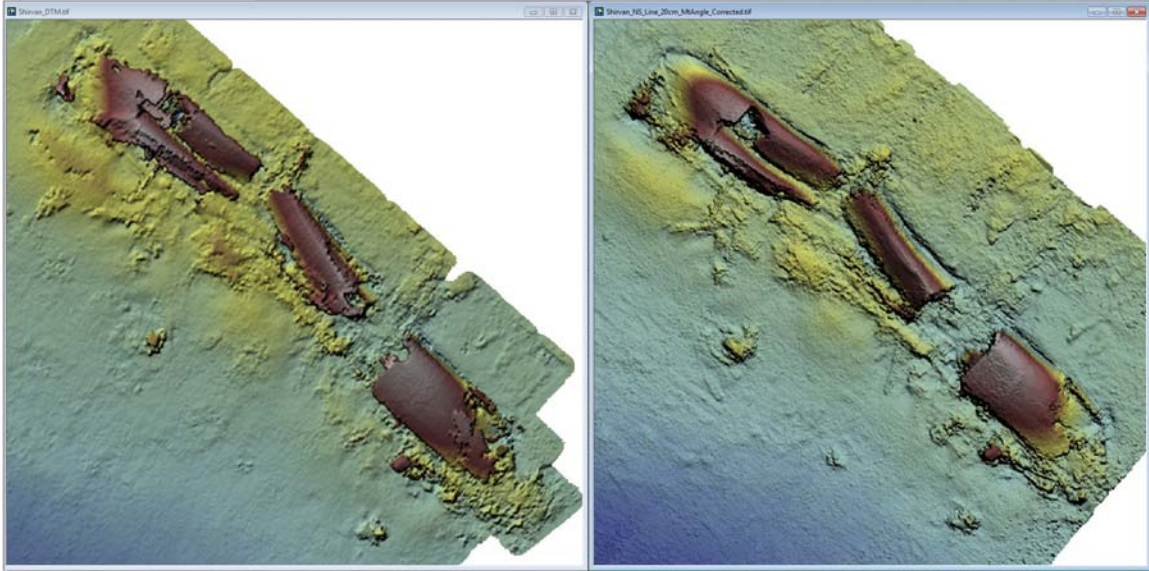


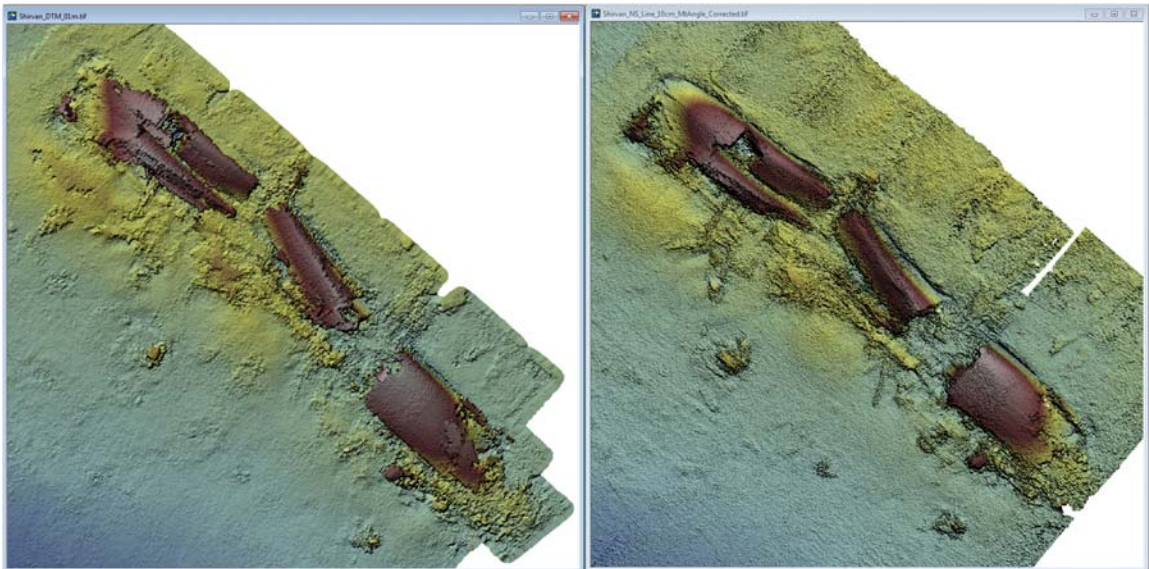
Processing memo on Gavia GeoSwath data of British oiler Shirvan Masaomi Uchida, Oceanic Imaging Consultants, Inc.

GeoSwath plus data acquired on Gavia AUV was processed in OIC's CleanSweep3 post-processing software.

Our processed data might look a little noisy at swath-to-swath boundaries but this is largely due to lack of calibration info (patch test, SVP and tide). I found about 2m difference in depth from NCS data. So, I simply applied constant z offset to match the two. You can also see they smoothed data quite a bit.



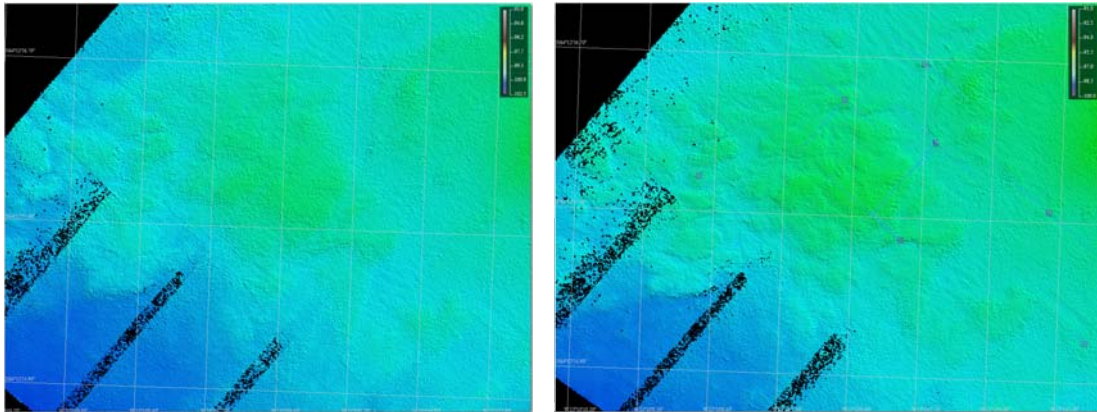
NCS (left) vs OIC (right) 20cm grid data comparison



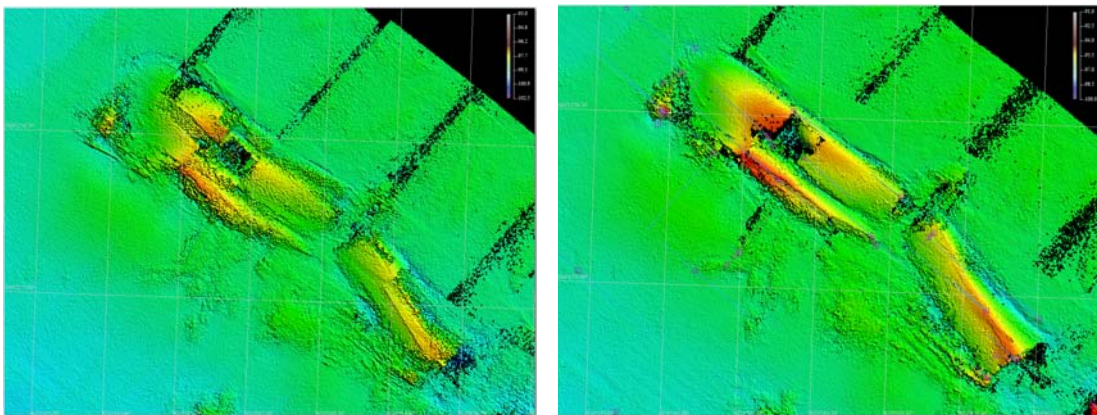
NCS (left) vs OIC (right) 10cm grid data comparison

I also spent fair amount of time to InterNav to match the features. I used bathy data instead of sidescan data for feature matching. Since the survey lines were very close to the bottom and the wreck is very large, distortion in the sidescan imagery was severe, making it unusable for precise

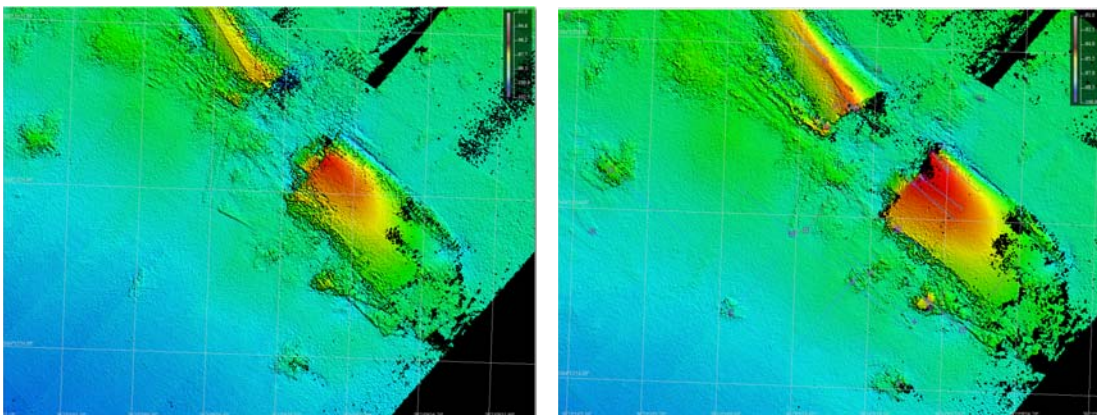
feature matching. Using bathy feature was not so easy but relative positions were greatly improved. You can see smaller features stand out better in our data.



Western rocky area before (left) and after (right) InterNav



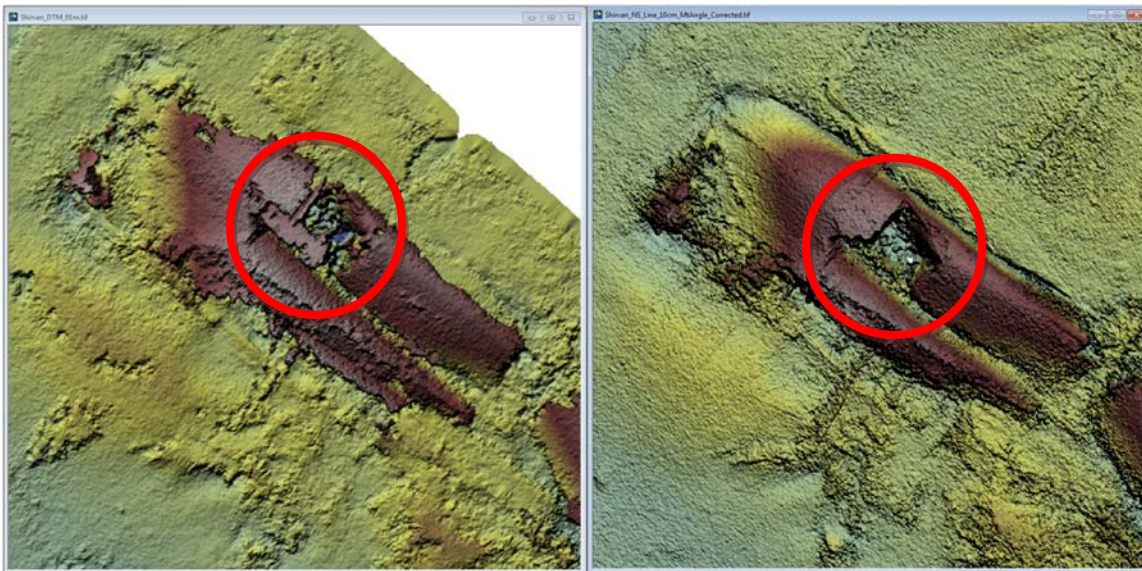
Shirvan wreck (western section) before (left) and after (right) InterNav



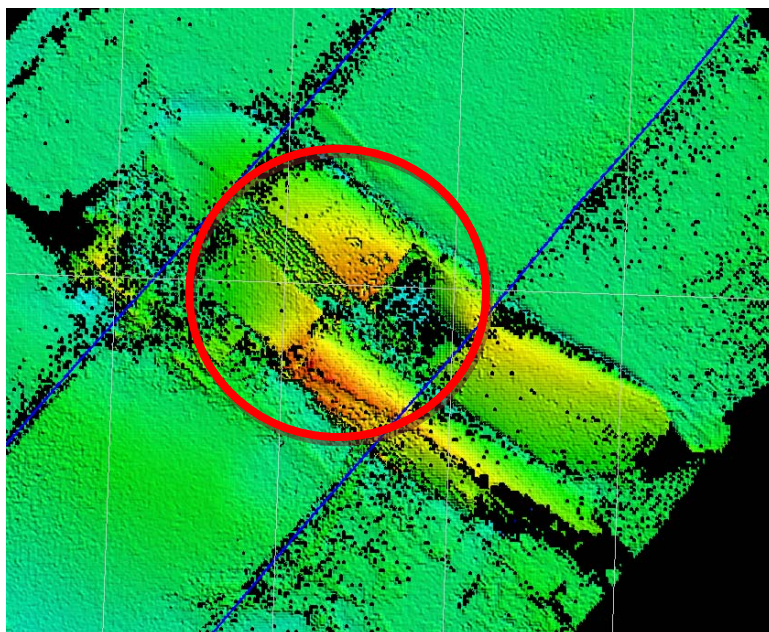
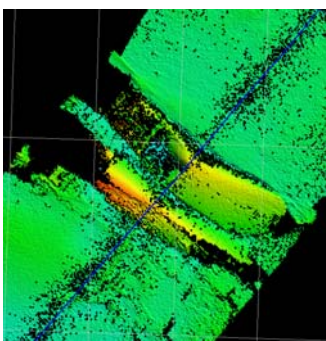
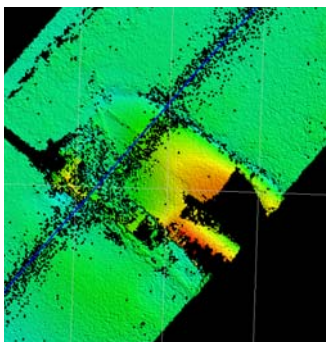
Shirvan wreck (eastern section) before (left) and after (right) InterNav

I found several faulty areas in NCS data over the wreck. During the survey, sometimes one line only saw the hull but the other captured inside the hull through the openings, which created two different surface levels but when gridded, they were averaged, thus creating another surface in between. Also

gridding vertical walls created another surface level. Since NCS didn't remove this, the integrity of the hulls in their data looks worse than what it should look like as in our data.

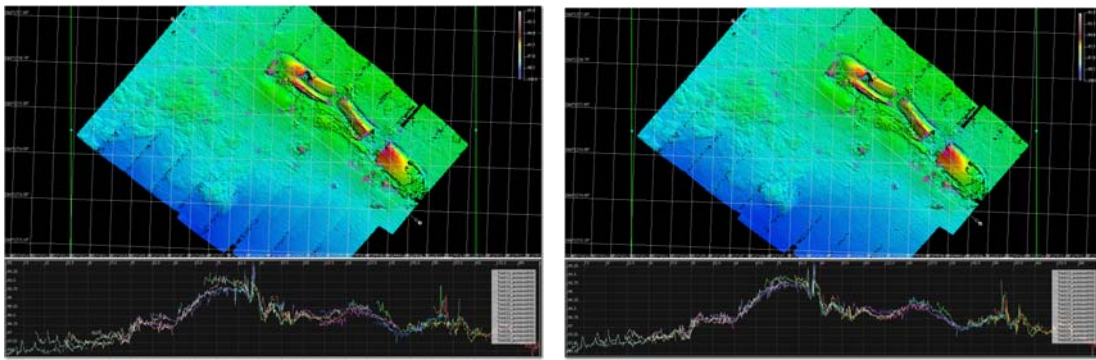


NCS (left) vs OIC (right)



Two adjacent swaths looking over the hull and inside the hull

There seems to be mount angle offset. I measured roll bias of all the adjacent swath pairs (e.g. 01 & 02, 02 & 03, 03 & 04, etc.) and found out the values of the pairs alternate between -0.7 deg and 0.3 deg (+/- 0.1deg). Since each side of the swath overlaps 100% with the other side of the adjacent swath, I concluded it's the mount angle offset rather than simple roll bias.

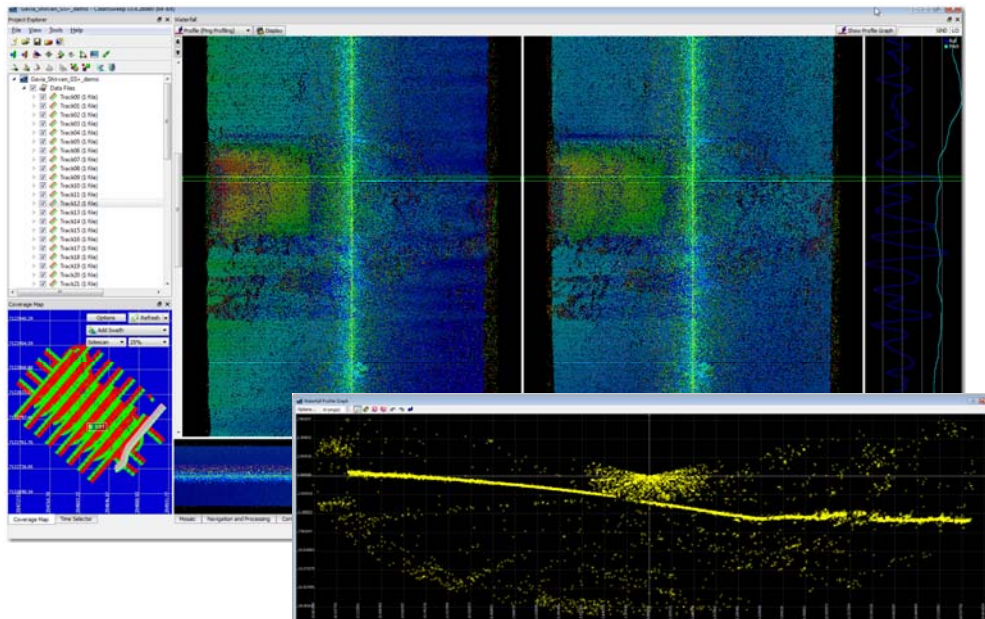


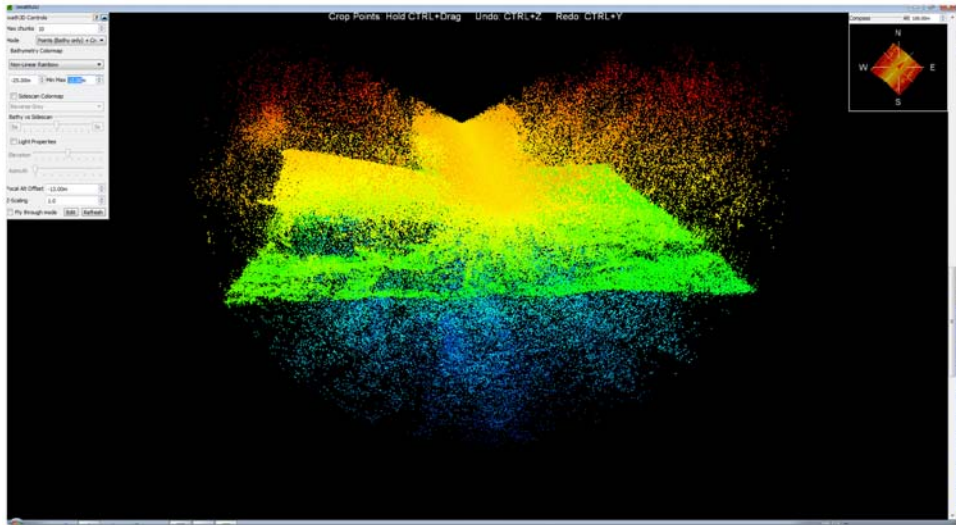
Before (left) and after (right) mount angle correction (-0.7 deg port, -0.3 deg stbd)

I didn't include the SE-NW lines for this demo processing since they are considerably different in Z and matching them with InterNav makes everything fuzzy instead of complementing the NE-SW lines.

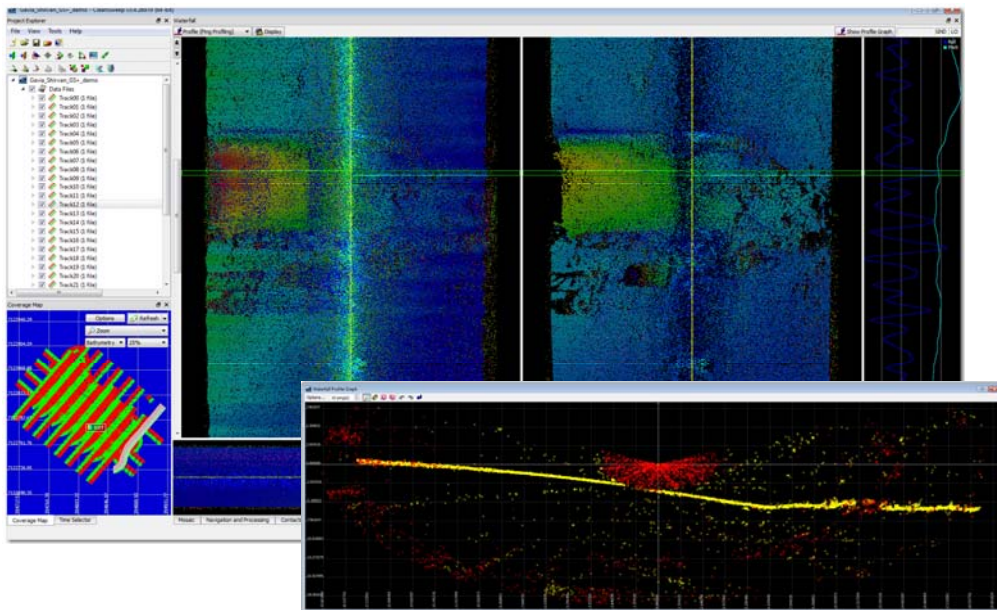
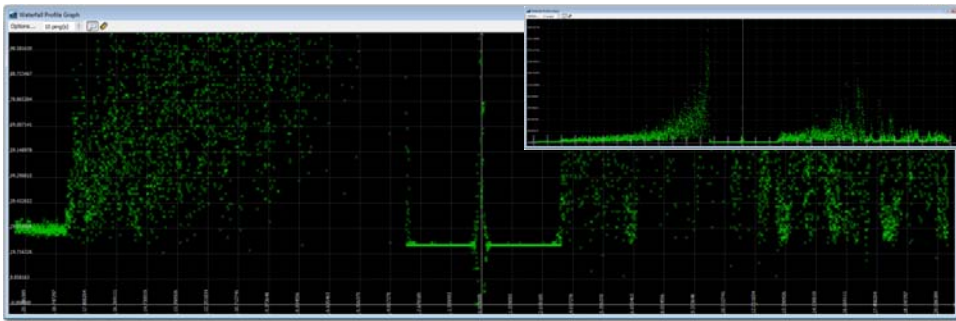
Bathy data processing steps were described below. Create a new project using Hull-mount sidescan and bathy setting and make sure to smooth navigation (~1s) and select the Subtract Depth option in the Platform Elevation tab in the Navigator prior to bathy processing.

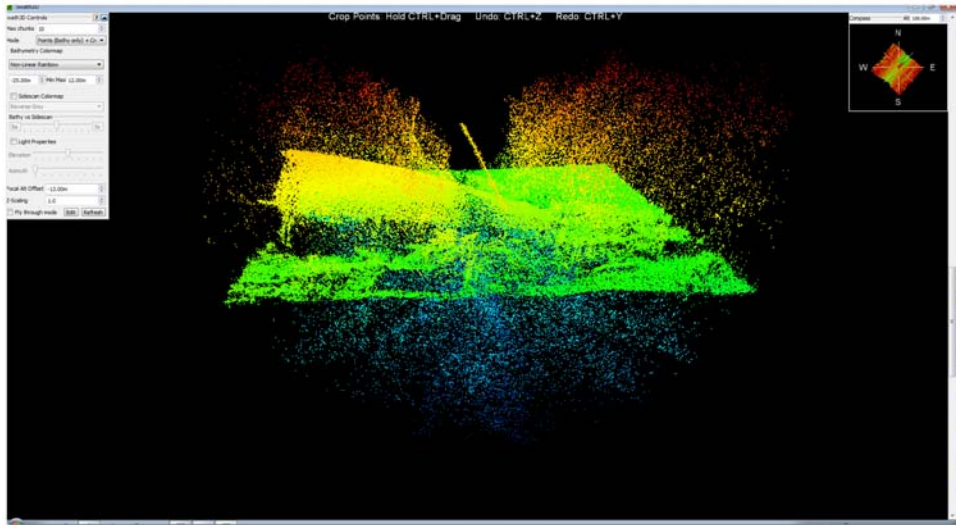
1. Check raw data in waterfall, ping profile and Swath3D.



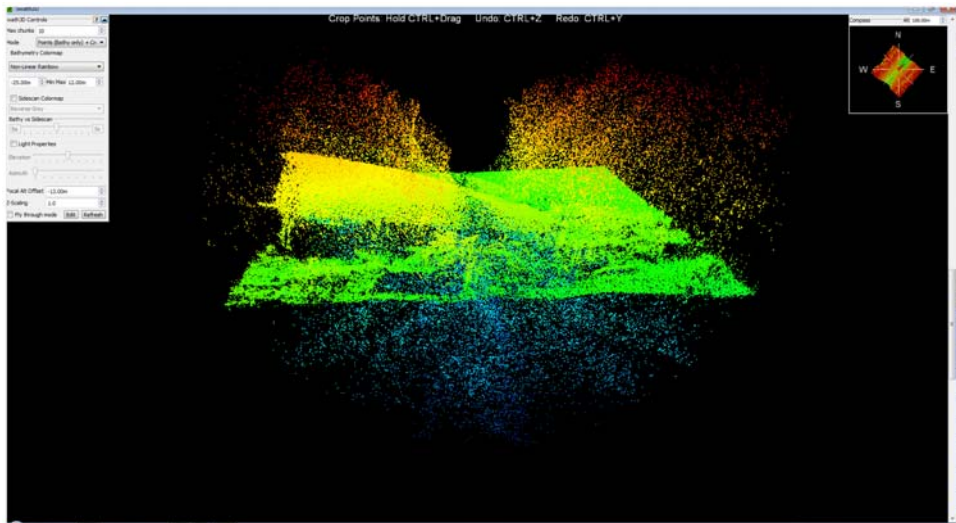
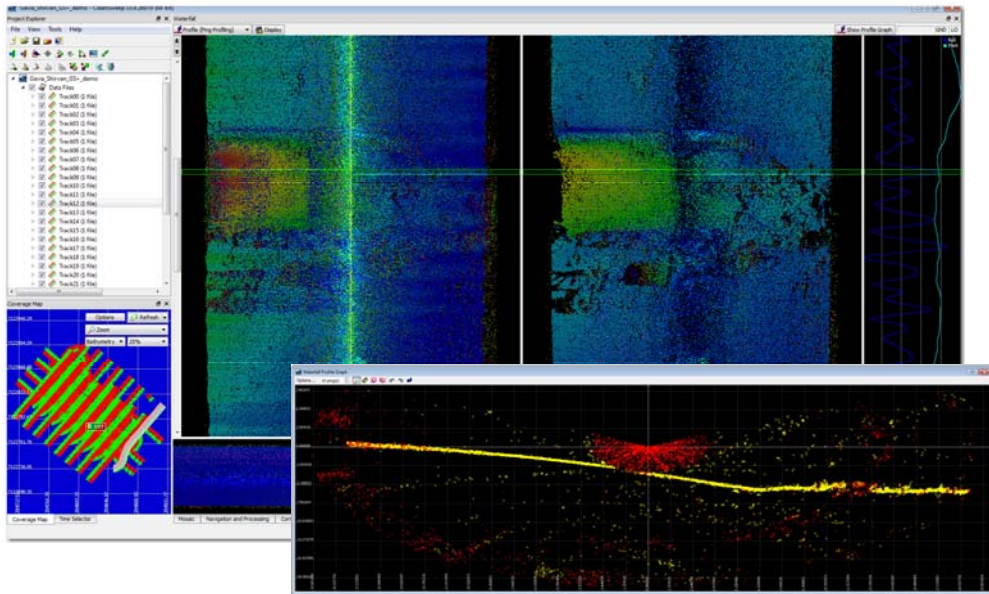


2. Apply Amplitude filter (shadow masking). You can use sidescan ping profile to check what values are reasonable for threshold. In this dataset, set 50 to be conservative or 100-150 if you want to get rid of more noise in exchange of some real data points.

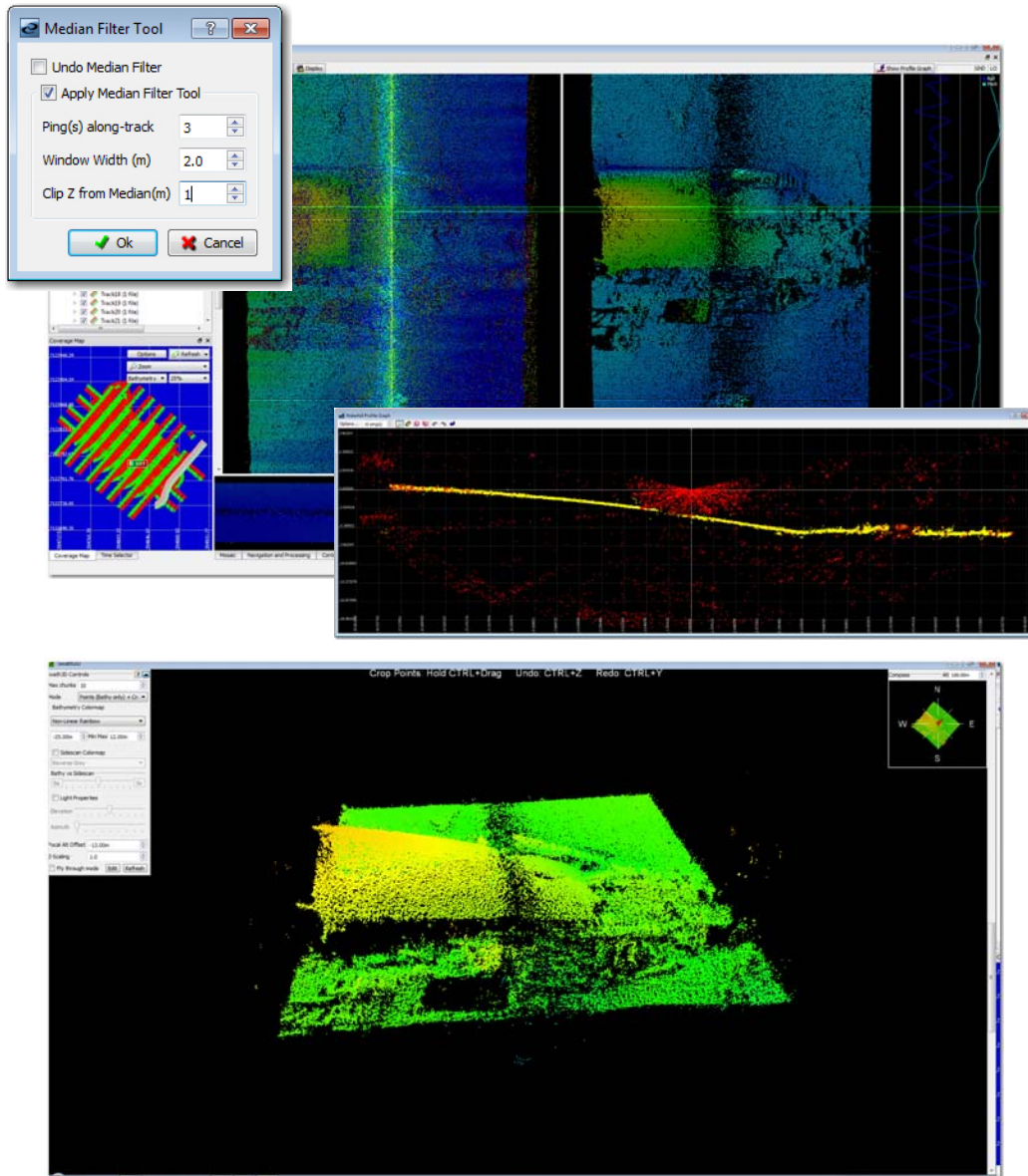




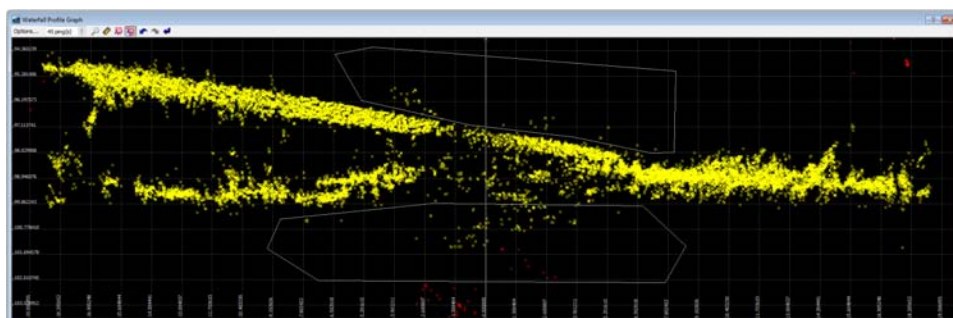
3. Apply basic bathy filter such as Altitude limits, Ground Range limits and Slant Range limits.

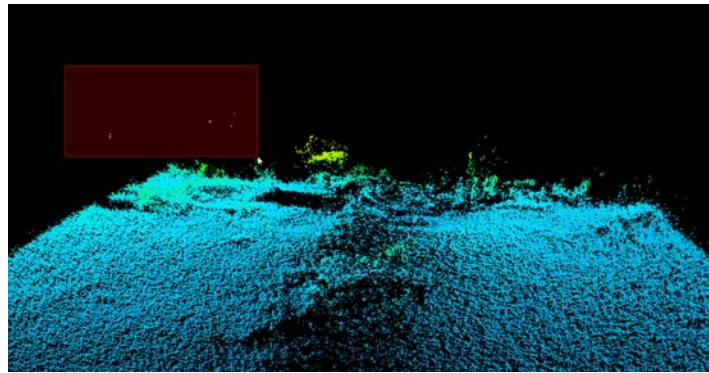


4. Apply Median Removal Tool. Right click on one or more swath(s), file(s) or track(s) to select Tools > Median Removal Tool to access the dialog. Below is an example of the setting.

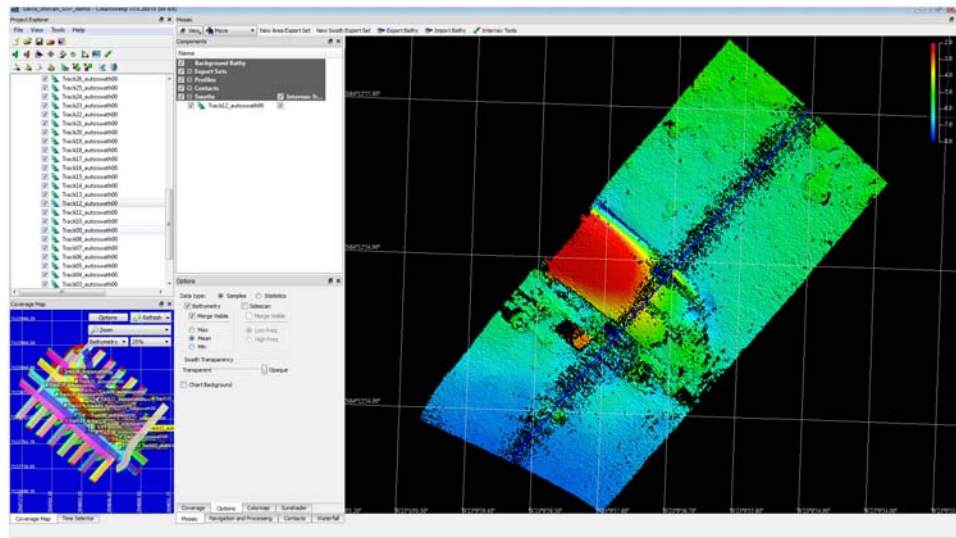


5. if necessary, use ping profile and/or Swath3D point mode to further clean the data. Polygon cropping tool is very efficient.

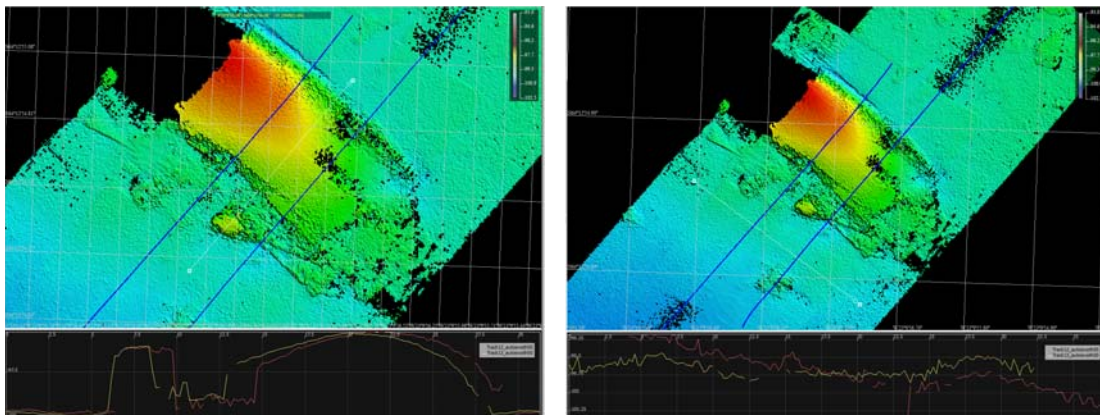




- Mosaic the data for review. Go back to the waterfall/Swath3D for more cleaning.



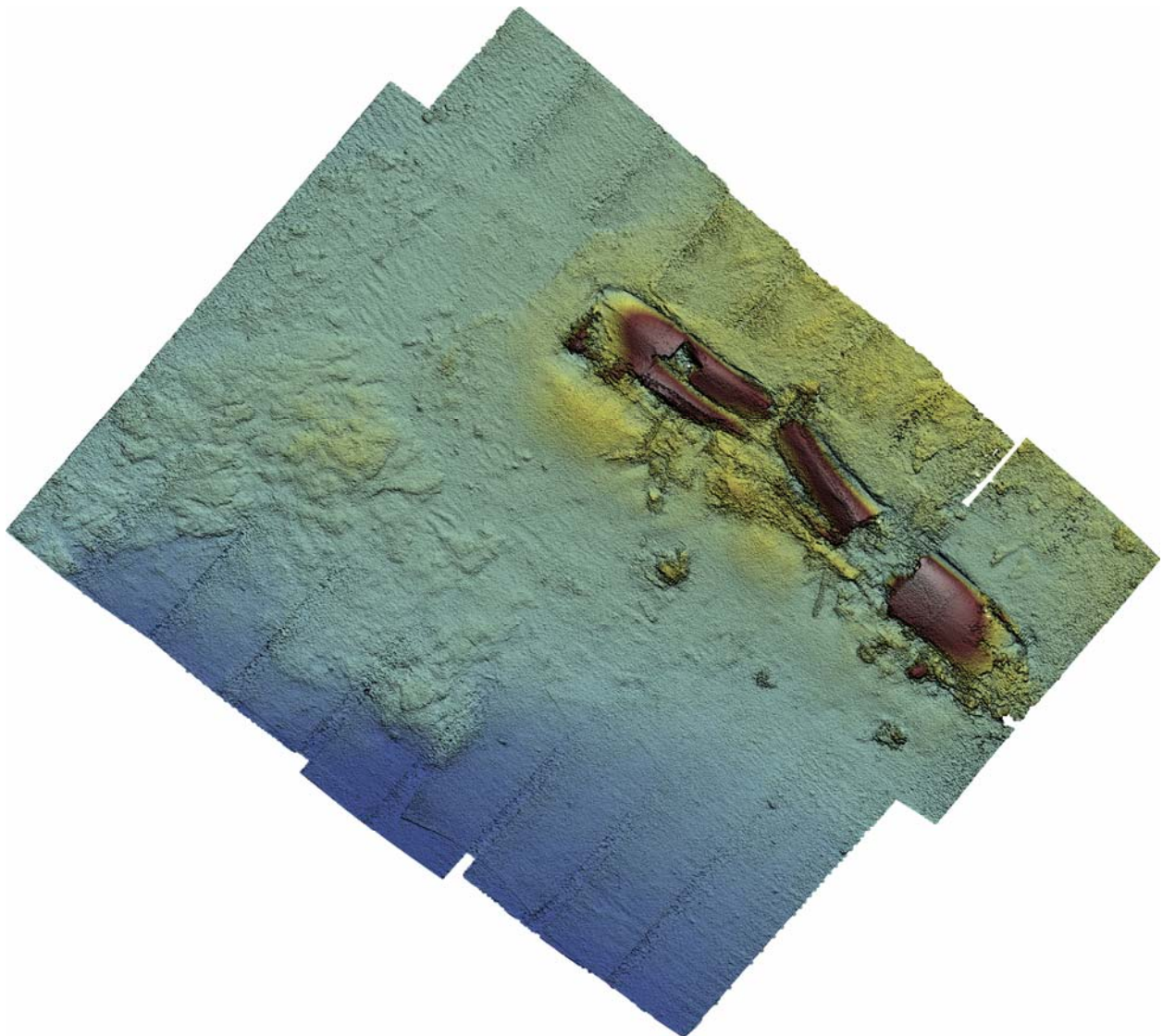
- Repeat above steps to process another swath. Use the mosaic profile tool to see if features are matching and contours are aligned.

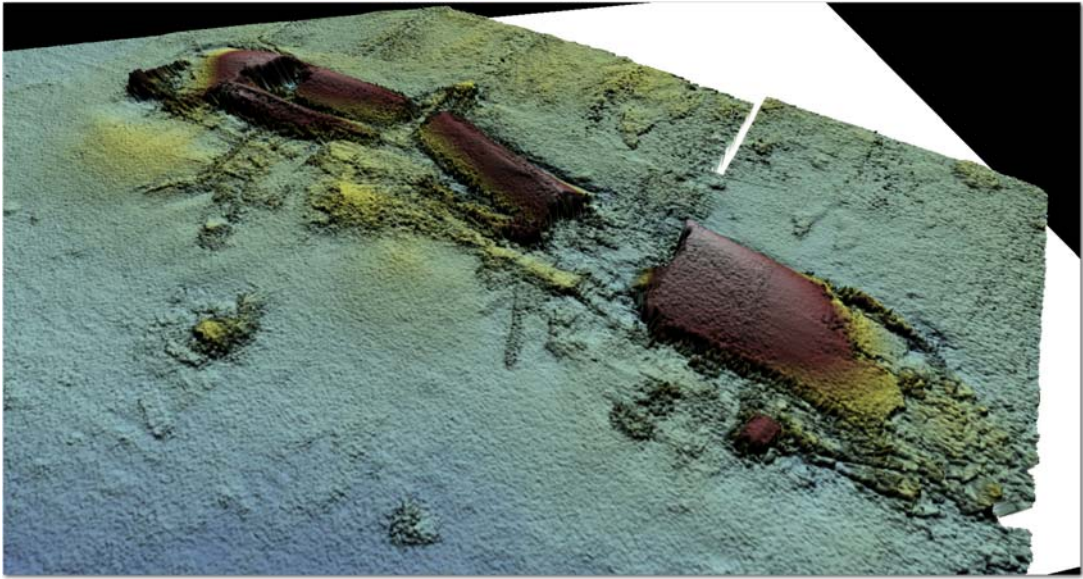
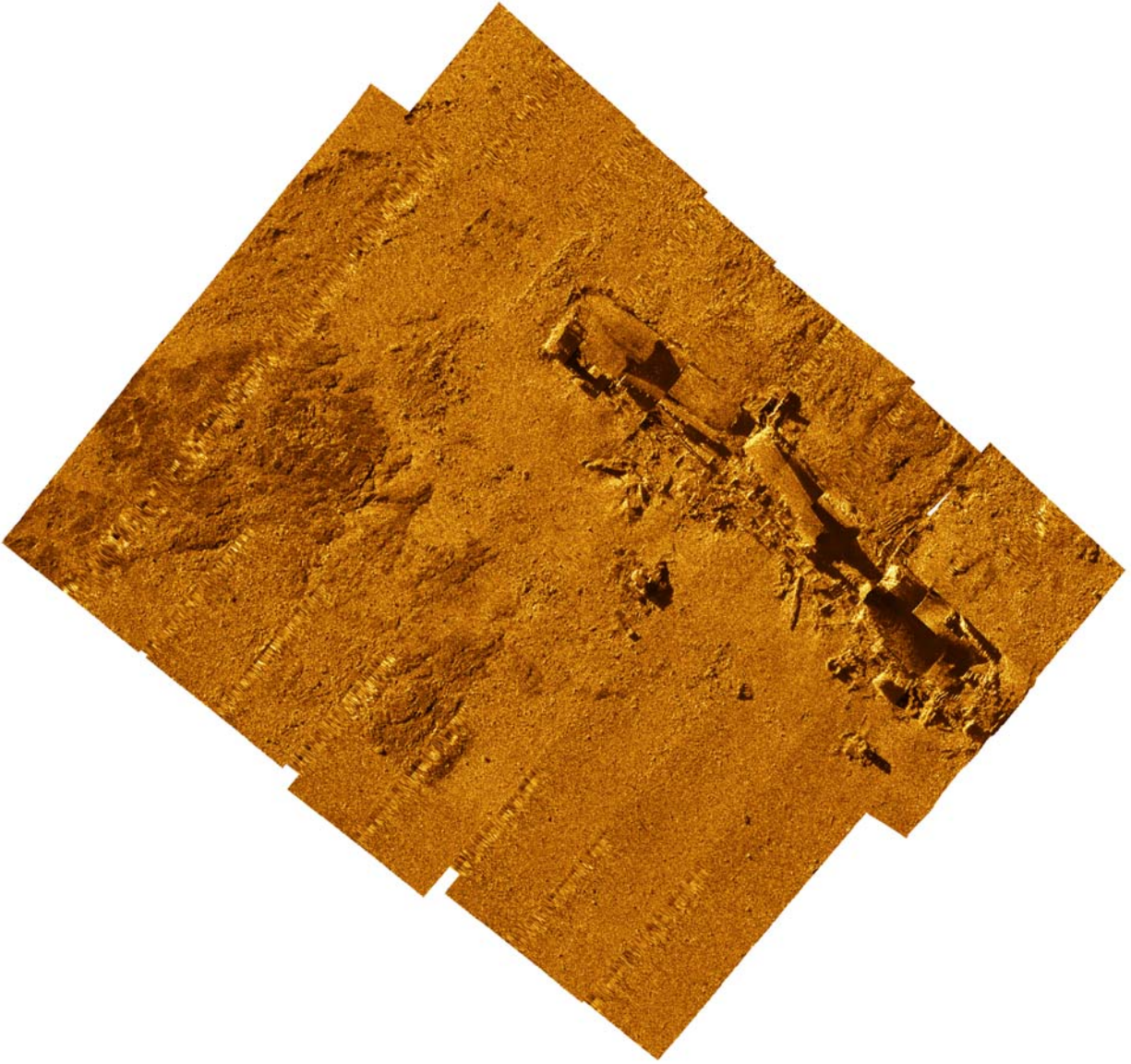


Apparent navigation offset (left) and roll bias or mount angle offset (right)

- Use InterNav Feature points to match bathymetry features that appear on multiple swaths.

9. Once navigations are corrected, run roll calibration tool for each adjacent swath pairs. Notice that each alternating pair has similar roll bias (-0.7 deg and 0.3 deg, +0.1 deg error). This implies that between swath misalignment is not due to roll bias but most likely caused by mount angle offset of each transducer. In the Advanced tab of the Bathymetry Filter Database dialog, set the Mount Angles Correction of -0.7 deg for Port and -0.3 deg for Stbd.
10. Resulting mosaic should be smoother at swath-to-swath boundaries (both in the stack and merge mode).
11. Export the processed bathymetry data as an ASCII XYZ grid.





Filename: GeoSwath_Shirvan_dataprocessing.doc
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