



# Processing Klein 5000 Interferometry Data

by Harold Orlinsky

Another converter option, now inside the HSX Converter, is the SDF files for bathymetry. This was done to get the interferometry data extracted from the file collected by the Klein 5000 v2. This system was recently developed by L3-Klein. Both side scan and bathy data can be extracted from the SDF file to create HSX files, for processing in the HYSWEEP® EDITOR and SIDE SCAN TARGETING AND MOSAICKING.

The converter parses the data to angle-based decimation, with the user-defined maximum swath angle and angle increment. The limitation of the swath angle / angle increment is still the 1440 beam limit of the HSX file; in Figure 1, the HSX file has a swath of 800 beams (160 degree swath / 0.20 degrees ).

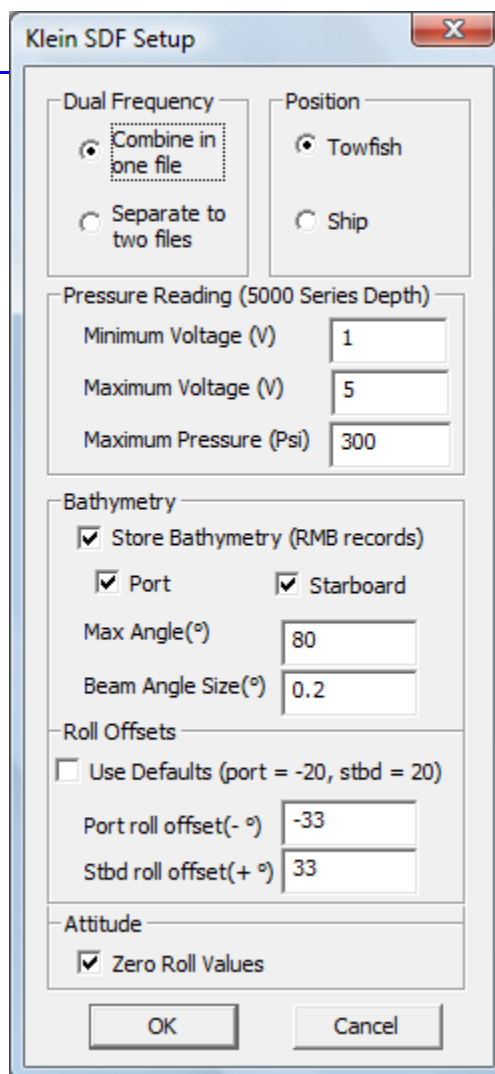
**FIGURE 1.** Converting Klein 5000 SDF files to HSX format

The transducers do not have a fixed depression angle and the computation takes these offsets into account. A towed system uses the default angle of 20 degrees. In Figure 1, the sonar had the transducers set at 33 degrees.

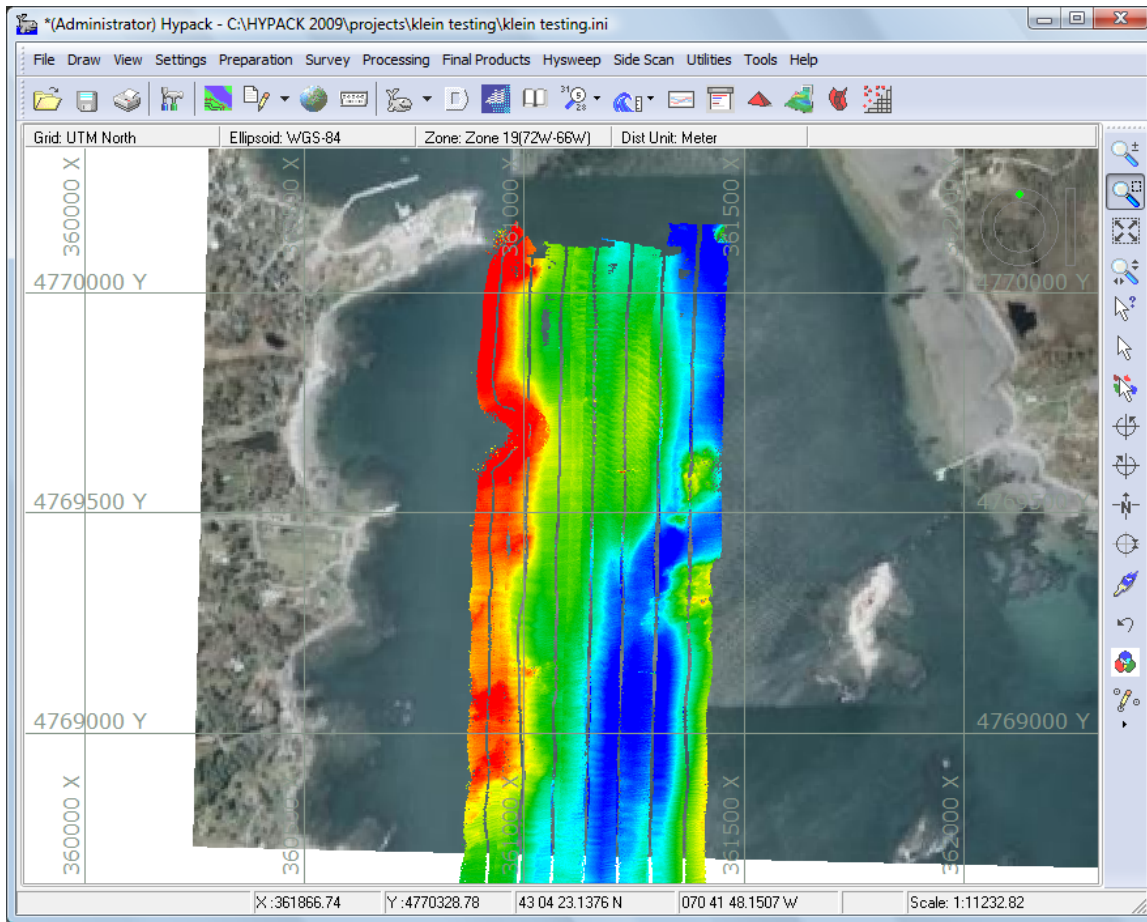
The **roll** computation is a bit unique in this data conversion. Whereas typical multibeam systems have a single roll value, taken from the HCP record, applied to the entire swath of data. The HCP field in the Klein 5000 has only **pitch** and **heave** values populated. Each beam within a swath has its own roll value. By selecting the “Zero Roll Values” option, the take-off angle is adjusted by the individual roll value. The HYSWEEP® EDITOR uses these values for processing.

On a towed system, the sonar depth is stored in the HSX file as a DFT (draft) value, by converting voltage to pressure then to a depth. In HYSWEEP® EDITOR, the DFT value will be added to the bathymetry, to give the actual seafloor depth.

We collected a data set inshore of Portsmouth Harbor, covering an area 1500 meters by 600 meters. We converted the files and processed them in the HYSWEEP® EDITOR. This resulted in the area-based coverage. The distinctive pattern of having a “hole” at the nadir region can be seen in the trackline of our test data. A typical survey would have tighter line spacing to provide coverage in the nadir gap region.

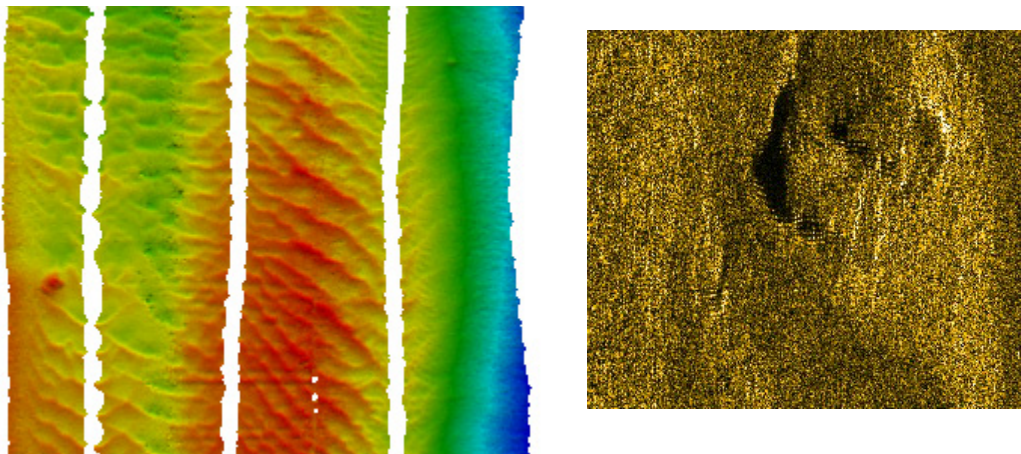


**FIGURE 2. Portsmouth Harbor Test Data**



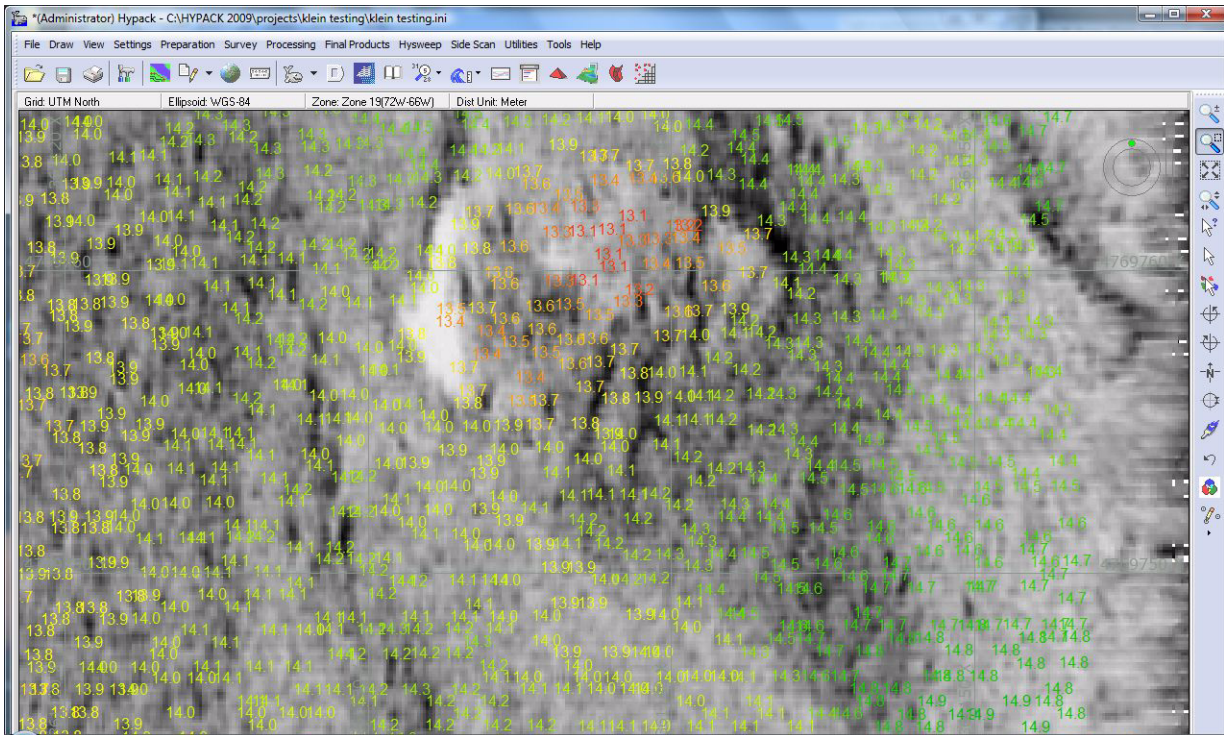
One interesting section had an area of sand waves. Although the sand pattern could be seen on the sidescan, the small rock feature at the south end would be a good evaluation of matching sidescan and bathymetry. The sidescan data was processed in the SIDE SCAN TARGETING AND MOSAICKING program and measuring the target gave a height of 1.0 meter off the seafloor.

**FIGURE 3. Bathymetry (left) vs Side Scan Data (right)**



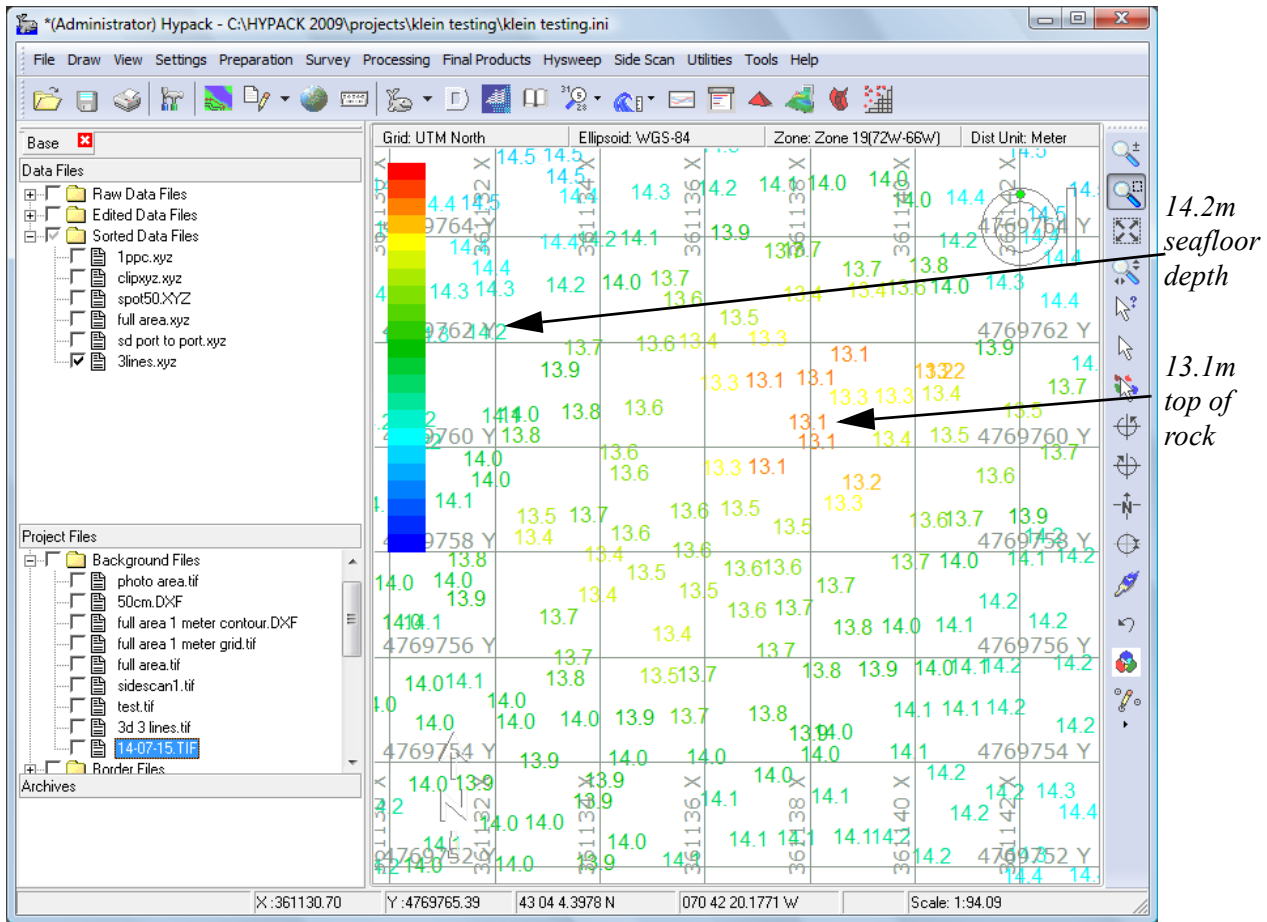
The sounding data was overlaid on the sidescan image, to verify the sounding depth and location of the feature.

**FIGURE 4. XYZ Soundings Overlaid on the Side Scan TIF**



The sounding data showed the height of the feature was 1.1 meter; a minimum depth of 13.1 was located on top of the rock and the surrounding seafloor showed an average depth of 14.2.

FIGURE 5. Sounding Data Correctly Corresponds with Side Scan Data



The system is relatively new, but HYPACK® is able to work with its SDF files, processing the bathymetry and side scan data. It's one more file format conversion that HYPACK® supports, and one more sonar system available to use for seafloor mapping.