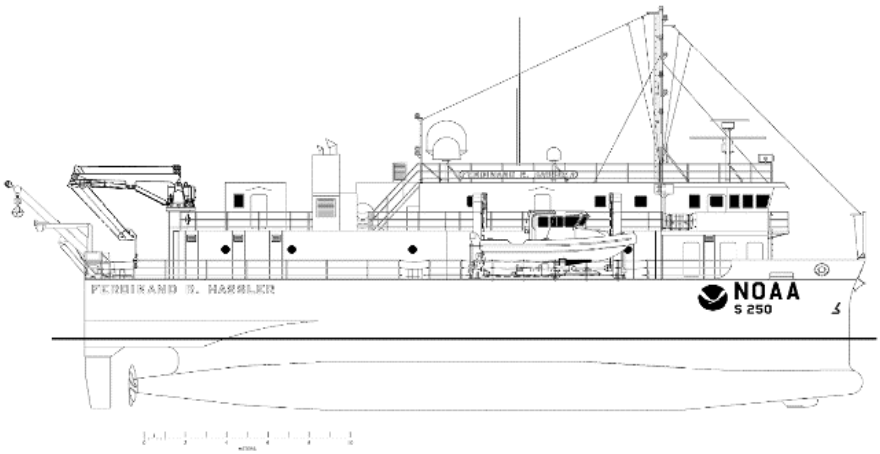
# FMGT Backscatter Processing

**S**tandard
**O**perating
**P**rocedure




| REVISION HISTORY | | | |
|---|---|---|---|
| **REV** | **Description of Change** | **Editor** | **Effective Date** |
| 1 | Initial release | UNK | 2022 |
| 2 | Updated | LT Debroisse | 10/10/2023 |
| 3 | | | |

Expect this process to take up between 12-24 hours or more if you generate all this at once. Ensure the computer running the operation will remain functioning during the time frame. This is best done once all cleaning is complete.

**Background:**

Acoustic backscatter is the acoustic energy returned to the echo sounder receiver, measured in intensity. The backscatter products that are created from our data are eventually submitted to the National Center for Environmental Information and used for seafloor characterization,

marine habitat mapping, marine construction, etc. Backscatter processing attempts to account for energy losses during transmission, and quantifies the strength of the returning object.

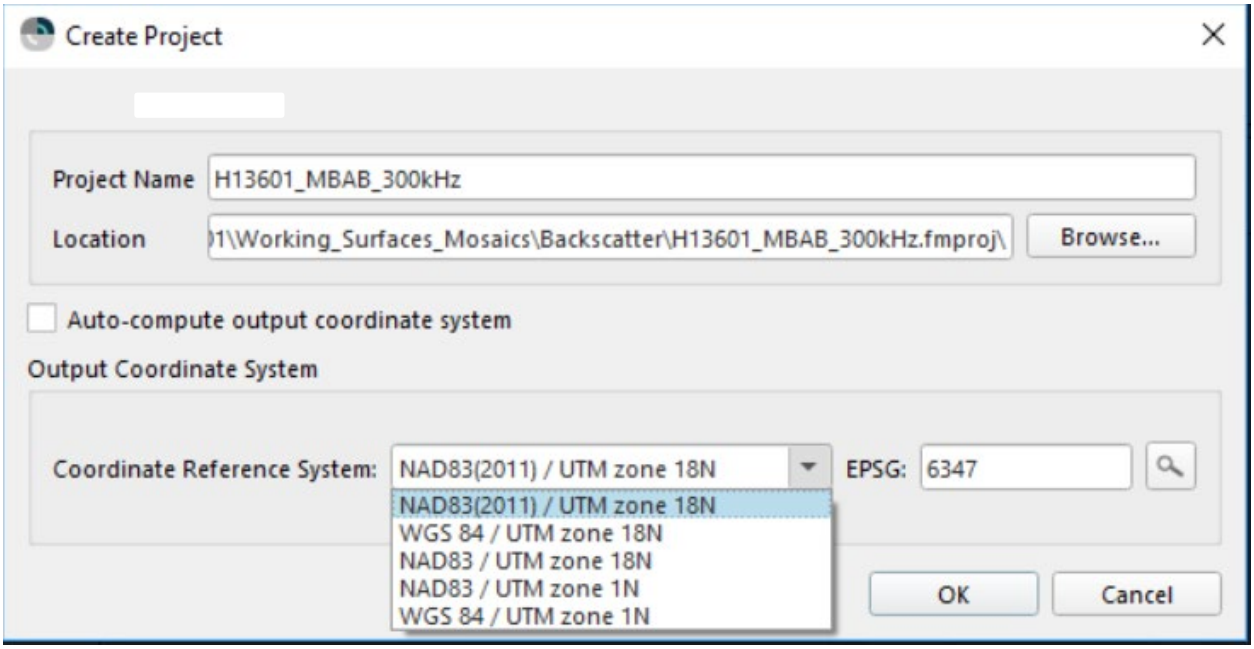
Backscatter data are collected by the Kongsberg systems and stored within the .all files. FMGT pairs the .all files with HDCS files to produce GSF (Generic Sensor Files). The GSF files are used to create mosaics, and are eventually what the branch submits to NCEI. GSF files contain both backscatter and processed bathymetry.

**Note:** Ensure that you have the most current version of Fledermaus installed on your computer.

To install the license:

1. **Open License Manager.** Click **Install a license file…** then click **Browse** and navigate to the xml file designated by the FOO. Ensure you select **Install license file for just the current user.** Click **OK.**

2. **Create a project.** Go to **File > Create Project**. Next to **Project Name** type in the sheet number and frequency (example HXXXXX_MBAB_300kHz). Next to **Location** browse to S:\YYYY\OPR-XXXX-FH-YY\HXXXXX\Working Surface Mosaics\Backscatter. Uncheck the **Auto-compute output coordinate system** box, and select the correct coordinates for your project.

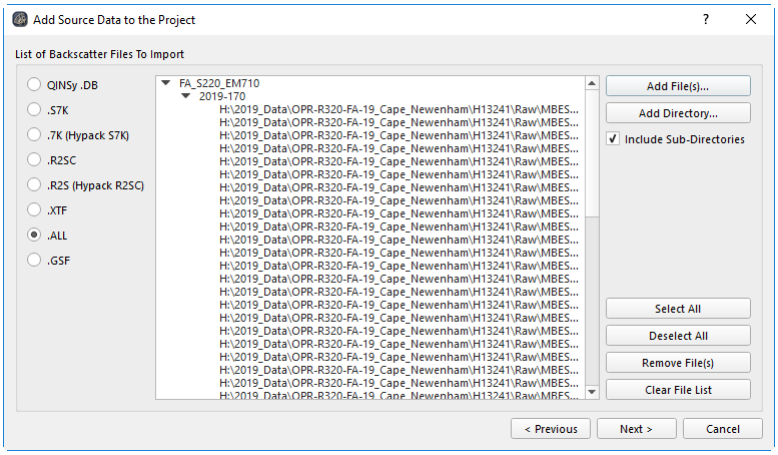



3. A separate project must be generated for each frequency utilized during acquisition
    a. If just one vessel, one frequency, skip down to Step 5.
    b. If a relative calibration has been conducted between the launch and the ship, data collected may be mosaicked together across platforms utilizing the same frequency.
4. Enter pulse mode correctors to bring the survey systems into alignment:
    a. Select **Settings > Add Processing Settings**. Enter the name of the launch and frequency (S250_XXXkHz) in the dialog box.
    b. Right click the new Launch under the Settings Tab. Click **Edit**. In the **Format** tab, enter the appropriate pulse mode correctors for the specific launch/frequency/sonar being processed (see table below).

If you're unsure, to determine which frequencies were used during acquisition, navigate to **P:\Survey_Storage\04_SOPs\3_Processing\6_Backscatter\Kongsberg Frequency Separator.docx**, and follow the instructions within the folder.

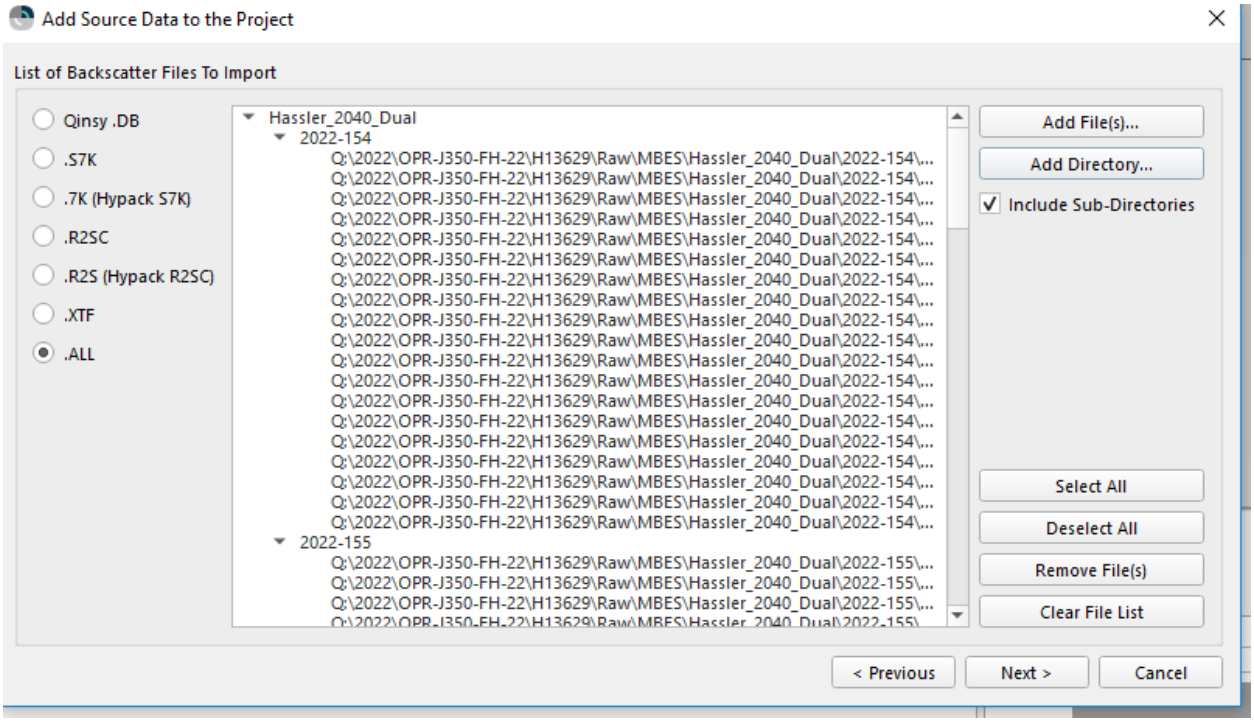
5. If you are just doing a quick backscatter acquisition check for coverage or QAQC, you can just process the raw .all Kongsberg files.

a. Select **File** > **Add Source Files…**
b. Select **.ALL** files from the List of Backscatter Files to Import, Use the **Add Directory** button to add a parent file. Leave **Include Sub-Directories** checked. You can also add files individually by browsing to your .ALL files in Add Files. Browse to the correct directory on the Q drive to find your raw .ALL files Q:\20XX_Data\OPR-XXXX-FH-XX\HXXXXX\Raw\MBES\HasslerDualDual



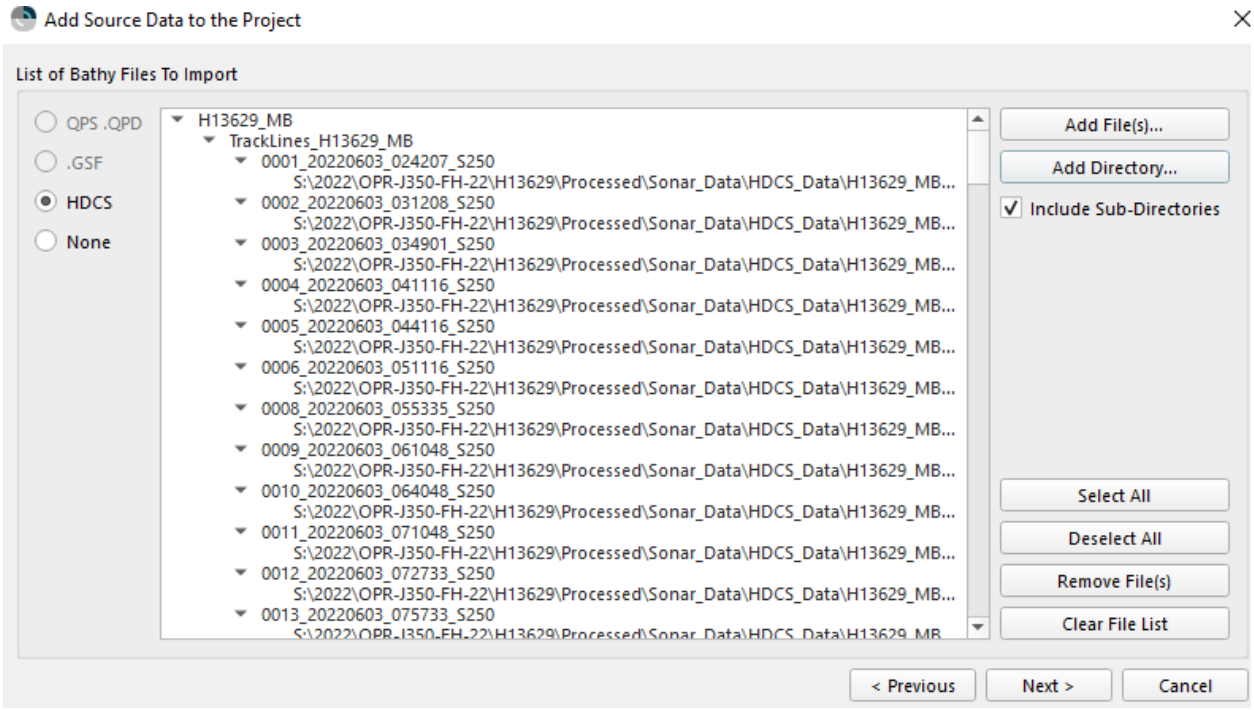

Hit Next. Use the default settings, hit Finish, then skip to Step 7

6. If bathymetry is fully processed for the sheet (SVP, SBETS, Subset Edited), then you can pair the CARIS HDCS data with the .all files to create GSF files within FMGT.
   a. Select **File** > **Add Source/ paired Files**
   b. Select **.ALL** files from the List of Backscatter Files to Import, Use the **Add Directory** button to add a parent file. Leave **Include Sub-Directories** checked. You can also add files individually by browsing to your .ALL files in Add Files. Browse to the correct directory on the Q drive to find your raw .ALL files Q:\20XX_Data\OPR-XXXX-FH-XX\HXXXXX\Raw\MBES\HasslerDualDual

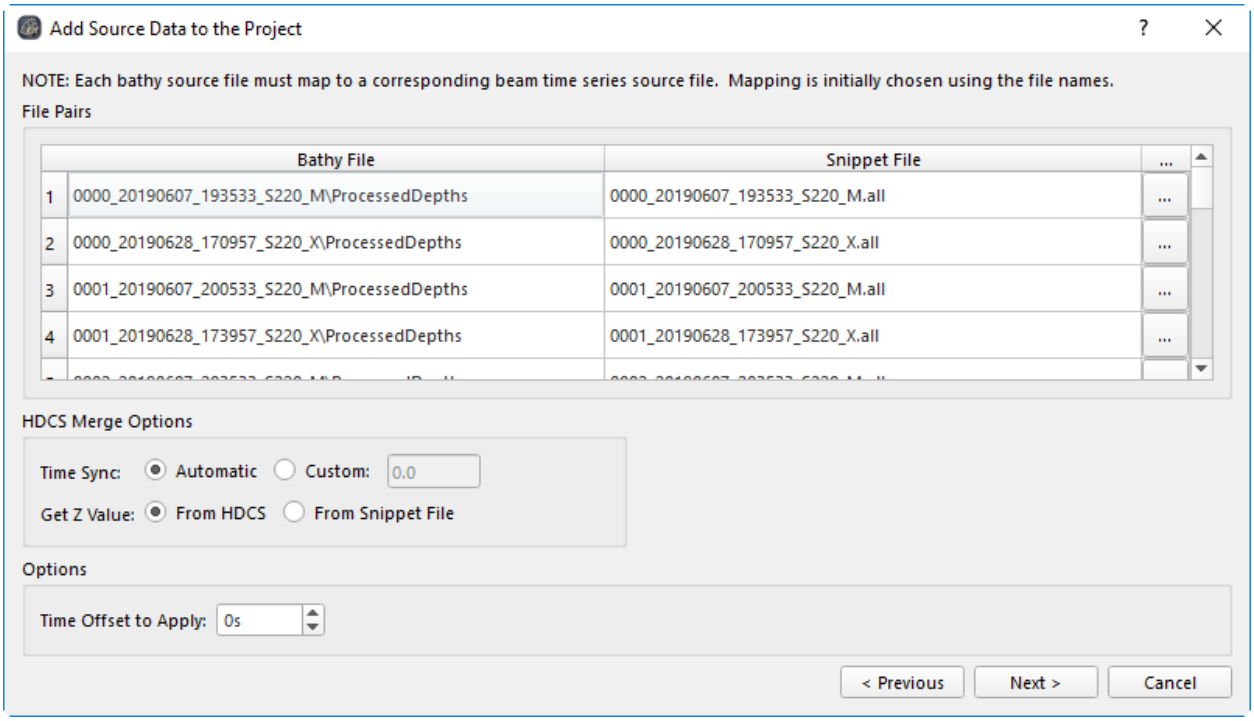



Hit Next.

c. The next window that appears is also titled **Add Source Data to the Project**. Make sure HDCS lines are selected under the **List of Bathy Files to Import** on the left side of the screen. Use the **Add Directory** button to browse to your HDCS files for the days that are being uploaded: S:\20XX_Data\OPR-XXXX-FH-XX\HXXXXX\Processed\Sonar_Data\HDCS_Data\HXXXXX_MB

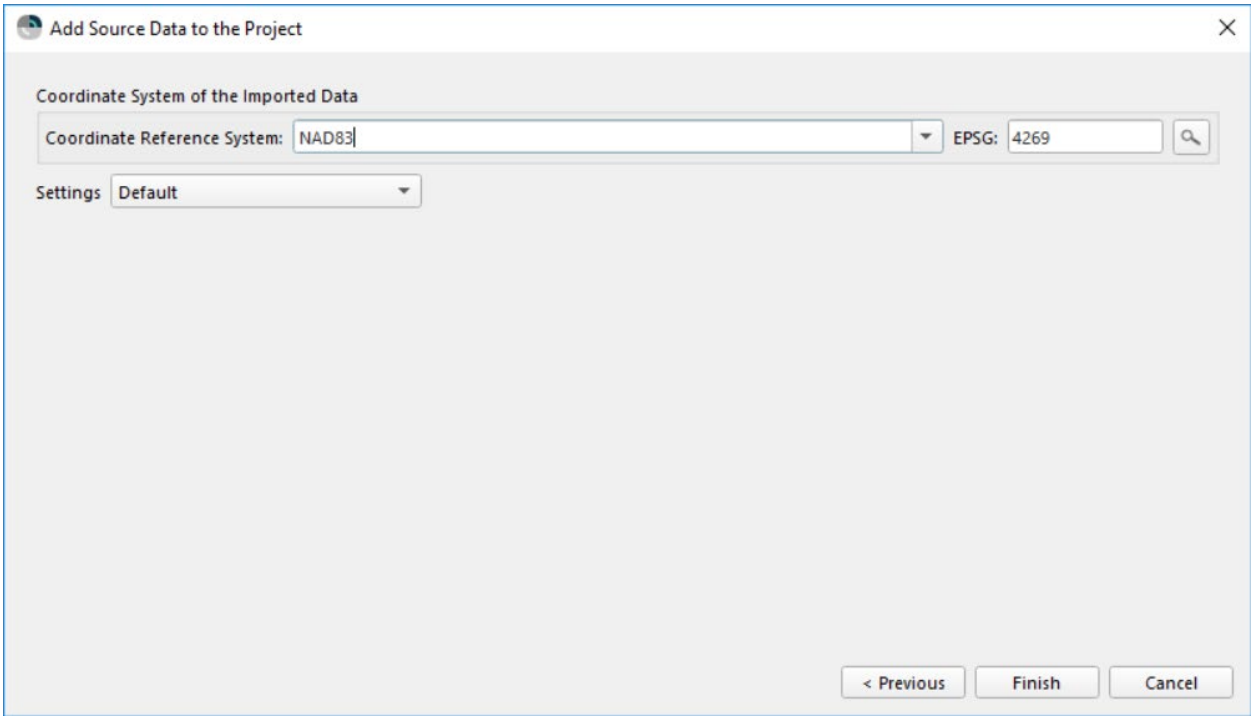

Add Source Data to the Project
List of Bathy Files To Import
QPS .QPD
.GSF
HDCS
None
H13629_MB
TrackLines_H13629_MB
0001_20220603_024207_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0002_20220603_031208_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0003_20220603_034901_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0004_20220603_041116_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0005_20220603_044116_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0006_20220603_051116_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0008_20220603_055335_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0009_20220603_061048_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0010_20220603_064048_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0011_20220603_071048_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0012_20220603_072733_S250
S:\2022\OPR-J350-FH-22\H13629\Processed\Sonar_Data\HDCS_Data\H13629_MB...
0013_20220603_075733_S250
Add File(s)...
Add Directory...
Include Sub-Directories
Select All
Deselect All
Remove File(s)
Clear File List
< Previous
Next >
Cancel

Hit Next.




Leave the default settings. Hit Next

Select **NAD83 or EPSG 4269** for the **Horizontal Coordinate System** for the incoming lines and leave the **Vertical Datum FD_Undefined.** Under **Settings**, chose the Default settings.

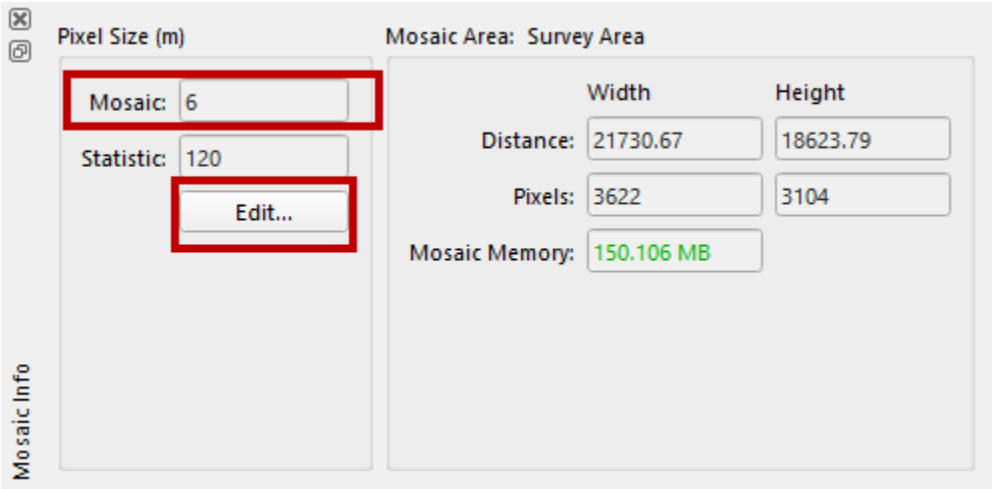



Hit Finish.

Processing will take some time but after it's done follow the steps below.

Files should open in the Source files tab, if not navigate to where you saved the project and attempt to open the project from there. Ensure that the lines you wish to put in your mosaic are checked, and the rest are de-selected. **Deselect all crosslines before making the mosaic.**

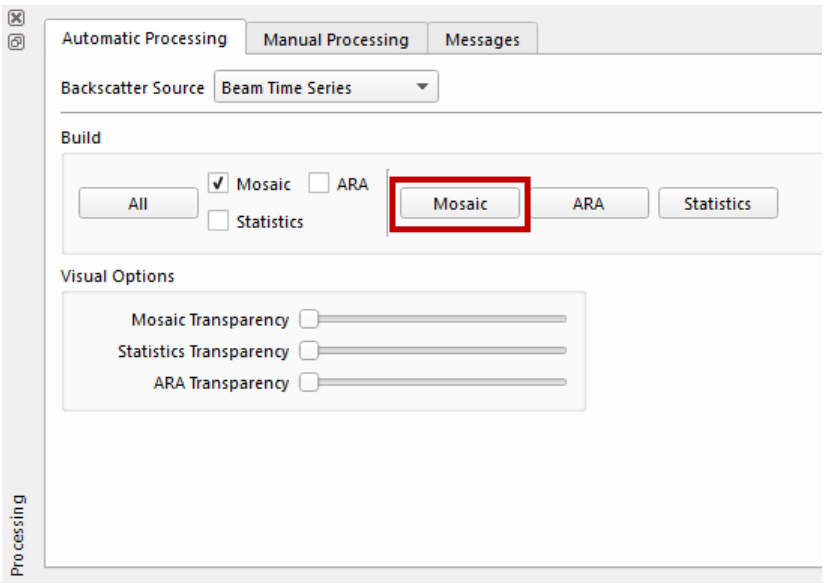
7. Set the Mosaic resolution by selecting Edit under Pixel Size, and entering the correct resolution for Mosaic based on the guidelines below. Statistic will change automatically.




Resolution is currently based solely on frequency. See HTD 2018-3 for the equation (600/nominal frequency) rounded to the nearest whole integer. Nominal Frequency (>50kHz) will be rounded in 100kHz increments. See the table below:

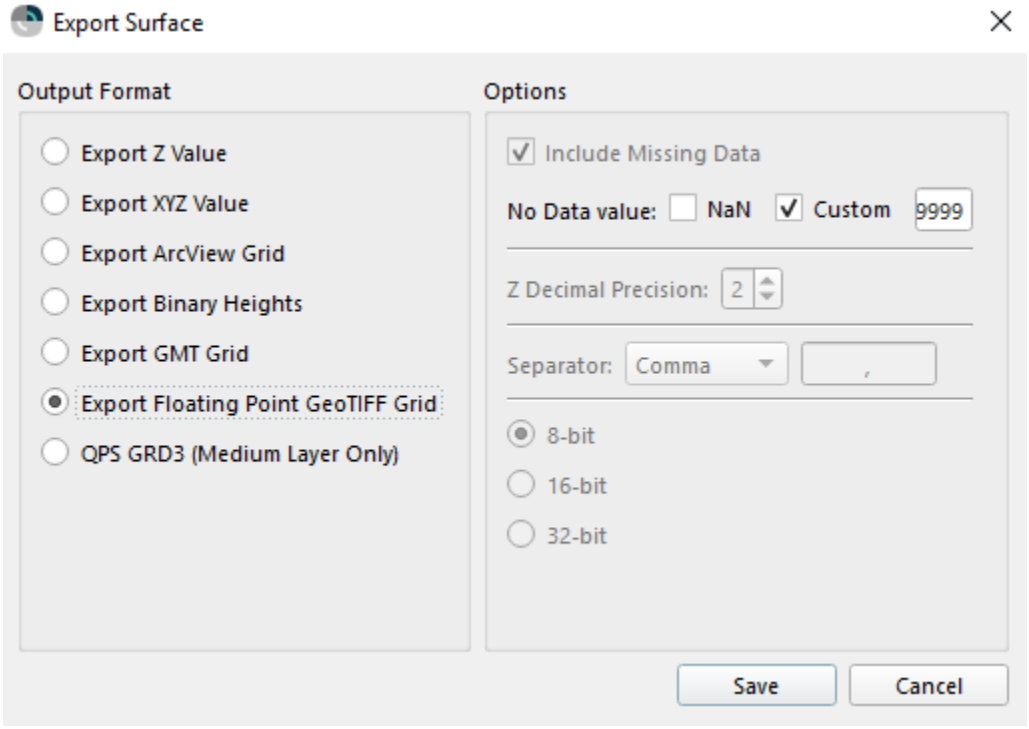
| Frequency | Resolution (meters) |
|---|---|
| 200kHz | 3.0 |
| 300kHz (FH dual freq uses this mostly) | 2.0 |
| 400kHz | 1.5 |

8. Once the configurations are set properly, press the **Mosaic** button.



9. FMGT will create a backscatter mosaic with a grey linear color map. Within this color scheme, light grey represents hard seafloor and dark grey represents soft seafloor. Mosaics should be exported in this color scheme as well.

10. To export the mosaic to a floating point GeoTiff, browse to the **Visual Objects** tab located next to your **Source Files** tab. Highlight the mosaic you would like to export and right click, select **Export** -> **Surface** -> **Export Floating Point GeoTIFF Grid**. Save your GeoTiff in the processed backscatter folder within the project on the S drive. S:\20XX_Data\OPR-XXXX-FA-XX \HXXXXX\Processed\Surfaces_Mosaics\Backscatter




The proper naming convention is **HXXXXX_MBAB_Xm_XXXXkHz_xofx**

11. To add a new day to your project, just open your project in Fledermaus (**File-> Open Project**) and **add new Source/ Paired Files**.