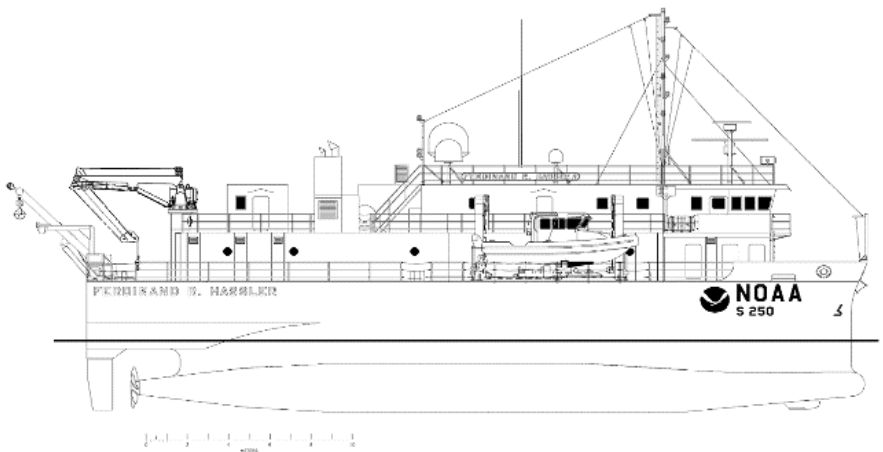


Ferdinand R. Hassler

Manual MBES Processing in Caris 11

Standard Operating Procedures



Revision History

Date	Revision Description (Reason/What)	Updated by
?	Original SOP from NOAA Ship FA and fleetwide manual Caris processing SOP	NOAA Ship FA personnel, John Doroba
05/24/2021	Cross-checked and adapted above SOPs for FH	ST Tigges
6/29/2022	Added line report and updating acquisition log sections	LTJG Carly Robbins
6/18/2023	Added updated Georeference settings based on HSTB 'Hydrogroup' request to update to CARIS v11.4.25	Colin Stewart, Laura Pagano

Manual MBES Processing in Caris 11

This document outlines manual processing in Caris 11 and includes all of the steps necessary for night processing. This includes data transfer, acquisition log concatenation, sound speed profile concatenation, Caris MBES processing, and data cleaning. These are all of the tasks that Charlene does automatically.

If you are just looking to process or reprocess a couple of lines in Caris, feel free to skip ahead to the good part.

Data Transfer and File Management

When not processing or transferring data with Charlene, files created during acquisition on the ship and launches will need to be transferred onto the network.

Ensure the following data has been transferred to the appropriate vessel and day number (DNXXX) folder:


- Kongsberg (SIS) to **RAW Q:\ drive** (*.ALL)
Q:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Raw\MBES\Hassler_2040_Dual\YYYY-DDD
- GNSS Data - POSMV files (*.000-*.00#) to **RAW Q:\ drive**
Q:\YYYY\OPR-XXXX-FH-YY\H13349\Raw\Positioning\Hassler_2040_Dual\YYYY-DDD
- Acquisition Logs to **Proc S:\ drive** (excel file)
S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Processed\Reports\Survey\Separates\I_Acquisition_Processing_Logs\Acquisition_Logs\Hassler_2040_Dual\YYYY-DDD
- Raw Sound Velocity and NODC to **RAW Q:\ drive** (.m1, .s12, etc. and .nc)
Q:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Raw\SVP\Hassler_2040_Dual\Raw\YYYY-DDD
Q:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Raw\SVP\Hassler_2040_Dual\NODC\YYYY-DDD
- Sound Velocity to **Proc S:\ drive** (*.svp files)
S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Processed\SVP\Hassler_2040_Dual\SVP\YYYY-DDD

Concatenating .svp Files

1. Concatenate Sound Speed Casts

After transferring the raw data, the daily .svp file should be concatenated into the master vessel .svp file for application. The master file should follow this naming convention: HXXXXX_master.svp. This master file is stored at S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Processed\SVP.

To concatenate the daily files, open the daily .svp file (found in S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Processed\SVP\Hassler_2040_Dual\SVP\YYYY-DDD) and the master vessel file in edit notepad. Then, simply copy and paste the daily file's casts to the end of the master vessel file. It should look something like what is shown below. Notice the headers that separate each cast from each other.



H12813_2805_215.svp - Notepad

[SVP_VERSION_2]
2015_215.svp
Section 2015-215 21:00 06:32:22 -163:25:36

1.22	1493.86
1.59	1493.97
1.82	1493.91
2.18	1493.79
3.45	1493.76
5.10	1493.76
6.06	1493.81
7.06	1493.91
8.13	1493.96
9.07	1493.95
9.99	1493.97
11.04	1493.99
12.07	1494.00
13.04	1494.02
14.08	1494.04

Section 2015-215 21:56 06:33:16 -163:26:24

1.09	1494.38
1.22	1494.48
1.34	1494.49
2.43	1494.33
4.06	1494.07
5.04	1493.93
5.95	1493.90
6.97	1493.93
7.95	1493.97
9.01	1493.99
10.11	1493.97
11.09	1493.96
11.99	1493.96
12.72	1493.96
13.68	1493.96
15.40	1493.98

Section 2015-215 22:45 06:32:10 -163:29:37

H12813_2805.svp - Notepad

14.03	1496.89
15.60	1490.94
16.02	1458.98

Section 2015-215 21:00 06:32:22 -163:25:36

1.22	1493.86
1.59	1493.97
1.82	1493.91
2.18	1493.79
3.45	1493.76
5.10	1493.76
6.06	1493.81
7.06	1493.91
8.13	1493.96
9.07	1493.95
9.99	1493.97
11.04	1493.99
12.07	1494.00
13.04	1494.02
14.08	1494.04

Section 2015-215 21:56 06:33:16 -163:26:24

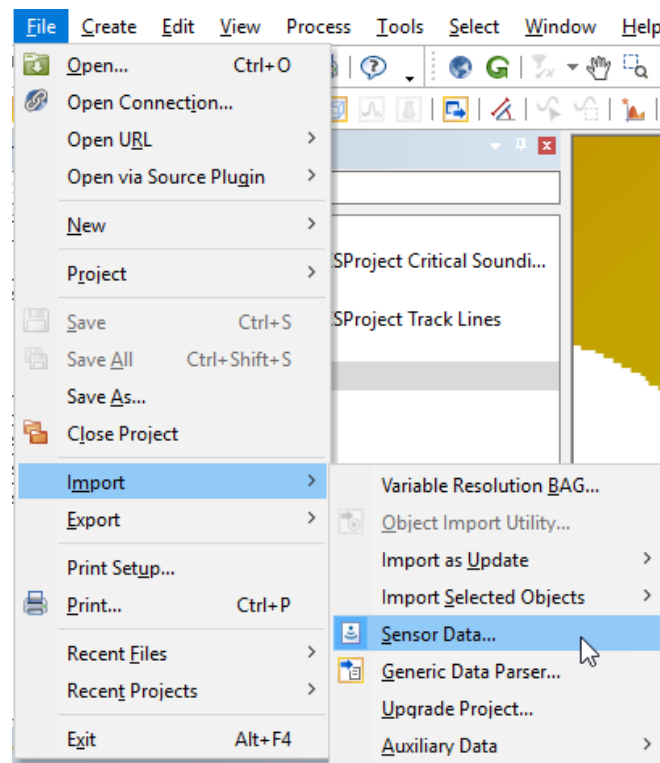
1.09	1494.38
1.22	1494.48
1.34	1494.49
2.43	1494.33
4.06	1494.07
5.04	1493.93
5.95	1493.90
6.97	1493.93
7.95	1493.97
9.01	1493.99
10.11	1493.97
11.09	1493.96
11.99	1493.96
12.72	1493.96
13.68	1493.96
15.40	1493.98

Import Sensor Data

2. Import Raw data into CARIS

Open CARIS HIPS and SIPS 11.x. If this is the first time opening CARIS 11.x, you will likely need to setup the correct mapping environment.

Step 1. Select File > Import > Sensor Data



Step 2. In the Import Sensor Data window, adjust the following settings:



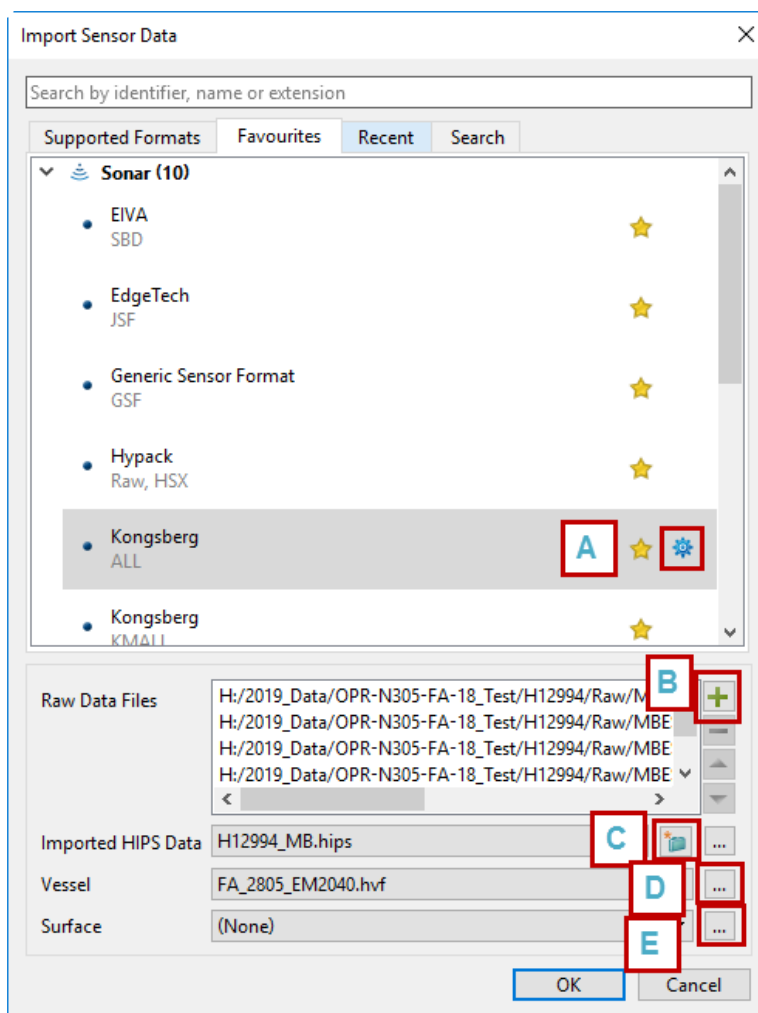
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A. Import Options- Select the Kongsberg, ALL option. Select the Import Options button by clicking on the gear wheel next to it and ensure the following settings are correct.

- **Options** check **Convert Navigation into HDCS Format**
- **Devices > GPS Height Device > GGK**
- **Devices > Surface Sound Speed > Depth**
- Under **Input**, select the correct Coordinate Reference System for the Project area
- Select **OK**



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Import Options - Kongsberg ALL

Options

Convert Navigation into HDCS For... ☒

Convert Vehicle Depth ☐

Devices

Navigation Automatic

GPS Height Device GGK

Heading Automatic

Heave Automatic

Pitch Automatic

Roll Automatic

Surface Sound Speed Depth

Timestamps

GPS Timestamps Automatic

Time Shift 0

Input

Input Coordinate Reference System NAD83 / UTM zone 10N [NA83]

Carry Over Raw Data Files ☐

Advanced Options

Overwrite

☐ Bathymetry

☐ Navigation

☐ Motion

☐ Backscatter

☐ Sidescan

Filter Extent Type

Extent

Enter top coord... Enter left coord... Enter right coord... Enter bottom coord...

Filter Data

Filter Data

Minimum 0.000000 m

Maximum 0.000000 m

OK Cancel

- B. Raw Data Files** – Select the Green Plus sign and navigate to the location of the raw data files you need to import, and select the files you wish to import.

Q:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Raw\MBES\Hassler_2040_Dual\YYYY-DDD

- C. Import HIPS Data** – Select HIPS project or create a new HIPS project. Unless this is the first day of processing, navigate to the .hips file in the correct project location.

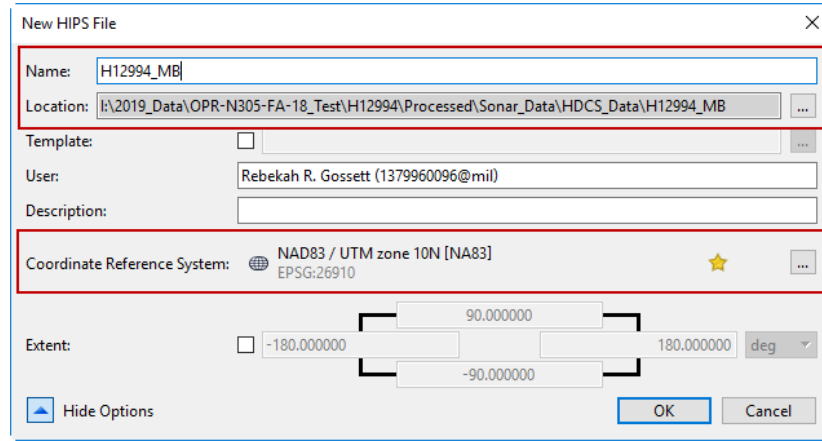
S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Processed\Sonar_Data\HDCS_Data\HXXXXX_MB

If this is the first day of processing you will have to create a new project. To do so, select the GUI with the folder and star. In the New HIPS File window select the **Show Options** dropdown in the left corner and adjust the following settings:

-Name > HXXXXX_MB

-Location: **S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Processed\Sonar_Data\HDCS_Data\HXXXXX_MB**

-Select the correct Coordinate Reference System used for the project area, then **OK**



- D. Vessel** – Navigate to the following location and select the correct HVF for that vessel used.
S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Processed\Sonar_Data\HDCS_Data\VesselConfig
 If it's the first day of the sheet and you don't have an HVF in the VesselConfig folder yet, you can find an HVF in the appropriate vessel folder at **P:\Survey_Storage\00_PROJECTS\YYYY\HSRR\j_HVF**
- E. Surface** – Unless instructed to do so otherwise, select **None** in the dropdown.

Once your lines have finished converting, they should appear in the main view of Caris. You should also see them listed in the *Active Tracklines* tab.

Import Auxiliary Data

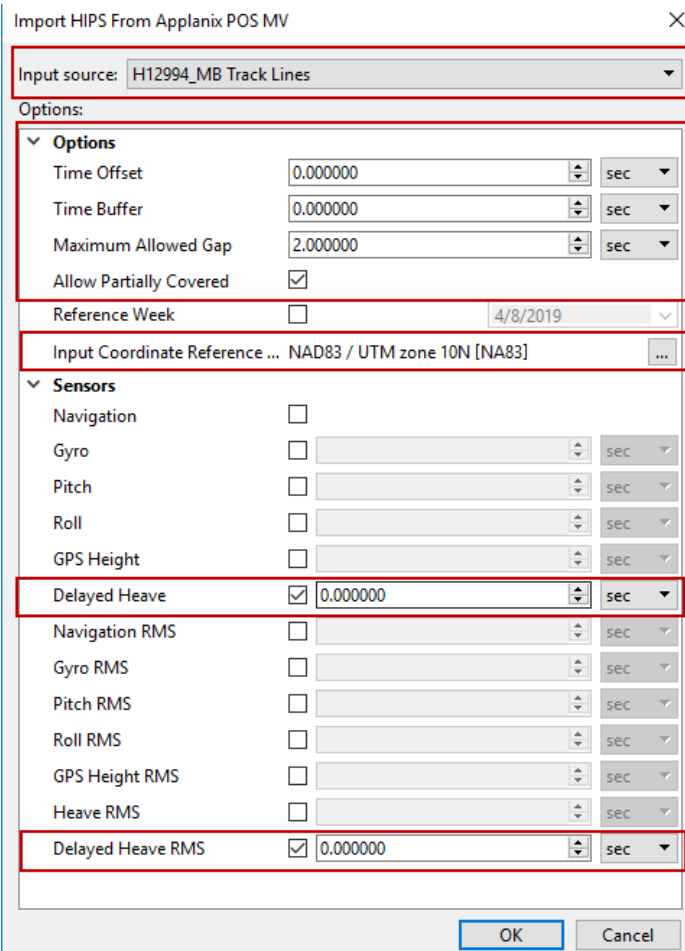
3. Apply Delayed Heave

With your lines selected, select **File > Import > Auxiliary Data > Applanix POSMV** and browse to your POS files:

Q:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Raw\Positioning\Hassler_2040_Dual\YYYY-DDD

In the **Import HIPS From Applanix POS MV** window, adjust the following settings:

- **Input Source > Selected Tracklines**
- Under **Options**, be sure **Maximum Allowed Gap = 2.00 sec**
- Under **Options**, check **Allow Partially Covered**
- Set the **Coordinate Reference Station**
- Under **Sensors**, Check **Delayed Heave** and **Delayed Heave RMS**. Set these values to **0.0**
- Click **OK**



Import HIPS From Applanix POS MV

Input source: H12994_MB Track Lines

Options:

▼ Options

Time Offset	0.000000	sec
Time Buffer	0.000000	sec
Maximum Allowed Gap	2.000000	sec
Allow Partially Covered	<input checked="" type="checkbox"/>	
Reference Week	<input type="checkbox"/>	4/8/2019

Input Coordinate Reference ... NAD83 / UTM zone 10N [NA83]

▼ Sensors

Navigation	<input type="checkbox"/>	
Gyro	<input type="checkbox"/>	
Pitch	<input type="checkbox"/>	
Roll	<input type="checkbox"/>	
GPS Height	<input type="checkbox"/>	
Delayed Heave	<input checked="" type="checkbox"/>	0.000000 sec
Navigation RMS	<input type="checkbox"/>	
Gyro RMS	<input type="checkbox"/>	
Pitch RMS	<input type="checkbox"/>	
Roll RMS	<input type="checkbox"/>	
GPS Height RMS	<input type="checkbox"/>	
Heave RMS	<input type="checkbox"/>	
Delayed Heave RMS	<input checked="" type="checkbox"/>	0.000000 sec

OK Cancel

4. Apply SBETs and RMS data

SBETS

Select the lines you wish to apply SBETs to **AND ONLY THOSE LINES. NO OTHER LINES.** Then go to File > Import > Auxiliary Data > Applanix SBET. Navigate to the location of the processed SBET, which should be the following:

S:\YYYY\OPR-XXXX-FH-YY\H13349\Processed\SBET\Hassler_2040_Dual\YYYY-DDD

(If you haven't moved your SBET into this folder yet, it could still be in the POSpac_Projects folder. Check there.)

If you are unsure whether SBETs have been created for the data, be sure to check with FOO to confirm.

Ensure the following parameters are entered:

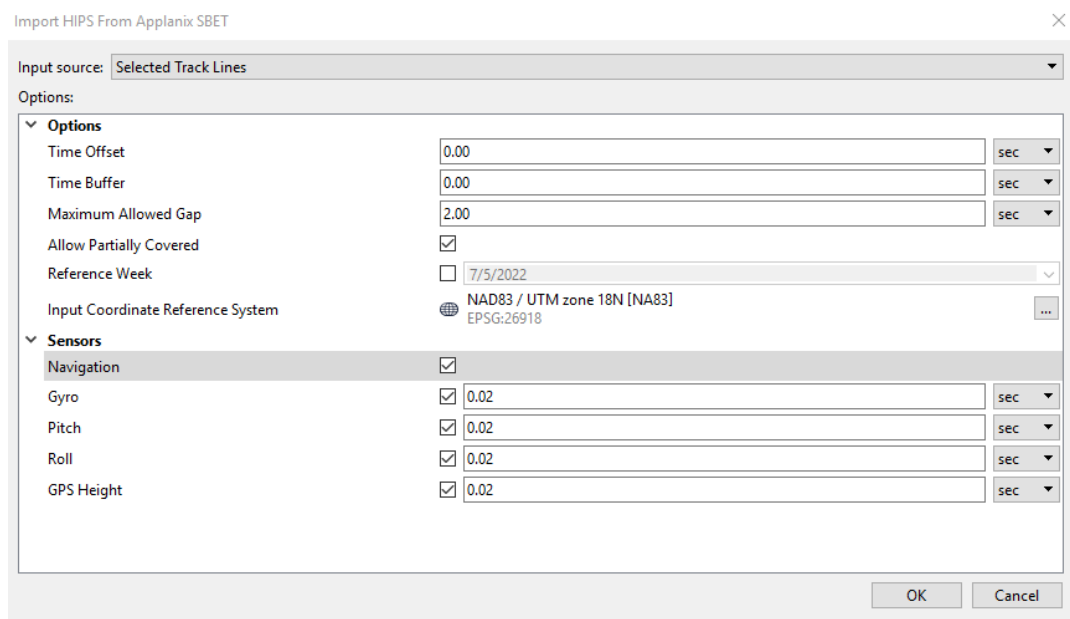
Input Source > Selected Tracklines

Under **Options**, change the **Maximum Allowed Gap** to **2.0** sec and check **Allow Partially Covered**.

Change the **Input Coordinate Reference** to the correct **UTM Zone** for the Project.

Under **Sensors**, check **Navigation, Gyro, Pitch, Roll, GPS Height**, and set these values to **0.02** sec.

Click **OK**.



Import HIPS From Applanix SBET

Input source: Selected Track Lines

Options:

- Options**
 - Time Offset: 0.00 sec
 - Time Buffer: 0.00 sec
 - Maximum Allowed Gap: 2.00 sec
 - Allow Partially Covered: ☒
 - Reference Week: 7/5/2022
 - Input Coordinate Reference System: NAD83 / UTM zone 18N [NA83]
- Sensors**
 - Navigation: ☒
 - Gyro: ☒ 0.02 sec
 - Pitch: ☒ 0.02 sec
 - Roll: ☒ 0.02 sec
 - GPS Height: ☒ 0.02 sec

OK Cancel

RMS Data

Select the lines you wish to apply SBET RMS to **AND ONLY THOSE LINES. NO OTHER LINES.** Then go to File > Import > Auxiliary Data > Applanix RMS. Navigate to the location of the processed SBET RMS (.smrmsg), which should be the following:

S:\YYYY\OPR-XXXX-FH-YY\H13349\Processed\SBET\Hassler_2040_Dual\YYYY-DDD

Ensure the following parameters are entered:

Input Source > Selected Tracklines

Under **Options**, change **Maximum Allowed Gap** to 2.0 sec and check **Allow Partially Covered**.



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Under **Sensors**, check **Navigation RMS**, **Gyro RMS**, **Pitch RMS**, **Roll RMS**, **GPS Height RMS**, and set all the values to **1.0 sec**.

Click **OK**.

Import HIPS From Applanix RMS

Input source: Selected Track Lines

Options:

Options

Time Offset	0.000000	sec
Time Buffer	0.000000	sec
Maximum Allowed Gap	2.000000	sec
Allow Partially Covered	<input checked="" type="checkbox"/>	
Reference Week	<input type="checkbox"/> 6/22/2019	

Sensors

Navigation RMS	<input checked="" type="checkbox"/> 1.000000	sec
Gyro RMS	<input checked="" type="checkbox"/> 1.000000	sec
Pitch RMS	<input checked="" type="checkbox"/> 1.000000	sec
Roll RMS	<input checked="" type="checkbox"/> 1.000000	sec
GPS Height RMS	<input checked="" type="checkbox"/> 1.000000	sec

OK Cancel



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5. Georeferencing

In the **Active Track Lines** window, select the Track Lines you want to georeference. For Night processing this will just be the Day's data for whichever vessel you are processing.

Select **Georeference Bathymetry**



Click the show all options arrow.

Input Source > Selected Track Lines

Check both **Sound Velocity Correction** and **Total Propagated Uncertainty**

If using Vdatum or PMVD, select
Vertical datum reference > GPS
And **Use default system settings**

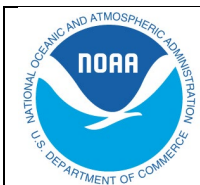
****If using TCARI, select Vertical datum reference > None**

General

Leave the default settings with **Vertical Offset > 0.00** and **Heave Source > Delayed**

Shift

Type > None



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Sound Velocity Correction

l:/2019_Data/HSRR_2019/Processed/SVP/HSRR_2

S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Processed\SVP

Sound Velocity Profile(s) ☒

Profile Selection Method: Nearest in Distance Within Time

Nearest in Distance Hours: 4

Use Surface Sound Speed: ☒

Steered Beam Angle Recomputation: ☐

Total Propagated Uncertainty

GPS Height Source	Realtime
GPS Sounding Datum	0.126 m
Measured Sound Velocity	2.00 m/s
Surface Sound Velocity	0.50 m/s
Sweep Maximum Heave	0.000 m
Sweep Maximum Roll	0.00 deg
Sweep Maximum Pitch	0.00 deg
Navigation Source	Realtime
Sonar Source	Realtime
Gyro Source	Realtime
Pitch Source	Realtime
Roll Source	Realtime
Heave Source	Delayed
Tide Source	Realtime

GPS Vertical Adjustment

Compute GPS Vertical Adjustment: ☒

Sounding Datum Offset: ☒ 0.000 m

Model File: ☒ rum_cov_100m_NAD83_2011-MLLW_geoid18.csar

Band Name: ☒ NAD83_MLLW

ASCII Format Information File: ☐

Coordinate Reference System: ☒ NAD83(2011) / UTM zone 18N EPSG:6347

Smooth GPS Height: ☐

Output Components: ☐

Hide Options OK Cancel

Sound Velocity Correction

Sound Velocity Profile(s) > Check

Select the Browse gui to direct CARIS to the Master .SVP file, found in the location listed left.

Profile Selection Method > Nearest Distance Within Time

Nearest in Distance Hours > 4

Use Surface Sound Speed > Check

Total Propagated Uncertainty

**For GPS Tides

Height Source = Realtime

Sounding Datum = uncertainty from PIs

**for TCARI, Measured tide = 0.0

Tide Zoning = 0.0

Measured SV = 2.0

Surface SV = 0.5

The realtime values will default to the static vessel where there are no realtime values available. If SBETs have been applied, use Realtime.

Heave Source > Delayed

**Applying GPS Tides

GPS Vertical Adjustment

Compute GPS Vertical Adjustment > Check

Model file > Vdatum .csar file

Band Name: look in the VDATUM .csar

Set to correct Coordinate Reference System

Hit ok and have a snack, you deserve it!

Once Georeferencing is complete, check the Output log in CARIS. Take note of any lines with any issues and/or error messages. Ask for help from the FOO.

6. Update acquisition log and concatenate acquisition logs

A line report in Caris generates information about your track lines such as (X, Y, Z). If this is your first time running a line report on the computer you are using, you will need to configure which variables the line report will generate. To do so, you will first run a script that will organize the variables for you. This will make it so your Line Report contains all the necessary fields to be compatible with the acquisition log, and will also bring much joy. You will then run the line report.

NOTE: If FH upgrades Caris to 11.X, BringMeJoy will be broken. It currently works for Caris 11.4. To restore BringMeJoy, Navigate to P:\Survey_Storage\02_Software\CARIS\Line Report and open BringMeJoy using NotePad++. Change the version number (highlighted in screenshot) to what is appropriate. Save BringMeJoy. Proceed with the following steps.

```
1 REM Copies the LineReportConfig.xml file to the user account
2 COPY LineReportConfig.xml "%APPDATA%\CARIS\HIPS and SIPS\11.4"
```

1. Navigate to P:\Survey_Storage\02_Software\CARIS\Line Report and double click BringMeJoy, then click Run
2. In CARIS, select your newly processed lines and select Tools > Report > Line.
3. In the Line Report window, ensure that the variables are organized in the Details window as per the screenshot below. If they are not organized as per the screenshot, you must go back and re-run BringMeJoy.

Line Report

File options

Delimiter: Comma

☐ Include headers
 ☐ Include column totals

Details:

☒ HIPS file
 ☒ Vessel
 ☒ Day
 ☒ Line Name
 ☒ Length
 ☒ SVP Corrected
 ☒ SVP File
 ☒ Delayed Heave Loaded
 ☒ Delayed Heave File
 ☒ Georeferenced
 ☒ TPU Computed
 ☒ Outdated
 ☒ Speed
 ☒ Heading
 ☒ Source File
 ☒ Nav|Att File
 ☒ RMS File

Move Up

Move Down

Show

Hide

Output type: Report grid

OK

Cancel

4. Once CARIS outputs the line report, click the first line in the output window, grab the slider on the right and drag it all the way to the bottom (EVEN IF IT DOESN'T MOVE). Wait, it will jump to the bottom in time. When it does HOLD SHIFT AND CLICK the bottom line. Then right click and select copy (Ctrl-C does not work!) and paste them into the acquisition log. It should match the screen shot shown below. If this is done correctly, the fields above the query should be populated with the information from the query. If this doesn't happen, undo and try again, or get help from the lead night processor.

Report

HIPS file	Vessel	Day	Line Name	Length	SVP Corrected	SVP File	Delayed
H13629_MB	Hassler_2040...	2022-154	0014_202206...	3054.76	Yes	S:\2022\OPR...	
H13629_MB	Hassler_2040...	2022-154	0018_202206...	9709.89	Yes	S:\2022\OP...	
H13629_MB	Hassler_2040...	2022-154	0016_202206...	9004.64	Yes	S:\2022\OP...	
H13629_MB	Hassler_2040...	2022-154	0017_202206...	3098.79	Yes	S:\2022\OP...	

Output

Selection

Report

UPDATE ACQUISITION LOG

1. Copy the line report.
2. Open the acquisition log.
3. Scroll to the bottom of the document, and under the HIPS file header, paste the line report. You may need to delete the first row of the pasted report.

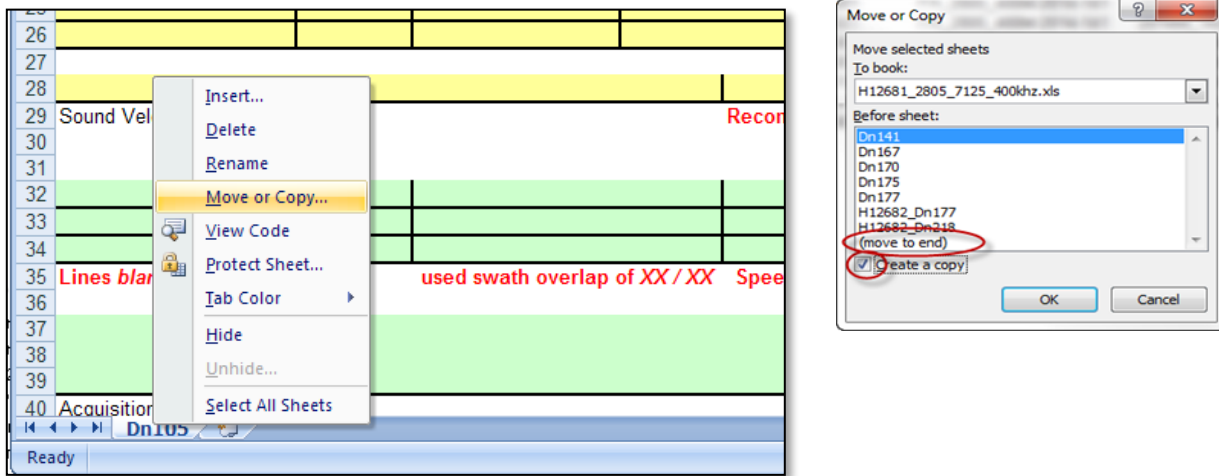
	A	B	C	D	E	F	G
166							
167							
168		ADD NEW LINE					
169							
170							
171							
172	Processing comments						
173							
174							
175	PROCESSING QUERY						
176	• Make sure the CARIS query fields match the fields below EXACTLY .						
177	• Paste line query from CARIS. Total Mileage, Caris Lines, Launch Lines, and Count Check will ca						
178							
179	Total Nautical Miles		Number of Lines in CARIS		Number of lines transferred		
180	89.99102		25				
181							
182	HIPS file	Vessel	Day	Line Name	Length	Speed	Heading
183	H13629_M Hassler_2040_Dual		2022-155	0033_2022C	9711.11	5.39	324.
184	H13629_M Hassler_2040_Dual		2022-155	0021_2022C	9448.97	5.25	325.
185	H13629_M Hassler_2040_Dual		2022-155	0027_2022C	9410.47	5.23	325.
186	H13629_M Hassler_2040_Dual		2022-155	0034_2022C	9379.71	5.21	324.
187	H13629_M Hassler_2040_Dual		2022-155	0040_2022C	9353.12	5.20	324.
188	H13629_M Hassler_2040_Dual		2022-155	0041_2022C	9257.5	5.14	323.
189	H13629_M Hassler_2040_Dual		2022-155	0022_2022C	9167.2	5.09	324.
190	H13629_M Hassler_2040_Dual		2022-155	0028_2022C	9162.15	5.09	324.
191	H13629_M Hassler_2040_Dual		2022-155	0038_2022C	9101.83	5.06	144.
192	H13629_M Hassler_2040_Dual		2022-155	0037_2022C	8958.55	4.98	144.
193	H13629_M Hassler_2040_Dual		2022-155	0043_2022C	8927.04	4.96	145.
194	H13629_M Hassler_2040_Dual		2022-155	0044_2022C	8783.67	4.88	144.

CONCATENATE ACQUISITION LOGS

1. Open the Master Concatenated file (HXXXXX_S250_EM2040_YYYY) for the vessel located here:
S:\YYYY\OPR-X###-FH-22\HXXXXX\Processed\Reports\Survey\
Acquisition_Processing_Logs\Acquisition_Logs\Hassler_2040_Dual\YYYY-DDD

If it is the first day of acquisition simply make a copy of the acquisition log and rename it to be the master.

B. Once the daily and master files are open, go to the daily log, right mouse click on the daily tab and select "Move or Copy."



Make sure to have the concatenated file in “To Book”, the option to “move to end” of document selected, and check the box for “Create a copy” as seen in the image above.

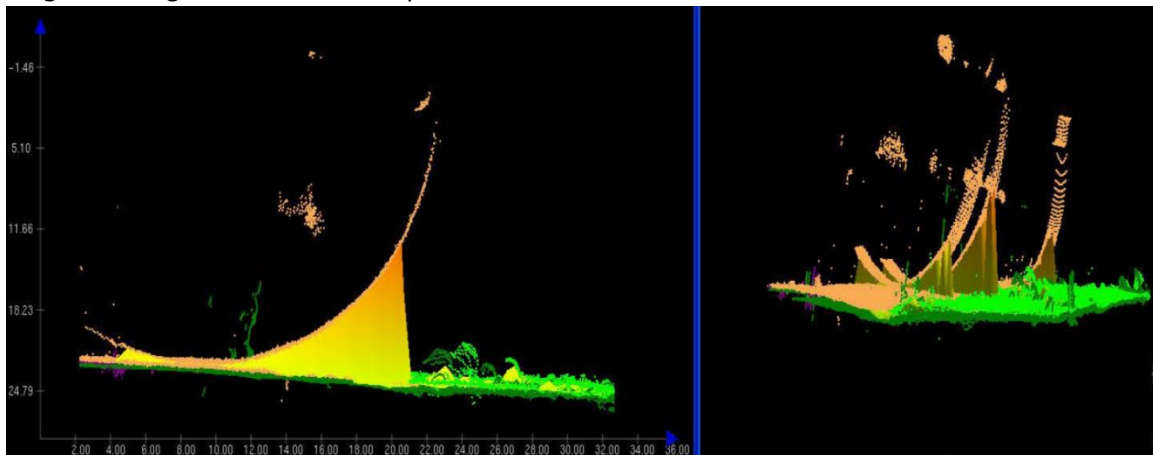
Creating a Surface and Rough Cleaning

7. Creating a Surface

Next, you will need to create a surface of the data you’ve converted and processed. To do so, open the [Creating CUBE Surfaces Caris 11.x](#) SOP and follow the guidelines to create a surface. For Night Processing, it might be helpful to the sheet manager to add the DNXXX onto the name of the surface created. For example HXXXXX_MB_VR_MLLW_DNXXX. Save the surface in **S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Working_Surfaces_Mosaics\Bathymetry.**

8. Rough Cleaning

Now that you’ve created a beautiful surface, it’s time to do some rough cleaning. The key word here is **rough**. If you are unsure where to kill the dots or not, just leave them. The intention of this rough cleaning is just to clear out any obvious fliers, so don’t clean too close to the surface. The Sheet Manager will take care of the final cleaning. The image below is an example of obvious fliers.



For further assistance with subset editor, be sure to ask the lead night processor for help. The following subset editor SOP can also be helpful.

At this point, you have:

- Transferred Data
 - Concatenated SVP files and Acquisition Log
- Converted Data into HIPS file
- Applied Delayed Heave (POS)
- Applied SBET and RMS Data
- Georeferenced Data (SVP Correction, GPS Tides, Computed TPU)
- Updated the Acquisition Log
- Created a Surface
- Rough Cleaning of Surface

If you can put a check beside all of these things, you have finished!