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Sounding Better!

MBMAX64 Multifrequency Update

By Mike Kalmbach

Our multibeam editor has been updated for multiple frequency surveys. Soundings can be color-coded by frequency and individual frequencies can be enabled and disabled as desired. The processing is not complicated and leads to interesting analysis – see the TIN volumes example below.

The multibeam sonar is from R2Sonic and it provides multifrequency soundings in a way that's easy to work with. Transmit frequency cycles from 100 to 200 to 400 KHz (then repeats), changing every ping.

Loading Multifrequency Files

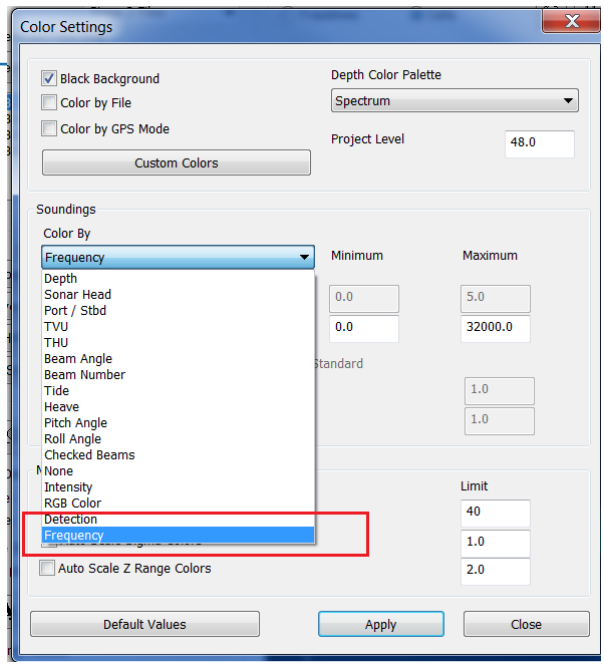
HYSWEEP HSX, HS2 and HS2x files are loaded as one normally would. Nothing special or specific for multifrequency. When loading HSX files all frequencies are enabled initially. When loading HS2 / HS2x the frequencies enabled upon save stay enabled.

BEWARE! Multifrequency logging was not right before HYSWEEP® SURVEY version 18.1.4. So watch out for that.

Color by Frequency

The new option is shown in figure 1. Frequency has been added to the sounding color list.

FIGURE 1. *New Option to Color-code Soundings by Frequency.*



Figures 2 and 3 show soundings with all frequencies enabled.

Figure 2 is the Sweep window (pings from a single survey line) in map view. It's easy to see how the transmit frequency cycles.

Figure 3 is the Profile window, showing all survey lines and frequencies together. Profile is a primary edit window and characteristics of the individual frequencies are highlighted here—depth and outliers primarily.

All edit windows show soundings colored by frequency with a couple of exceptions:

- The Survey window which is gridded depth statistics.

- The Imagery window which in MBMAX64 is simply a ‘second opinion’ to aid depth editing.

FIGURE 2. *The Sweep window in Map View Shows R2Sonic Frequency Cycling.*

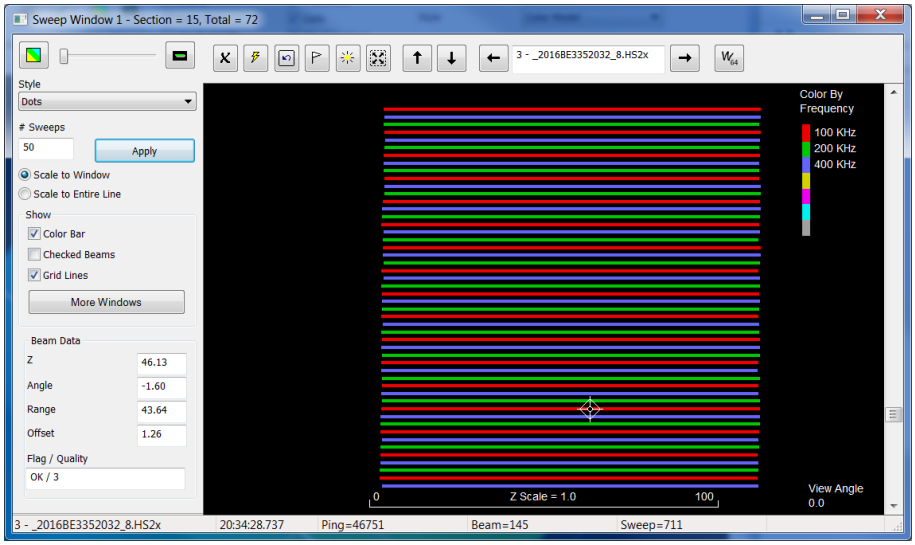
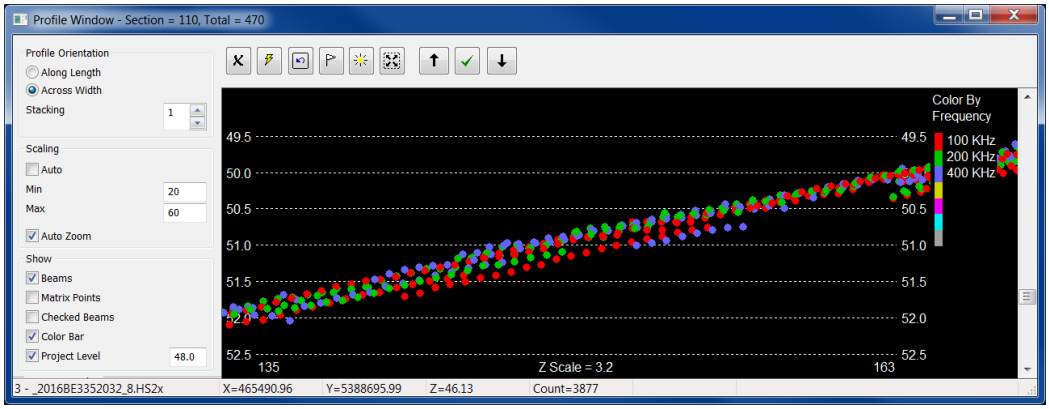


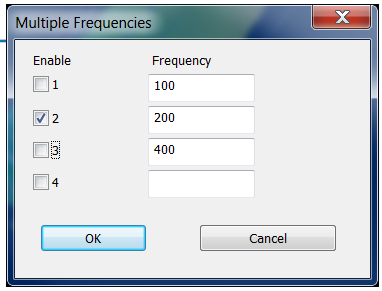
FIGURE 3. *The Profile Window Stacks All Enabled Frequencies.*



ENABLE / DISABLE FREQUENCIES

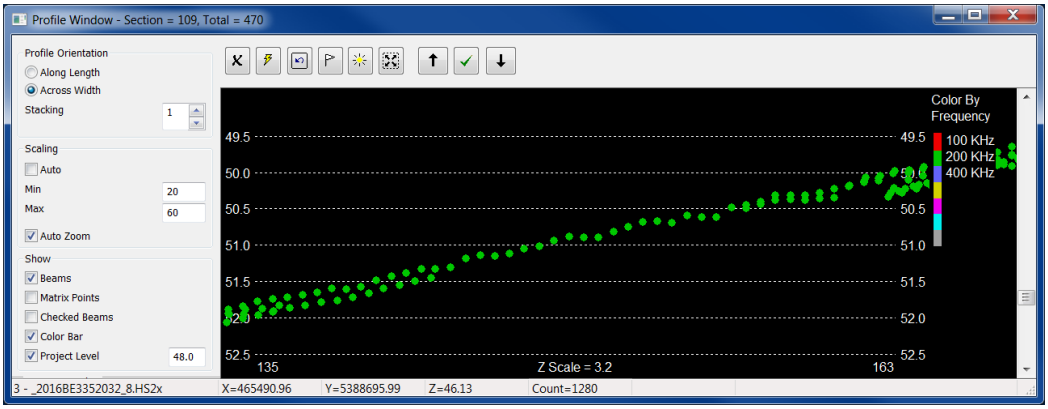
Select EDIT- MULTIPLE FREQUENCIES to access the Multiple Frequencies dialog (Figure 4).

FIGURE 4. *Simple Setup to Enable and Disable Frequencies.*



Frequencies are disabled with flagging and not actually removed from the survey, similar to MBMAX64 manual delete and automatic filter. A flag specific to frequency is used. When a frequency is disabled, soundings are flagged for frequency and disappear from the survey. When a frequency is enabled, soundings flagged for frequency are reflagged OK and rejoin the survey.

FIGURE 5. *Profile with only 200 KHz Enabled. Compare to figure 3.*



File Save and Reload

What gets saved depends on file format:

- **HS2x**: All frequencies are saved, with enable/disable flagging as described above.
- **HS2**: Same as HS2x in this case. (If you still use HS2 format, you should switch to HS2x.)
- **XYZ**: Only enabled frequencies are saved.

Example with TIN Volume Comparison

The sample data is a small survey: four lines, each about 1300 meters long. It's easy to edit using my favorite MBMAX64 method—In the Profile window with plentiful stacking (15), use the line tool and fast delete. With all frequencies enabled, save to HS2x for re-edit later on.

For TIN volumes, save average depths for individual frequencies to XYZ files using 3x3 meter cells. Differing angle filters are used for comparison.

NOTE: It's important to note that depth will not change with frequency over hard bottom materials. Sand, gravel, rock, etc. That's been tested and verified by R2Sonic. It's over soft, loose materials that depth change with frequency might appear.

Sample TIN volume reports comparing frequencies are shown in figures 6 and 7. From these it's easy to calculate average depth difference using volume / area.

FIGURE 6. *400 KHz (TIN 1) above 100 KHz (TIN 2).*

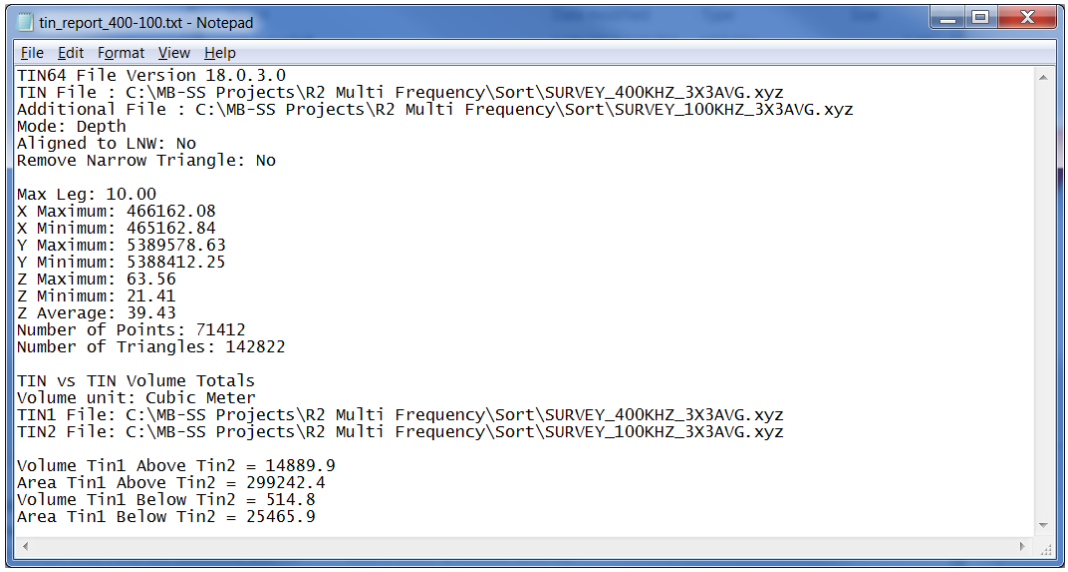
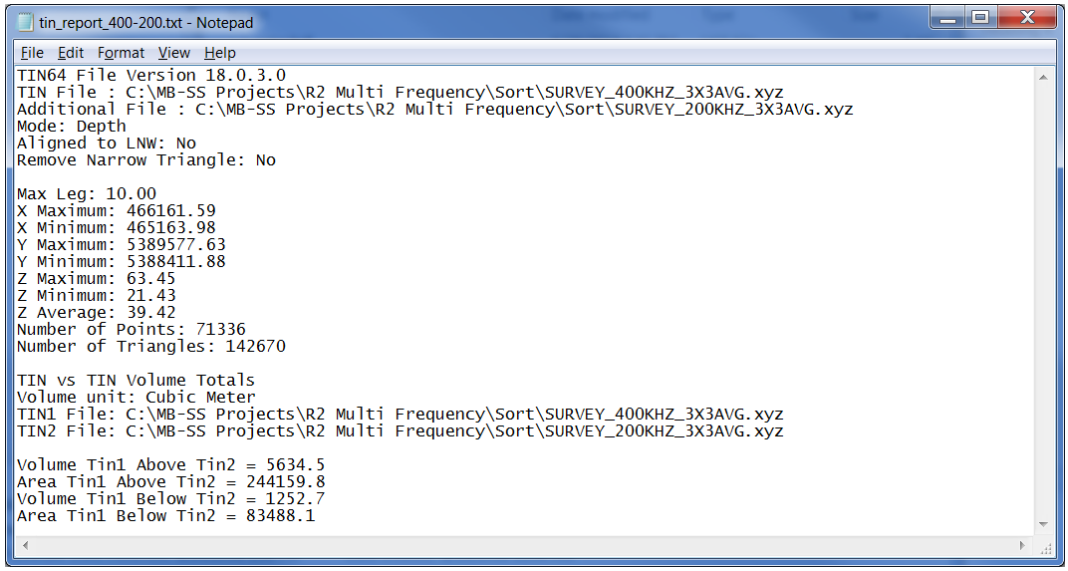


FIGURE 7. *400 KHz (TIN 1) above 200 KHz (TIN 2).*



Regardless of filtering, the 400 KHz is shoalest, 100 KHz deepest and 200 KHz in the middle.

SUMMARY

MBMAX64 now supports R2Sonic multi-frequency depth data, with color-coding and frequency enable / disable capabilities.

Volume comparison between frequencies shows what can be done with MBMAX64 / HYPACK® TIN MODEL and the R2Sonic multifrequency sonar.