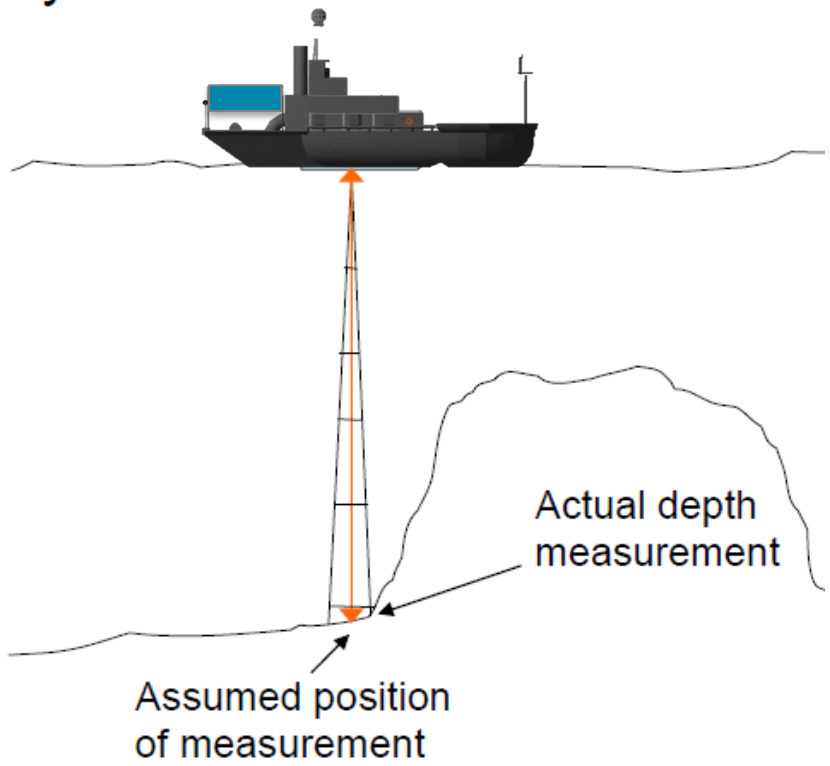
The width of the beam in a SBES can severely affect the accuracy of a reported sounding.

Wide beam system



Fish Finders use a wide angle to “see” any fish nearby.

Narrow beam system



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HYPACK HARDWARE

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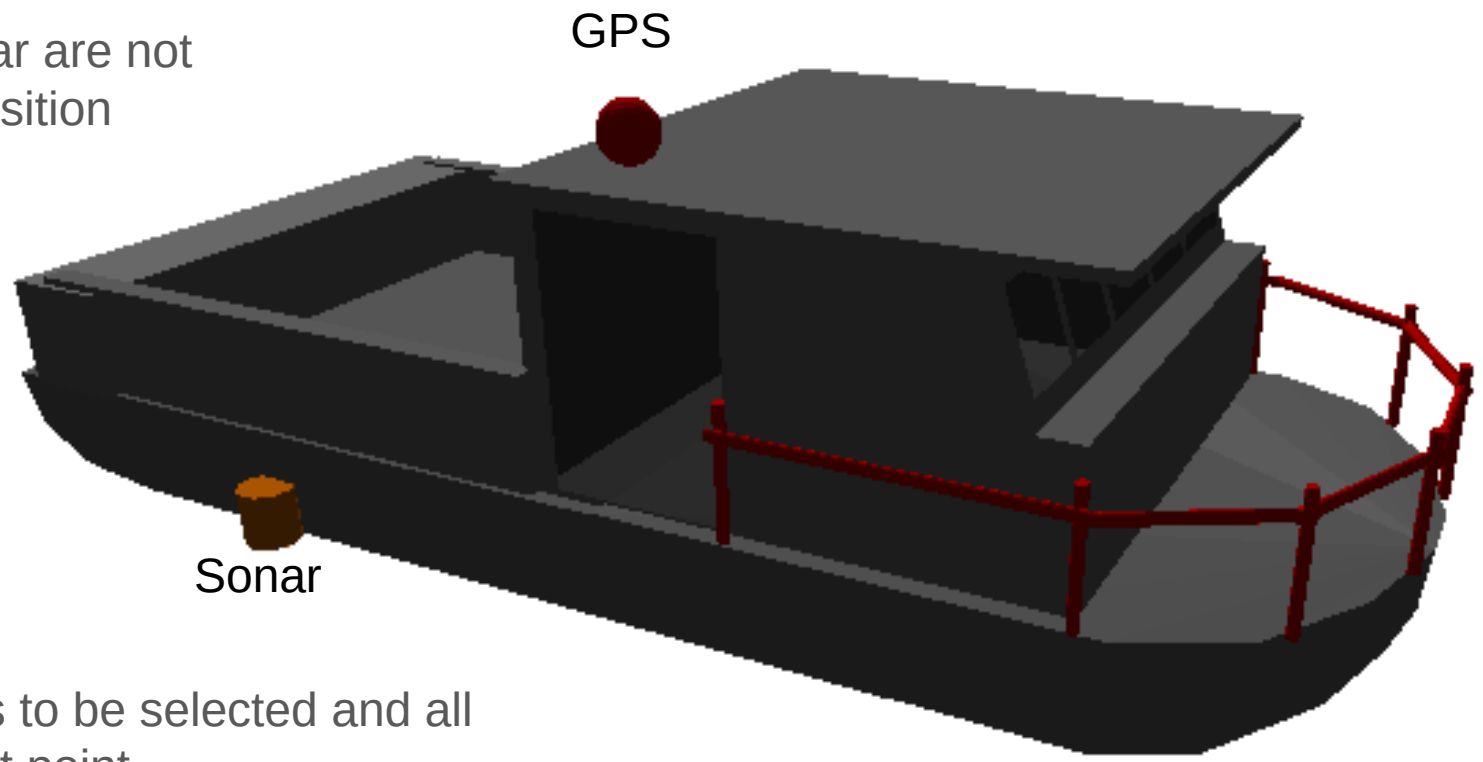
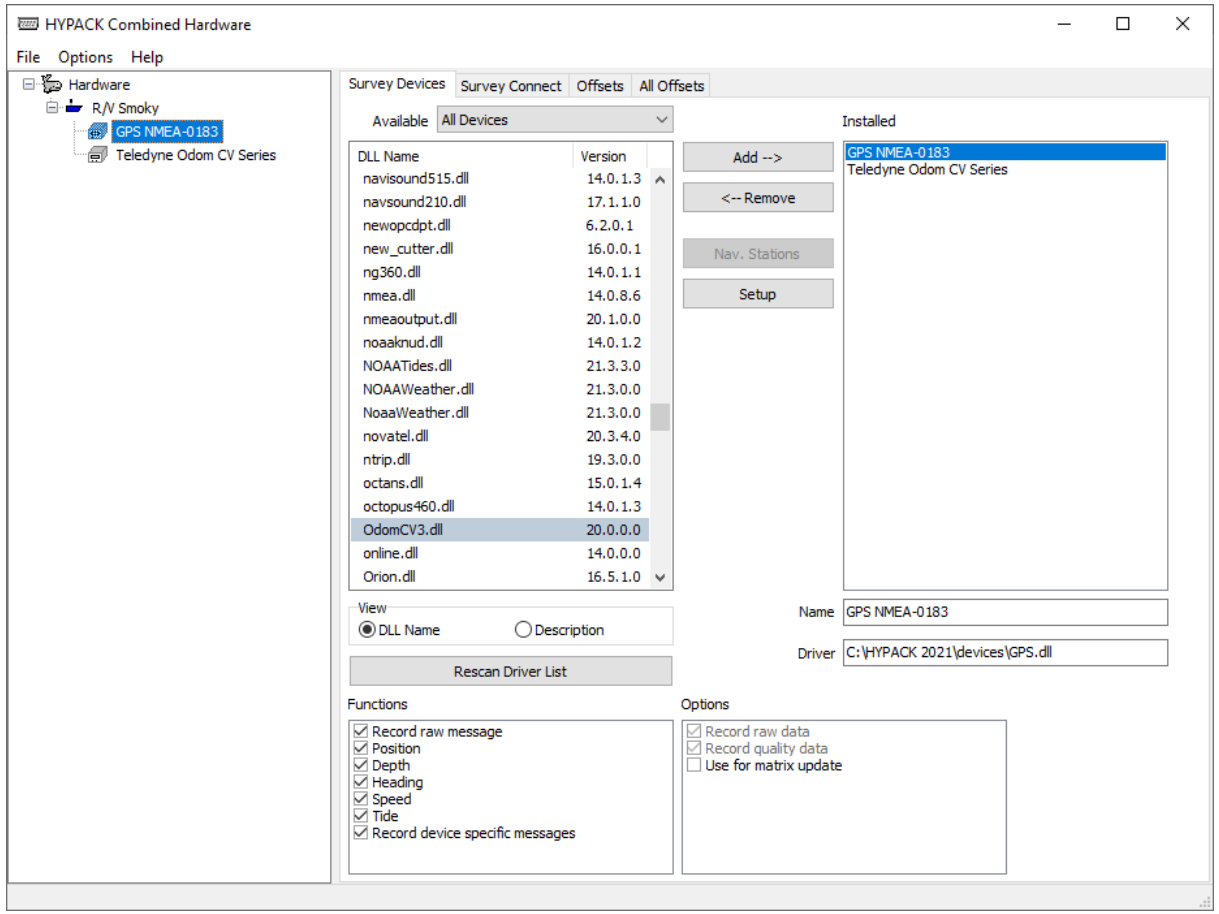
Physical Offsets

Frequently the GPS and the Sonar are not located at the same horizontal position



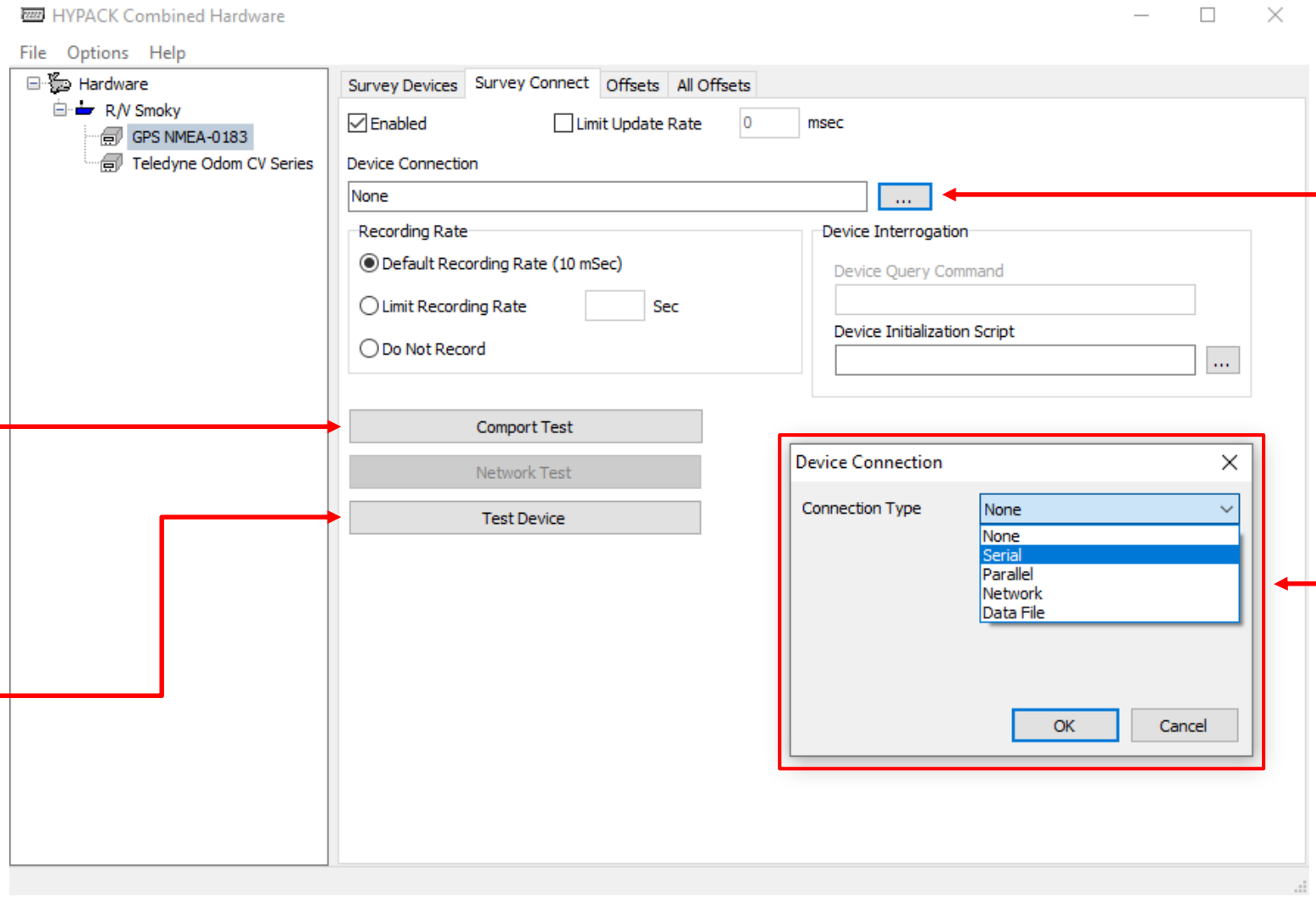
A reference point needs to be selected and all offsets measured to that point.

HYPACK® Hardware



HYPACK HARDWARE, HYSWEEP HARDWARE & SIDE SCAN HARDWARE are all configured from this program.

Devices: Connect Tab



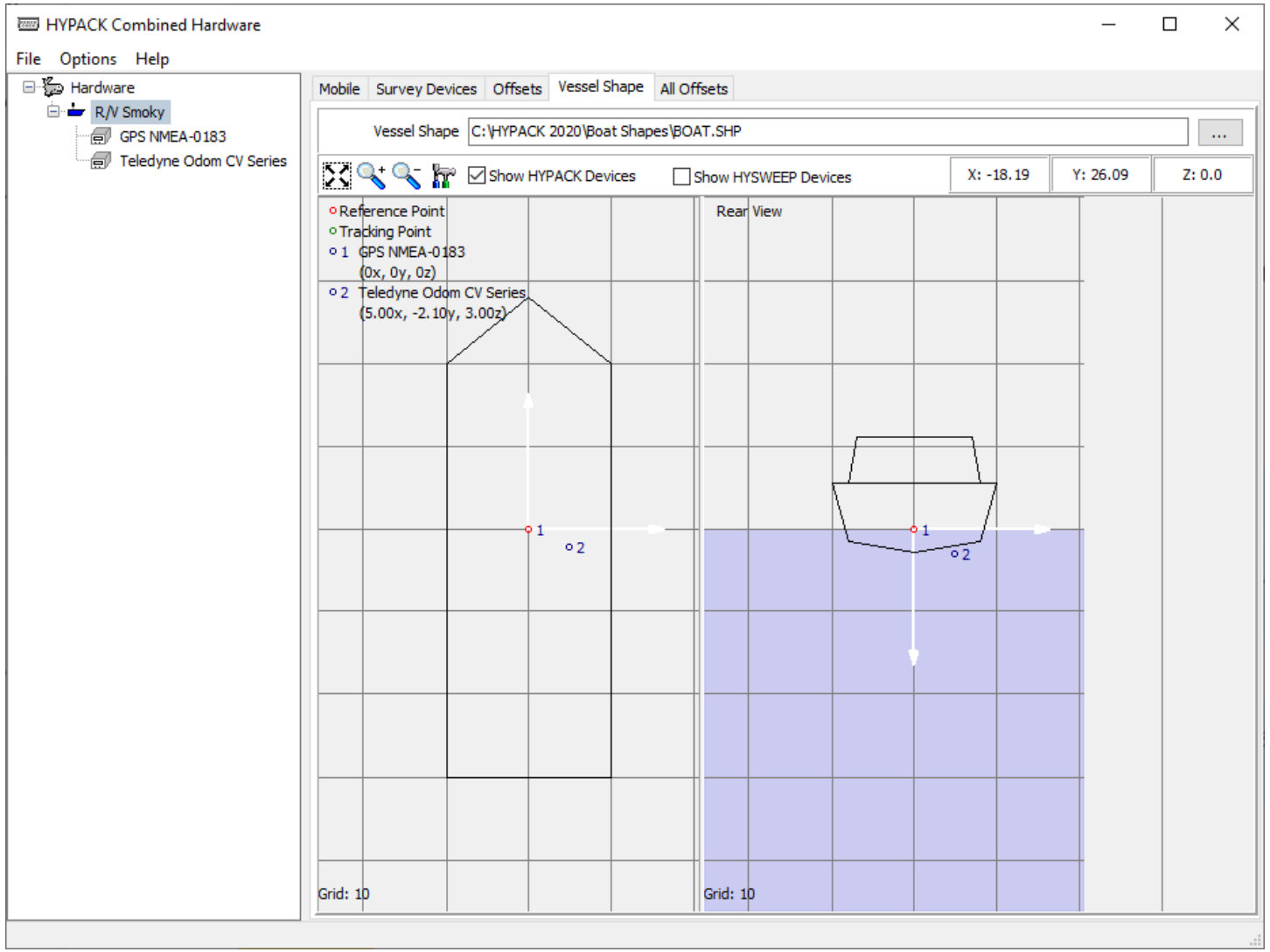
You can examine the serial port stream from here.

You can test the device from here.

Click to get the Device Connection window.

Vessel Page: Vessel Shape Tab

You can visually inspect the location of your sensors and pick your default 2-D boat shape for HYPACK SURVEY.

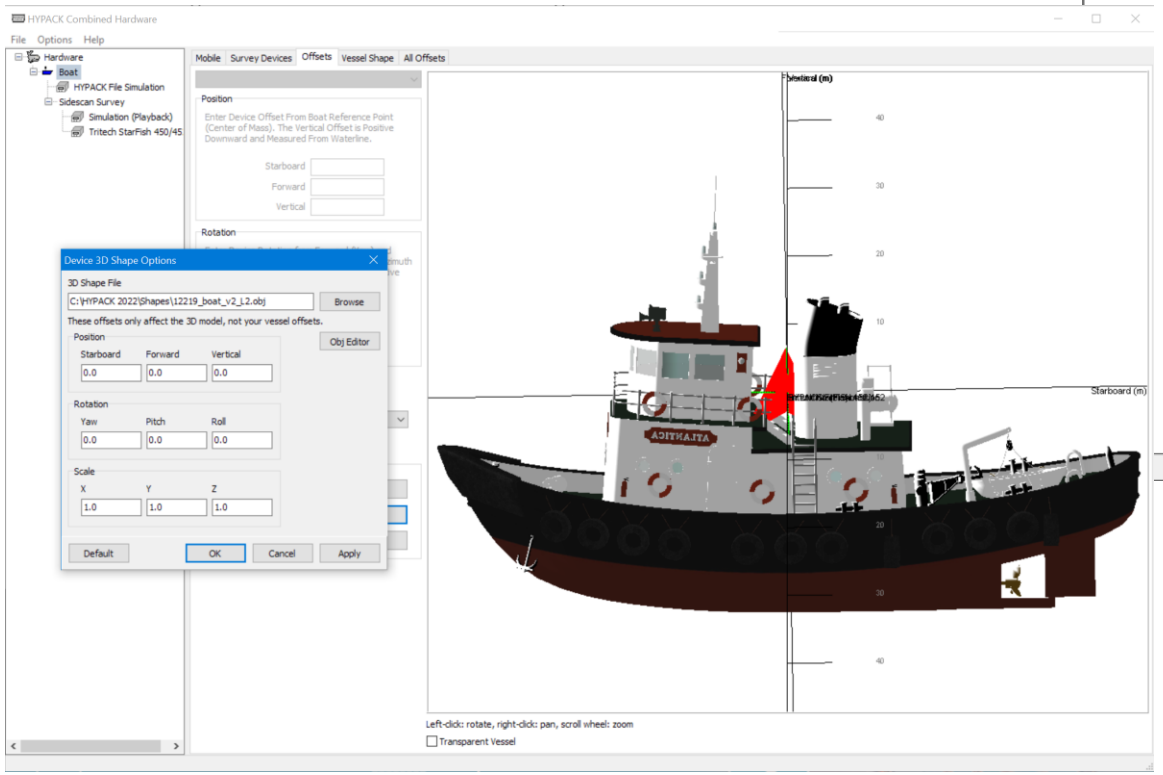


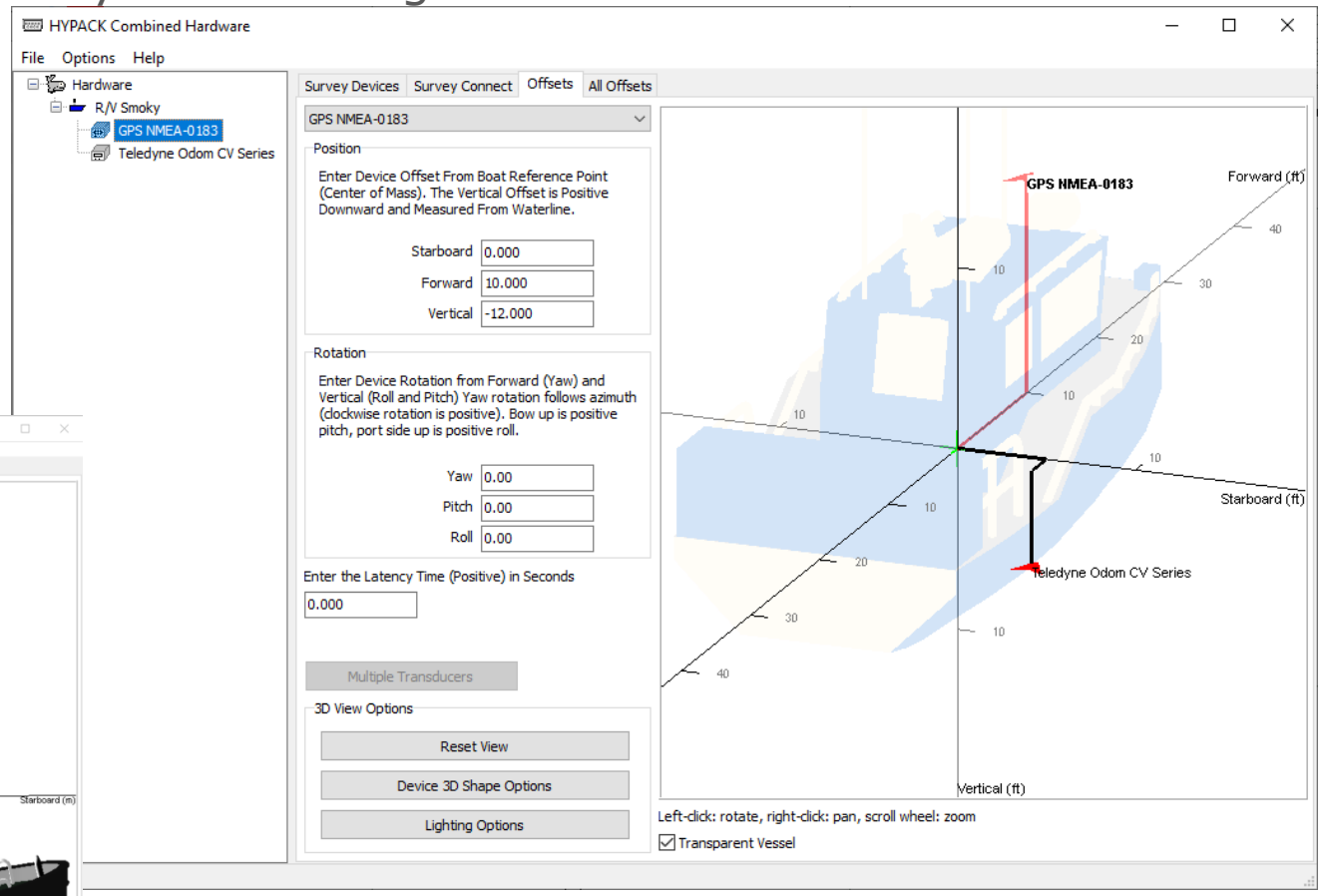
Devices: Device Offsets Tab

Specify the position for each device, relative to your boat origin. Remember, Z is positive downwards!

You can now visually inspect the location of your sensors in 3D.

Pan, tilt and zoom in/out. User can load 3od shape files.





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GPS Configuration

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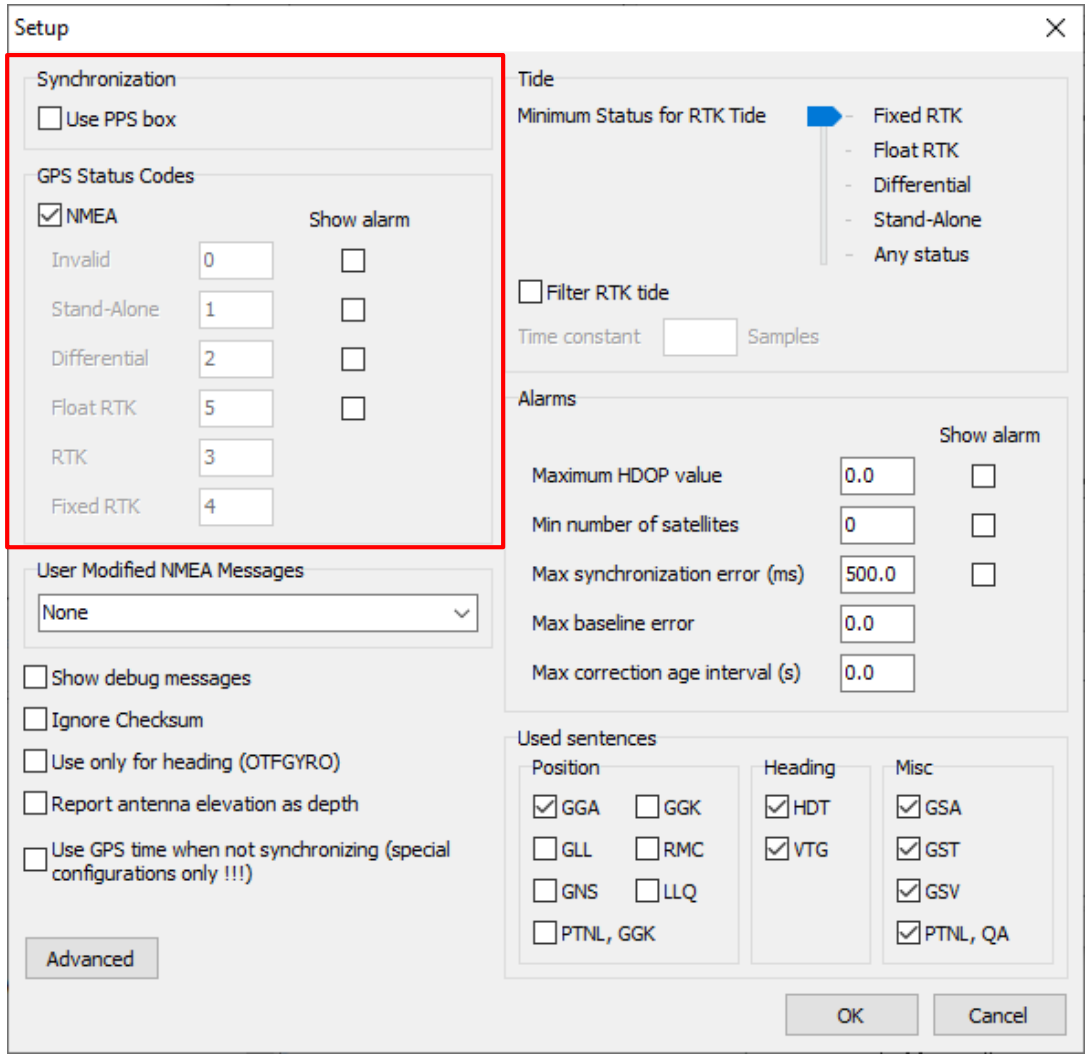
GPS: Setup Window

Synchronization:

- Are you using a 1PPS box?

GPS Status Codes:

- Standard – NMEA 3.0 (Most GPS units made after 2005)
- Uncheck NMEA box to manually set the Code values.
- Option to Show Alarm if GPS Status is lost.



GPS: Setup Window

RTK Tide:

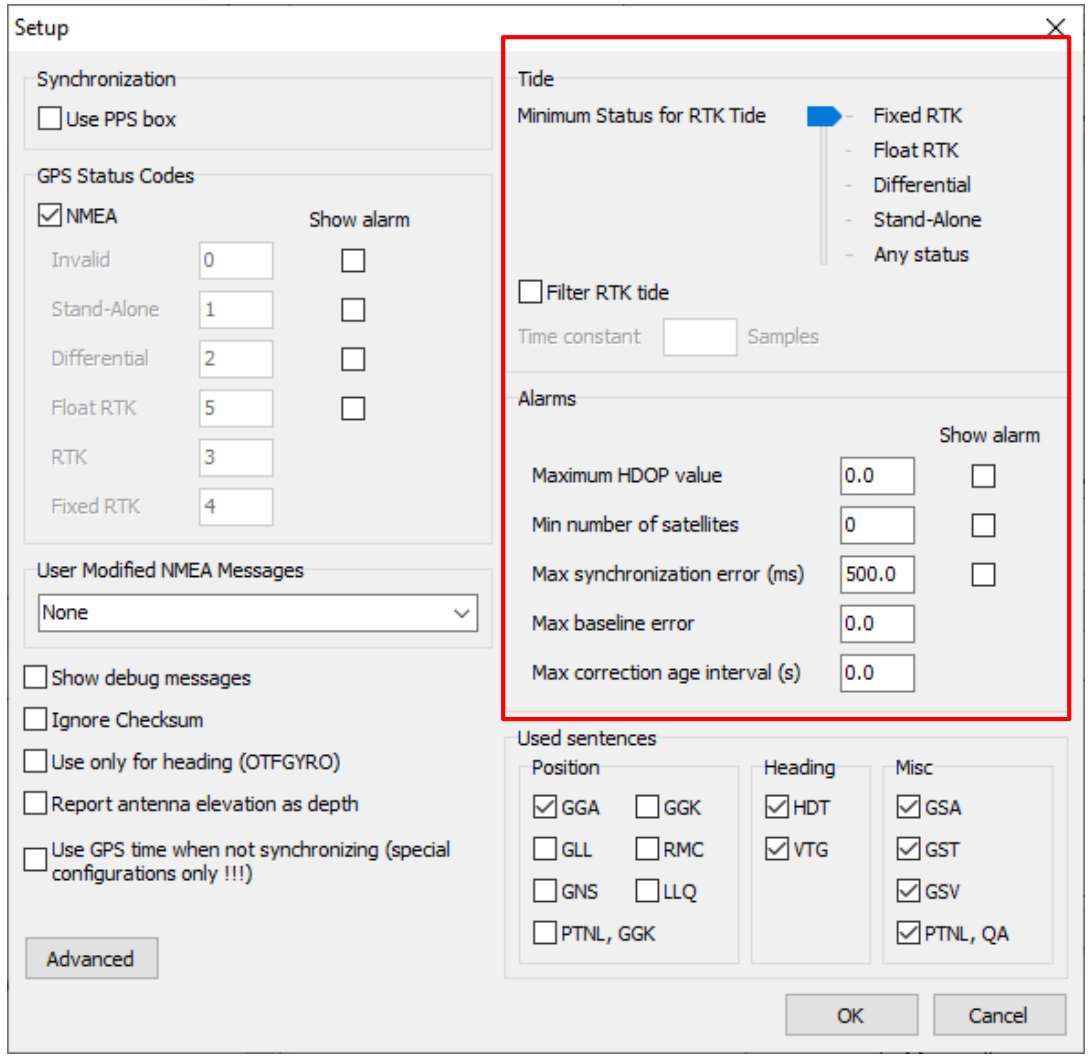
- Minimum status:
  - ➢ Compute for all and correct in post-processing.
- Filter RTK Tide:
  - ➢ Recommended on dredges.
  - ➢ Not recommended on survey vessels.

Alarms:

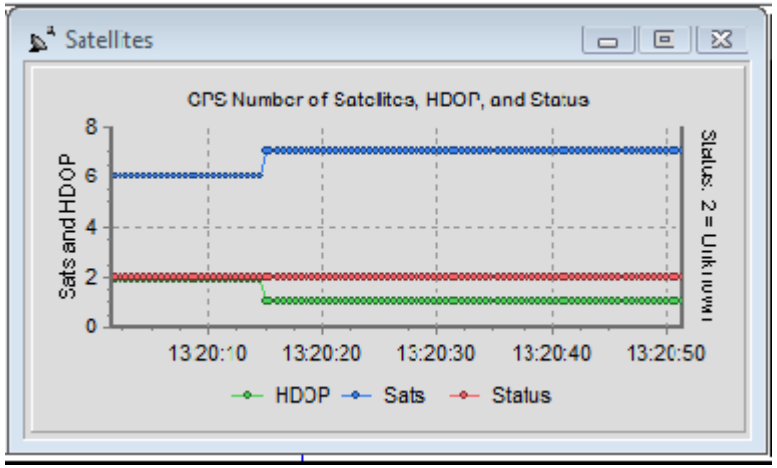
- Maximum HDOP Value: *recommended: 4.0*
- Minimum number of Satellites: *recommended: 5*
- Maximum synch error (ms): *recommended: 100*
- Maximum baseline error:

  Used when computing bearing between two GPS.
  recommended: DGPS: 2m | RTK: 0.5m
- Maximum correction age interval(s):

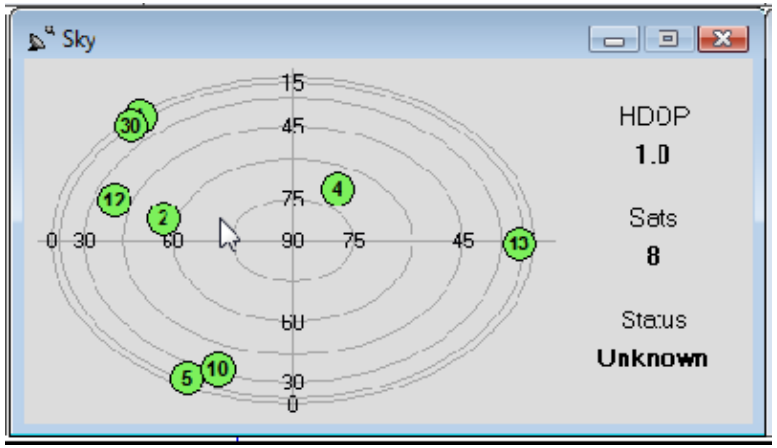
  Time between corrections from the RTK base station



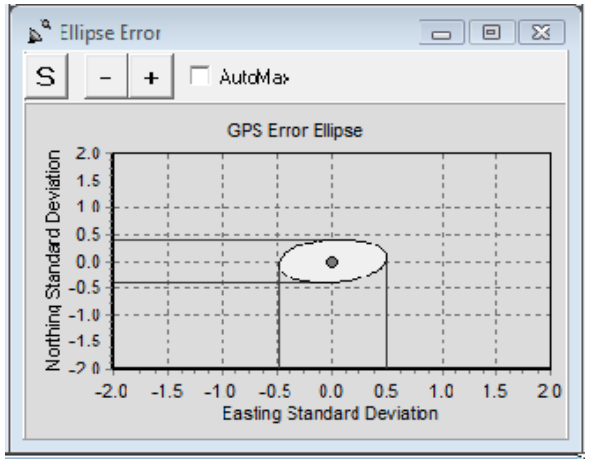
GPS Windows in Survey



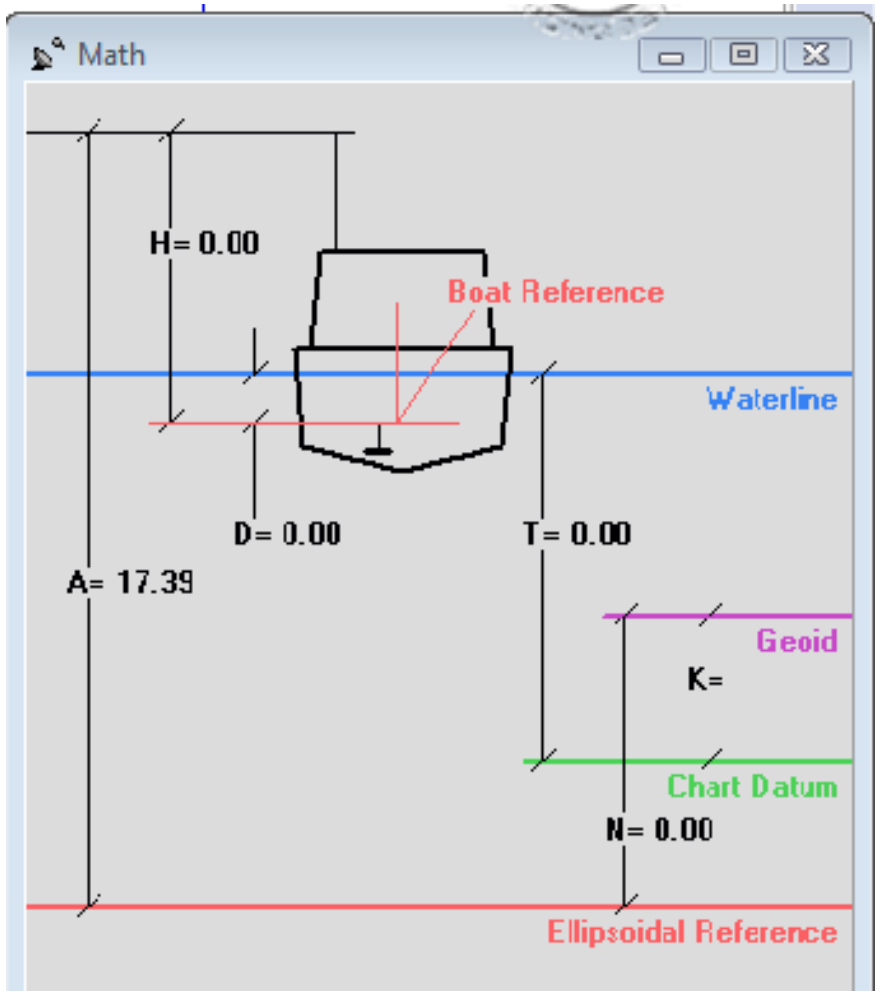
HDOP (Green), # of Sats (Blue), Status: (Red)



Sky Plot (Requires $GPGSV sentence)



Error Ellipse
(Requires $GPGST sentence)



RTK Math Window

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Sound Velocity and Single Beam Data

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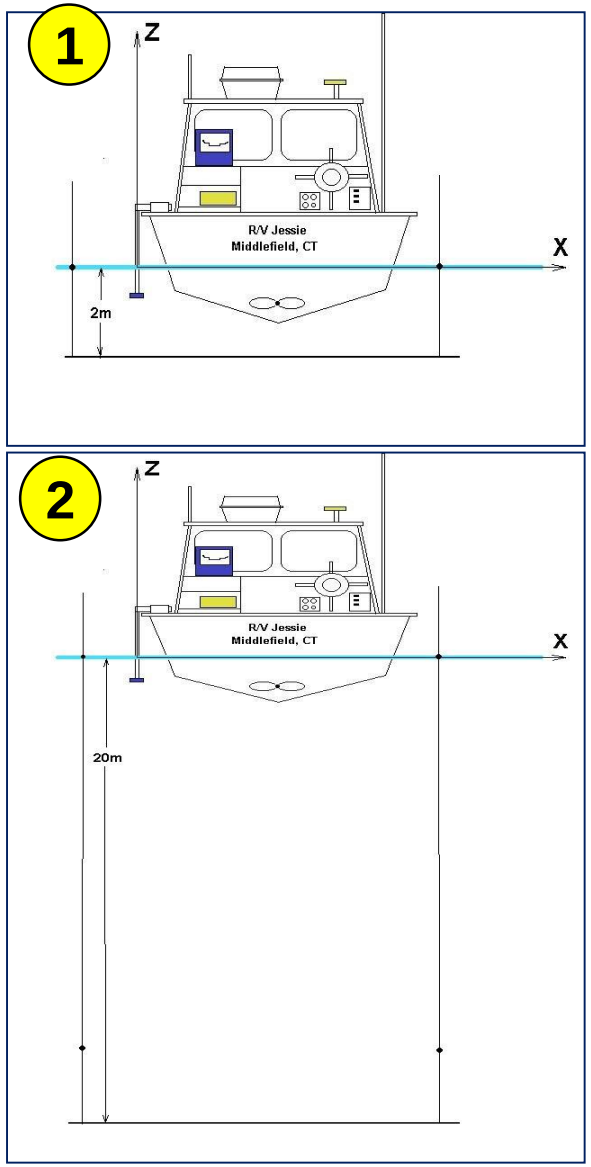
Sound Velocity Corrections

Method	Usage	Program
Calibrating your echosounder with a bar check.	Single Beam	None.
Correcting with a Sound Velocity Speed profile.	Multibeam and Single Beam	SOUND VELOCITY
Correcting for sound velocity based on measured errors at each depth.	Single Beam	SOUNDING ADJUSTMENT Separate program or built into SBMAX

The Bar Check

- Lower a bar or plate 5’ or 2m beneath the surface.
  - Adjust the ‘zero’ or ‘draft’ or ‘tide’ on your echo sounder until you read that value.
- Lower the bar to your deepest Project depth to be measured.
  - Adjust the sound velocity speed until you read that value.
- Repeat steps 1 and 2 until you don’t have to make any adjustments.
  - Your echo sounder will now output soundings that have sound velocity speed corrections factored into the output depth.



Problems with Bar Checks

- Wave action: (Nothing like trying to calibrate your sounder to a tenth of a foot while standing in a 2’ sea.)
- Currents: The bar moves from beneath the transducer when you lower it, limiting your ability to see it.
- Performing the bar check outside your survey area: It’s more convenient to do the bar check in the harbor.
- Surveying with a single bar check in an area where the sound velocity profile changes (fresh versus salt water boundaries).

Set aside time for your crews to practice and perform bar checks!

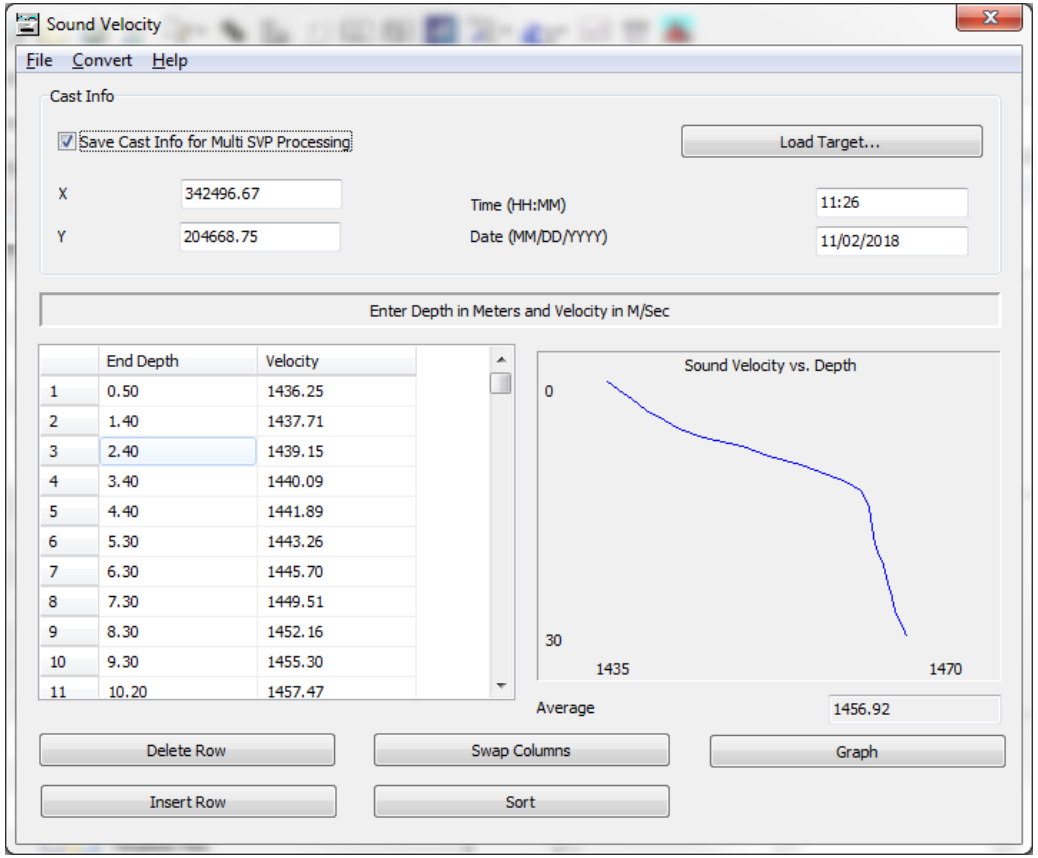
Using Data from a Velocity Probe

Use the SOUND VELOCITY program to enter the velocity information.

Direct import from:

- SonTek CastAway
- Valeport SWiFT
- AML Base X2

Load the resulting *.VEL file into the SINGLE BEAM EDITOR.



Why Sound Velocity Matters….

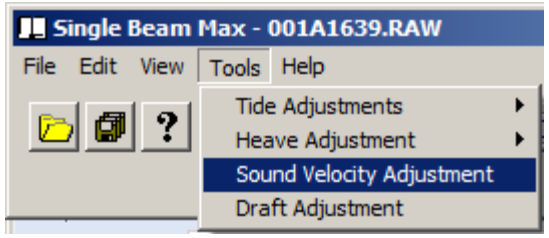
The green bars indicate the 0.3 foot change in depth based upon changes in Sound Velocity

Sound Velocity Error Chart (Feet)

(Difference in Sound Velocity in Feet per Second from Initial Setting)

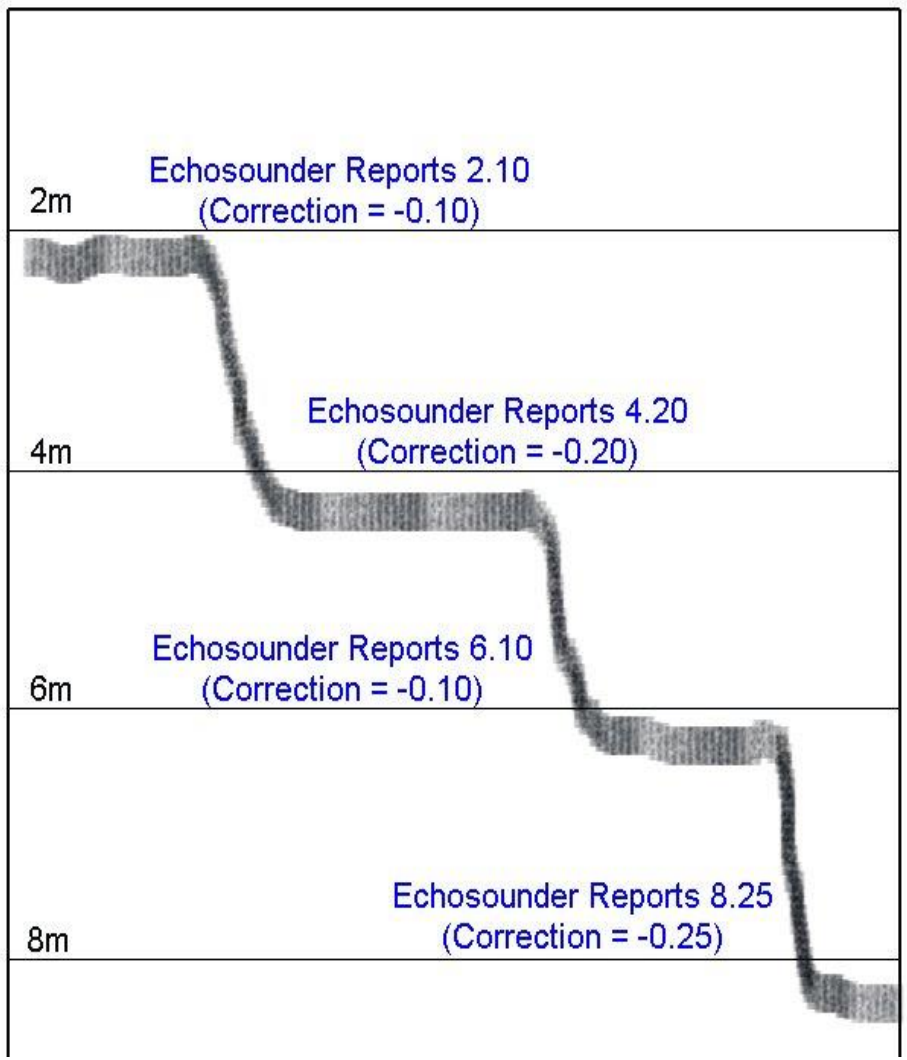
Depth (Feet)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
5	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20
10	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.37	0.39	0.41
15	0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.24	0.27	0.30	0.33	0.36	0.40	0.43	0.46	0.49	0.52	0.55	0.58	0.61
20	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.41	0.45	0.49	0.53	0.57	0.61	0.65	0.69	0.73	0.77	0.81
25	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.41	0.46	0.51	0.56	0.61	0.66	0.71	0.76	0.81	0.86	0.91	0.96	1.01
30	0.06	0.12	0.18	0.24	0.30	0.36	0.43	0.49	0.55	0.61	0.67	0.73	0.79	0.85	0.91	0.97	1.03	1.10	1.16	1.22
35	0.07	0.14	0.21	0.28	0.35	0.43	0.50	0.57	0.64	0.71	0.78	0.85	0.92	0.99	1.06	1.14	1.21	1.28	1.35	1.42
40	0.08	0.16	0.24	0.32	0.40	0.49	0.57	0.65	0.73	0.81	0.89	0.97	1.05	1.14	1.22	1.30	1.38	1.46	1.54	1.62
45	0.09	0.18	0.27	0.36	0.46	0.55	0.64	0.73	0.82	0.91	1.00	1.09	1.19	1.28	1.37	1.46	1.55	1.64	1.73	1.83
50	0.10	0.20	0.30	0.40	0.51	0.61	0.71	0.81	0.91	1.01	1.12	1.22	1.32	1.42	1.52	1.62	1.72	1.83	1.93	2.03
55	0.11	0.22	0.33	0.44	0.56	0.67	0.78	0.89	1.00	1.11	1.23	1.34	1.45	1.56	1.67	1.78	1.90	2.01	2.12	2.23
60	0.12	0.24	0.36	0.49	0.61	0.73	0.85	0.97	1.09	1.22	1.34	1.46	1.58	1.70	1.83	1.95	2.07	2.19	2.31	2.43
65	0.13	0.26	0.39	0.53	0.66	0.79	0.92	1.05	1.19	1.32	1.45	1.58	1.71	1.85	1.98	2.11	2.24	2.37	2.51	2.64
70	0.14	0.28	0.42	0.57	0.71	0.85	0.99	1.13	1.28	1.42	1.56	1.70	1.85	1.99	2.13	2.27	2.41	2.56	2.70	2.84
75	0.15	0.30	0.45	0.61	0.76	0.91	1.06	1.22	1.37	1.52	1.67	1.82	1.98	2.13	2.28	2.43	2.59	2.74	2.89	3.04
80	0.16	0.32	0.48	0.65	0.81	0.97	1.13	1.30	1.46	1.62	1.78	1.95	2.11	2.27	2.43	2.60	2.76	2.92	3.08	3.25
85	0.17	0.34	0.52	0.69	0.86	1.03	1.21	1.38	1.55	1.72	1.90	2.07	2.24	2.41	2.59	2.76	2.93	3.10	3.28	3.45
90	0.18	0.36	0.55	0.73	0.91	1.09	1.28	1.46	1.64	1.82	2.01	2.19	2.37	2.56	2.74	2.92	3.10	3.29	3.47	3.65
95	0.19	0.38	0.58	0.77	0.96	1.15	1.35	1.54	1.73	1.93	2.12	2.31	2.50	2.70	2.89	3.08	3.28	3.47	3.66	3.85
100	0.20	0.40	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.23	2.43	2.64	2.84	3.04	3.25	3.45	3.65	3.85	4.06

SOUNDING ADJUSTMENTS Routine



- Lower a bar to specific depths beneath the static water line.
- Note what the echo-sounder reports.
- SOUNDING ADJUSTMENT reads edited data files and inserts the appropriate ‘Correction’ based on the measured depth.
- This same routine is now available in the SINGLE BEAM EDITOR (SBMAX)

SOUNDING ADJUSTMENT is available as a separate program, or as an integrated routine in SBMAX.

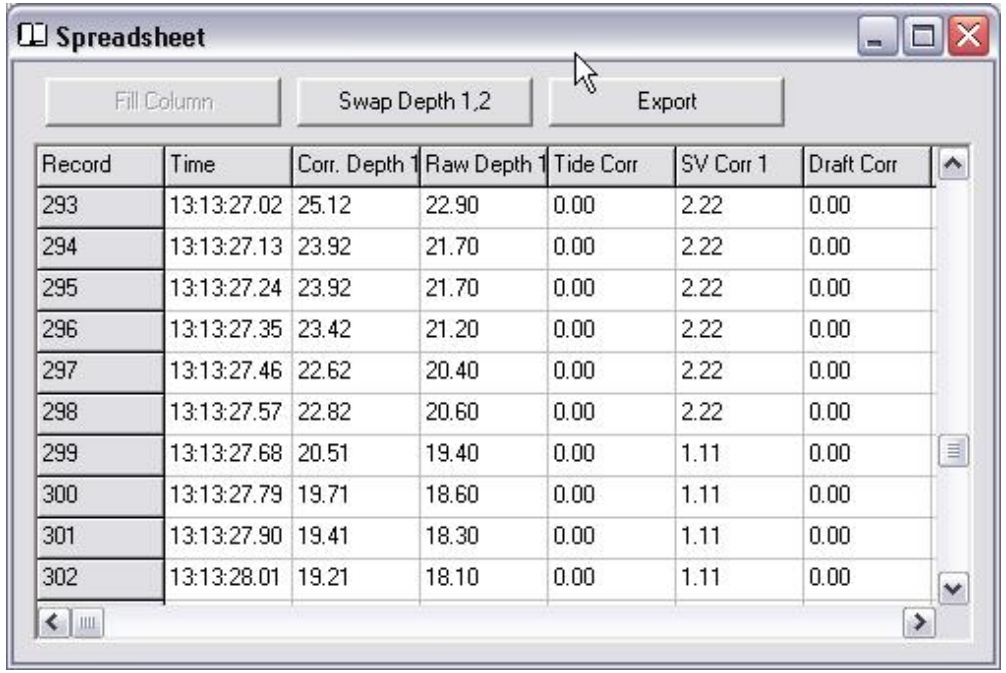


SOUNDING ADJUSTMENTS

1. Process the data in the SINGLE BEAM EDITOR.

2. Enter your Depth and Error information into the SOUNDING ADJUSTMENTS program.

3. Take the resulting edited ‘ALL’ format data files and process them through SOUNDING ADJUSTMENTS.



Record	Time	Corr. Depth 1	Raw Depth 1	Tide Corr	SV Corr 1	Draft Corr
293	13:13:27.02	25.12	22.90	0.00	2.22	0.00
294	13:13:27.13	23.92	21.70	0.00	2.22	0.00
295	13:13:27.24	23.92	21.70	0.00	2.22	0.00
296	13:13:27.35	23.42	21.20	0.00	2.22	0.00
297	13:13:27.46	22.62	20.40	0.00	2.22	0.00
298	13:13:27.57	22.82	20.60	0.00	2.22	0.00
299	13:13:27.68	20.51	19.40	0.00	1.11	0.00
300	13:13:27.79	19.71	18.60	0.00	1.11	0.00
301	13:13:27.90	19.41	18.30	0.00	1.11	0.00
302	13:13:28.01	19.21	18.10	0.00	1.11	0.00

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Echosounder Setup

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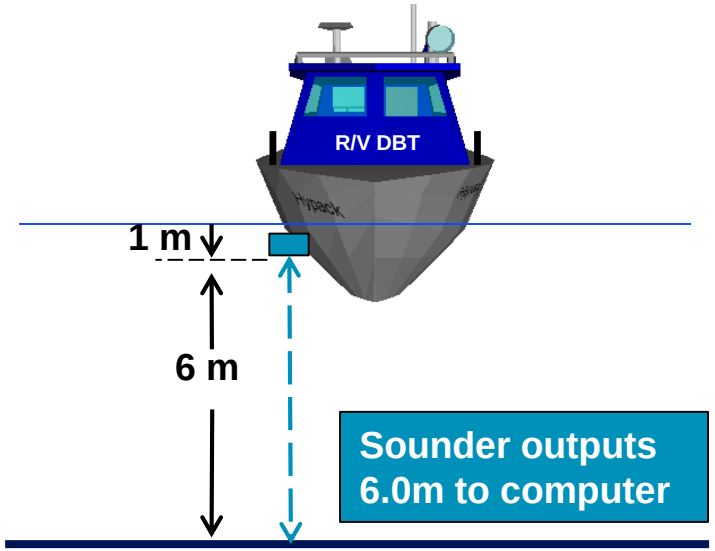
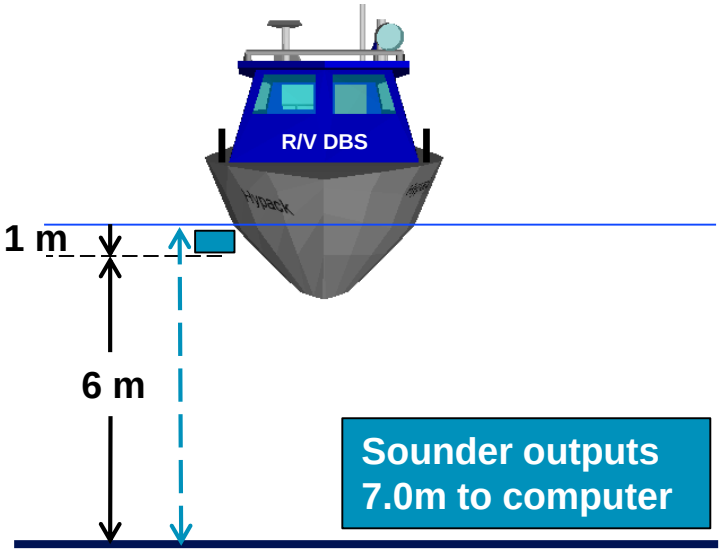
Echosounder: Vertical Offset

Correct for the Static Draft (depth of transducer below the static waterline) either in the echosounder (bar check) or in HARDWARE (Vertical Offset). DO NOT USE IN BOTH PLACES!

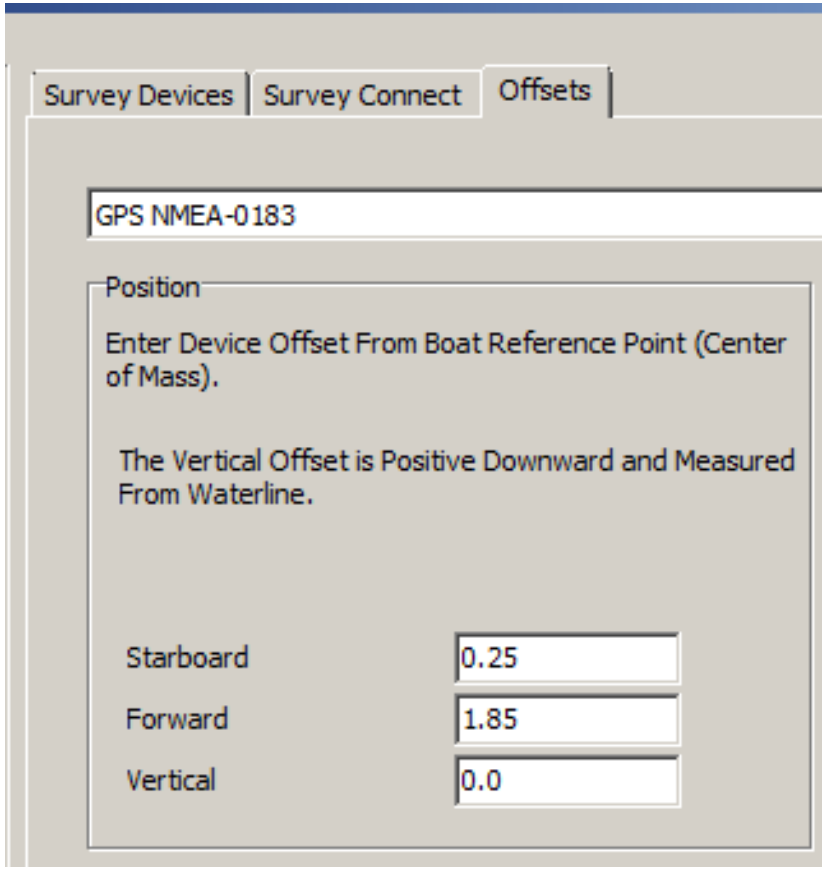




Outputting **Depth Below Surface (DBS)**:

Vertical Offset is set to 0.0

Echosounder Configuration: Offsets



Offsets:
Enter the offsets of the echosounder transducer, relative to the boat origin.

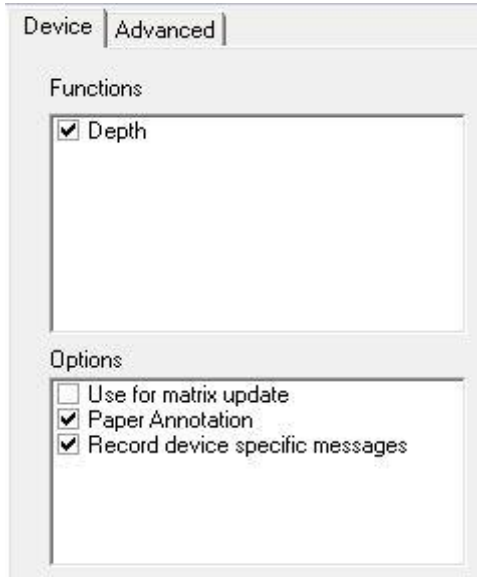
Vertical Offset:

- If your echosounder outputs the Depth Below Surface, then enter a Vertical Offset = 0.0
- If your echosounder outputs the Depth Below Transducer, then enter Vertical Offset = Static Draft.
- Z = positive downward!

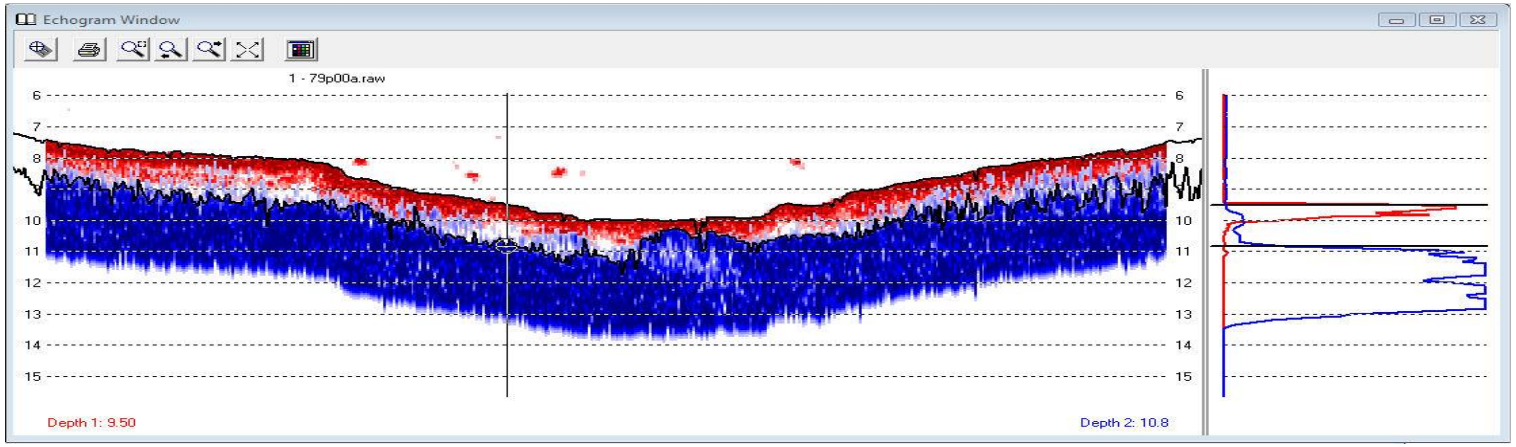
Latency:
For almost all single beam sounders, enter Latency = 0.00.
Enter the combined latency between the GPS and Echosounder determined in the SINGLE BEAM LATENCY program as the latency for the GPS device.

Echo Sounder Configuration

Functions:
Available functions may differ, depending on the echo sounder. As a minimum, you want to select *'Depth'.*



Options:
'Use for matrix update': Paints a matrix with the color-coded depth data.
'Paper Annotation': Enables the output of annotation to the echo sounder at event marks.
'Record device specific messages': Enables the storage of acoustic data for certain sounders.



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MRU use in HYPACK

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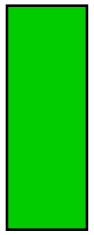
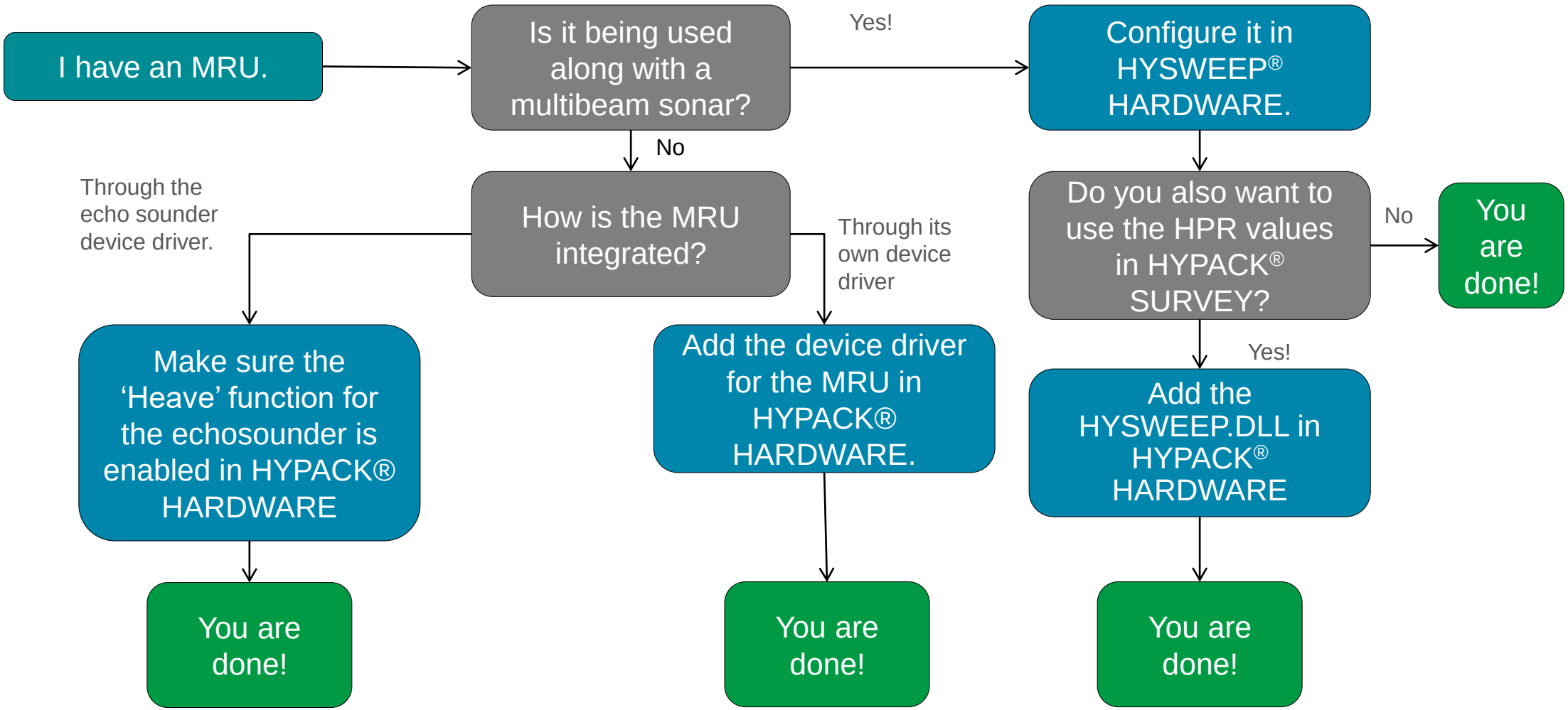
Motion Reference Units (MRUs)



Heave Vertical Reference

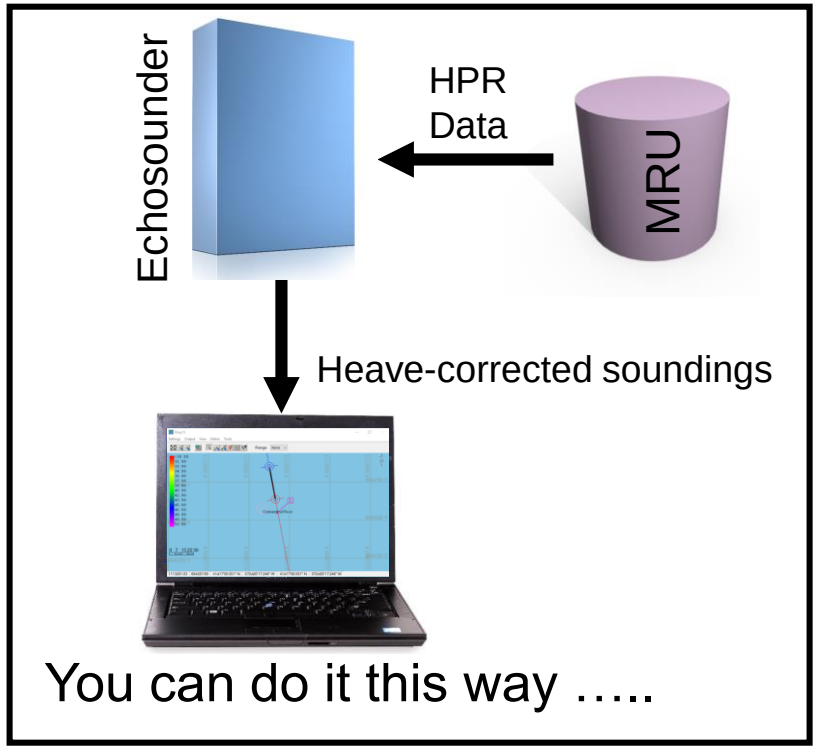
- A heave sensor (or MRU) outputs its height above or below it's current vertical reference.
- The vertical reference slowly changes based on the range of motion of the sensor.

MRU Decision Tree

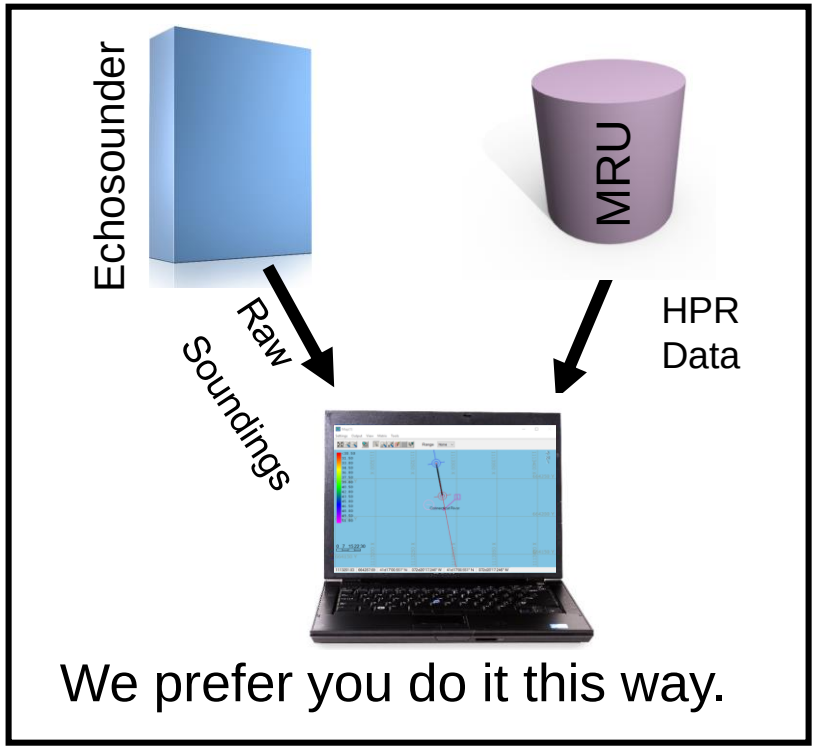


Connecting your MRU

If you echosounder can output uncorrected depths and MRU data, then we have no objection!

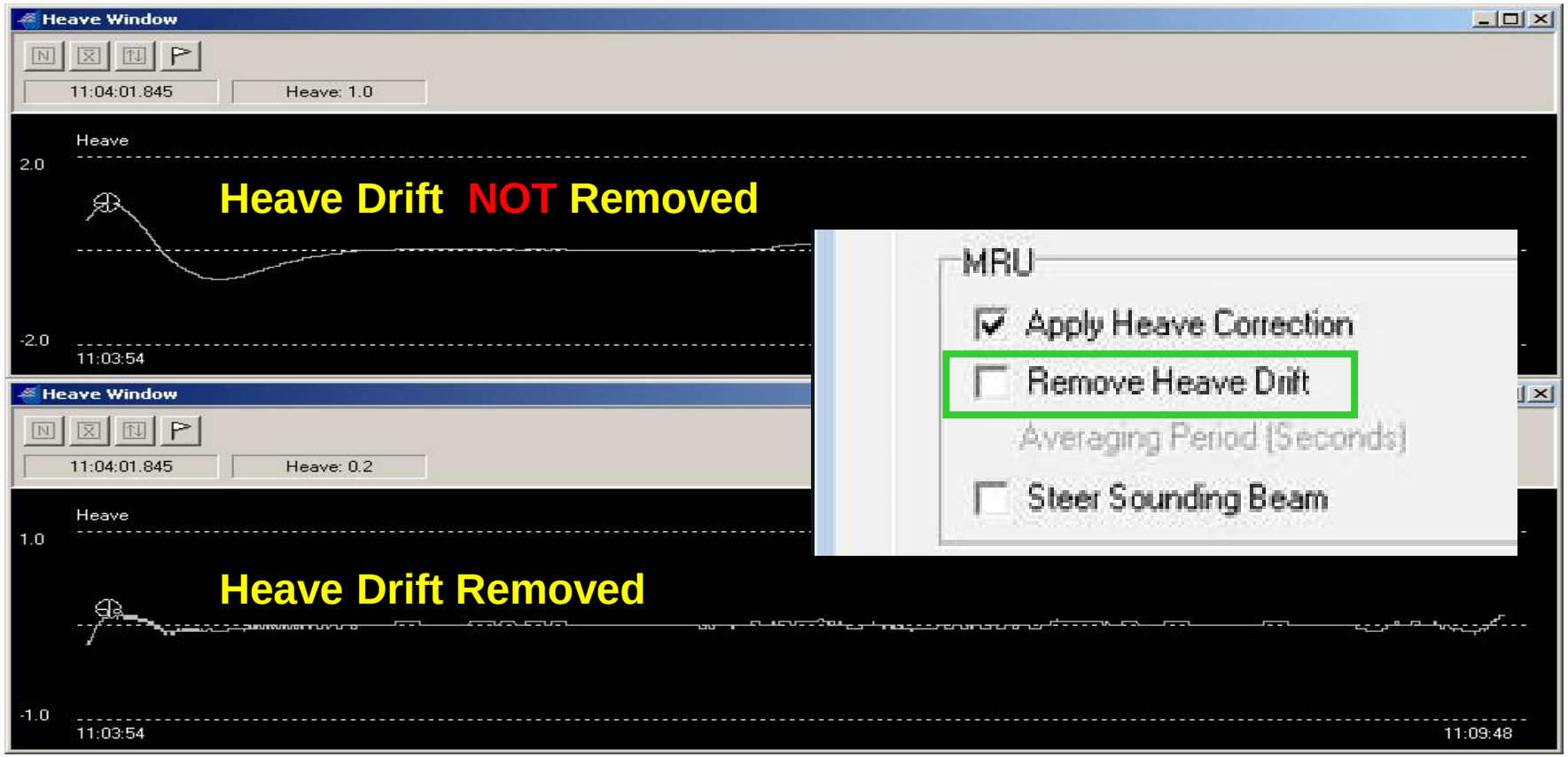


This is recommended only if your echo sounder can output the raw depth and heave measurement as separate entities.



Select the specific device driver for your MRU and configure it!

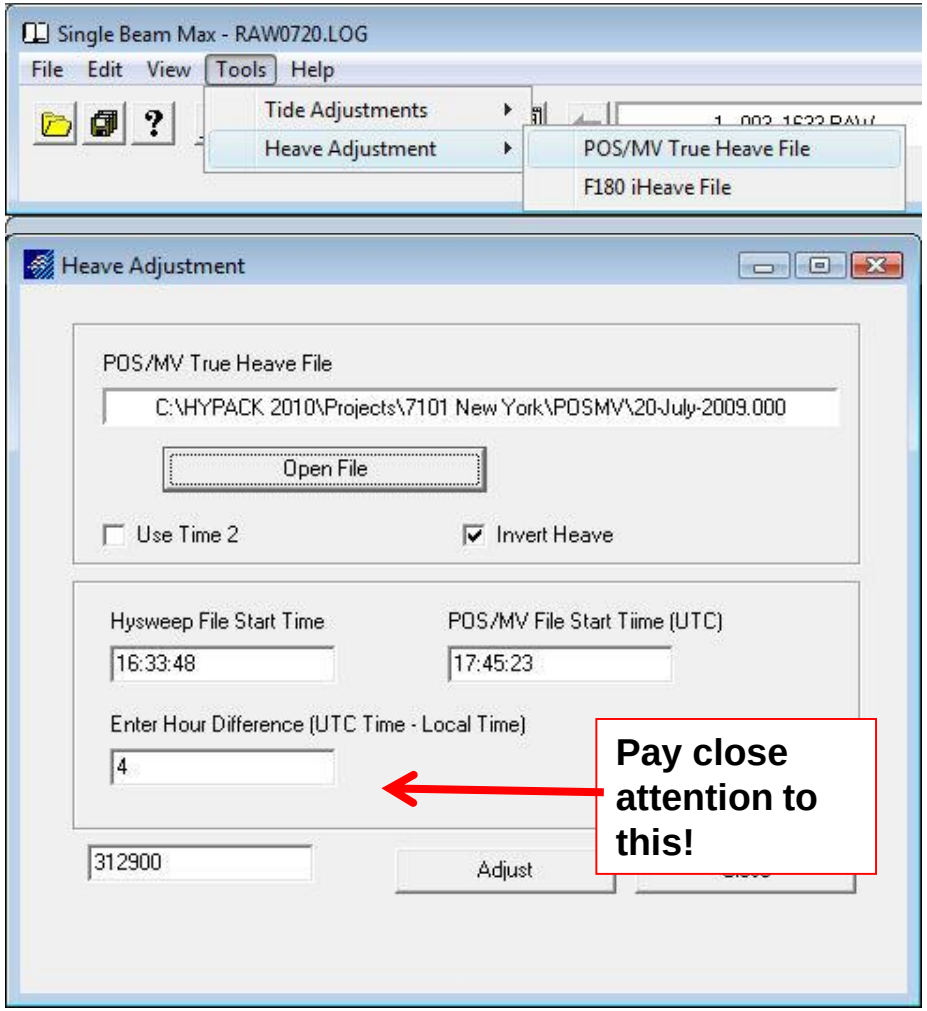
Correction of Heave Drift



Heave values can drift 'off-center' due to rapid accelerations or changes of direction.

Correcting with Post-Processed Heave

- Applanix POS M/V and other IMUs can internally log raw data that can be post-processed into more accurate heave data (= True Heave or iHeave).
- SBMAX (and MBMAX) can read these files and apply the new heave values.
    - You MUST synchronize the HYPACK SURVEY clock and the IMU clock in order for this to work!



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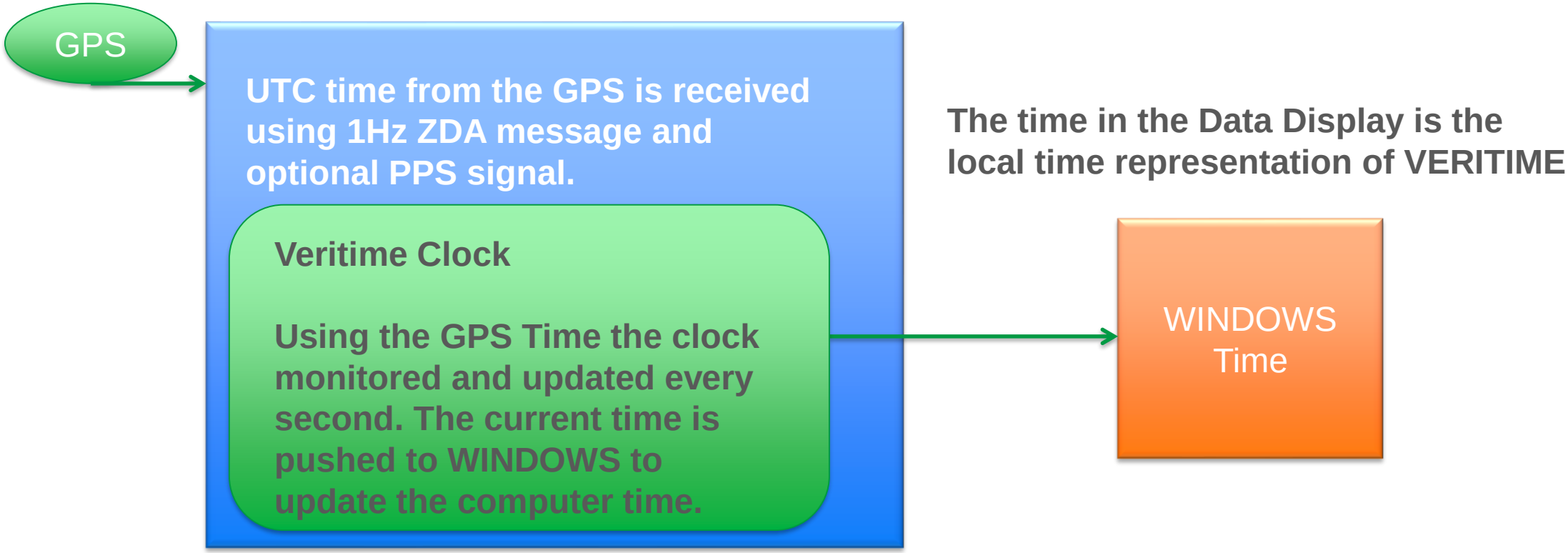
HYPACK Timing/Synchronizing

HYPACK 2022

HYPACK® Timing Basics

- The internal clock on your computer is a poor time device.
- HYPACK SURVEY and DREDGEPACK® use a proprietary clock model called **VERITIME.**
- When you start SURVEY or DREDGEPACK®
  - ➢ VERITIME is initially set to the Windows clock time.
  - ➢ VERITIME and Windows clock times slowly drift apart.
- In ‘Normal’ mode, all devices receive their time tags from the VERITIME clock model.
  - ➢ All devices are time tagged off the same time standard.

How Clock Synchronization Works



The device timing uses the VERITIME time for record time. If the time push to WINDOWS fails the device time is still in synch with the GPS time.

Clock Synchronization: How it works

When the ZDA sentence arrives: (1 Hz only!)

- HYPACK SURVEY compares the UTC time from the GPS (corrected with the time zone offset) with the time from the VERITIME clock model (HYPACK SURVEY).
- It can speed up the VERITIME clock model, or slow it down so that it matches UTC.
- You should wait one or two minutes after starting HYPACK SURVEY before starting to survey to allow the VERITIME clock model to synch to UTC. SURVEY will show a “No Synch” error until it locks on.

When the GGA sentence arrives (any rate):

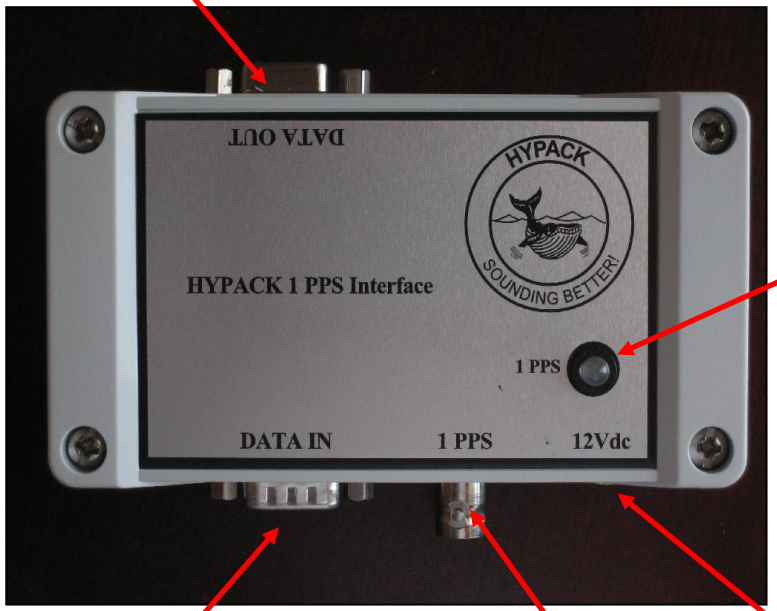
- HYPACK SURVEY uses the time tag in the GGA sentence (corrected for local time zone offset) as the position time tag.

When a message arrives from your echosounder, MRU or other non-GPS device:

- HYPACK SURVEY gets a time tag from the VERITIME clock model, which has been ‘synched’ to UTC less the local time zone offset.

The 1 PPS Box

RS232 Out
(to computer)



1 PPS Receipt Strobe

Alternates RED/GREEN every 1 second when operating correctly

12VDC In

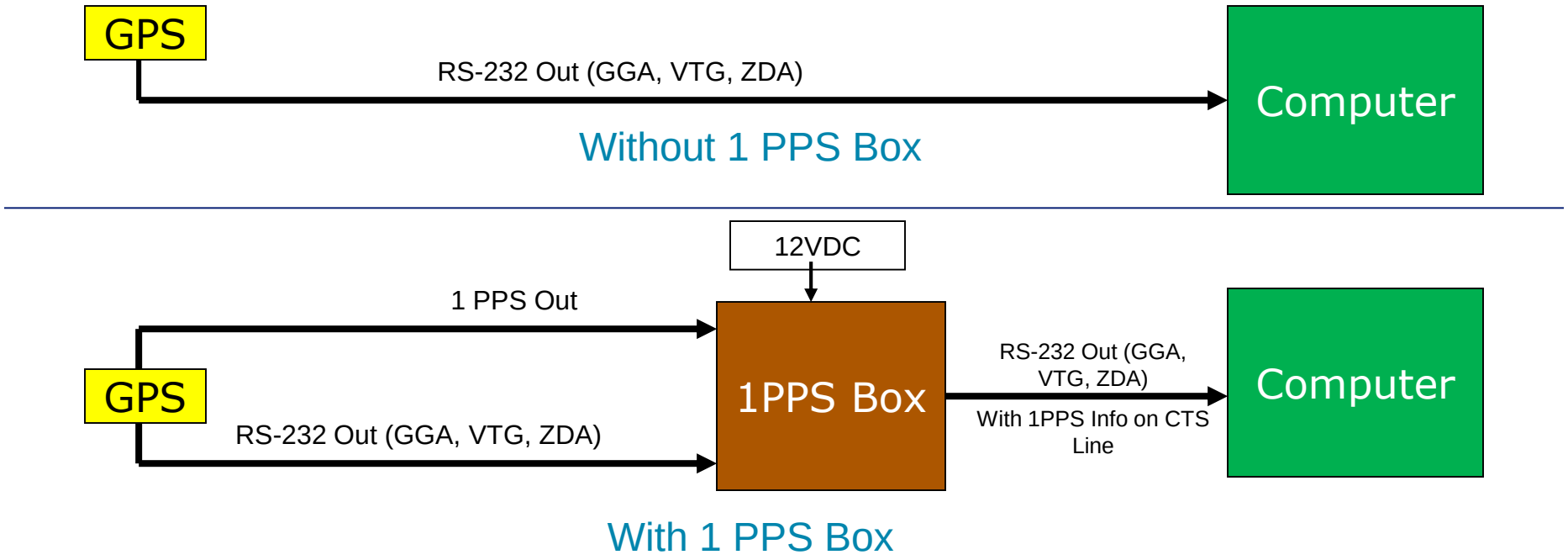
RS232 In
Requires ZDA at 1 Hz
May also carry 1PPS pulse on Pin 8 or 9

1 PPS In

(from GPS)
BNC
Connector

- The use of the PPS box is to allow the computer time to detect the PPS signal.
- The PPS box converts a short pulse into a stable, detectable signal.

Clock Synchronization – 1PPS Box

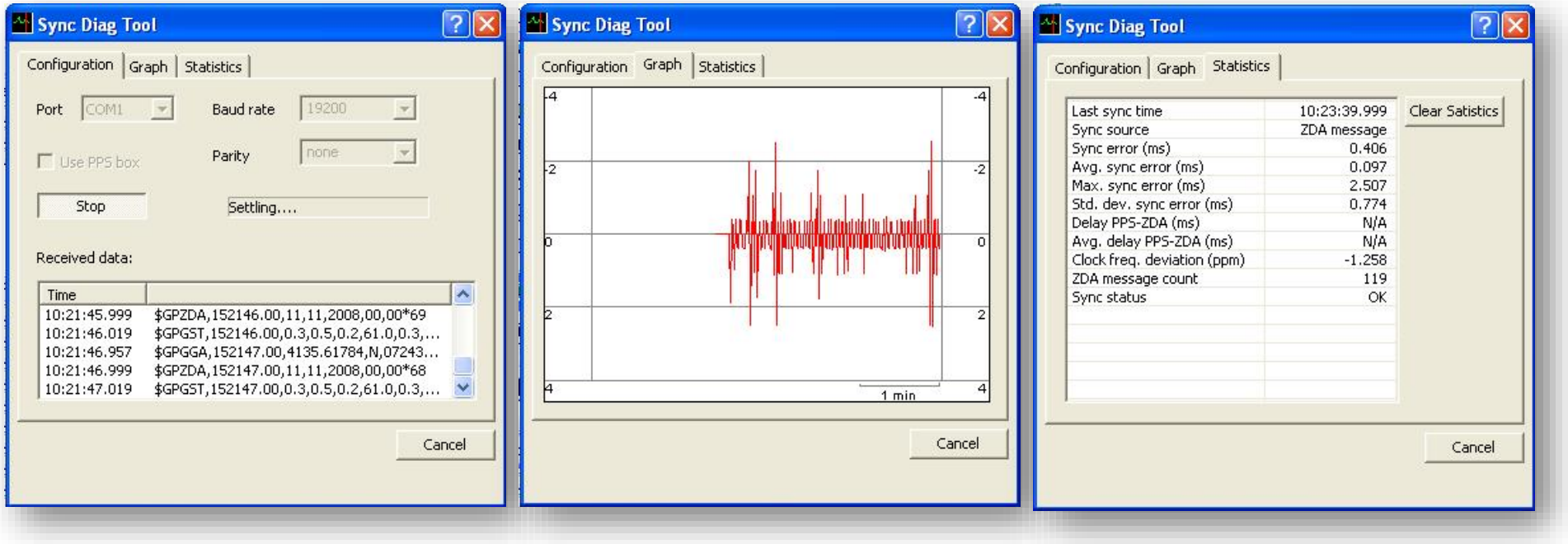


Without a 1PPS Box: Time of ZDA sentence is based on the arrival of first character of ZDA transmission.

With a 1PPS Box: Time of ZDA sentence is based on arrival of 1PPS pulse.

ZDA – 1PPS Testing: Utilities

Test the consistency of your ZDA message for synchronization.
Located under ‘Utilities – Calibration’ menu item.



Graph shows ‘Sync Error’ in mSecs. Sync Error equals the difference between VERITIME and the time of arrival of the ZDA message

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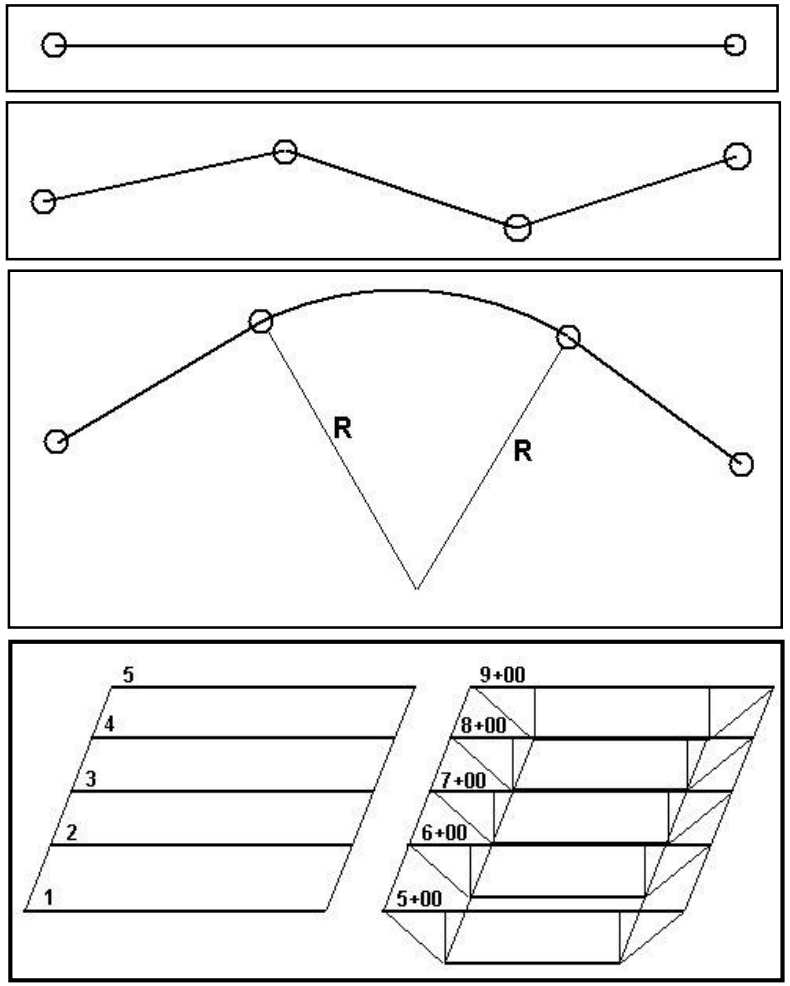
Planned Line Editor

HYPACK 2022

Planned Lines Basics



A planned line needs a minimum of two waypoints.

A planned line can have over 100 segments.

Internal segments can be made as arcs by entering the radius for the arc.

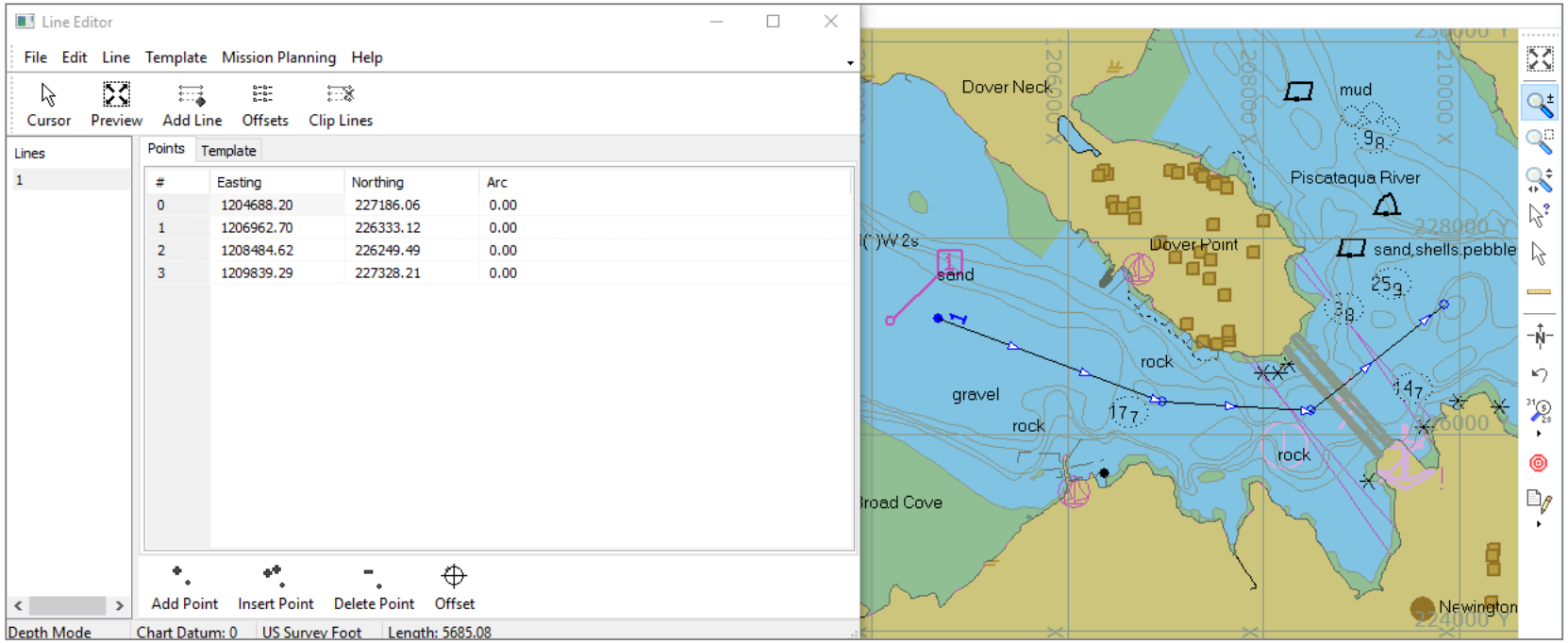
Lines can be:

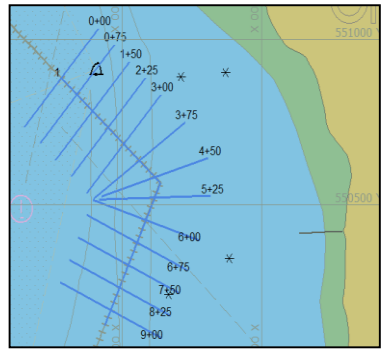
2D: Only X-Y at waypoints

3D: X-Y at waypoints and design depth at Distance Along Line

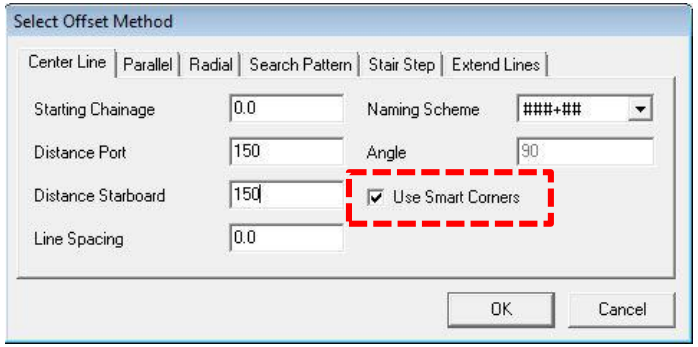
You can survey without Planned Lines. Many multibeam surveys do not use them and rely on a MTX file(s) to ensure 100% coverage.

Offsets: Centerline





Smart Corners, Centerline Offsets.



Create your centerline, Select Offsets: Centerline, Generate perpendicular lines.

Offsets: Parallel Lines

- Enter your initial line.
- Select Offsets: Parallel
- Generate your parallel lines.
- You can now stagger the offsets:
    - 50m, 100m, 50m, 100m, etc.

For Parallel Offsets, lines are renumbered North to South and West to East.

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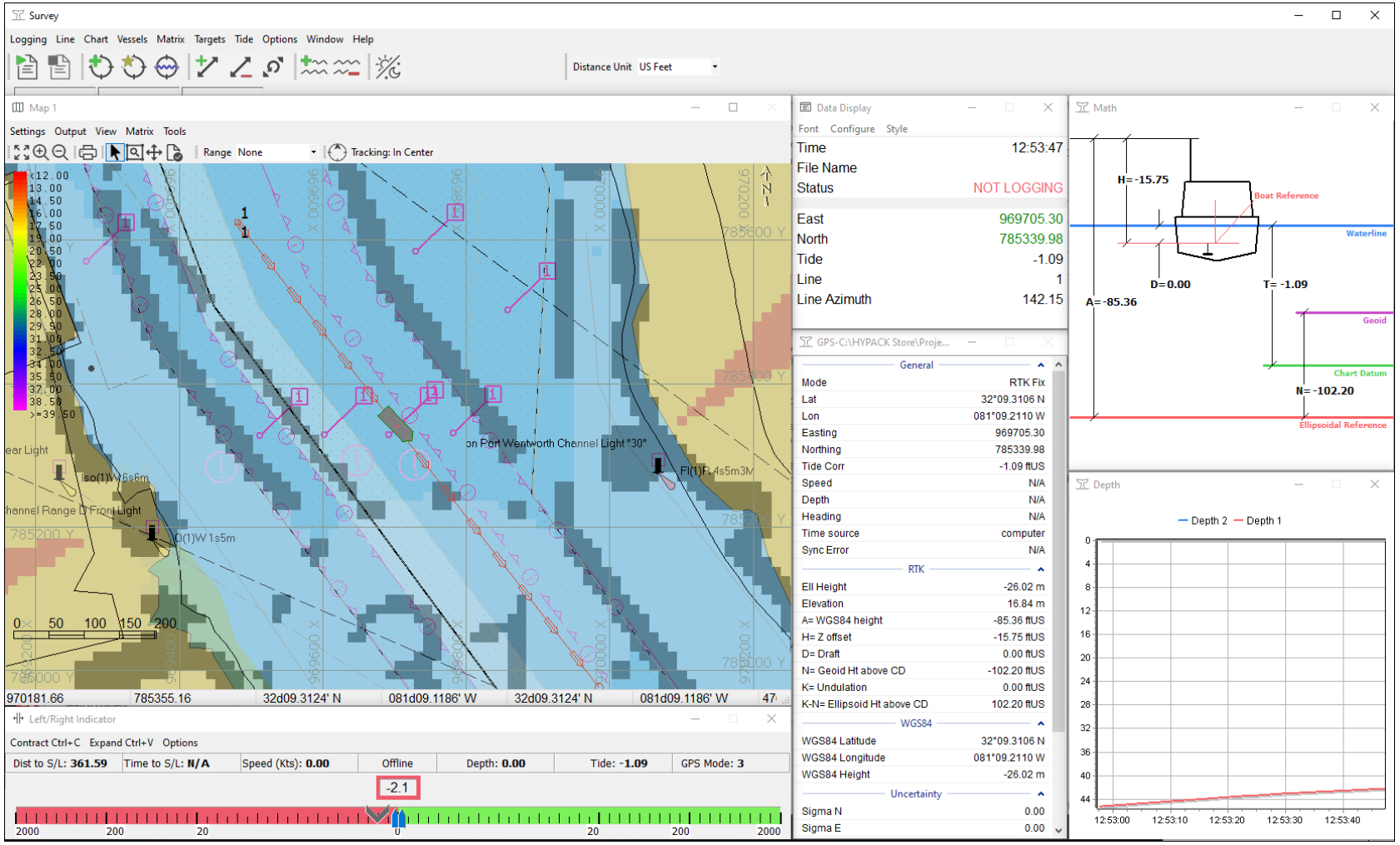
SBES – Collecting data

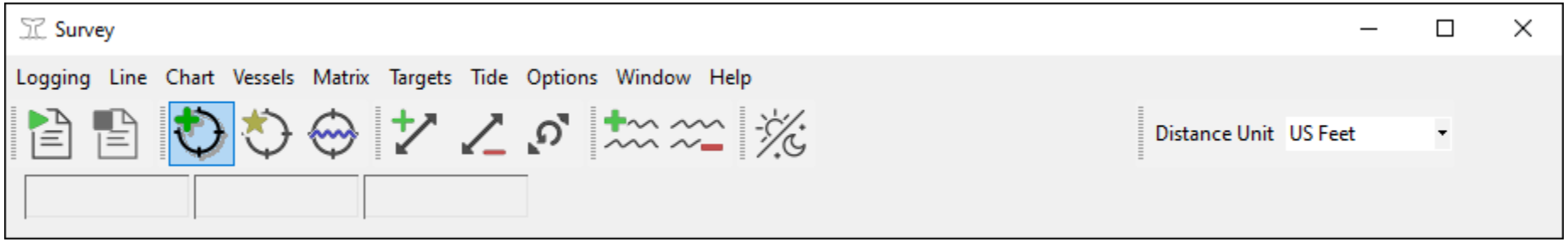
HYPACK 2022

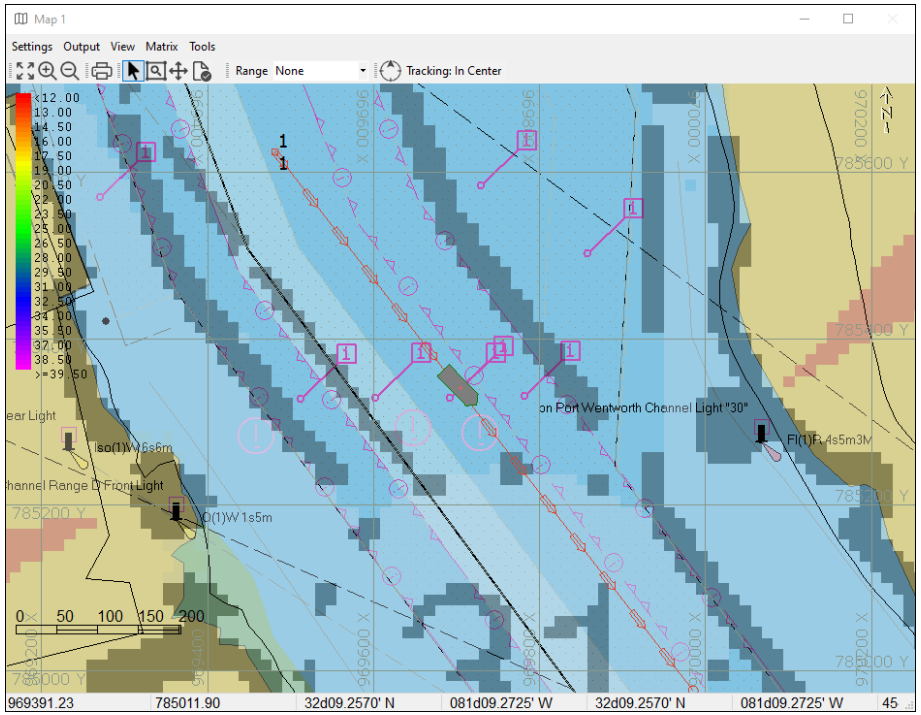
New Survey Program for 2022!



- Codename: RAD Survey
- Released as ‘Beta’ in 2021.
- New codebase makes it easier to make changes / updates.
- Modern icons.
- Same hot keys as ‘classic’ Survey.

Main Window

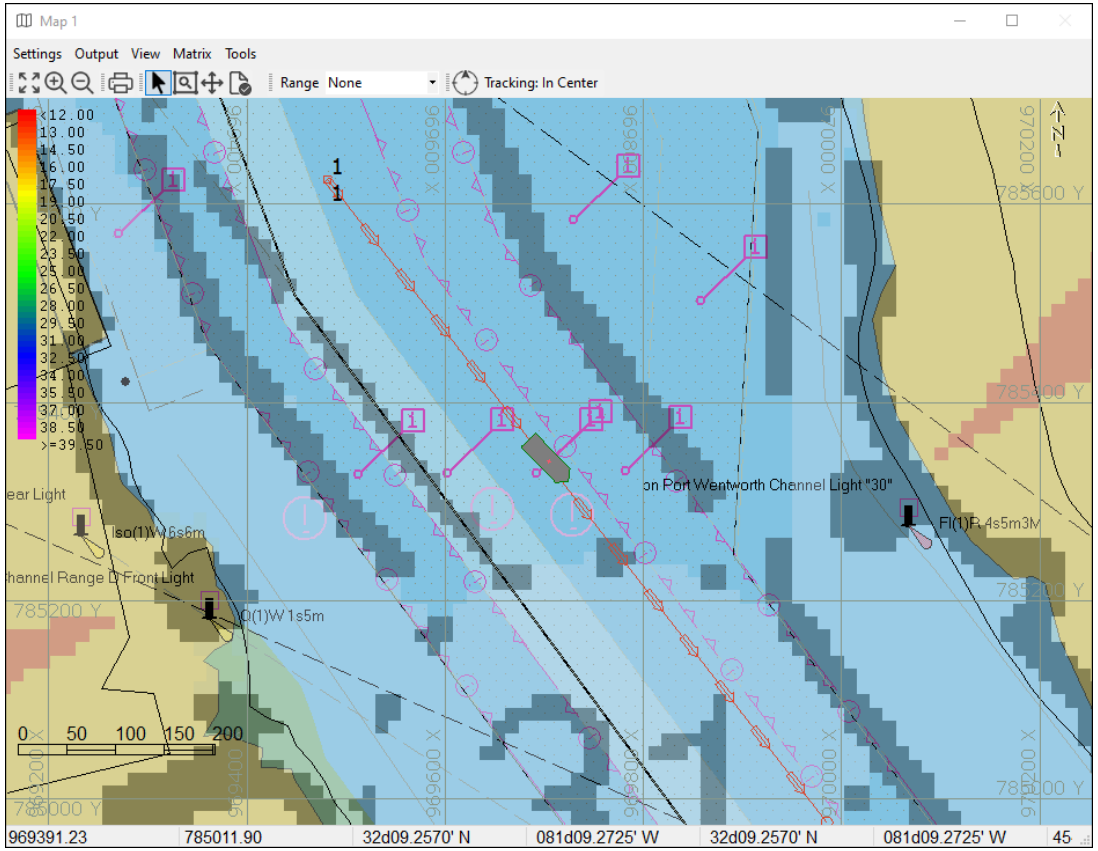




The **main window** is the control panel for HYPACK Survey. Access all settings dialogs, data displays, and driver windows from the menus. The primary buttons allow quick access to

- Start & stop logging
- Select the active planned line
- Mark targets and set the tide correction
- And enable real-time data overlays like matrix coverage and side scan mosaicking.

Area Map Windows

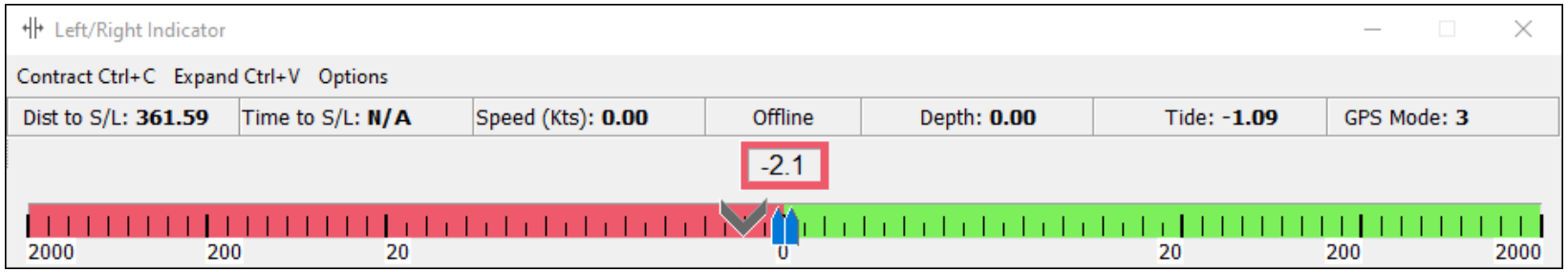


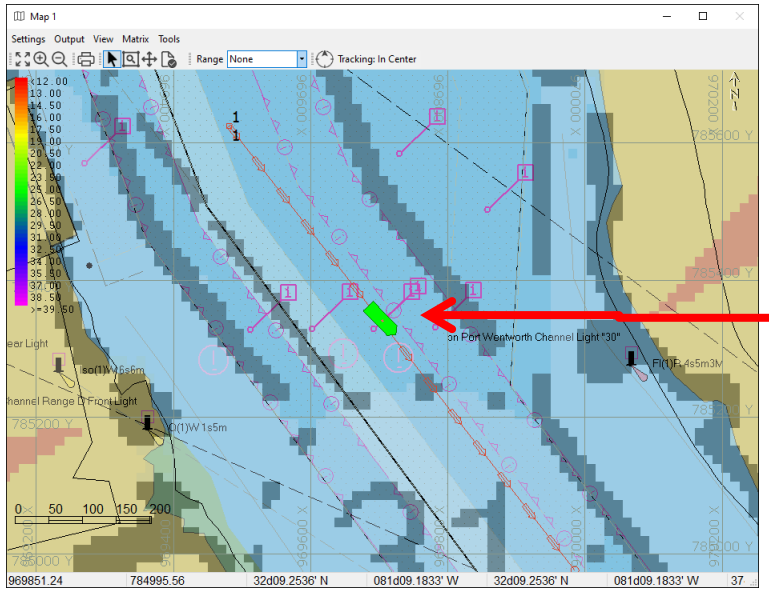
The **area map** windows contain a plan view of your survey area.

The area map displays

- Background files active in the SHELL
- ECDIS Symbols for each configured mobile
- Overlaid grids
- Planned lines
- Targets
- Channels
- Matrix files
- And more…

Left-right Indicator Windows





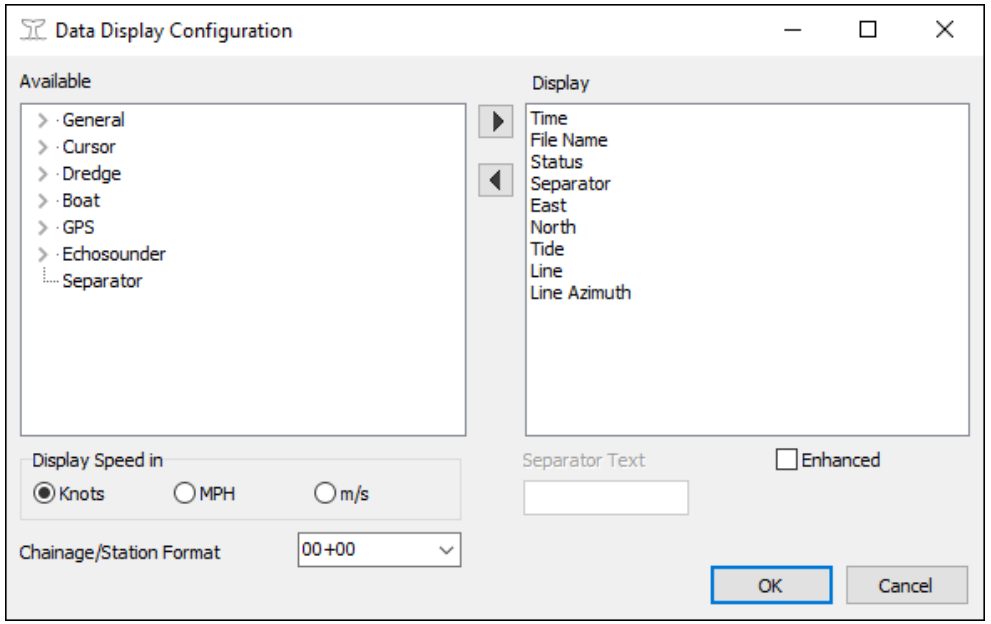
The **left-right indicator** windows only appear when you have planned lines loaded. They show the position of the main vessel relative to the planned survey line, as well as certain information of particular interest to the helmsman.

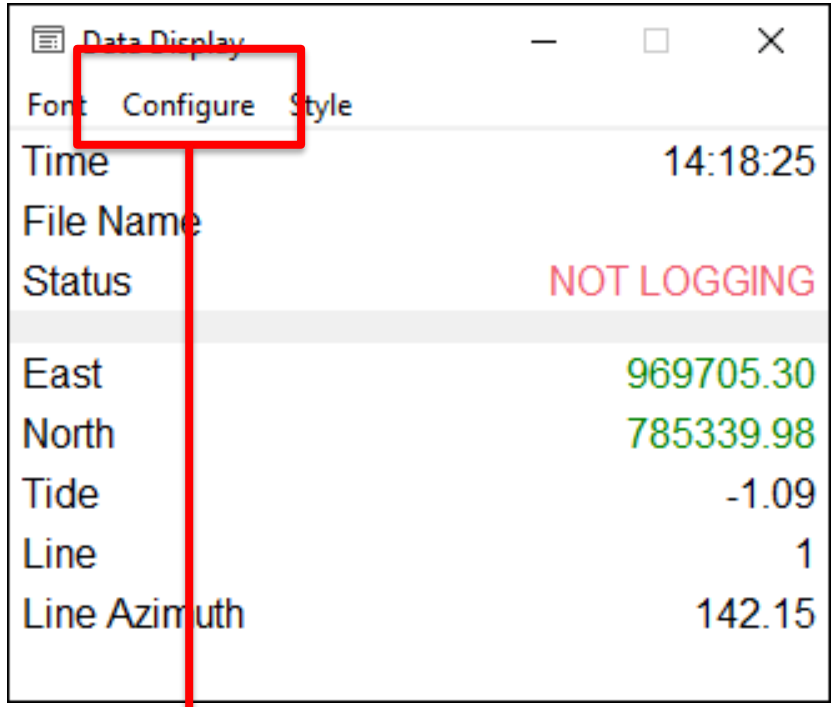
In this example, the helmsman is following the planned line closely. He is less than a foot off line.

Data Display Windows

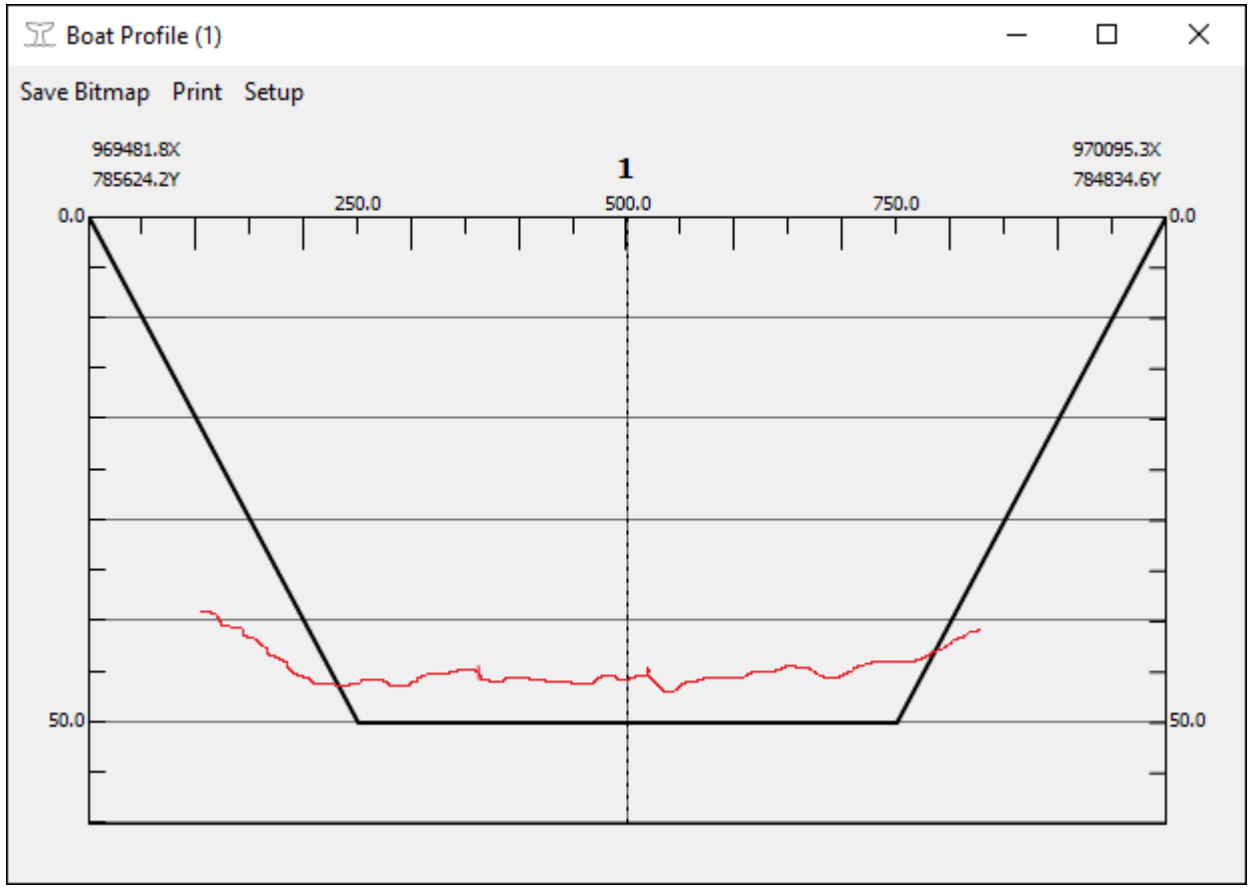
The **data display** windows show textual information about the survey or dredge project.

Select the items to display, their font, and the style of the display. Survey will restore the items and font in the same way when the program is restarted.





Boat Profile Window



The **profile window** shows a cross section view of the entire planned survey line.

If the planned line contains template points or a separate channel plan is loaded, this information will be overlaid on the depth graph.

When a new planned line becomes active, the profile will update accordingly.

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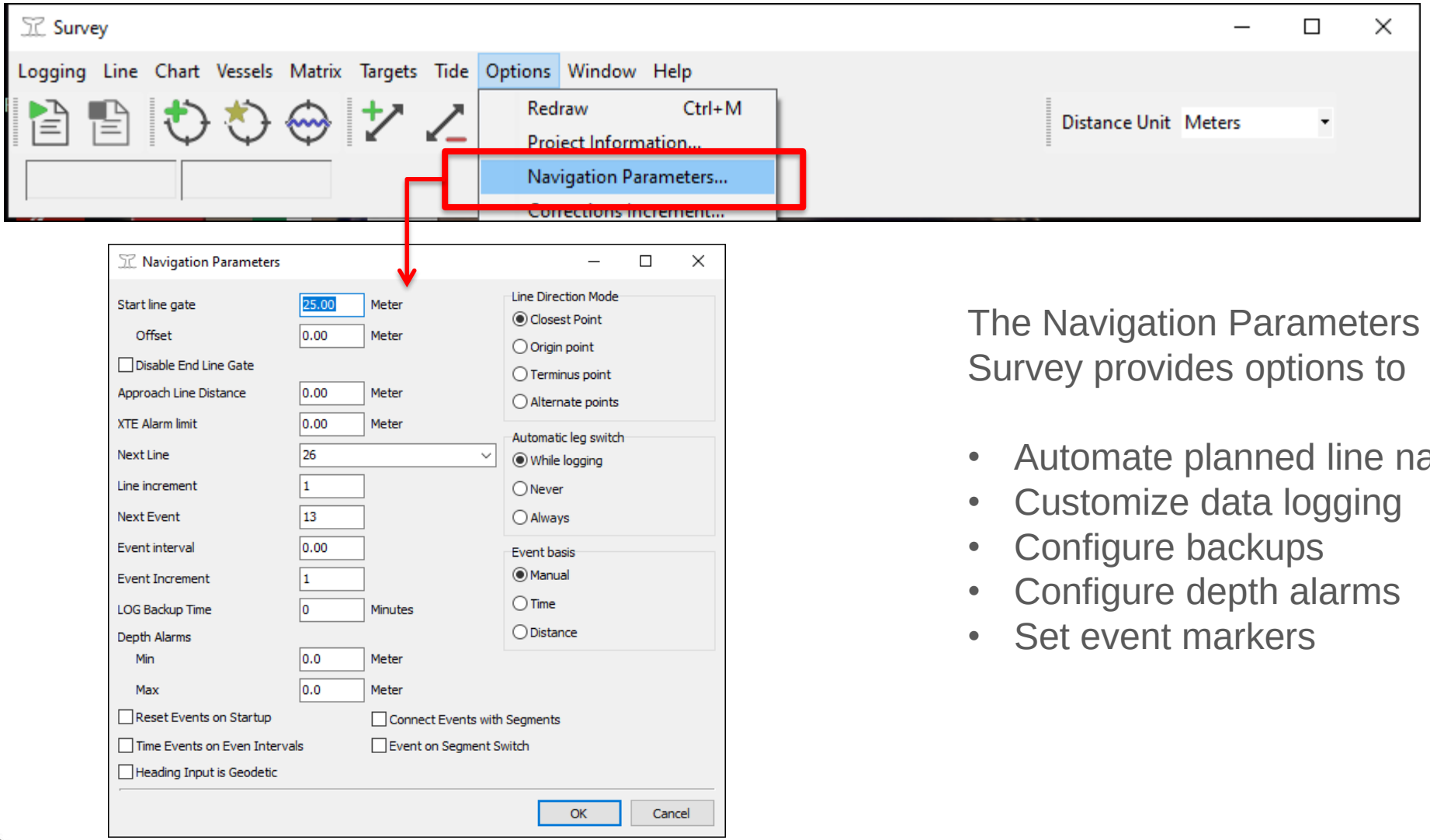
Navigation Parameters

HYPACK 2022

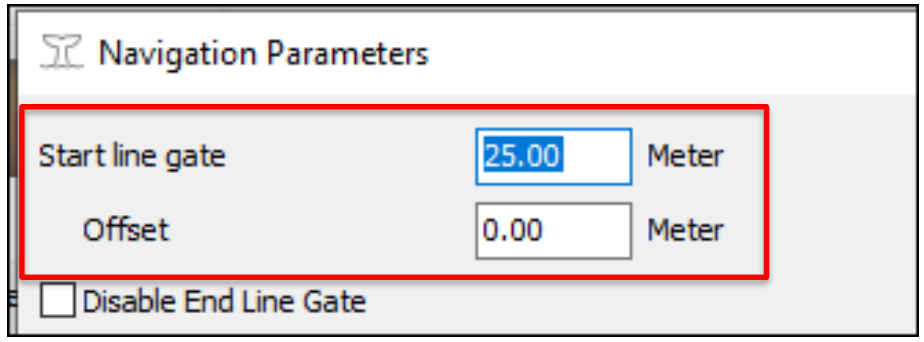
Navigation Parameters



The Navigation Parameters dialog in Survey provides options to

- Automate planned line navigation
- Customize data logging
- Configure backups
- Configure depth alarms
- Set event markers

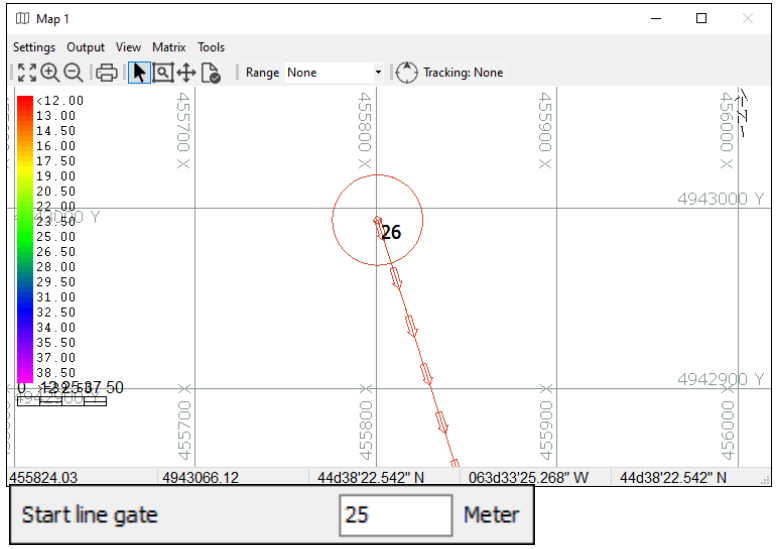
Navigation Parameters - Start Line Gates

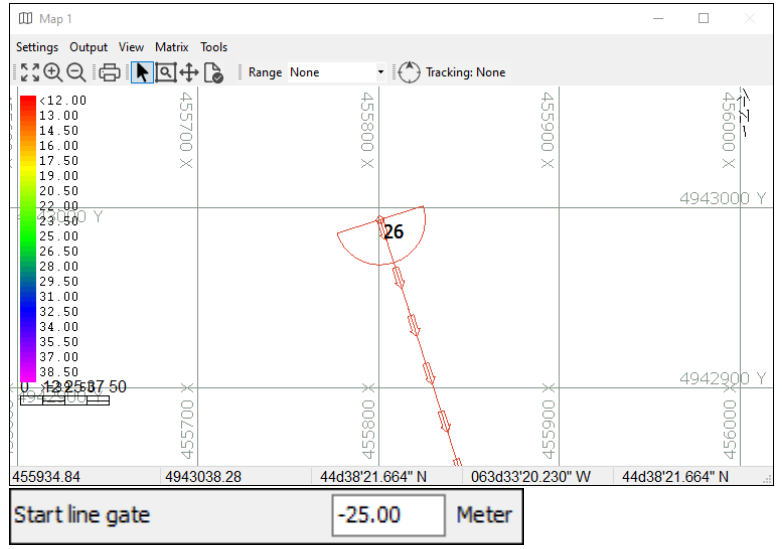


A **line gate** specifies an area that, when entered, triggers a start or stop logging action.

- **Gate = 0** — Gate is disabled.
- **Gate > 0** — Go on-line when vessel breaks into circle with radius = gate.
- **Gate < 0** — Go on-line when vessel breaks inward semi-circle with radius = |gate|.

Offset — Moves the gate up or down the line.





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Across Track Error Alarm

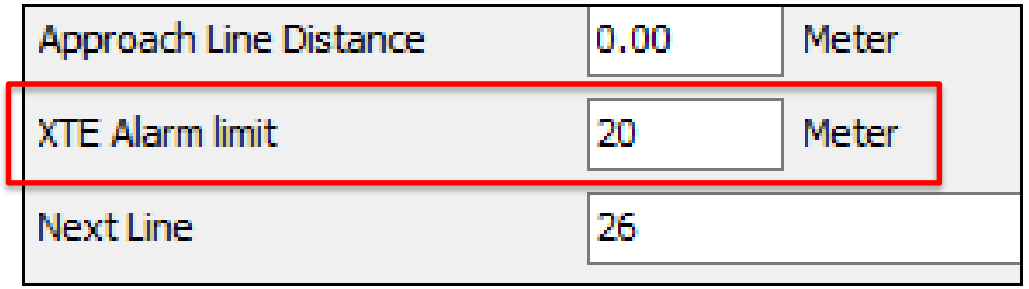
Across Track Error (XTE)

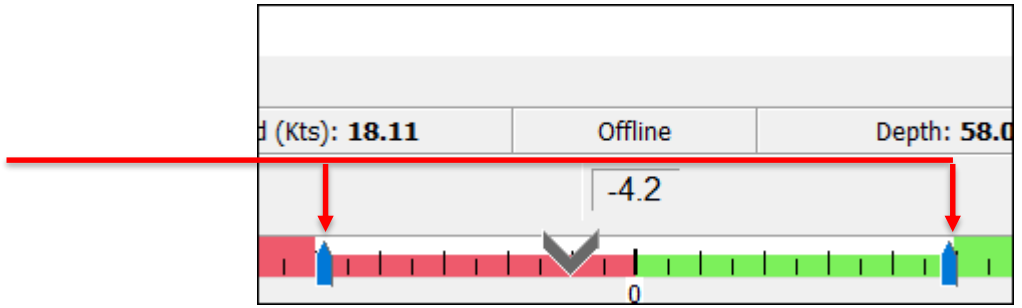
HYPACK Survey will generate an “XTE” alarm if the tracking point moves outside of the limit specified in Navigation Parameters.

The limit is relative to the active planned line.

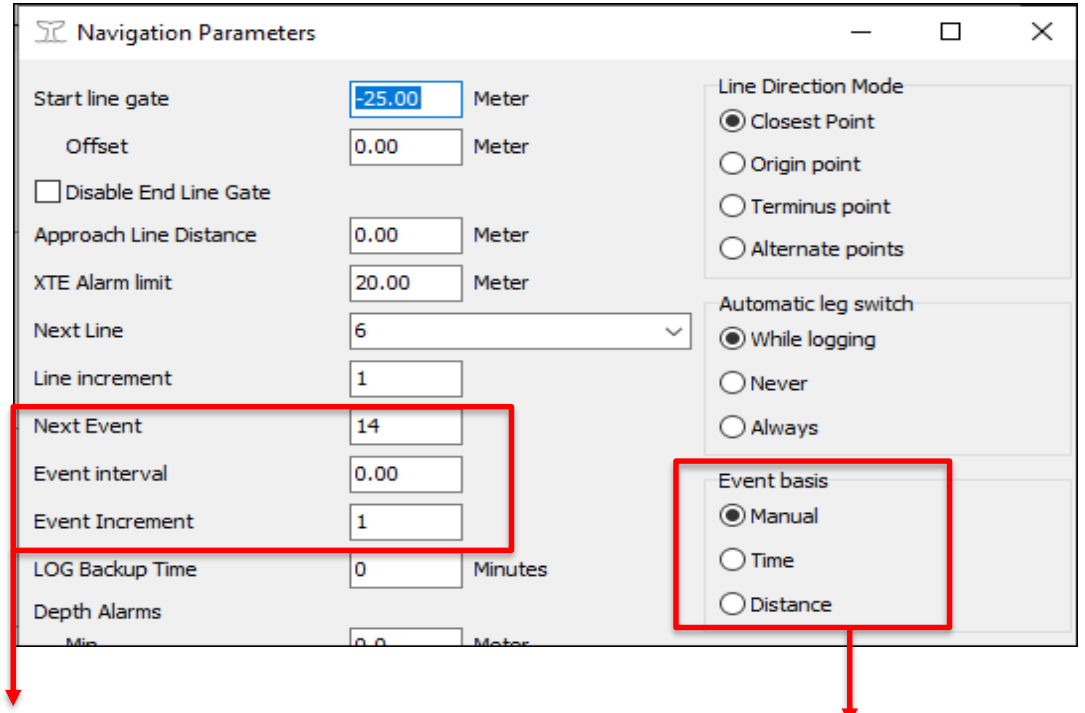
Setting the limit to zero disables the alarm.

Moving the sliders on the LR Indicator also adjusts XTE.





Event Marks



Next event — The next event number to use.

Event interval — The time in seconds or the distance along line in grid units between events.

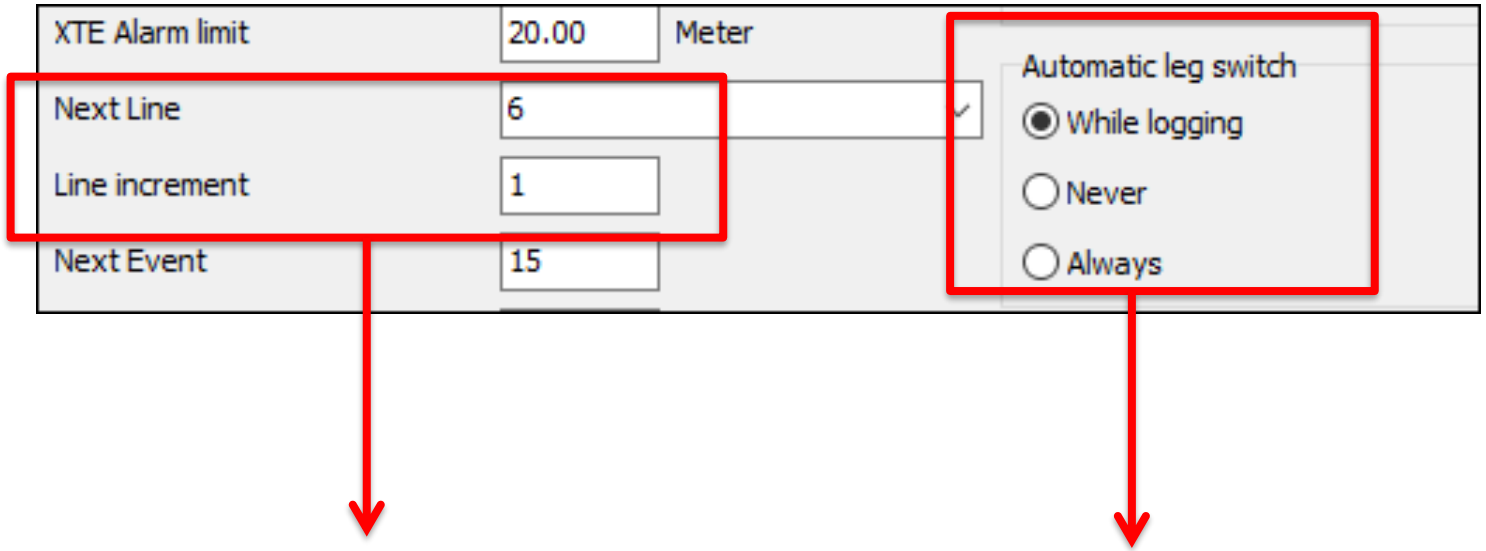
Event increment — The number added to the prior event number to generate the next number.

Manual — Make event marks at start/end of line and manually (CTRL-N).

Time — Make event marks at start/end of line and every *n* seconds.

Distance — Make event marks at start/end of line and every *n* grid units along the planned line.

Line Information



Next line — The name or number of the next line to be run.

Line increment — The number of lines to move down the line queue when selecting the next line.

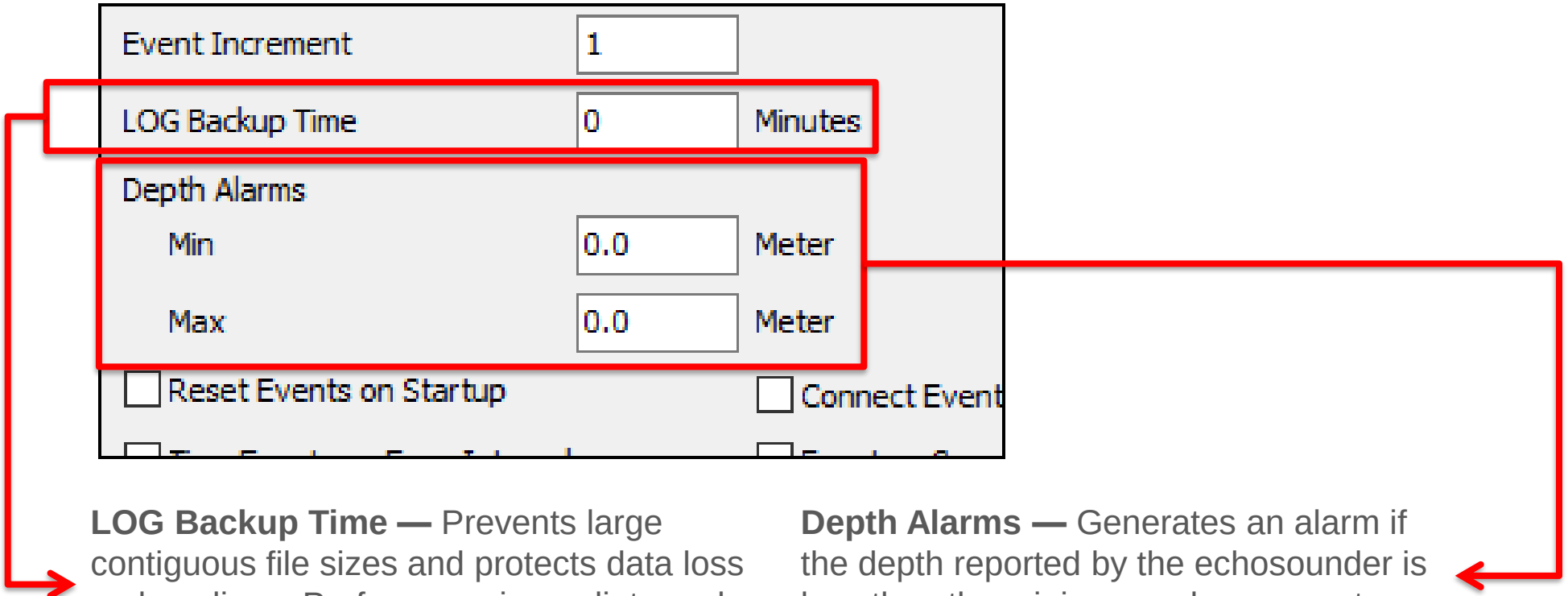
- If = 1, sequence = 1, 2, 3, 4
- If = 3, sequence = 1, 4, 7, 10
- If = -2, sequence = 9, 7, 5, 3

While logging — Select the most appropriate segment of the active line only while logging.

Always — Always auto-select active leg.

Never — Survey never changes line segment. User must use CTRL-B & CTRL-F.

Other Options

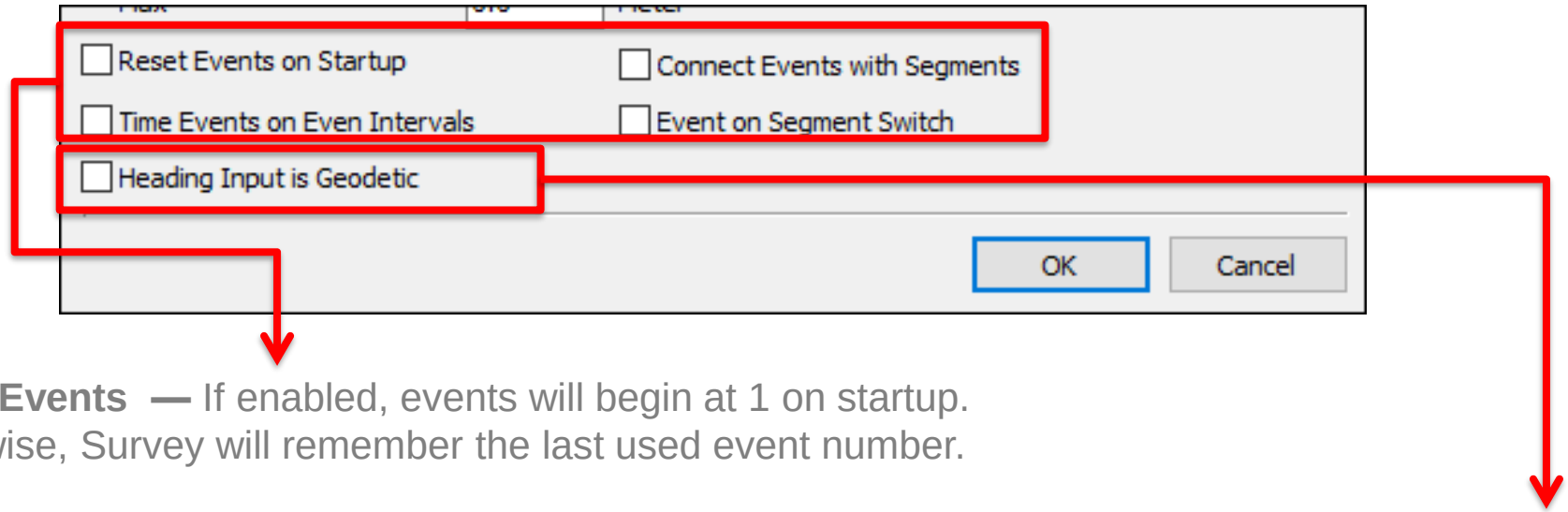


LOG Backup Time — Prevents large contiguous file sizes and protects data loss on long lines. Performs an immediate end line & start line.

MTX Backup Time — Moved to MATRIX – OPTIONS dialog..

Depth Alarms — Generates an alarm if the depth reported by the echosounder is less than the minimum value or greater than the maximum value. Set to 0 to disable an alarm.

Other Options



Reset Events — If enabled, events will begin at 1 on startup. Otherwise, Survey will remember the last used event number.

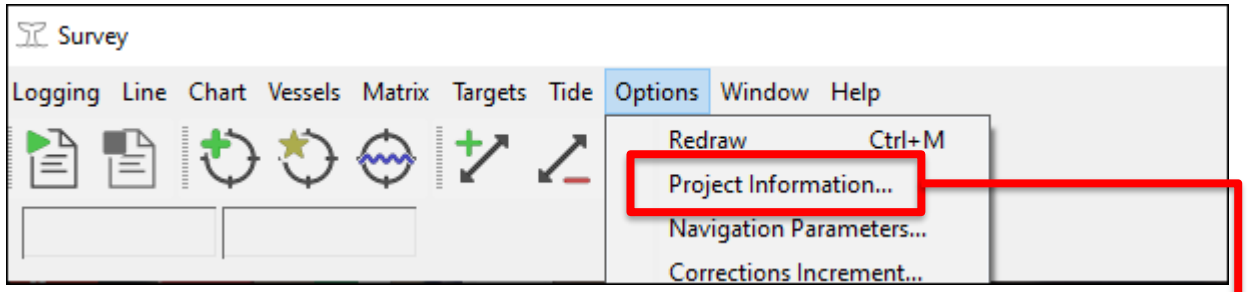
Even Intervals — Event time will be adjusted to the specified event time interval.

Connect Events — The Survey map will connect event marks with line segments.

Events on Segment Switch – Survey will generate an event at every waypoint of a multisegmented line.

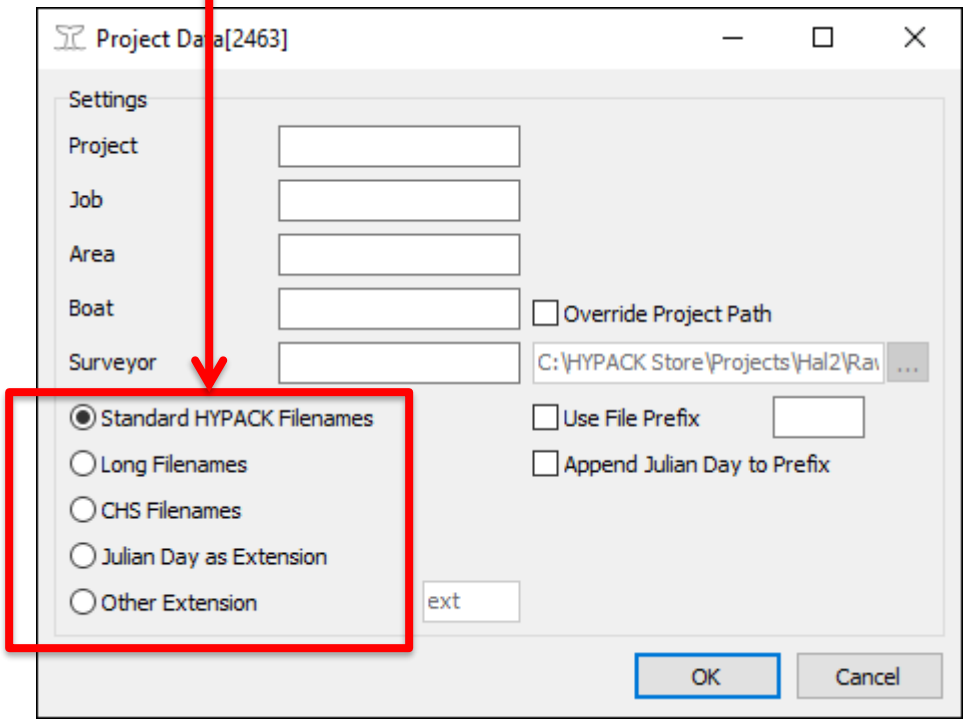
Geodetic Heading — Survey will convert the input heading from geodetic to grid heading by applying the grid convergence and then use the grid heading for all computations on the grid.

Naming Schemes



HYPACK provides several naming convention options for data files.

Method	2D Lines	3D Lines	No Lines
Standard	002_1607.RAW	10P00.RAW	000_1607.RAW
Long (Vessel Name is NANCY)	2003NA0061607_2.RAW	2003NA0061607_2.RAW	2003NA0061607_0.RAW
CHS	2003NA0061607.RAW	2003NA0061607.RAW	2003NA0061607.RAW
Julian (Julian day is 006)	002_1607.006	10P00.006	000_1607.006
Other	002_1607.ADB	10P00.ADB	000_1607.ADB



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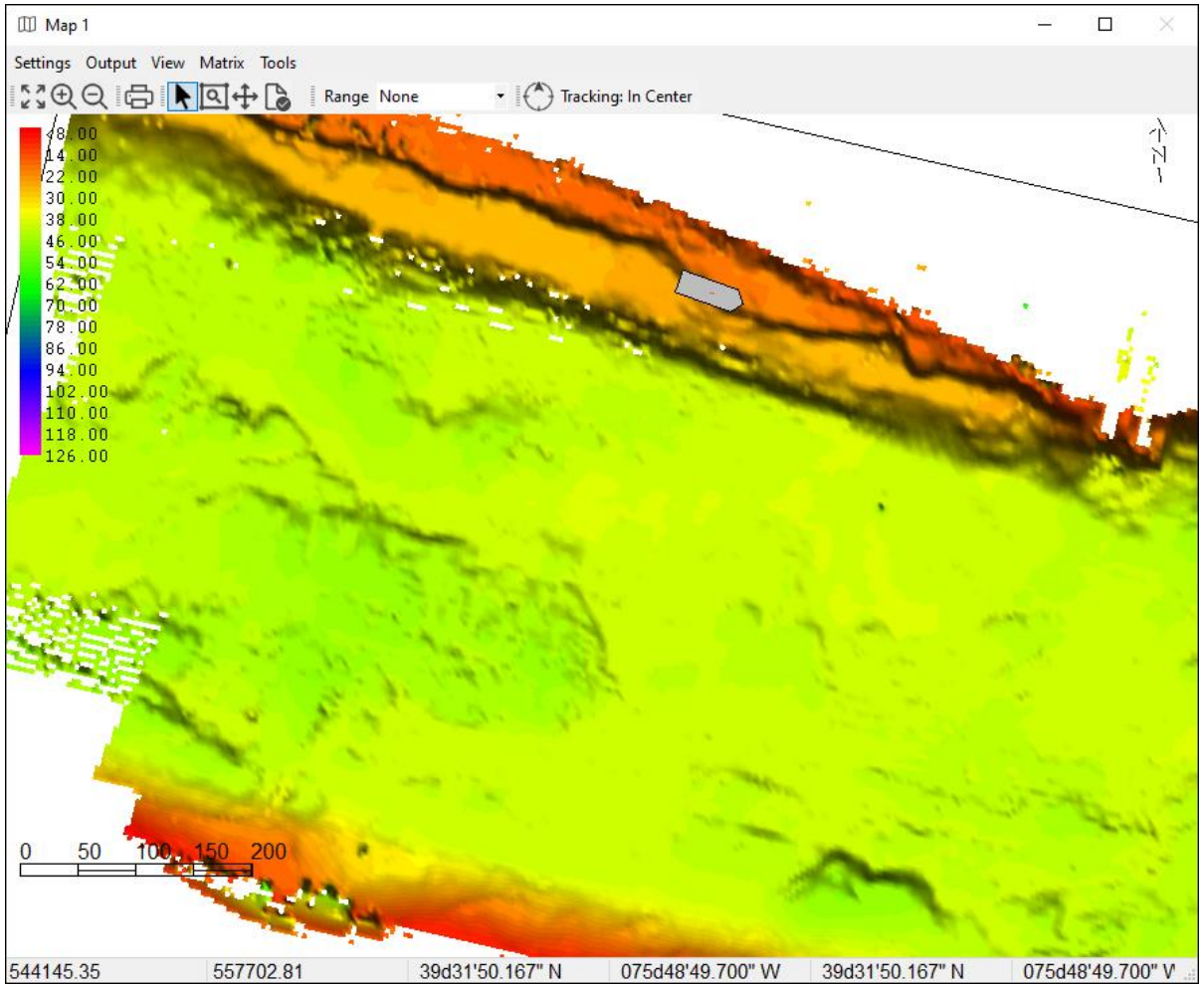
Matrix Files

HYPACK 2022

Matrices in HYPACK Survey



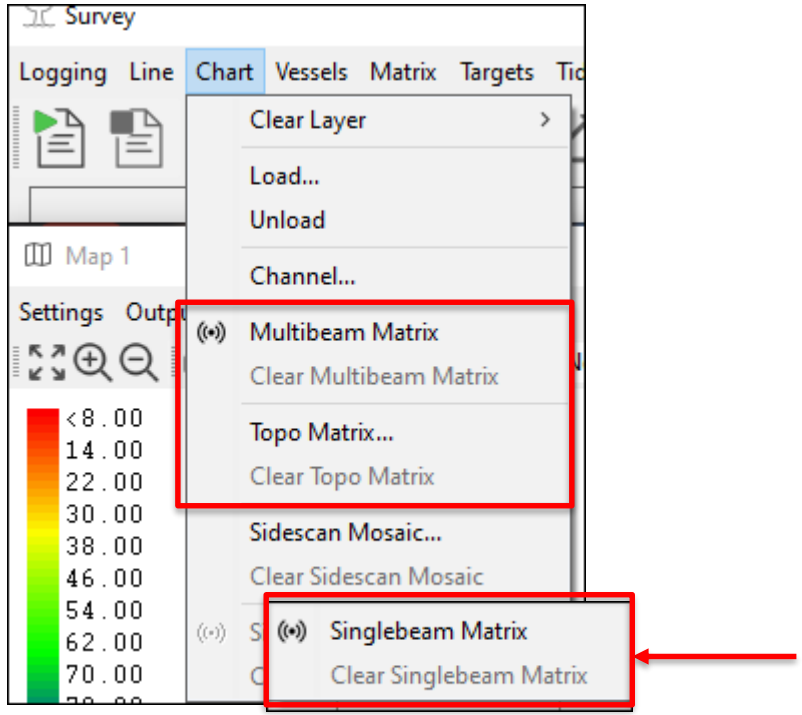
A HYPACK matrix (MTX) is a **gridded rectangular area** for recording depth information and other data during acquisition.

A matrix is used to:

1. Track coverage
2. Calculate cell statistics for multibeam bathymetry
3. Display a real-time surface as data is logged.

Matrix Configuration Options

	SURVEY	DREDGEPACK	HYSWEEP
MTX File	✓	✓	✓
Auto MTX single beam	✓	✗	✗
Auto MTX multibeam	✓	✗	✗



User-defined MTX files will work with all HYPACK products, but their bounds need to be pre-defined.

HYPACK Survey can auto-generate a set of matrices, This option is available for multibeam, topographic LiDAR, and single beam data.

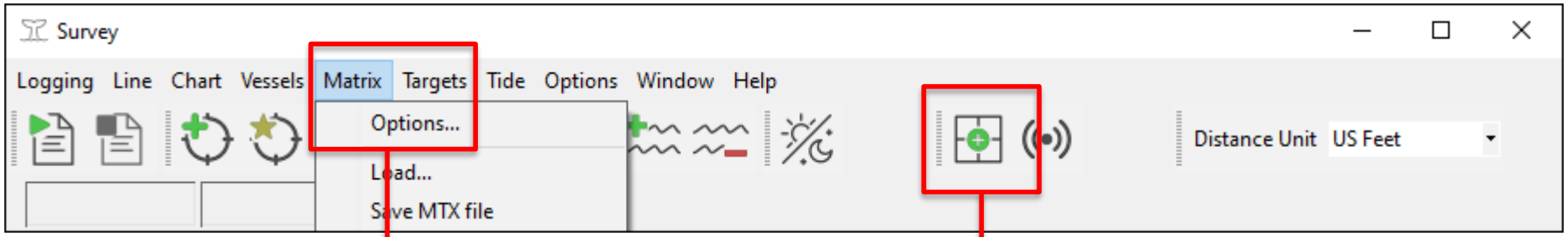
You cannot change method mid-survey.

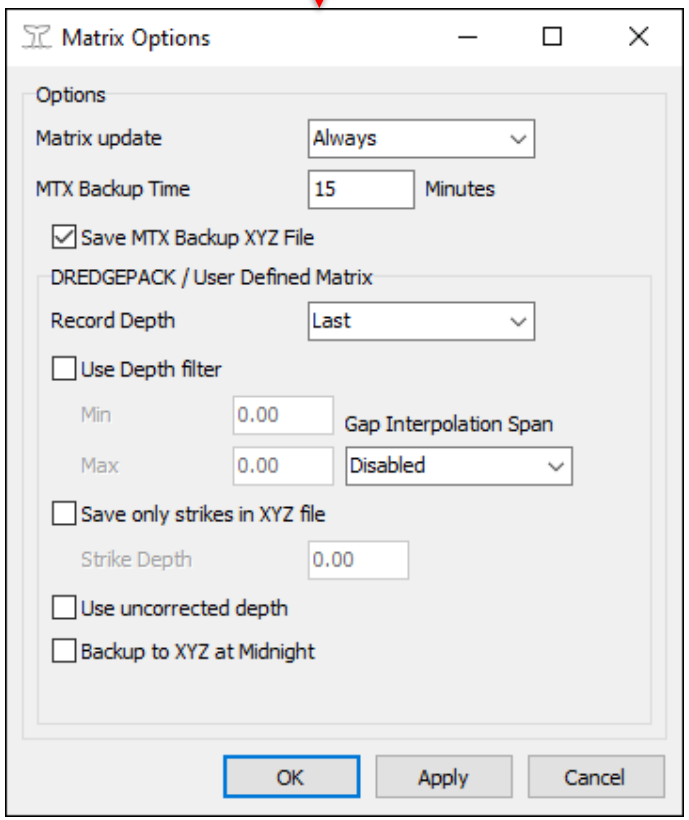
Singlebeam Auto Matrix now available in HYPACK 2022!

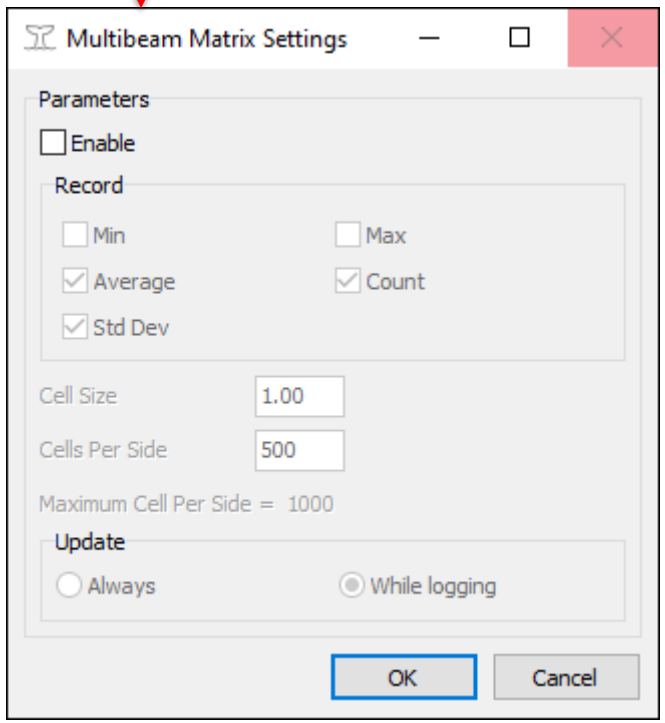
Programs That Can Use MTX Files

Program	Usage	Comments
Matrix Editor	Creates blank MTX files.	Make sure you designate usage in HYPACK or HYSWEEP!
MAPPER	Can fill MTX files with depths.	Does not 'infill' blank matrix cells.
TIN Model	Can fill MTX files with depths.	Can 'infill' blank cells on the interior of the model.
HYPACK Survey	Can update MTX files with depths.	Minimum, Maximum or Latest value. Corrected or Uncorrected depth.
HYSWEEP	Updates MTX with depths to show coverage.	Tracks minimum and maximum depth values in each cell. Tracks 100% or 200% for each cell.
DREDGEPACK	Updates MTX with depth of cutting tool.	Minimum depth for 'depth-based' projects. Maximum depth for 'elevation-based' projects.
XYZ to MTX	Automatically creates a filled MTX file.	TIN Model for Dummies.

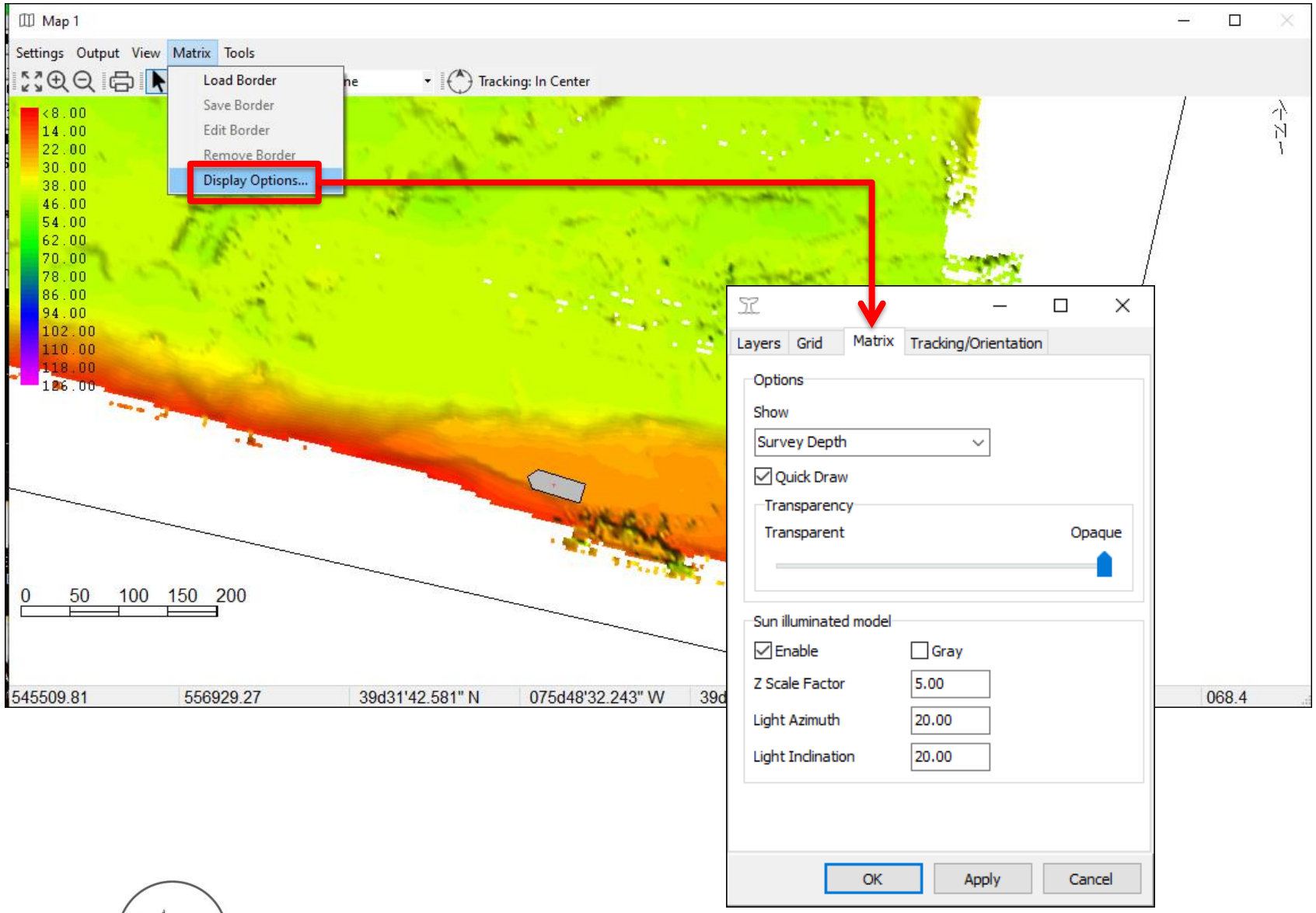
Configuring Matrix Options in HYPACK Survey







Map Window: Matrix Display Options



Each Map Window can display the matrix information differently according to the appearance settings dialog.

- Cell Depth
- Cell Hit Count
- Transparency
- Z Scaling
- Sun illumination

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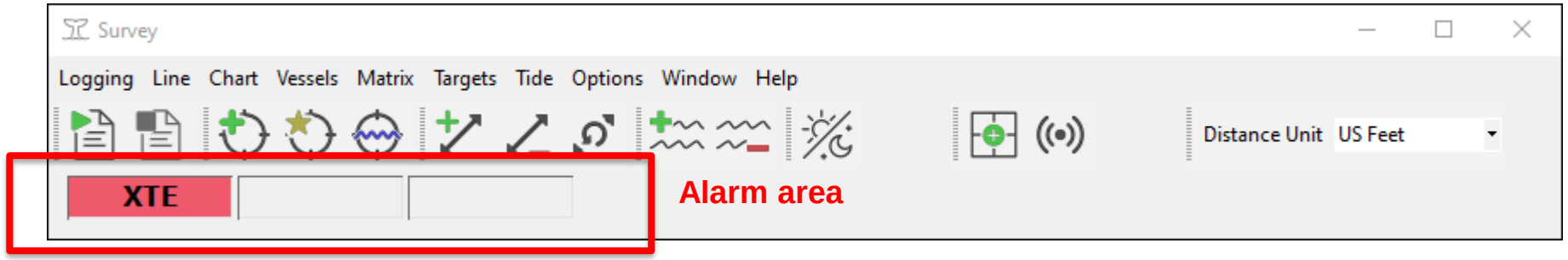
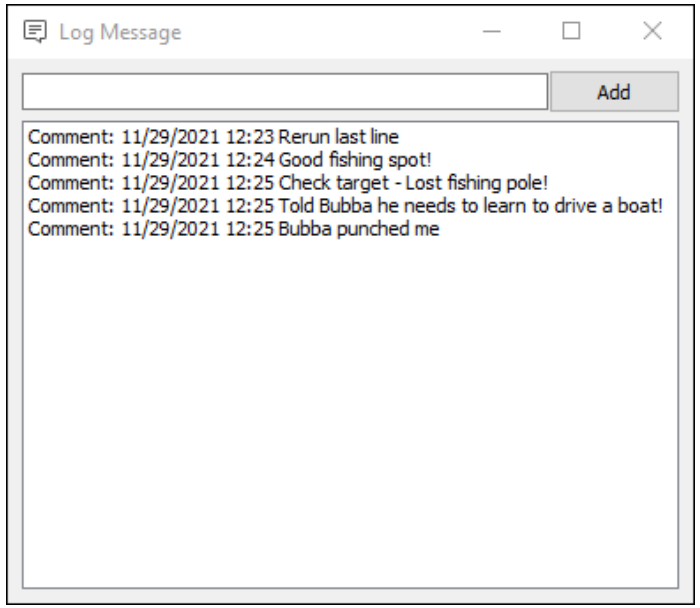
Extended Information

HYPACK 2022

Comments and Alarms

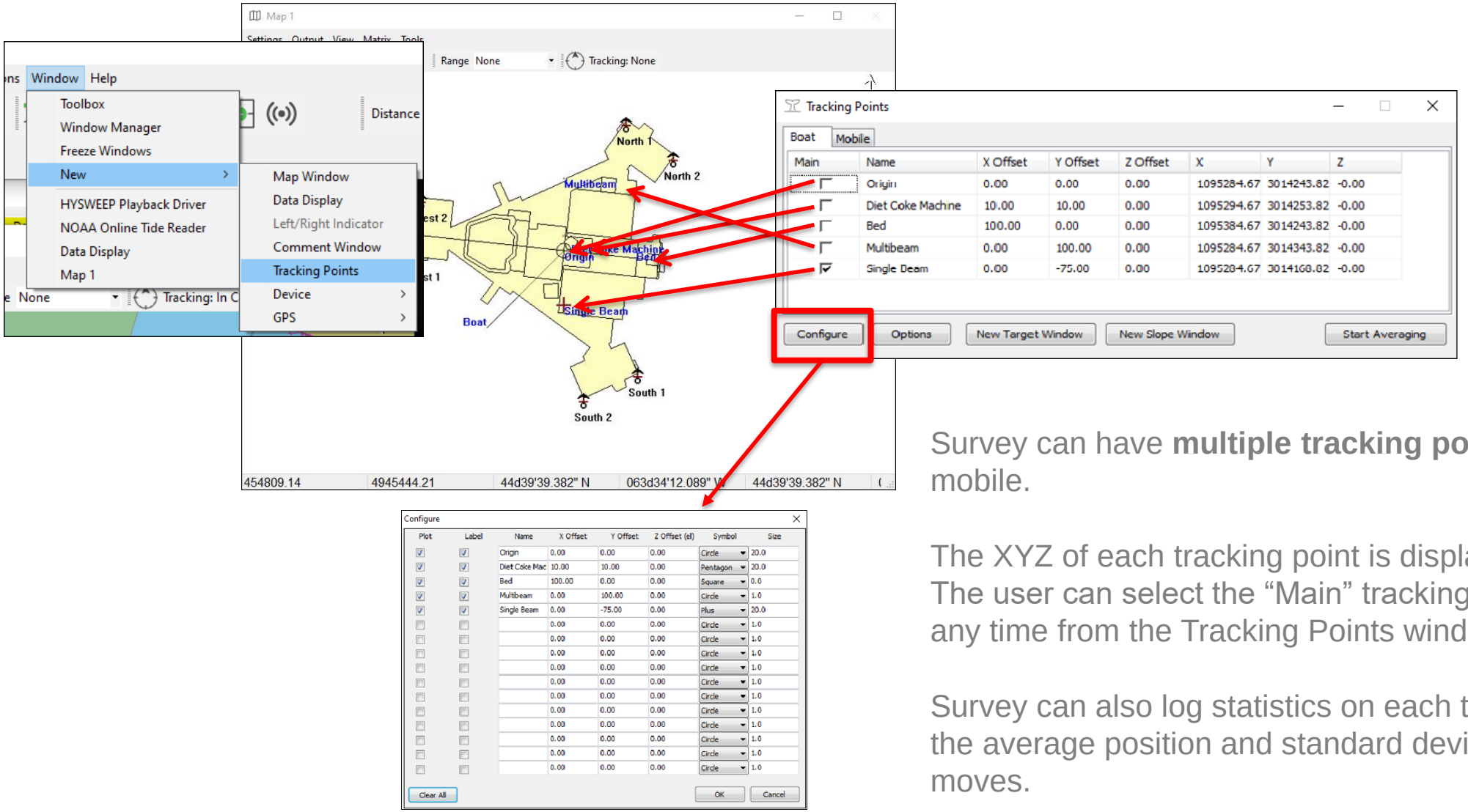




The **comment** window allows the operator to store text notes in the project log. Comments can be referred to during the editing process.

Alarm conditions are reported on the bottom of the main window. An alarm sound will repeat until the ESC key is pressed. The alarm will be displayed until the condition is rectified.

Tracking Points

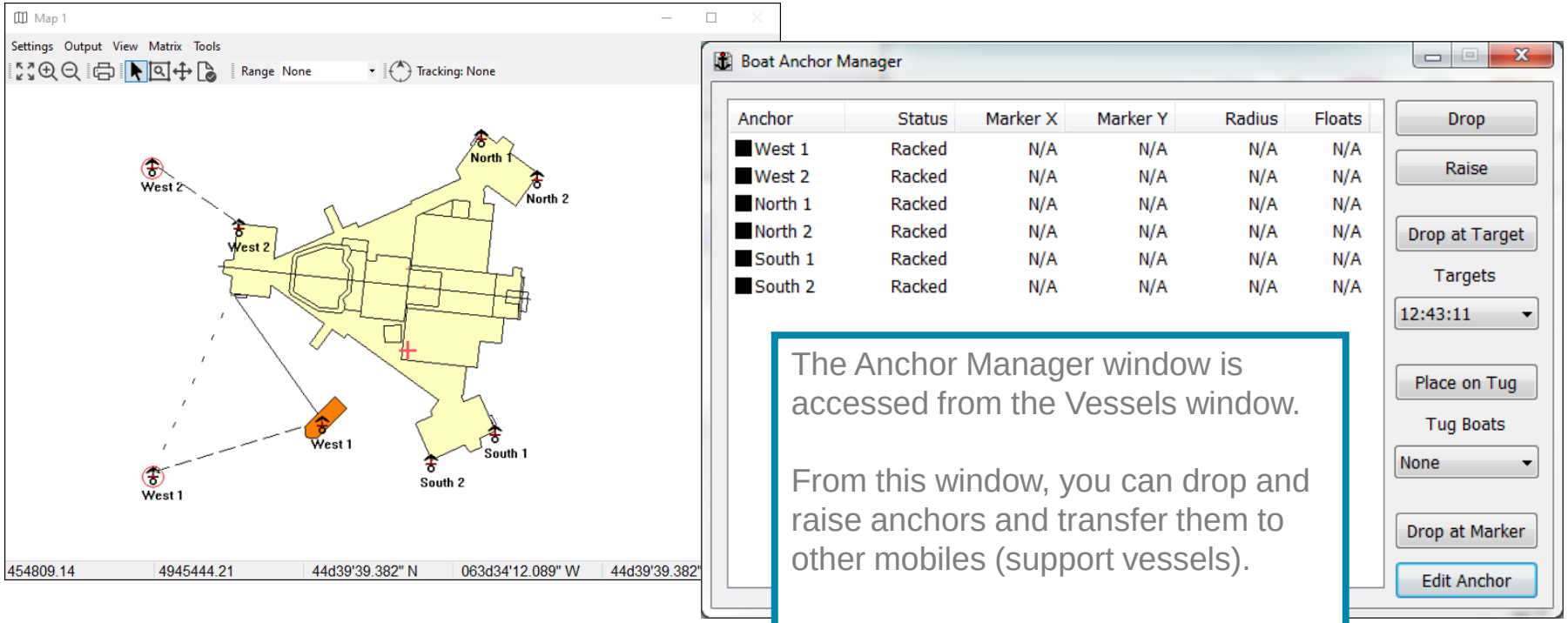


Survey can have **multiple tracking points** on each mobile.

The XYZ of each tracking point is displayed on the map. The user can select the “Main” tracking point to be used at any time from the Tracking Points window.

Survey can also log statistics on each tracking point to get the average position and standard deviation during rig moves.

Anchor Handling



The Anchor Manager window is accessed from the Vessels window.

From this window, you can drop and raise anchors and transfer them to other mobiles (support vessels).

You can also place floats on anchor wires or radius circles about dropped anchors.

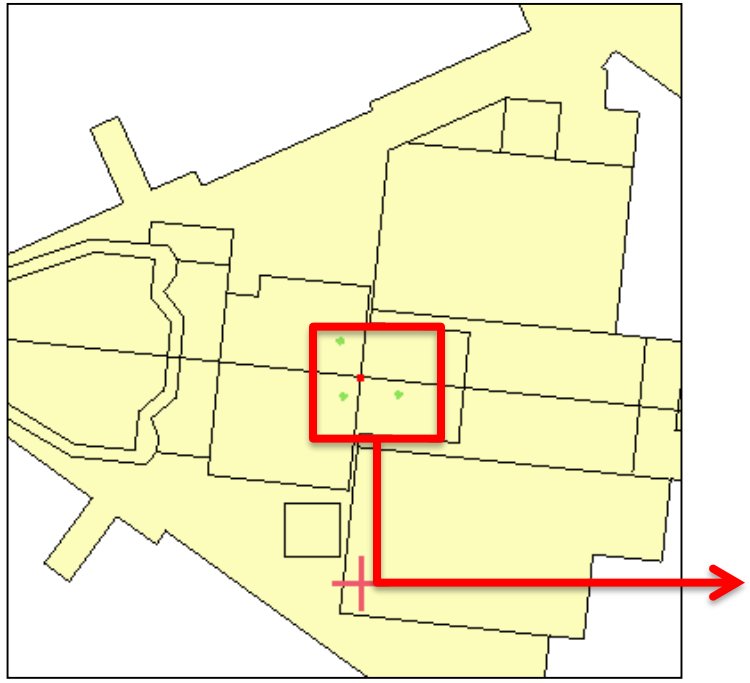
On an anchor or marker to drop or raise it.

+ Click and drag an anchor to set a **marker**.
Markers are planned anchor positions before deployment.

Multiple Position Sensors Per Mobile

Boat Multi Position-NUL:

Name	X	Y	DX	DY	NSat	HDOP	ElipH
Current Position	1095284.7	3014243.8					
☑ GPS 1	1095284.7	3014243.8	0.0	0.0	7	1.200	-1.5
☐ GPS 2	1095304.7	3014244.4	-20.1	-0.6	7	1.200	-1.5
☐ GPS 3	1095283.7	3014263.9	1.0	-20.1	7	1.200	-1.5



HYPACK Survey allows you to assign multiple positioning sensors to a mobile.

The Boat Multi Position window is used to select one or more sensors to determine the final vessel position. If multiple sensors are selected, an average position is calculated.

The green dots show the three GPS positions.
The red dot denotes their average.

Remote Viewing (New!)

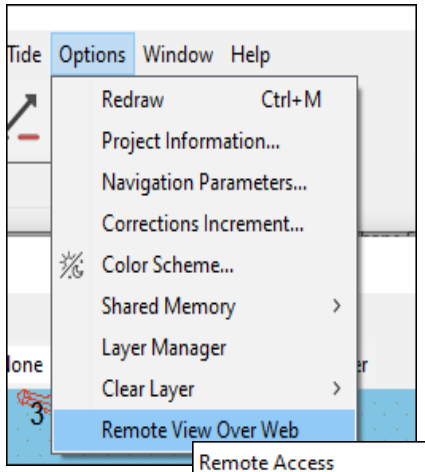
Observe & interact with HYPACK Survey using remote view tools

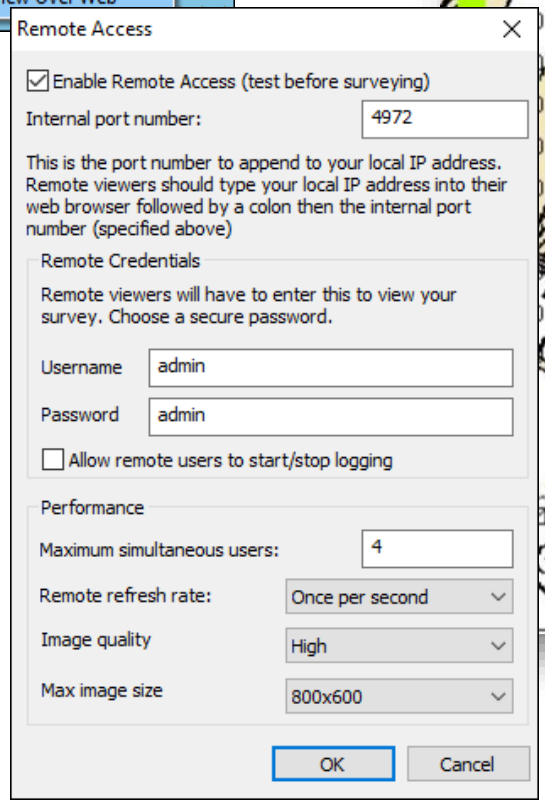
- View vessel position
- Manually control logging

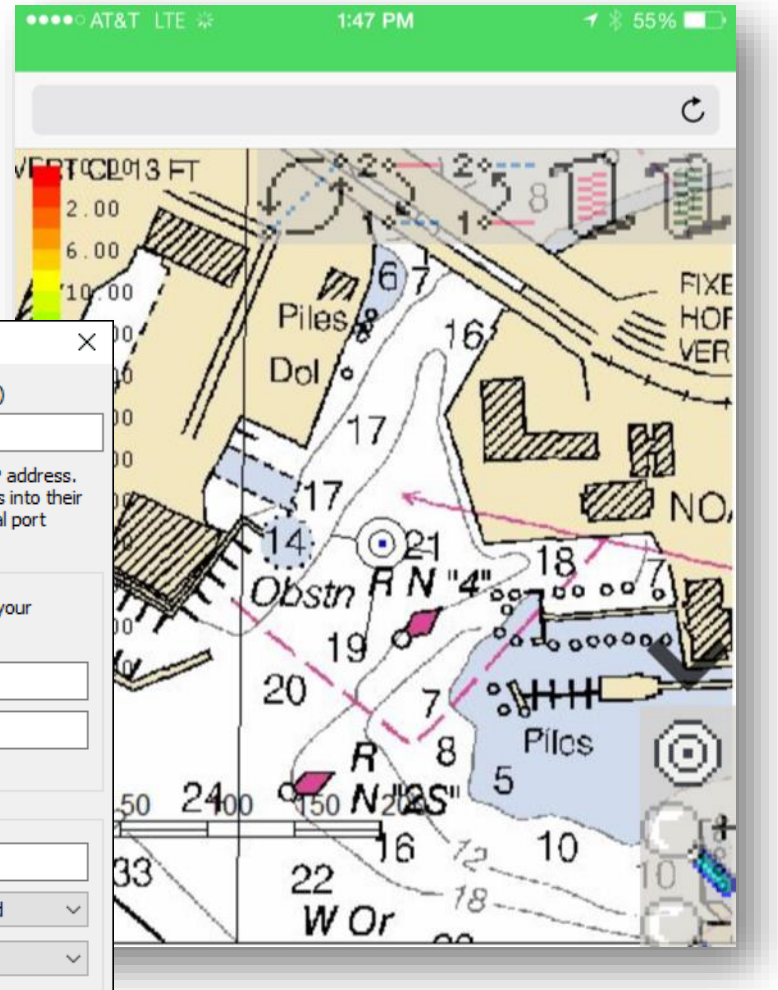
Use any web enabled device

- smartphones, tablets, computers

Controlled access and secured views







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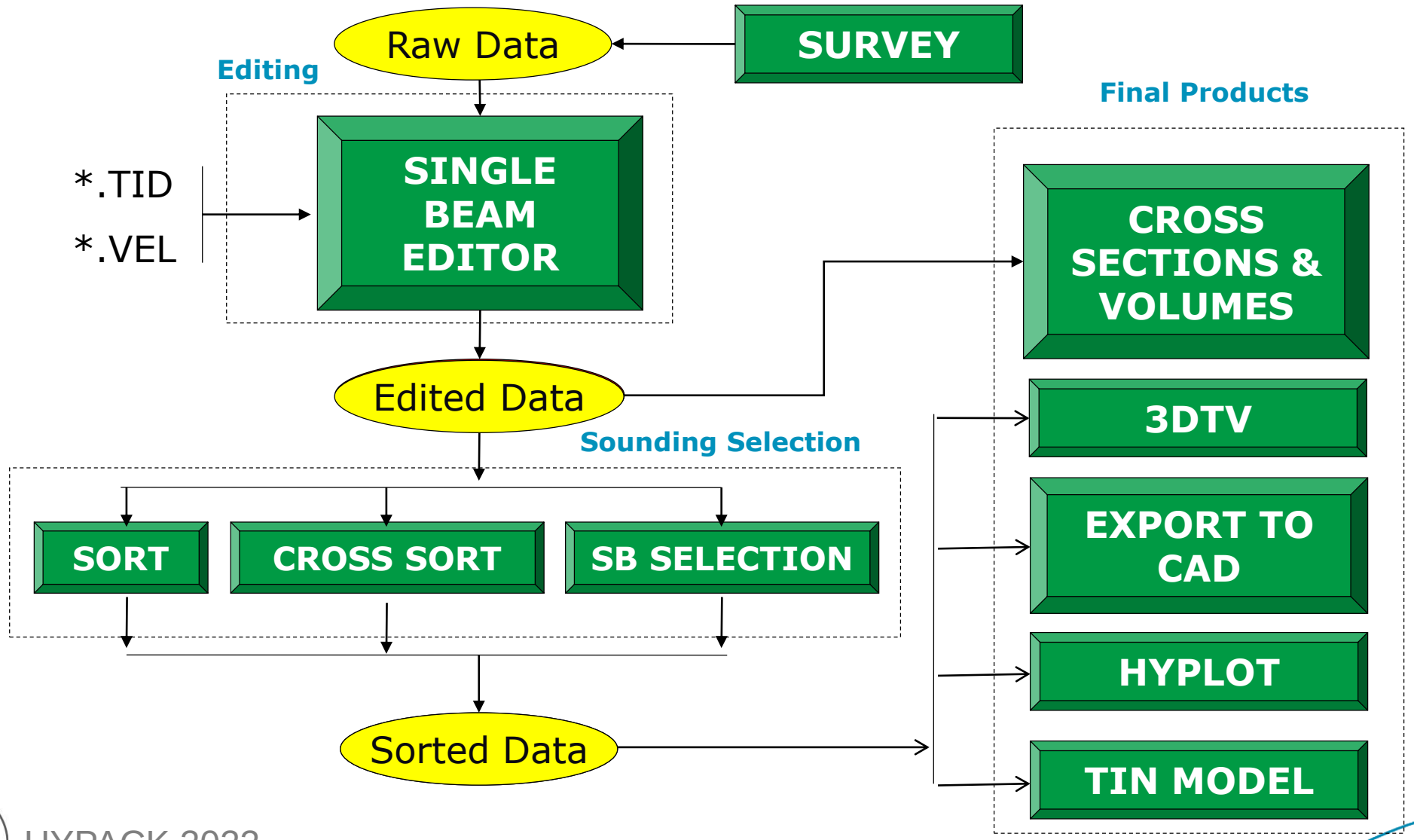
SBES - Processing Data

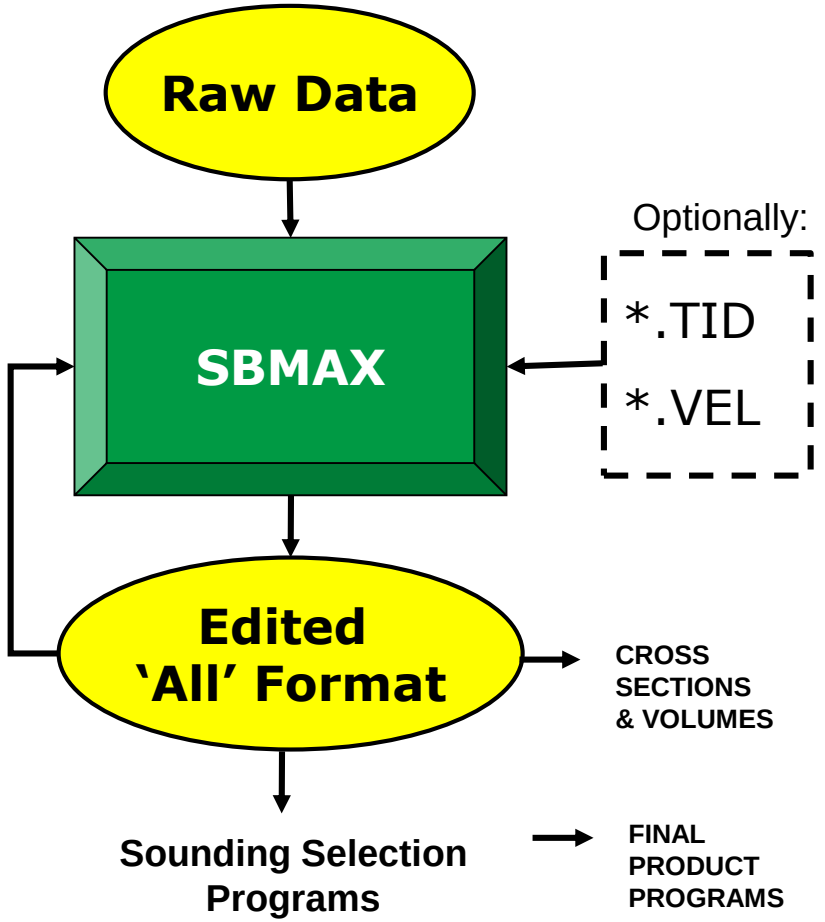
HYPACK 2022

Single Beam Editing Flow



Single Beam Editor (SBMAX)

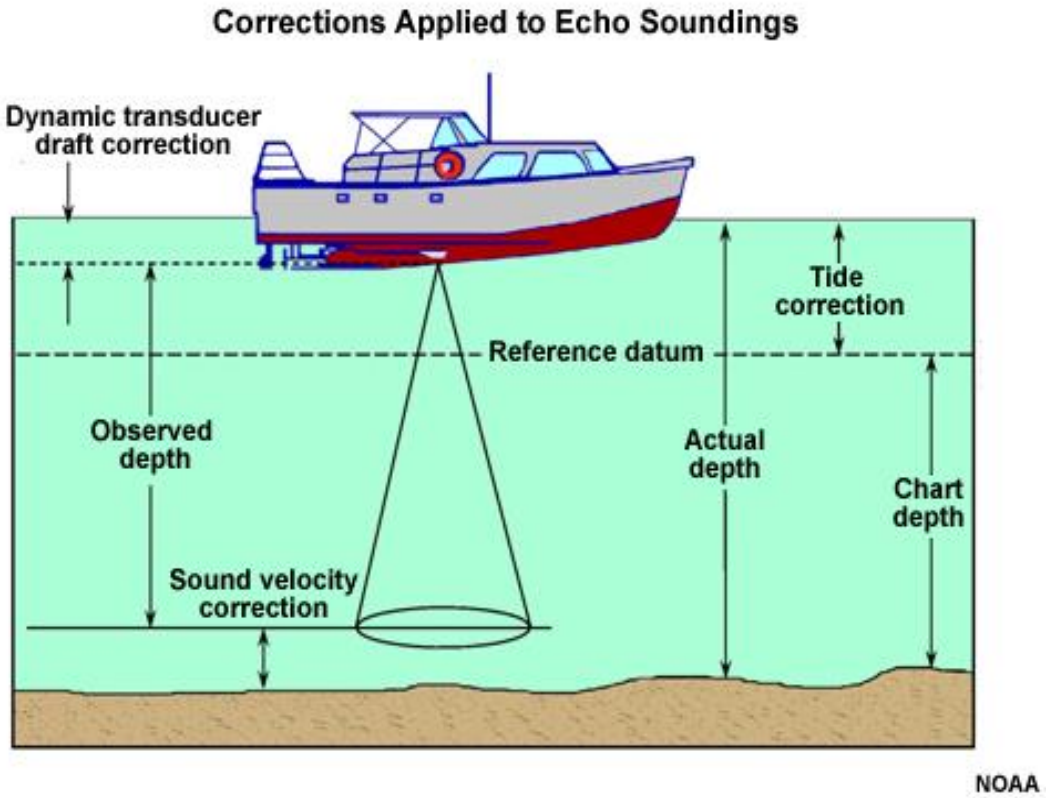
- Based on the time of the depth measurement, SBMAX interpolates:
  - Position
  - Tide
  - Draft
  - Sound Velocity
  - Heave-Pitch-Roll
- Eliminate or Smooth Positions.
- Eliminate or Smooth Depths.
- Save each depth with associated position and corrections.



You can process your data in SBMAX with predicted tides (or no tides). When you get your final tides, you can load the processed data back into SBMAX and insert the final tides.

Corrections to Soundings

- Static / Dynamic Draft
- Motion Reference Units
- Sound Velocity
- Tide \ Water Level

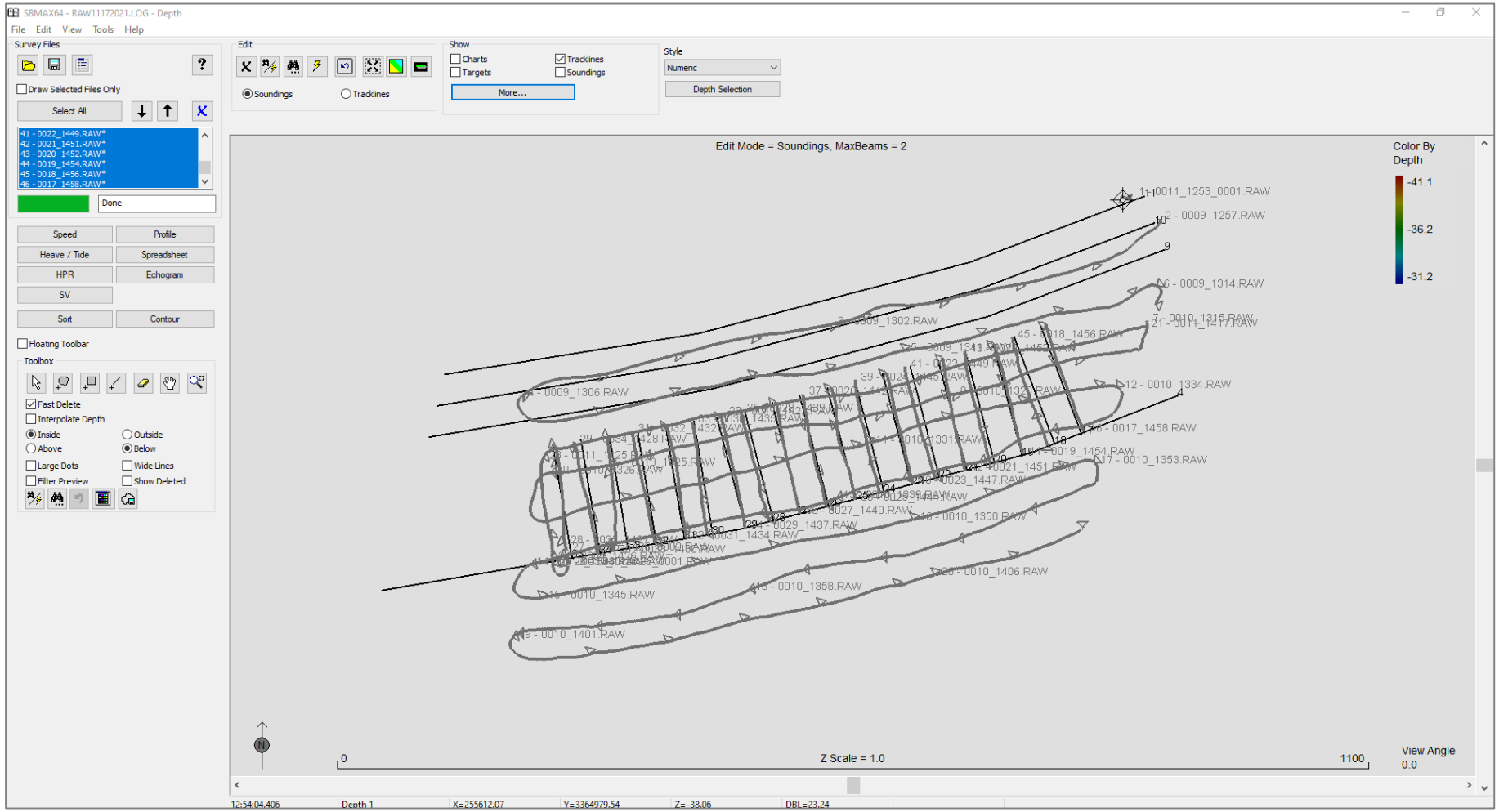


Single Beam Editing – 64 Bit

HYPACK 2022

Single Beam Editor (SBMAX-64)

- Easy user interface for Editing and Testing.
- Tide and SV Corrections.
- Added in HYPACK 2022, Contour and Sort



SBMAX64 Highlights

Uses HYSWEEP HS2x format for saved data. (Same dataformat as Multibeam data)

What you can do now (that you couldn't before):

- Recalculate RTK Tides from edited data.
- Properly adjust device offsets of edited files.
- All raw data available for every sounding.

More Sonar Options Without a HYSWEEP Key

- Multiple Transducer Systems.
- Sontek M9/Hydrosurveyor ADCP/Multibeam.

Change Read Parameters any time during Editing

- Don't need to reload to fix a mistake.

Common User Interface With MBMAX64 Multibeam Editor

- No need to learn two edit programs.
- Modernizes single beam editing.
- Edit all lines at once in the Survey Window.

Data Flow

Reads:

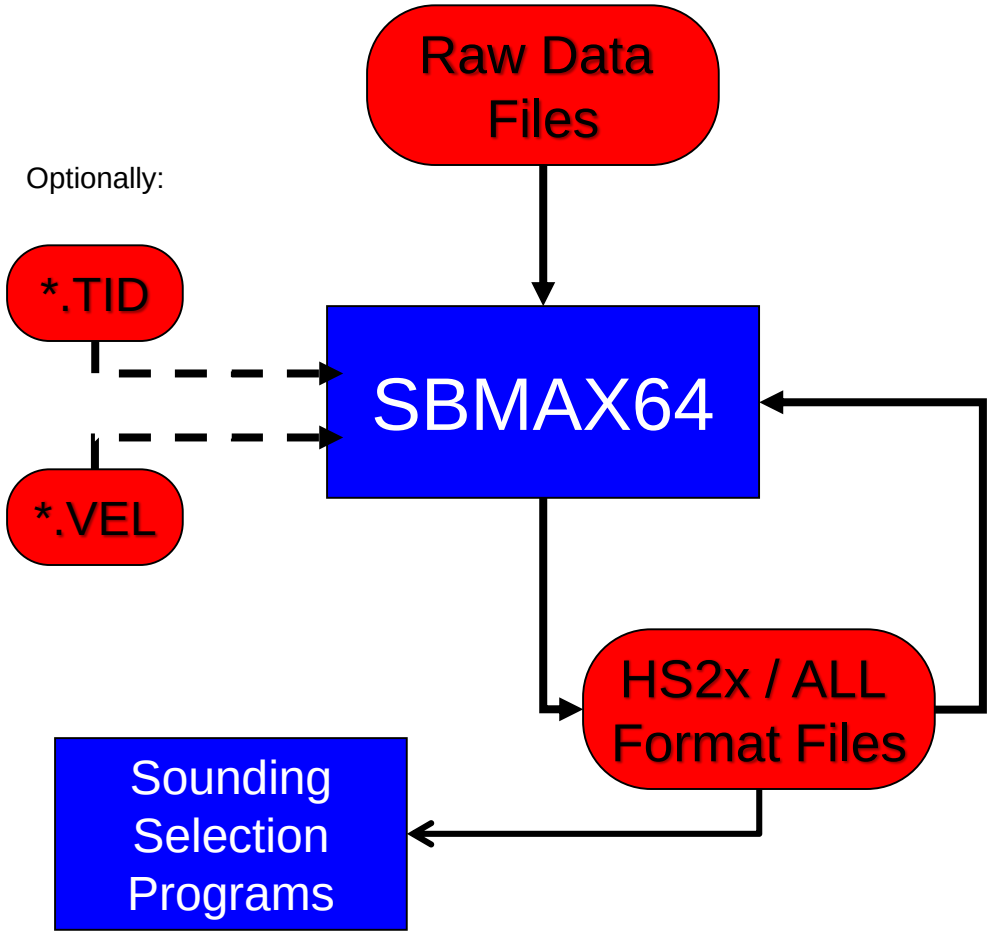
- Raw Data Files
- HS2x Edited Single Beam Files
- ALL2 Format Data Files
- Old ALL Format Data Files

Applies (optionally):

- Tide Correction Files
- SV Correction Files

Saves:

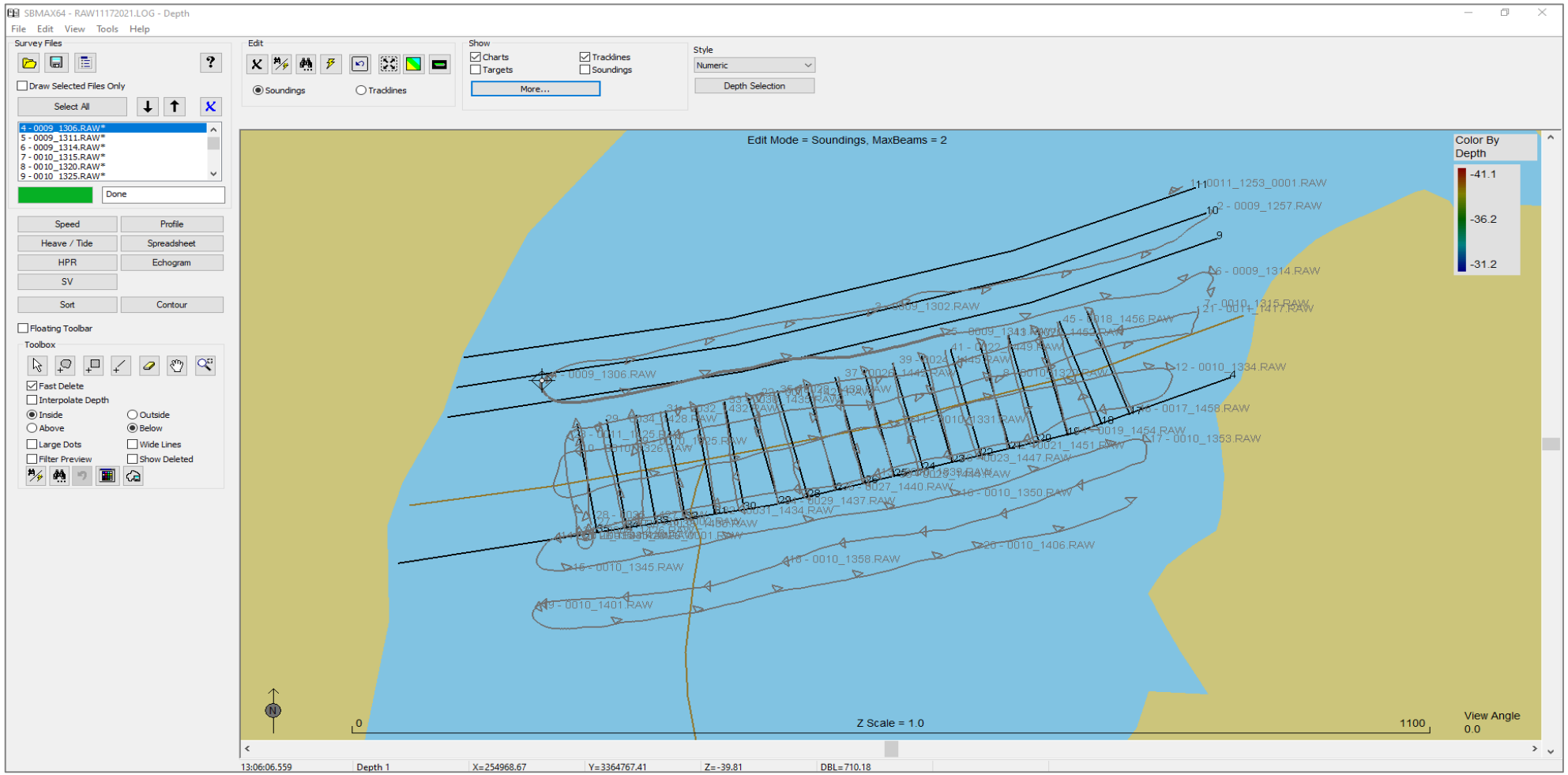
- HS2x Format Files (Default)
- ALL2 Format Data Files (Export)
- XYZ Format



Read a single file, selected files from a *.LOG, or the entire *.LOG file.

SBMAX64 Layout

Top Panel: Mostly Applies to the Survey Window and Data.



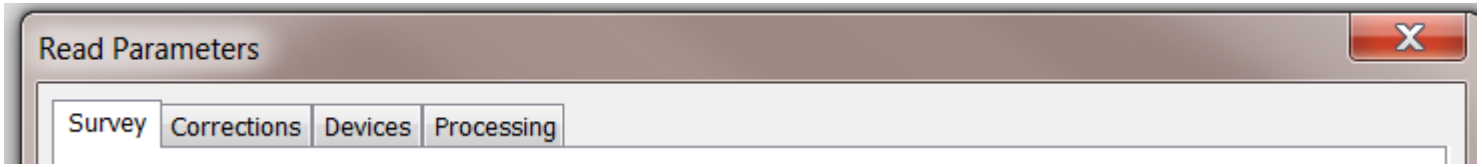
Left Panel: Applies to All Windows and Data

Survey Window: Tracklines or Soundings.

Status Bar: Point Data and Measurement Between Points.

Read Parameters

Everything Required to Process the Data



Tabs:

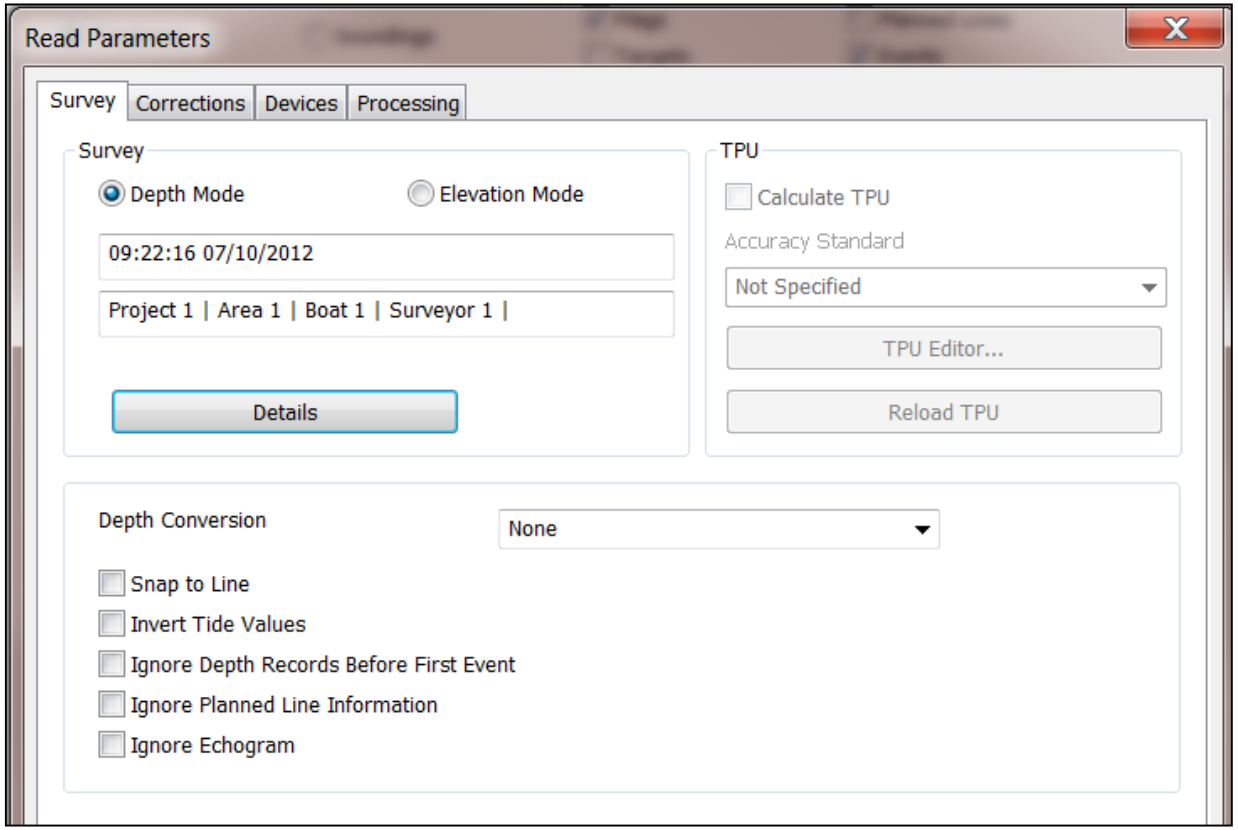
- Survey: Applies to all loaded files.
- Corrections: Tide, Sound Velocity and Dynamic Draft.
- Devices: Device Selections and Offsets.
- Processing: Heave and Sonar Settings.

In SBMAX64: Any of the Read Parameters can be updated *After Files are Loaded*!

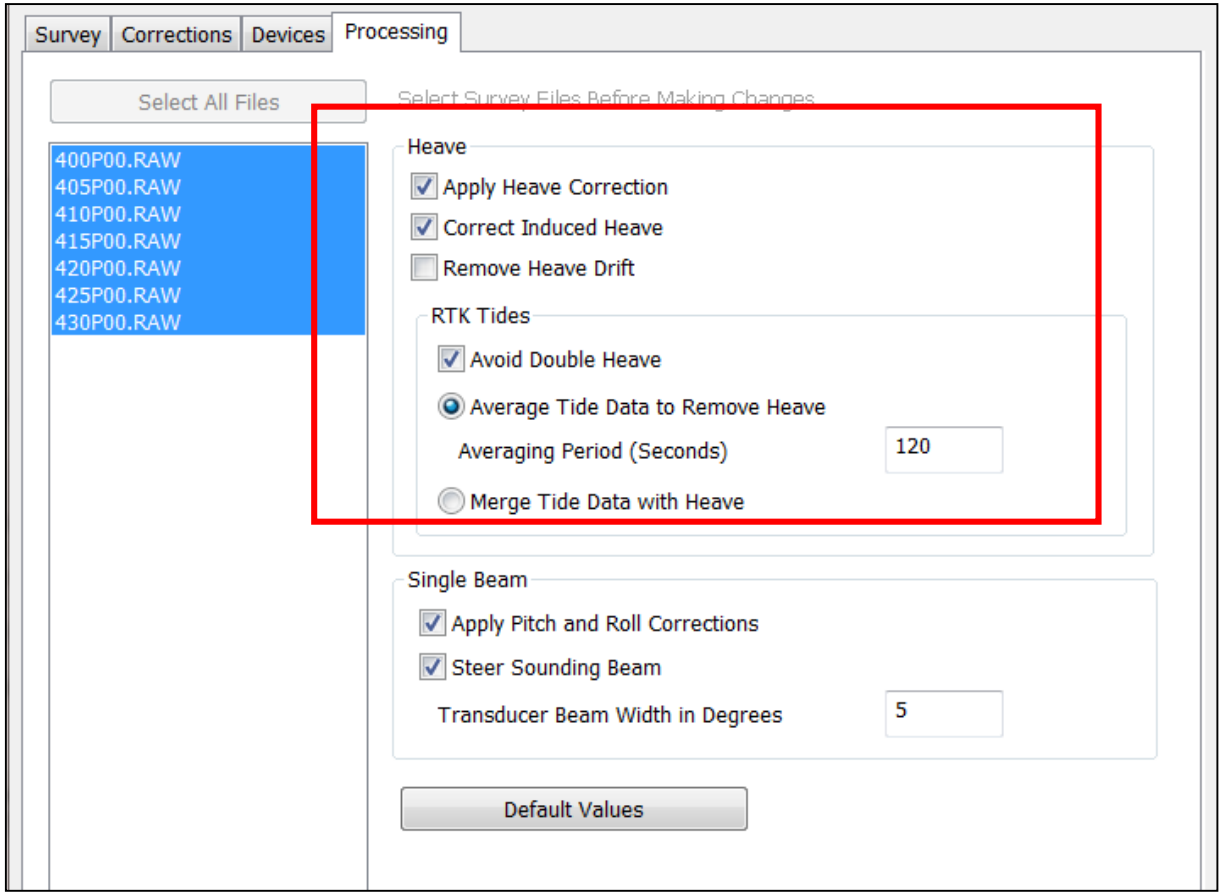
Survey Tab

Summary of Survey Info

- Depth or Elevation: Select Your Work Mode.
- Details: Click to see additional survey information.
- TPU: (Future) Calculate Total Propagated Uncertainty of each Sounding.
- Depth Conversion, etc.: To be used as needed.

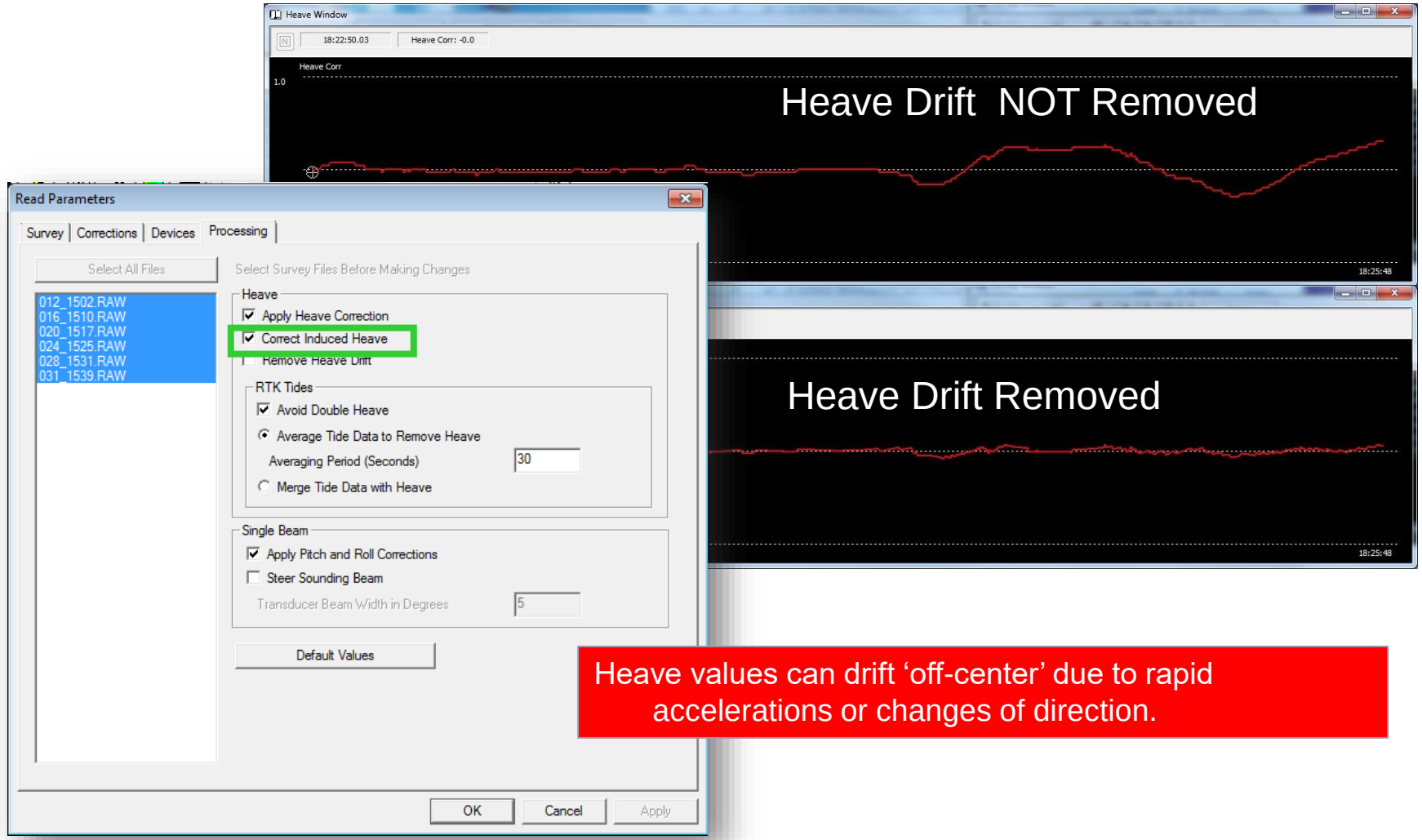


Processing Tab, Heave



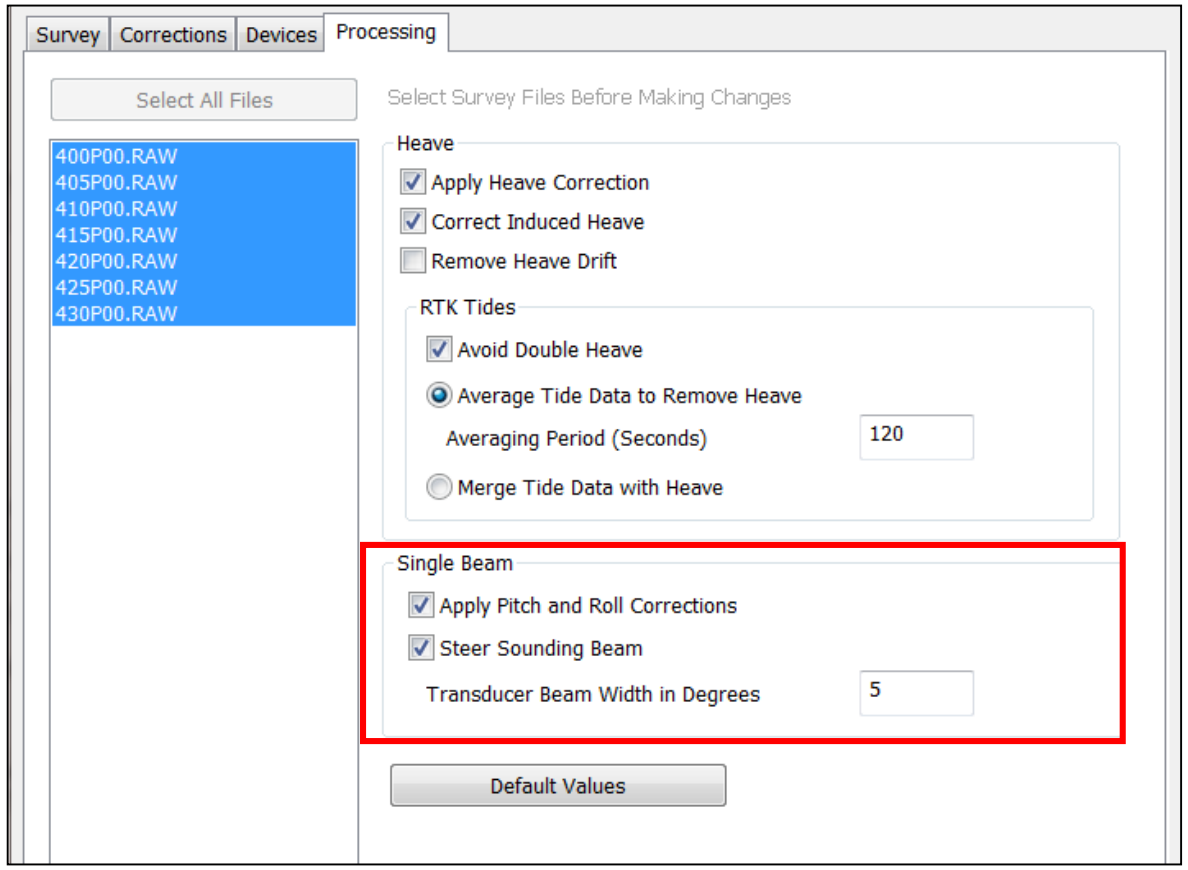
- Apply Heave Correction: Use Heave Correction From MRU.
- Correct Induced Heave: Required When MRU is Not Mounted at Boat Reference.
- Remove Heave Drift: Apply Averaging to “Fix” Heave Drift.
- Avoid Double Heave: When RTK Tide and MRU Both Measure Heave.
- Average to Remove Heave: Use Averaging to Remove Heave From RTK Tide.
- Merge Tides With Heave: Use Heave to Fill Gaps Between RTK Tide Points.

Correction of Heave Drift



Heave values can drift ‘off-center’ due to rapid accelerations or changes of direction.

Processing Tab, Single Beam



Apply Pitch and Roll Corrections: Use Corrections from the MRU to calculate transducer draft change.

Steer Sounding Beam: Use pitch and roll corrections to steer the beam. Otherwise depth is considered directly below the transducer. More in the next slide.

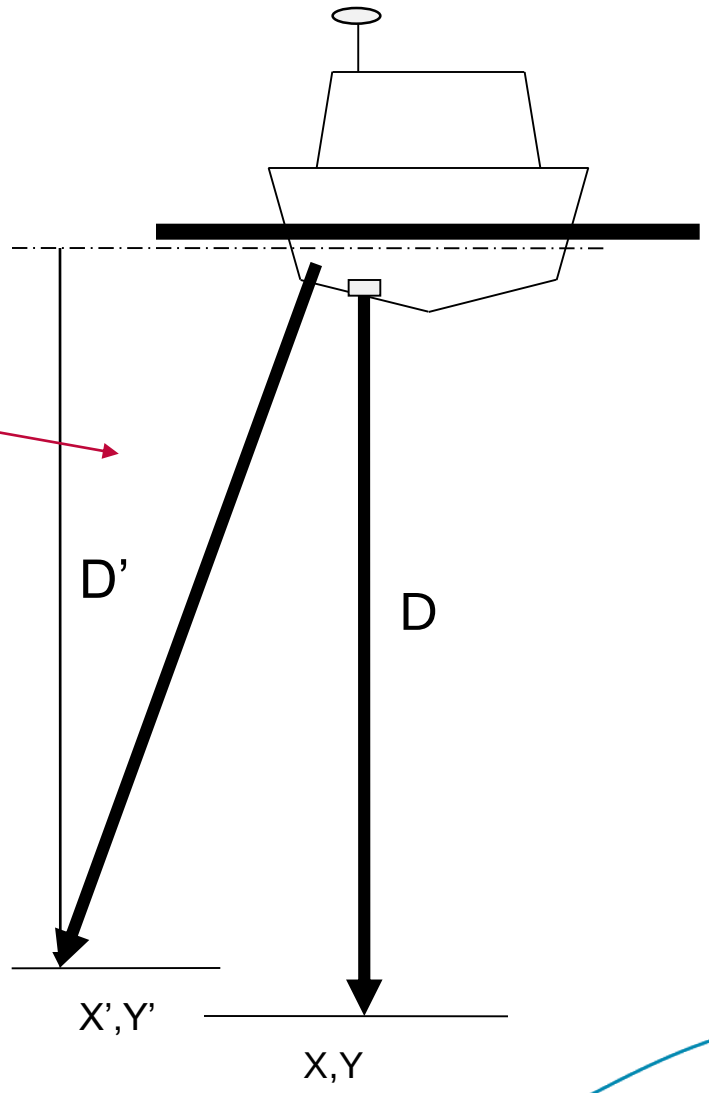
Transducer Beam Width in Degrees: From manufacturers specs.

Single Beam Steering

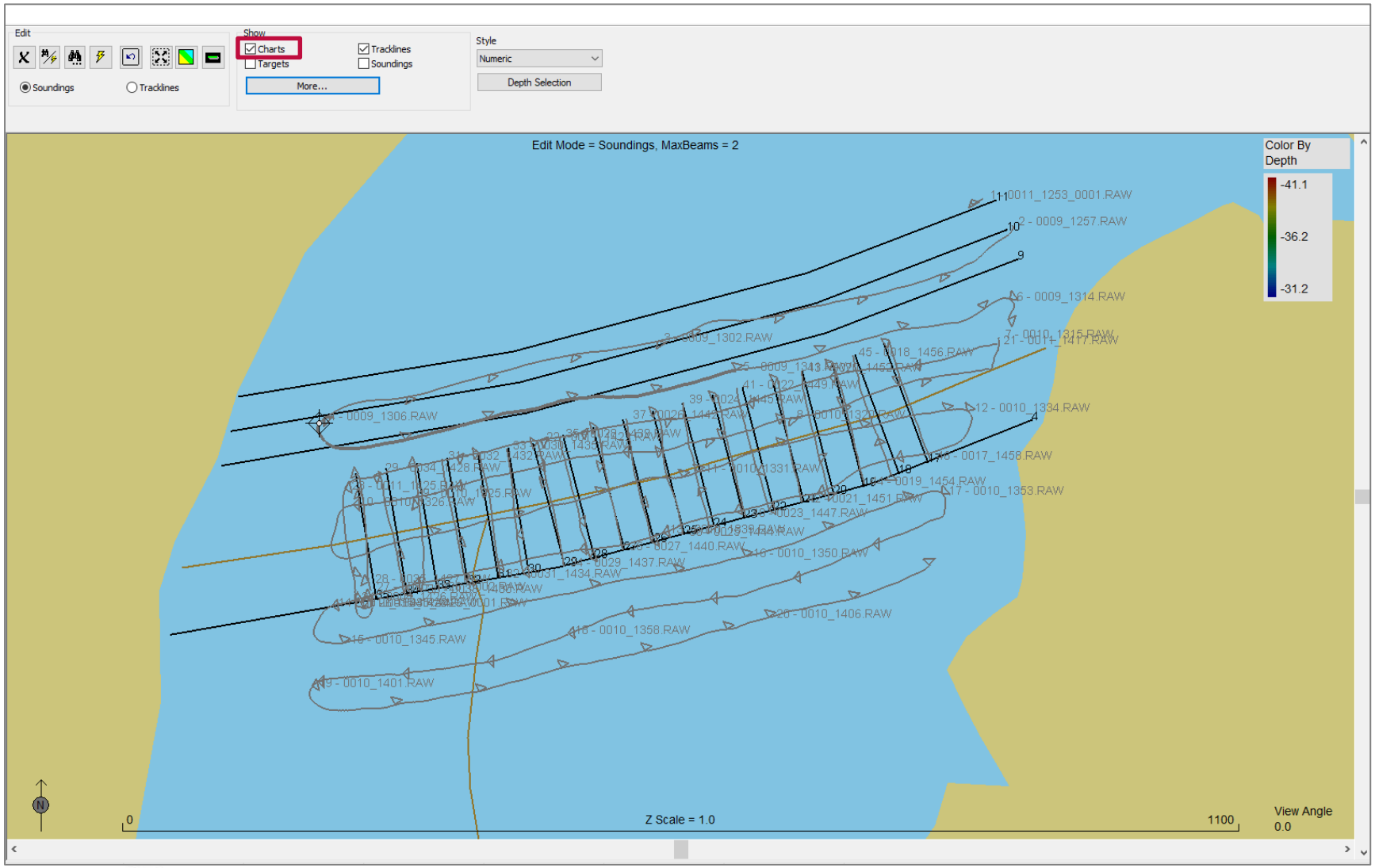
The position of the sounding is based upon the center of your transducer beam.

'Steer Sounding Beam' computes a new location for the center of your transducer beam, based on the pitch and roll values, and the beam width of your transducer.

D' = COS(pitch) * COS(roll) * D



Background Files in Survey Window

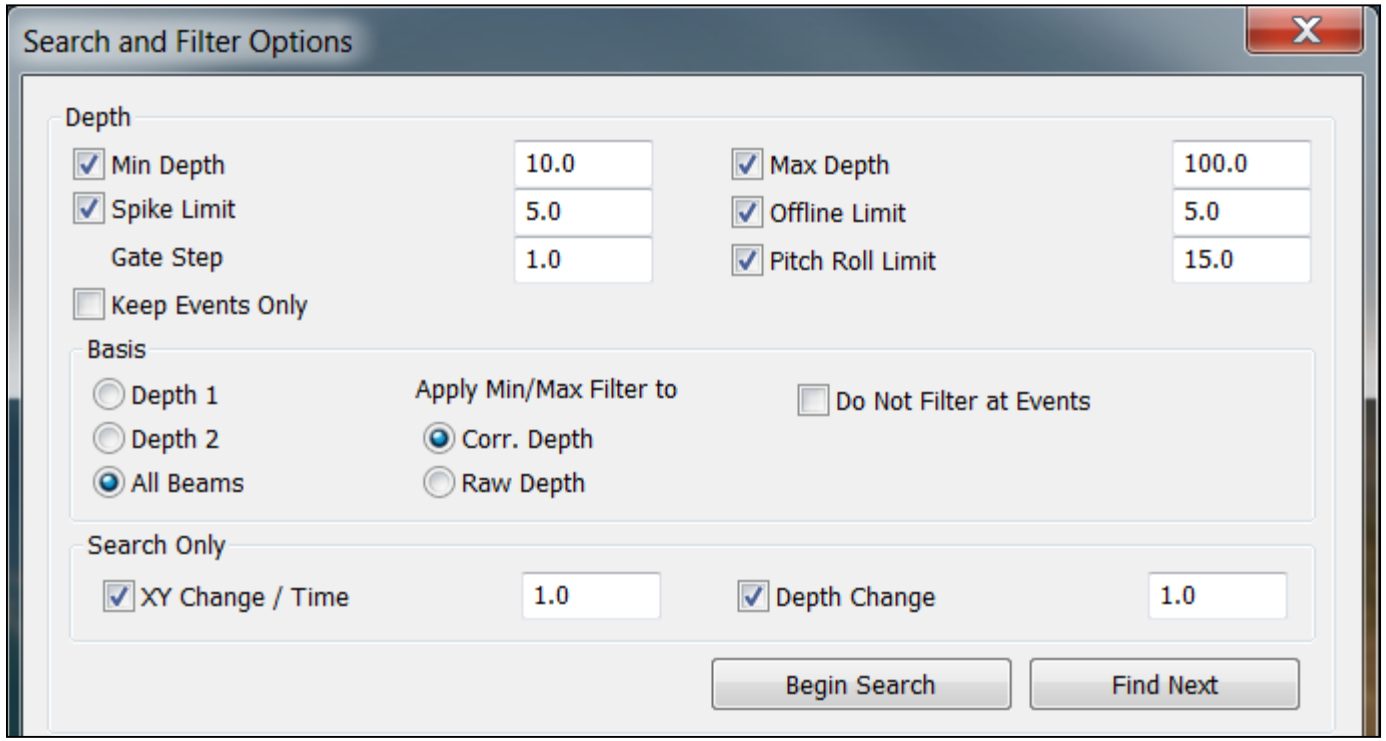


Users can display all background files in the main window.

Check the box at the top of the map.

Hit ‘F9’ to get to the View Options window.

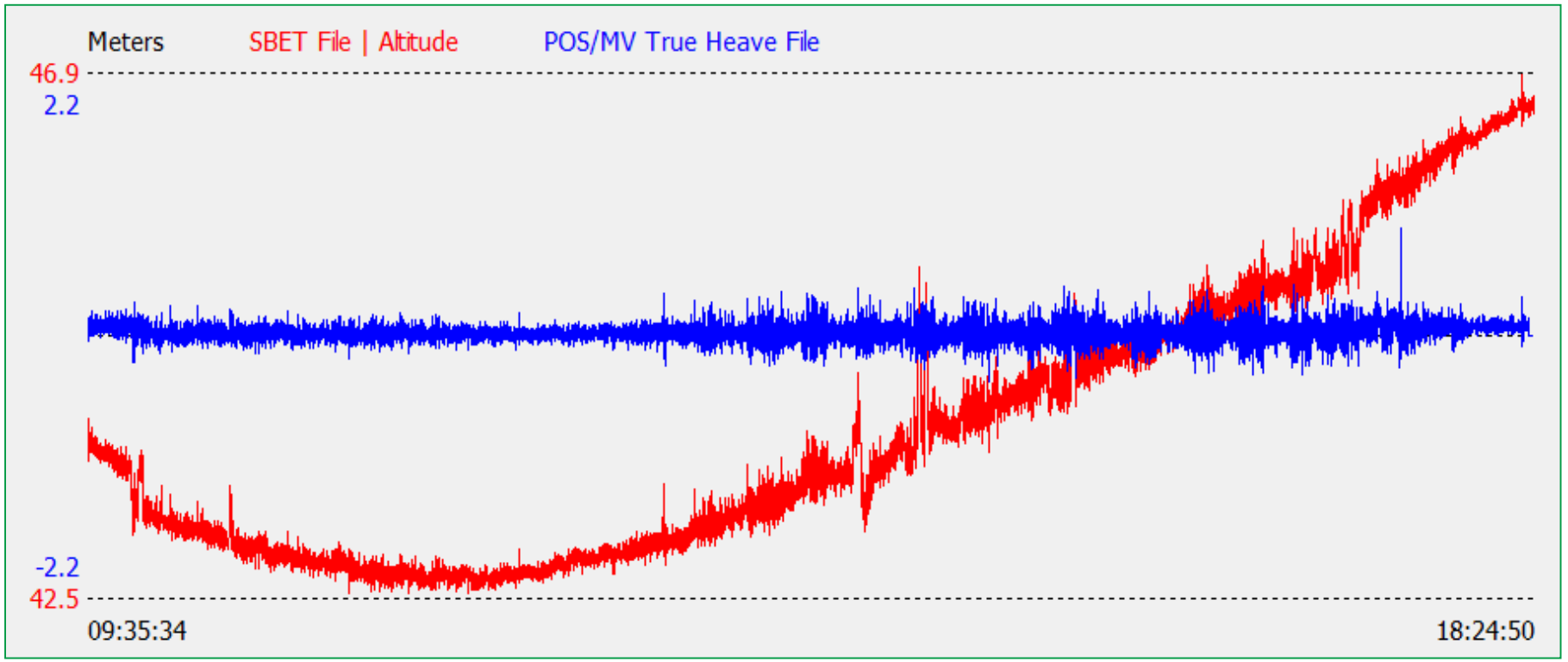
Depth Filters



Spike Limit: Uses a gating method to detect outliers. Spike Limit is the depth gate, Gate Step controls how fast the gate expands.
Offline Limit: Removes soundings beyond the set limit from planned line.
Basis Depth 1/2/All: Controls which beams filters are applied to.

SBET Editor

Use Tools Menu, SBET File Editor

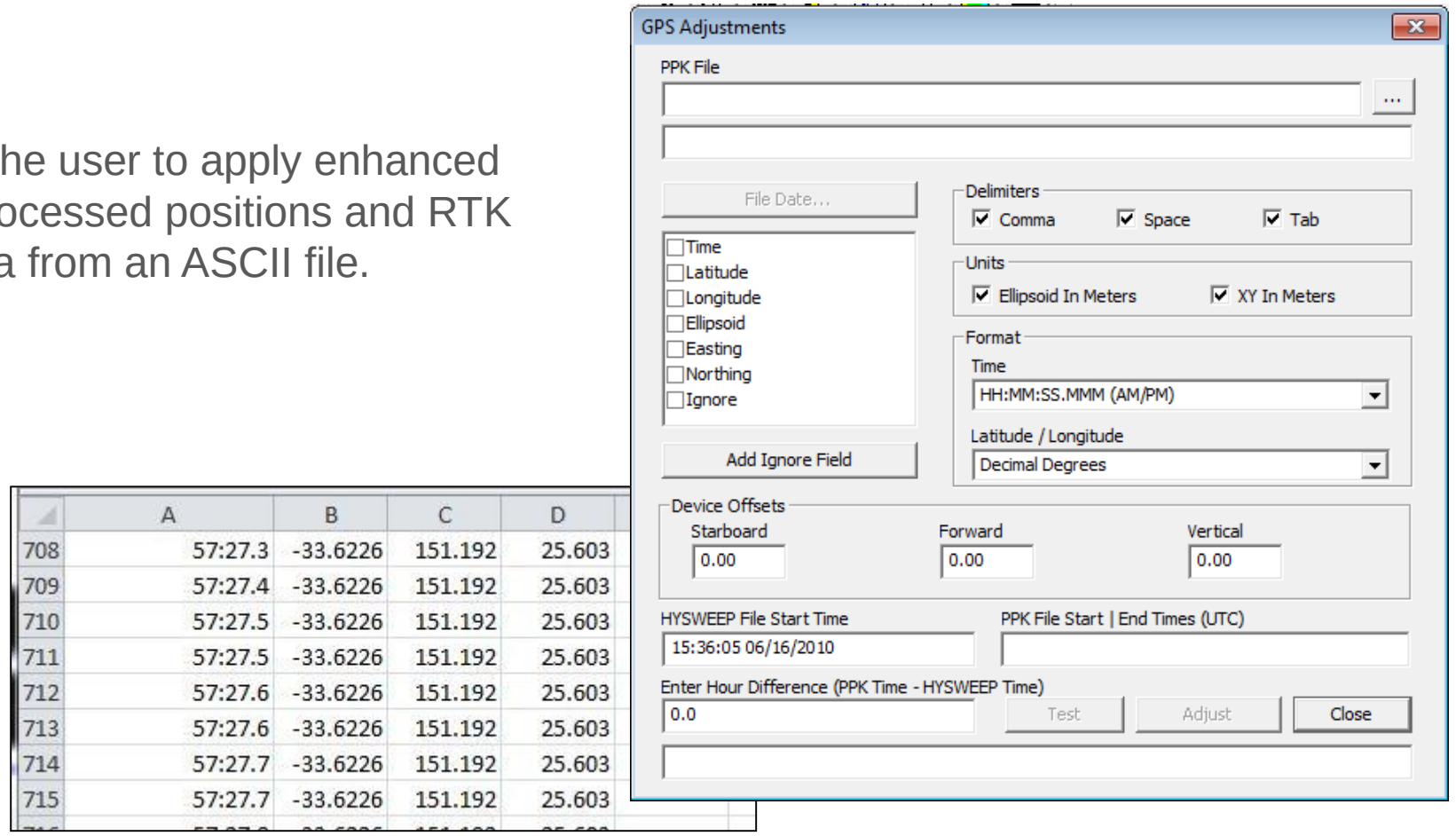


Clean and Save SBET files

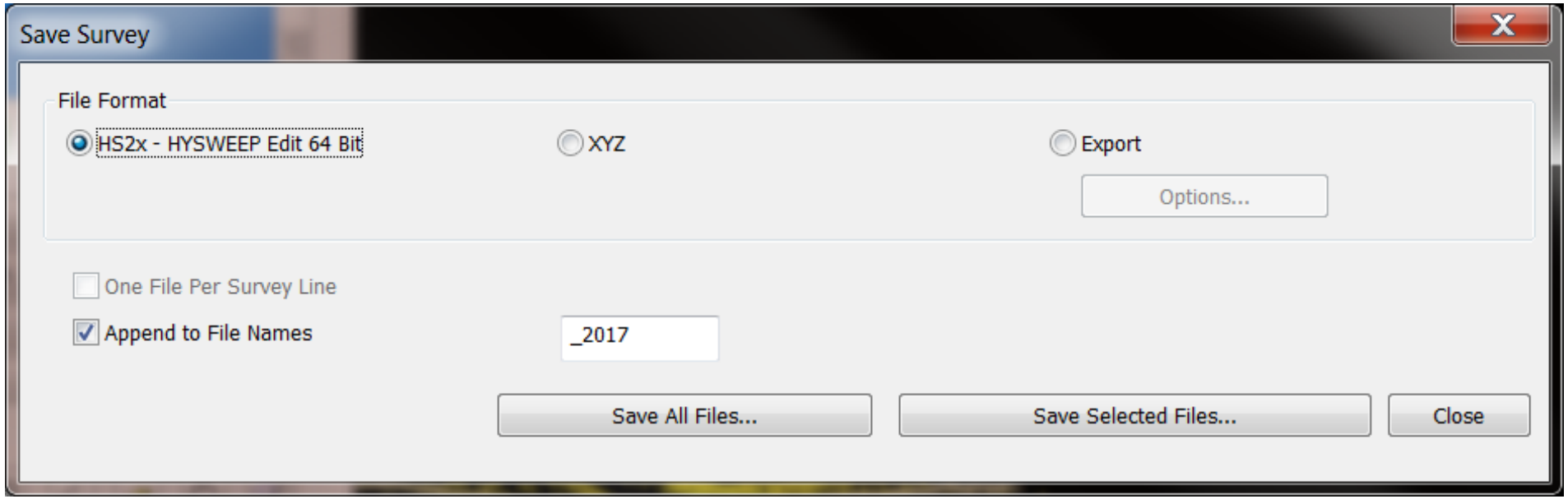
True Heave Fills Gaps Between Interpolations

Post-Processed GPS Correction

Allows the user to apply enhanced Post-Processed positions and RTK tide data from an ASCII file.



Saving Files



- HS2x – HYSWEEP Edit 64 bit: Default save format. Saves all raw data for adjustment or replacement in re-editing.
- XYZ: Soundings may be saved to XYZ as well.
- Export: Save to HYPACK ALL2 format for compatibility with older programs.
- One File Per Survey Line: Option for XYZ.
- Append to File Names: Option for HS2x and XYZ. Helps create unique file names when surveys are saved for differing purpose.

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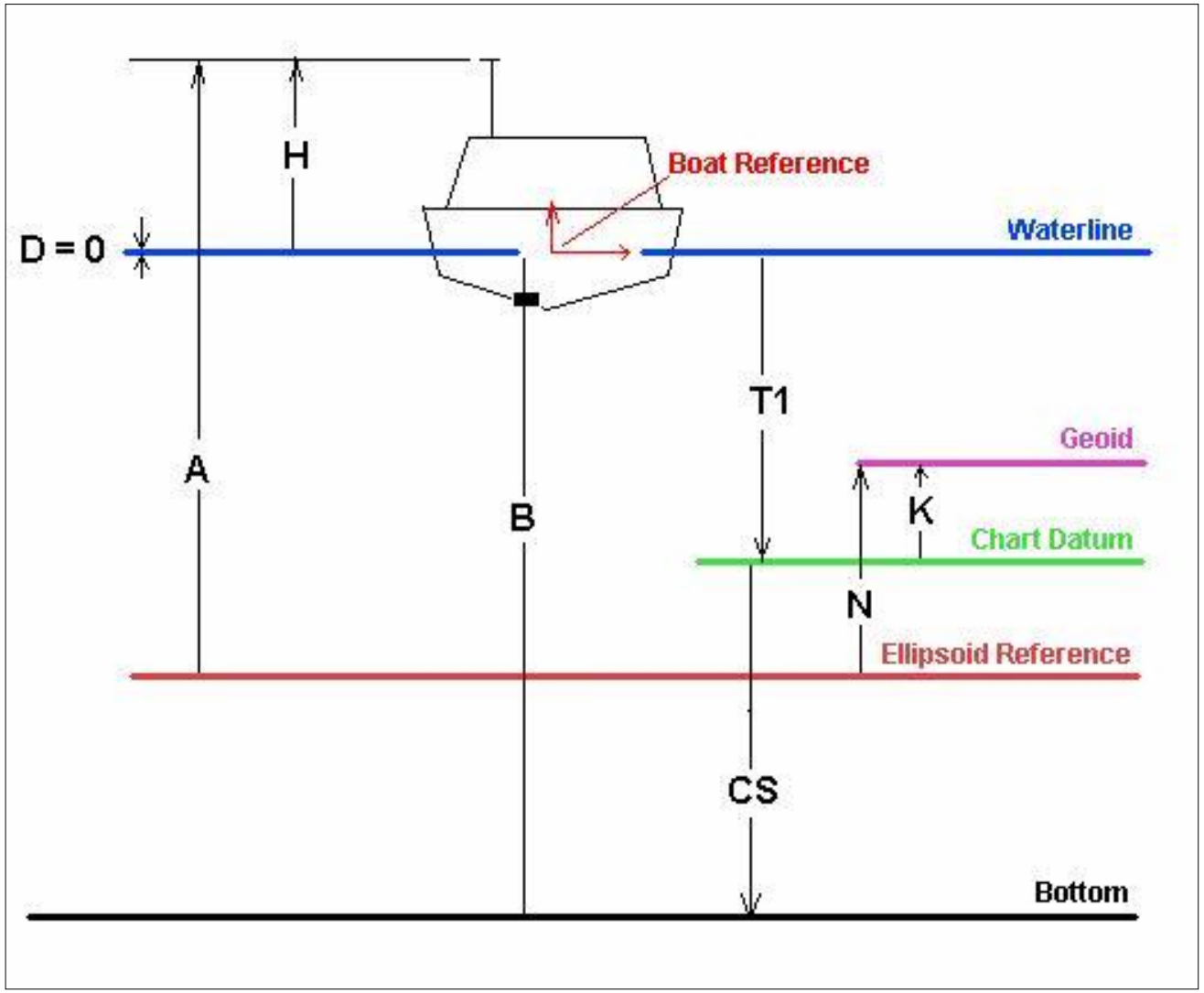
Water Level Corrections

HYPACK 2022

RTK Tides

- Computes the Tide correction based on vertical movements of the GPS antenna.
- RTK TIDES has its own presentation.



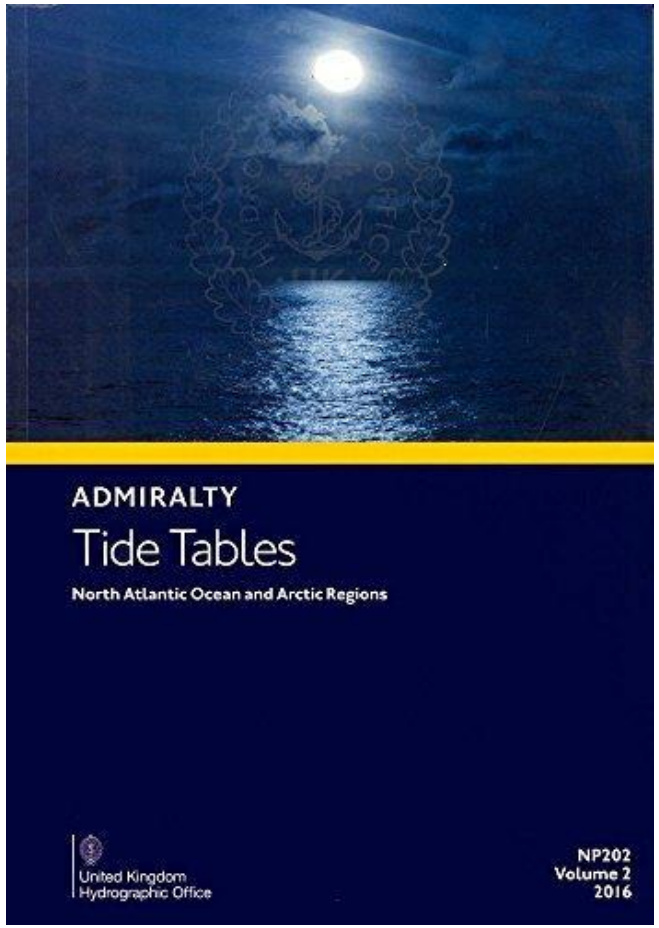
Manual Entry in Post-Processing

- Enter times and corrections into the MANUAL TIDES program.
- Generate corrections based on:
  - Linear
  - B-Spline
  - High/Low Water Times and Heights
- MANUAL TIDES can create tide correction files for a single day or for multiple days.
- Input of dates (multi-day) allows for US or International format.

Table data is stored in a *.TDX file.
Tide corrections are stored in a *.TID file.

Harmonic Predictions

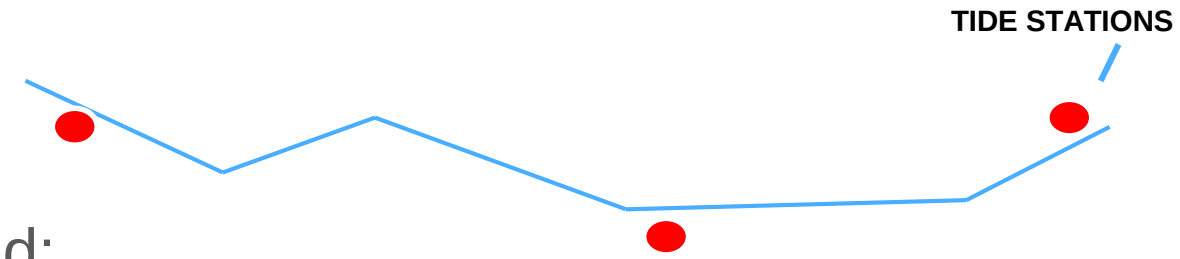
- Uses Port Factors and Day Factors from British Admiralty Publication NP 203.
- Computes a predicted tide, based on harmonic constituents.
- Saves result to a *.TID file.
- Do not use French constituents, as they are not ‘combined’.



Tide Adjustments

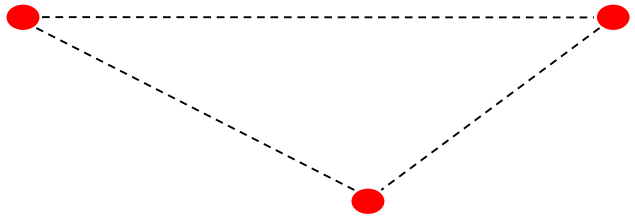
Centerline Method:

- Interpolates a tide correction based on the position of the sounding along a centerline and the distance from gauges referenced to the centerline. Two or more gauges.

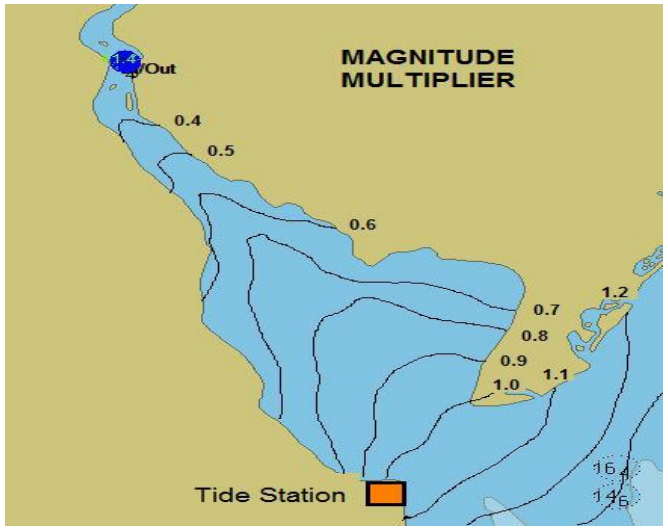


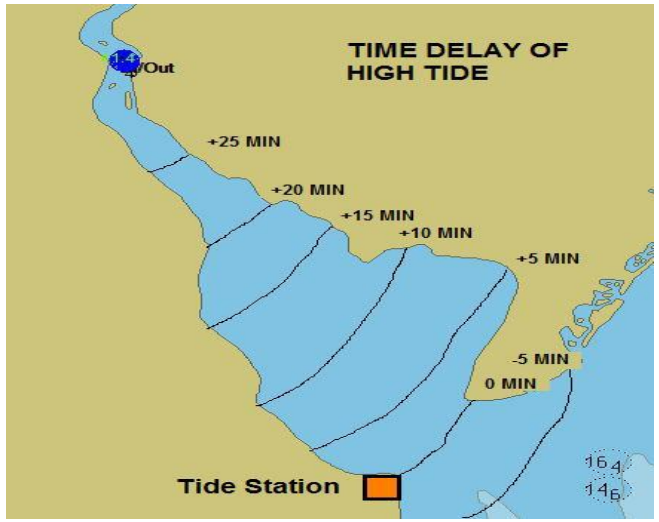
3 Point Method:

- Interpolates a tide correction based on the position of the sounding and a triangular tide surface created between three tide stations. Three gauges.



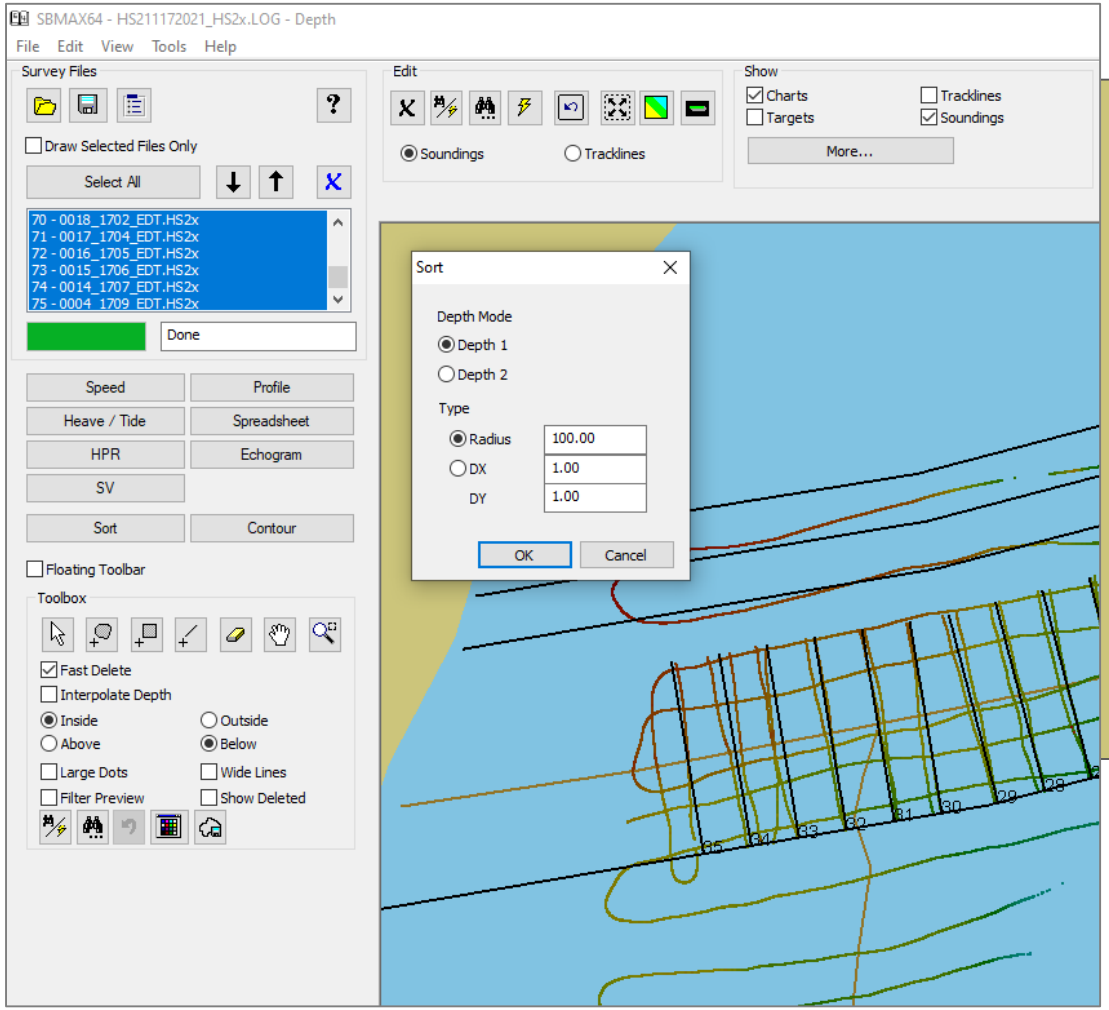
Tidal Zoning

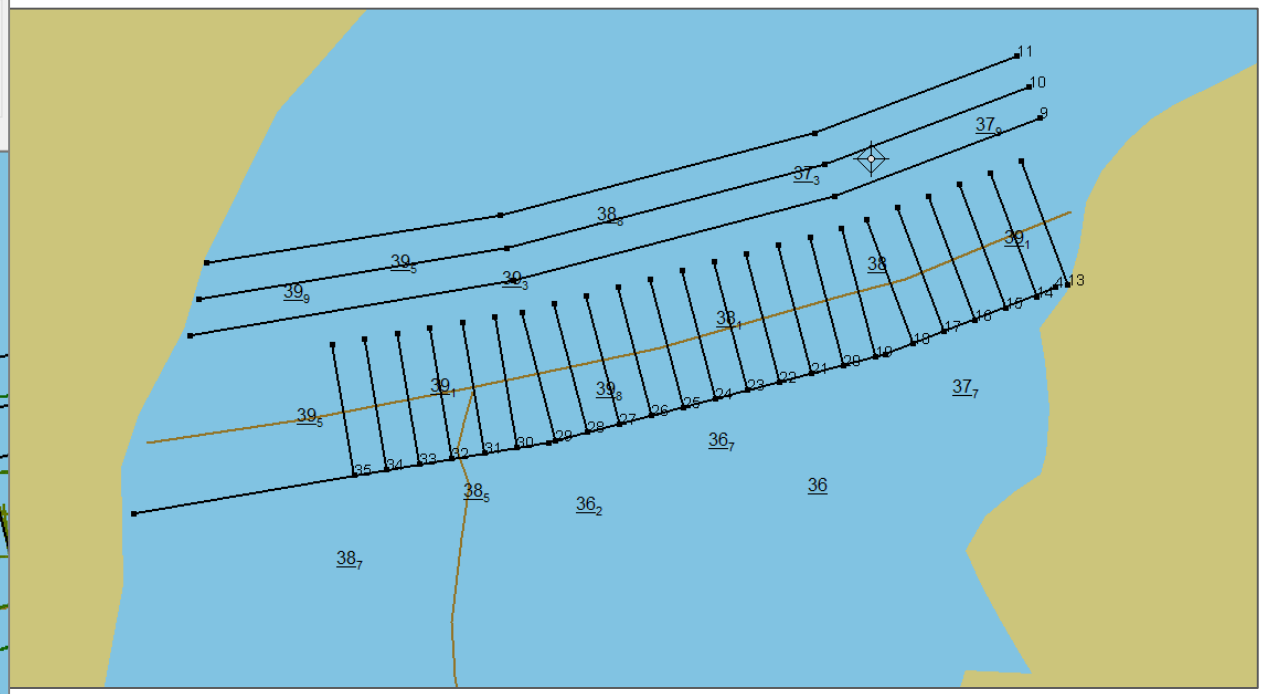




- Generates Tide corrections at the boat location based on Magnitude and Time difference models from primary tide location.
- Magnitude and Time Difference models are created in TIN MODEL and stored in the \HYPACK 20xx\TideModel folder.
- Check the HYPACK Help files for detailed information about the setup and application of the TIDAL ZONING program.

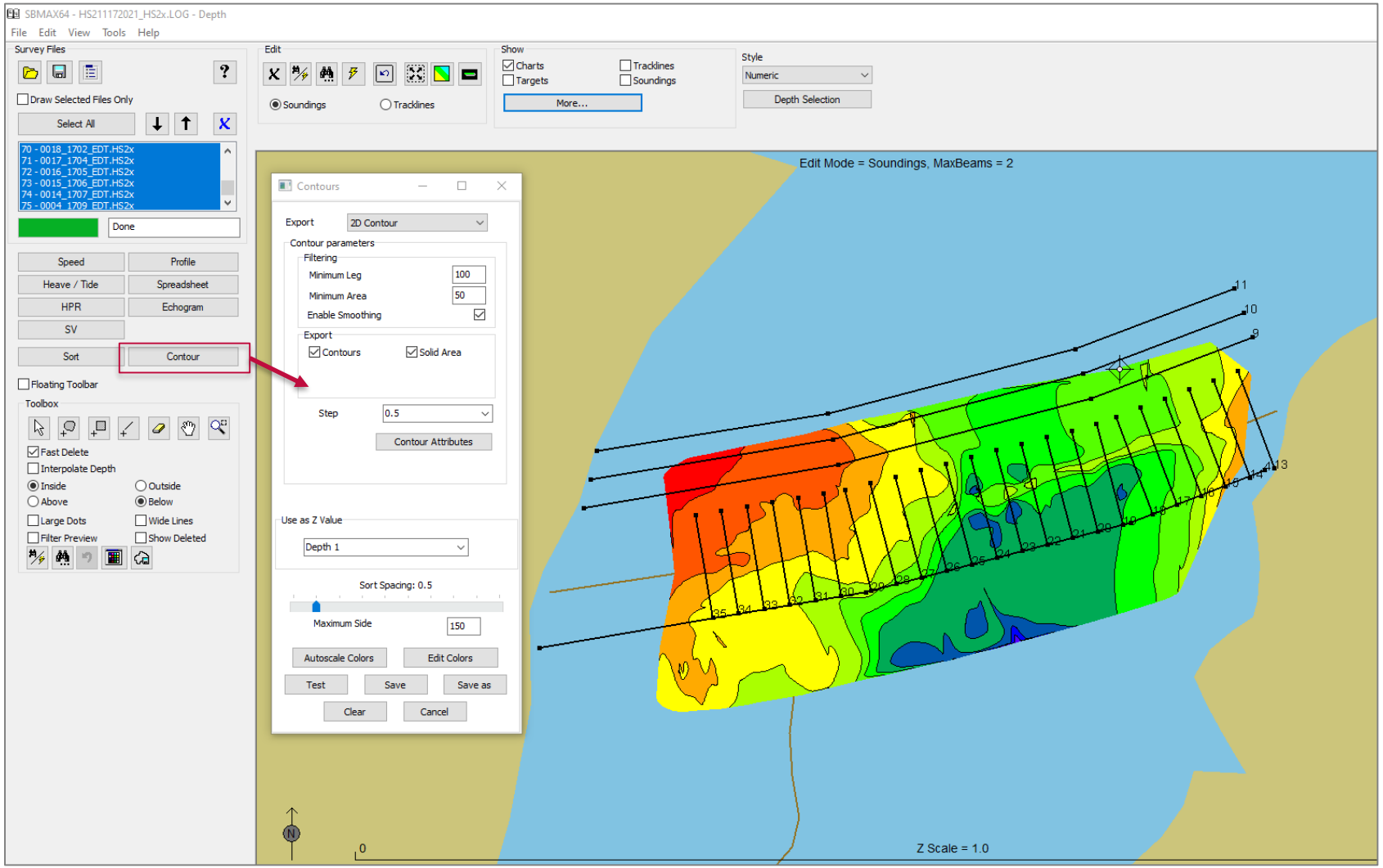
New Integrated Sort Routine





- This Sort routine allows basic sorting of the data
- No need to save and reload files

Generate DXF Contours inside SBMAX64



The SBMAX program now has the ability to generate the contours

The TIN MODEL export dialog allows users to test the contour and make adjustments before saving the DXF

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Thank You !

Contact Us:

Sales@HYPACK.com

Help@HYPACK.com

(860) 635 - 1500

Links to more information:

HYPACK on Youtube.com (Historical Sessions)

HYPACK on Youtube.com (Newer Sessions)

HYPACK SUPPORT Site

HYPACK Live Chat

HYPACK Ustream

HYPACK Website