CTI Technical Note 2014-02

Edgetech 6205 Bathymetric Processing Notes

Revision 1.0,12/16/2014

Chesapeake Technology, Inc.

eMail: support@chesapeaketech.com
Main Web site: http://www.chesapeaketech.com
Support Web site: http://www.chestech-support.com

1605 W. El Camino Real, Suite 100
Mountain View, CA 94040

Tel: 650-967-2045
Fax: 650-450-9300

Table of Contents

1 Scope

This document details the processing of the EdgeTech 6205 combined bathymetry and side scan sonar in SonarWiz. The document assumes that the sonar is mounted conventionally on a vertical pole mount with the forward axis directed towards the bow.

2 Vessel Configuration

The EdgeTech 6205 is a two-transducer hybrid interferometer/multibeam with both port- and starboard-facing transducers mounted on the same head assembly. The EdgeTech Discover software used for 6205 data acquisition accounts for the real orientation of the sonar transducers within the head assembly and stores bathymetry records in a rotated frame of reference that resembles a multibeam when both the port and starboard transducers are added together. For this reason, SonarWiz treats the 6205 as if each channel of the system were a downward-looking multibeam; the only difference being the port-facing transducer (channel 0) is rotated 180° from the starboard.

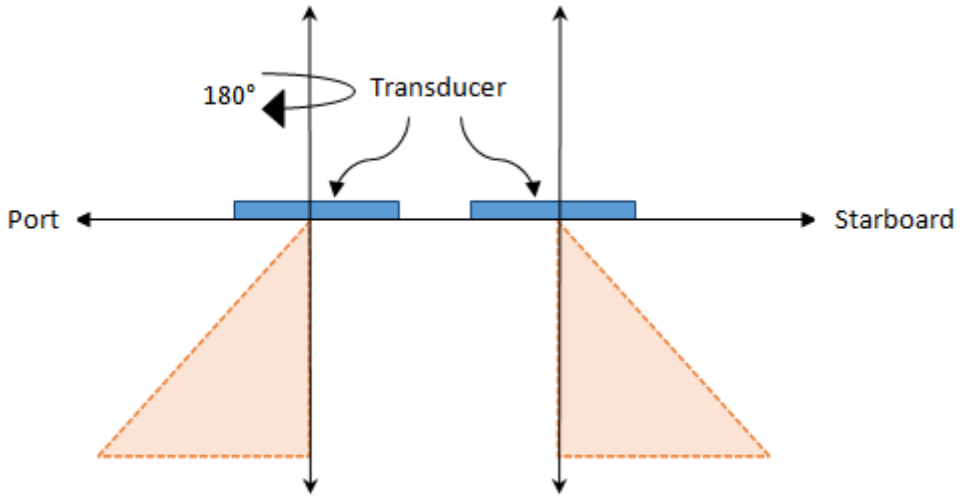


Figure 1 - Configuration of EdgeTech 6205 "Binned" and "Processed" Data (Pseudo-multibeam)

To configure the EdgeTech 6205 in the Chesapeake Vessel Editor (VE):

1. Add a **Swath Bathy** sensor with a sensor model set to **EdgeTech 6205.**
2. For each channel, configure the X, Y and Z lever arms relative to the Vessel Reference Point (VRP) as appropriate. Note that there is a small across-track (approximately 8 cm) offset between the port and starboard transducers.

3. To configure the orientation of the individual 6205 channels to the manufacturer defaults:
    a. Set channel 0 (port-facing transducer) with heading of +180 degrees.
    b. Set channel 1 (starboard facing transducer) with heading of 0 degrees.
    c. No Roll or Pitch values are required.

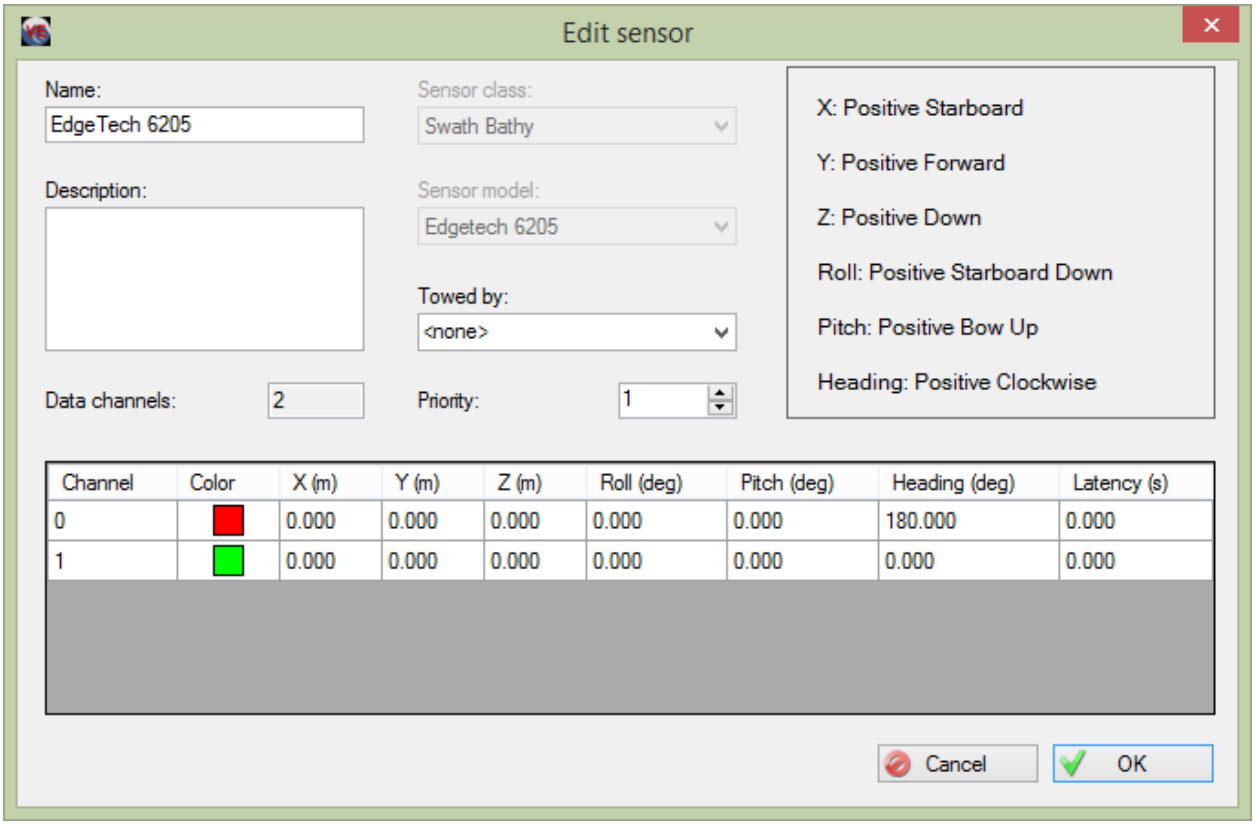


Figure 2- Example vessel configured for use with the EdgeTech 6205 using the manufacturer's default configuration

When properly configured, the vessel editor will display the port and starboard sonar fans overlapping as shown in Figure 3:

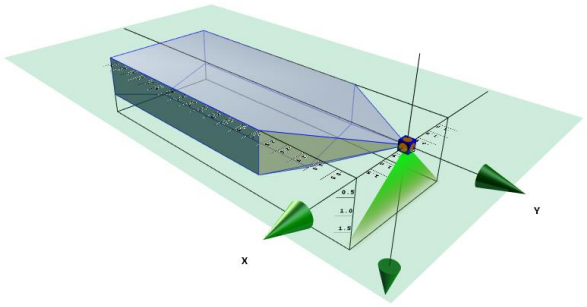


Figure 3- Example vessel properly configured for use with the EdgeTech 6205.

3 Data Import

EdgeTech 6205 bathymetric data is stored in *JSF files. There are two flavors of these files created by Discover. The first format is the “Processed” file. These files have had the interferometric angles calculated but no filtering or down sampling has occurred. The second format are “binned” files, these files have been extensively filtered using the proprietary tools available in Discover. In general, the binned files are easier to work with in SonarWiz and produce the cleanest bathymetry (compare Figure 4 and Figure 5).

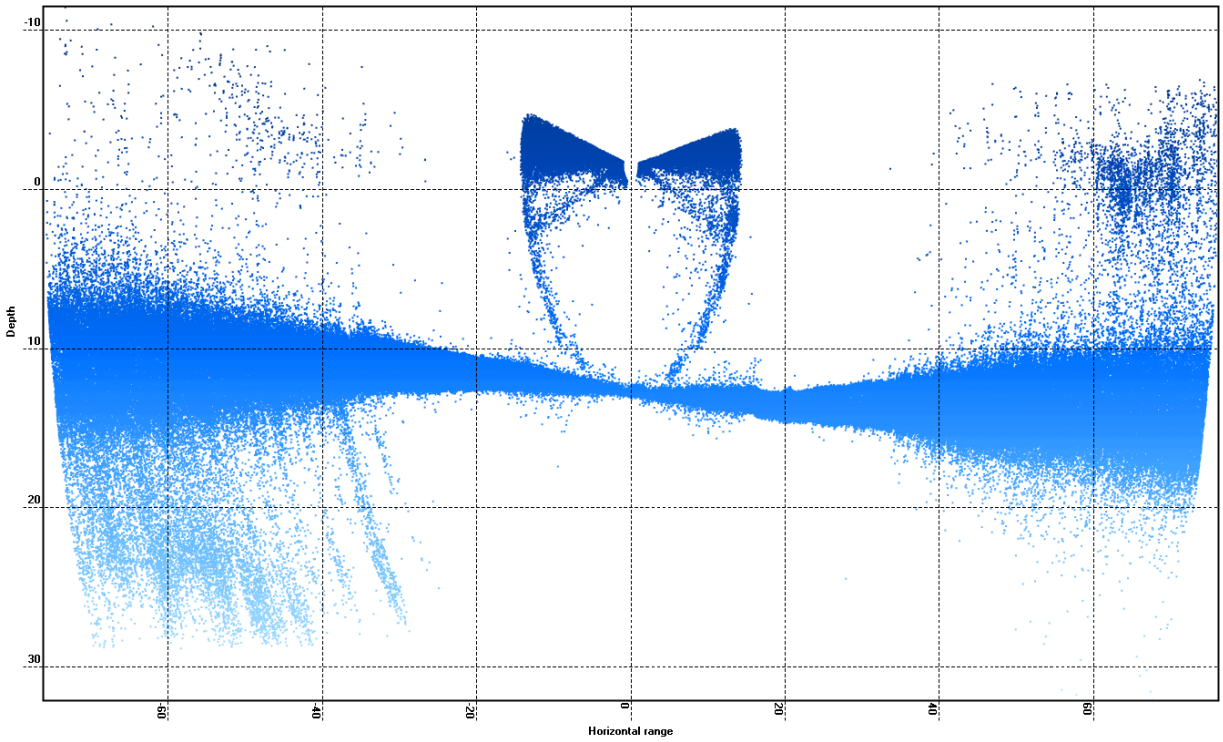


Figure 4- Example of "Processed" 6205 data

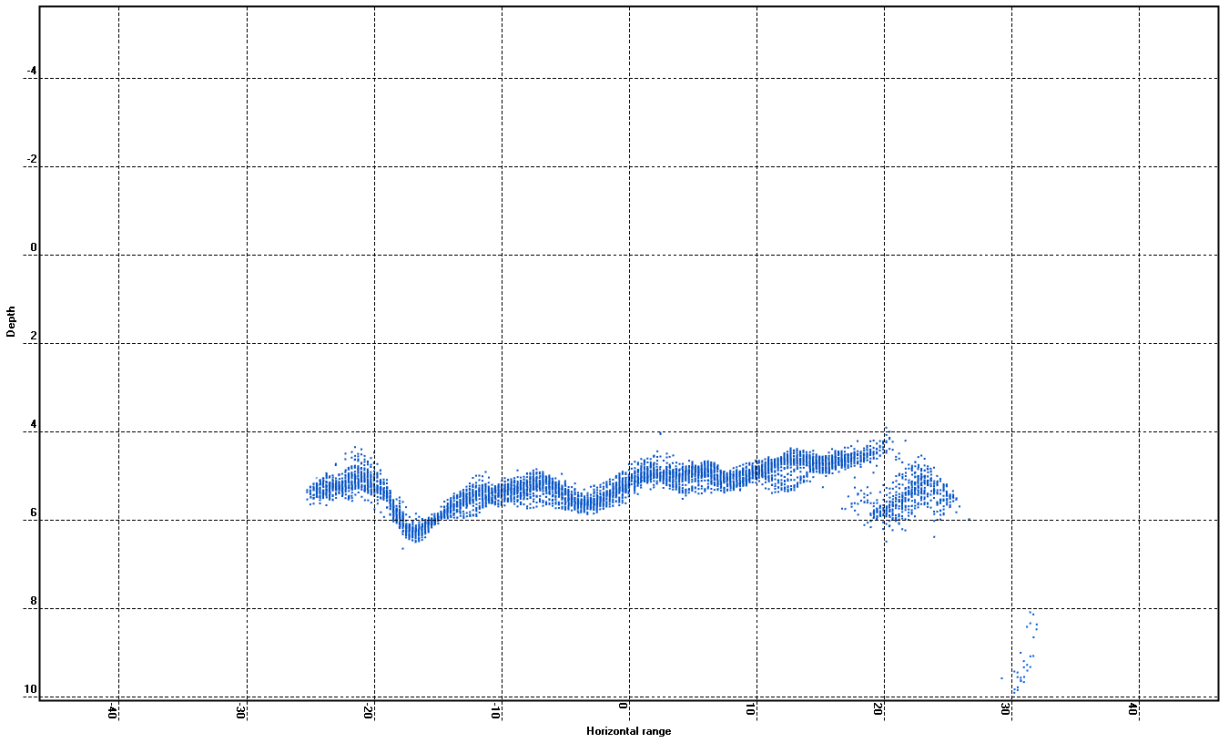


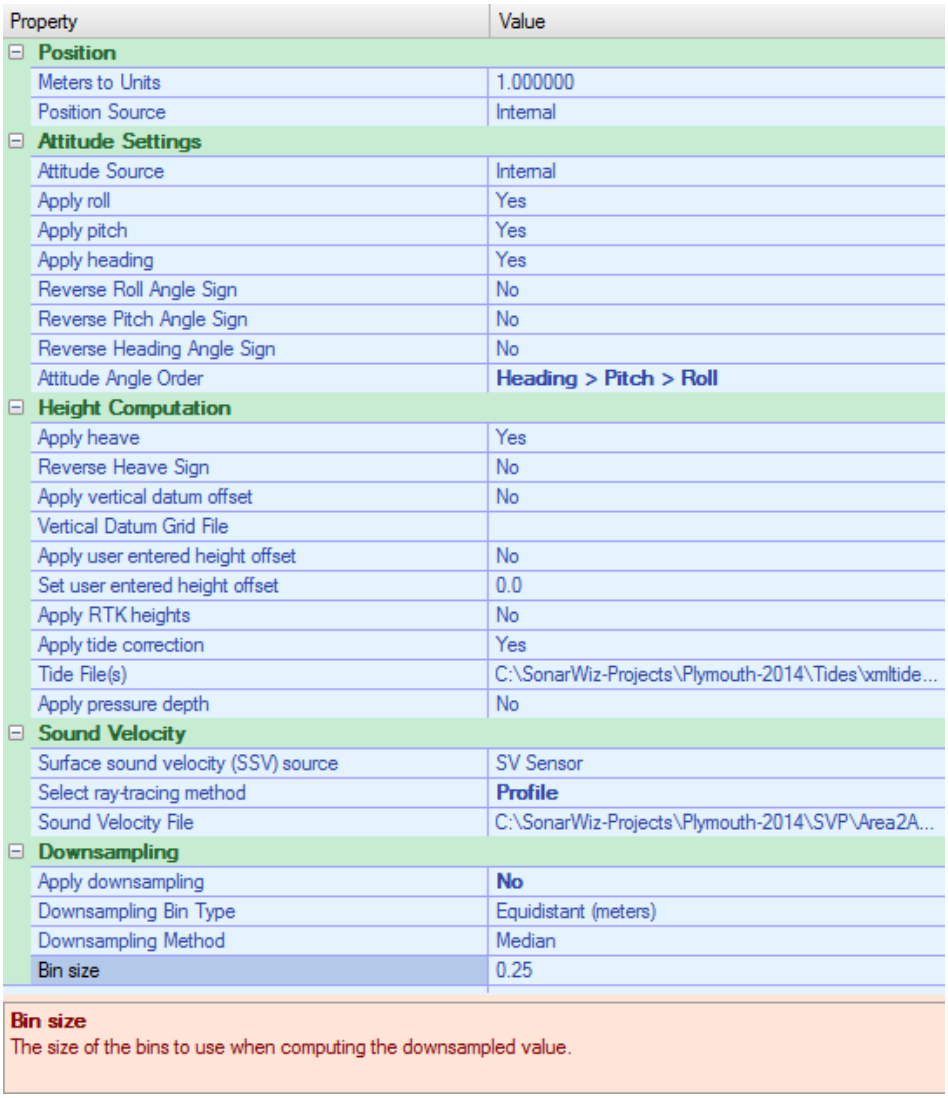
Figure 5 - Example of "Binned" 6205 data (not the same line as Figure 4)

SonarWiz can import JSF files directly using the **Post Processing Tab > Import > Bathymetry Files… > Open** dialog. There are no special settings for JSF bathymetry files at this time.

Auxiliary data such as observed tide data, sound velocity casts and post-processed navigation files should be loaded into SonarWiz using the standard procedures at this time.

4 Merging Data

The recommended merge settings for processing EdgeTech 6205 data are shown in Figure 6.



Property	Value
Position	
Meters to Units	1.000000
Position Source	Internal
Attitude Settings	
Attitude Source	Internal
Apply roll	Yes
Apply pitch	Yes
Apply heading	Yes
Reverse Roll Angle Sign	No
Reverse Pitch Angle Sign	No
Reverse Heading Angle Sign	No
Attitude Angle Order	**Heading > Pitch > Roll**
Height Computation	
Apply heave	Yes
Reverse Heave Sign	No
Apply vertical datum offset	No
Vertical Datum Grid File	
Apply user entered height offset	No
Set user entered height offset	0.0
Apply RTK heights	No
Apply tide correction	Yes
Tide File(s)	C:\SonarWiz-Projects\Plymouth-2014\Tides\xmltide...
Apply pressure depth	No
Sound Velocity	
Surface sound velocity (SSV) source	SV Sensor
Select ray-tracing method	**Profile**
Sound Velocity File	C:\SonarWiz-Projects\Plymouth-2014\SVP\Area2A...
Downsampling	
Apply downsampling	**No**
Downsampling Bin Type	Equidistant (meters)
Downsampling Method	Median
Bin size	0.25

Bin size
The size of the bins to use when computing the downsampled value.

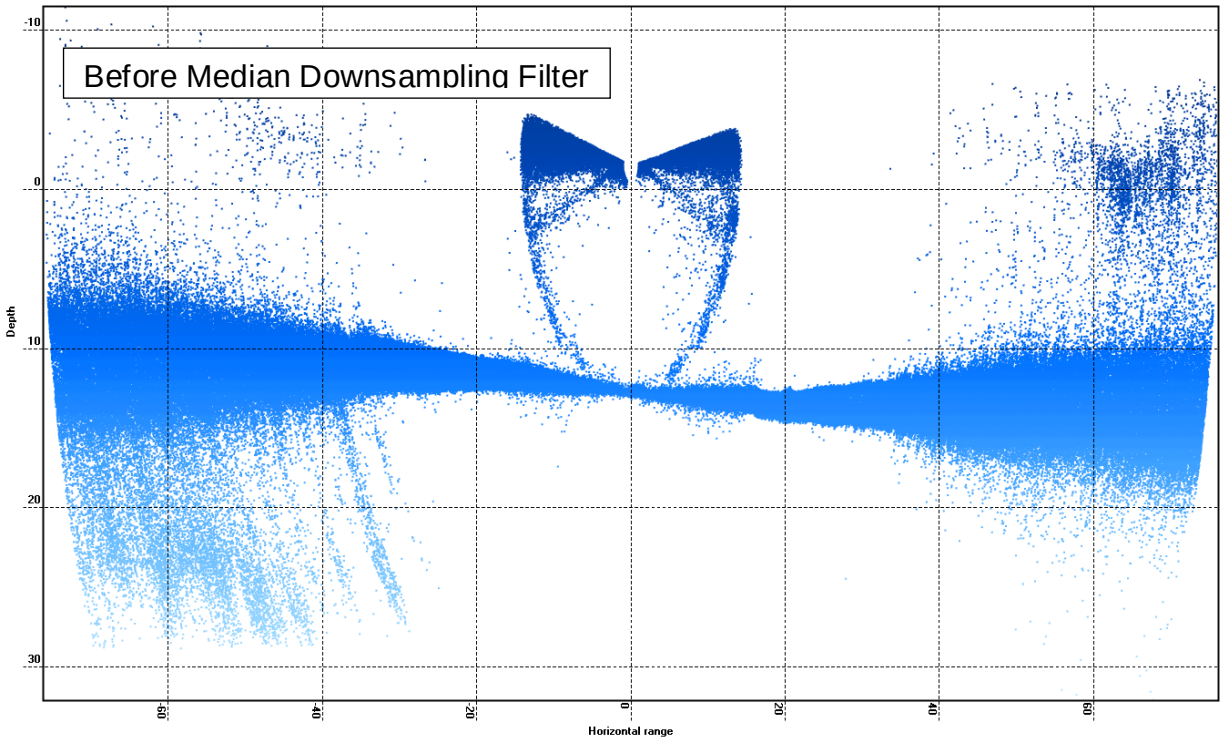
Figure 6 - Recommended initial merge settings

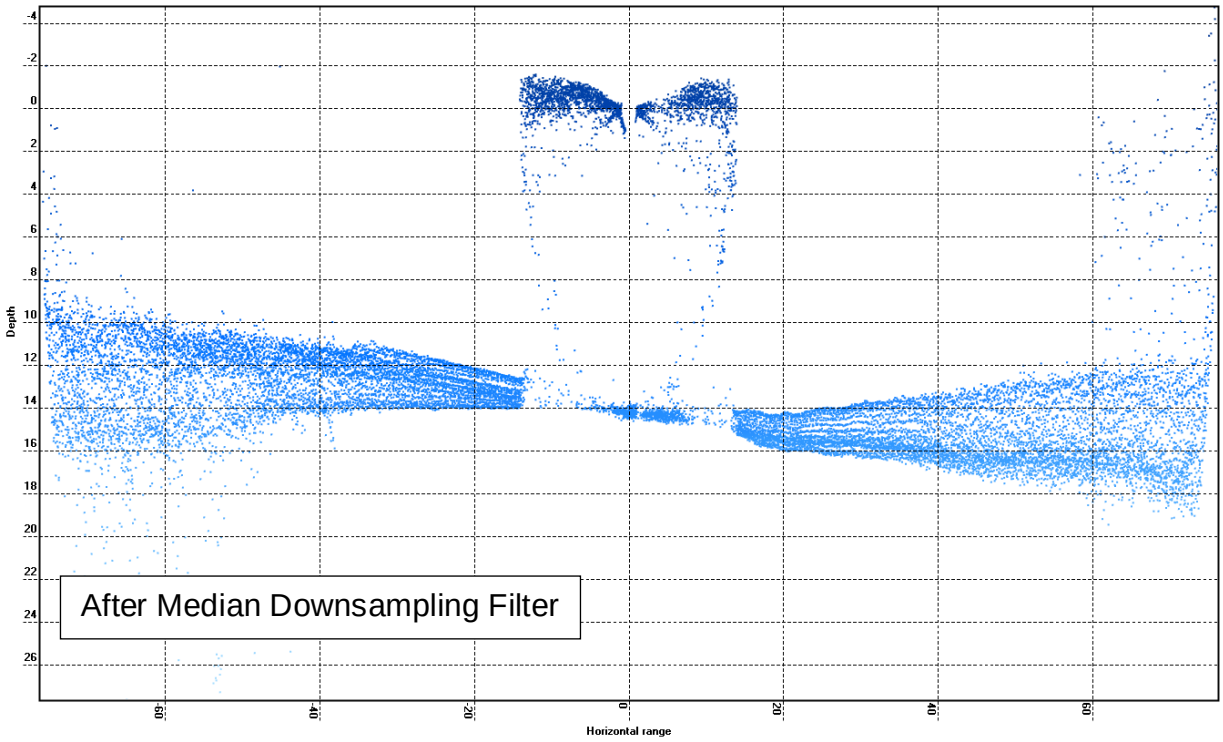
Merge settings can be left at their default values. However, it is recommended that the user review Height computation and Sound Velocity settings and use the most accurate data available.

It is HIGHLY recommended to use the Down sampling filter with EdgeTech 6205 Processed data however, it is unnecessary to down sample the Binned data (it has already been down sampled by Discover). Setting the bin size to about 1/4th the ultimate spatial resolution of the deliverable product is recommended (for example, use 0.25 m bins if the deliverable is 1 m resolution). The difference between the mean and median options on the down sample filter are as follows:

1. The median filter sorts all the samples in each horizontal bin and returns the sample with the median depth.

2. The mean filter averages together all of the samples in each bin and returns an aggregate “average” sample.





5 Filtering

Automatic filtering of the track lines can improve the bathymetry product without much effort, particularly for the “Processed” 6205 format (the “Binned” format often does not need automatic filtering). For 6205 Processed data, the best strategy is to try and separate the seafloor returns from the near and far-field noise. In the following example a range filter was used to eliminate noise near the transducers, a box filter was used to trim the edges of the swath, and an along track filter helped to eliminate spikes proud of the seafloor:

Property	Value
Manufacturer Flag Filter	
Enable Filter	Yes
Manufacturer Filter Outliers	No
Manufacturer Filter Water Column	No
Manufacturer Filter SNR	No
Manufacturer Filter Quality	Yes
Manufacturer Filter Amplitude	No
Channel Filter	
Enable Channel Filter	No
Use Channel 0	Yes
Use Channel 1	Yes
Use Channel 2	Yes
Use Channel 3	Yes
Amplitude Filter	
Enable Amplitude Filter	No
Amplitude Filter Bias	1.500000
Range Filter	
Enable Range Filter	Yes
Filter Near Range	5.000000
Filter Far Range	200.000000
Cutoff Angle Filter	
Enable Cutoff Angle Filter	No
Minimum Cutoff Angle	-70.000000
Maximum Cutoff Angle	70.000000
Water Column Filter	
Enable Water Column Filter	No
Threshold Fraction	0.800000
Bathymetry Box Filter	
Enable Bathymetry Box Filter	Yes
Filter Minimum Depth	Yes
Filter Maximum Depth	Yes
Filter Minimum Horizontal Range	Yes
Filter Maximum Horizontal Range	Yes
Minimum Depth	5.000000
Maximum Depth	20.000000
Minimum Horizontal Range	-40.000000
Maximum Horizontal Range	40.000000
Along Track Filter	
Enable Bathymetry Along Track Filter	Yes
Number of Pings	6
Vertical Threshold	2.000000
Horizontal Bin Size	1.000000

Horizontal Bin Size
Width of the horizontal bins in map units. (default = 1.0)

Figure 7 - Filter dialog settings

The result of running just the box filter and the along-track filter are shown in the following cross profile:

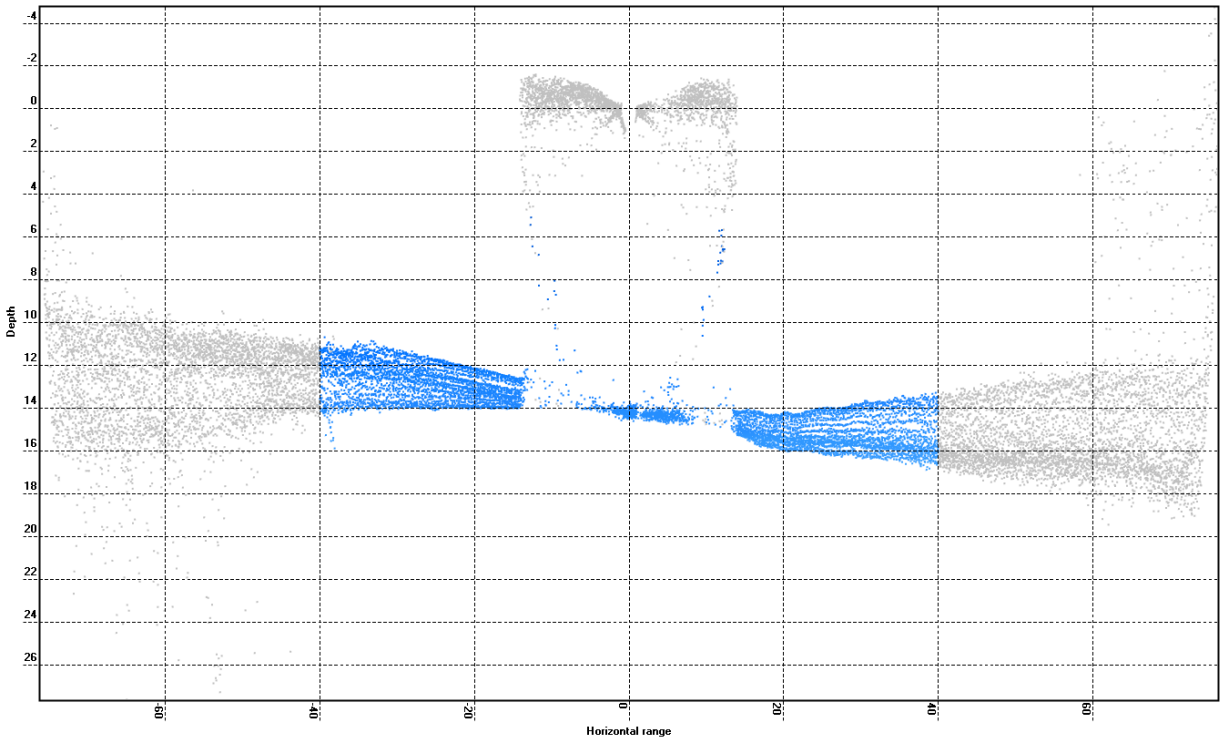


Figure 8 - Filtered swath profile (gray points have been rejected, Blue points are valid)

The data should now be minimally cleaned and ready for patch test calibration.

6 Calibration and Processing

The EdgeTech 6205 should be calibrated using standard procedures for a two-transducer system. From this point forward, the data can be processed using standard procedures.