New Features Coming to Sub-bottom Acquisition

By Dave Maddock

I managed escaped the frozen tundra of Connecticut and visit the good folks at Marine GeoSolutions in sunny Durban, South Africa for a week in February. They were kind enough to give me some boat time and guidance in further developing the HYPACK® driver for analog sub-bottom acquisition. The updates, which will be available in a forthcoming service pack, include new bottom tracking and TVG algorithms, support for 2 simultaneous analog sub-bottom profilers, and improved gain control of the A/D converter to maximize the quality of digitization.

BOTTOM TRACKING

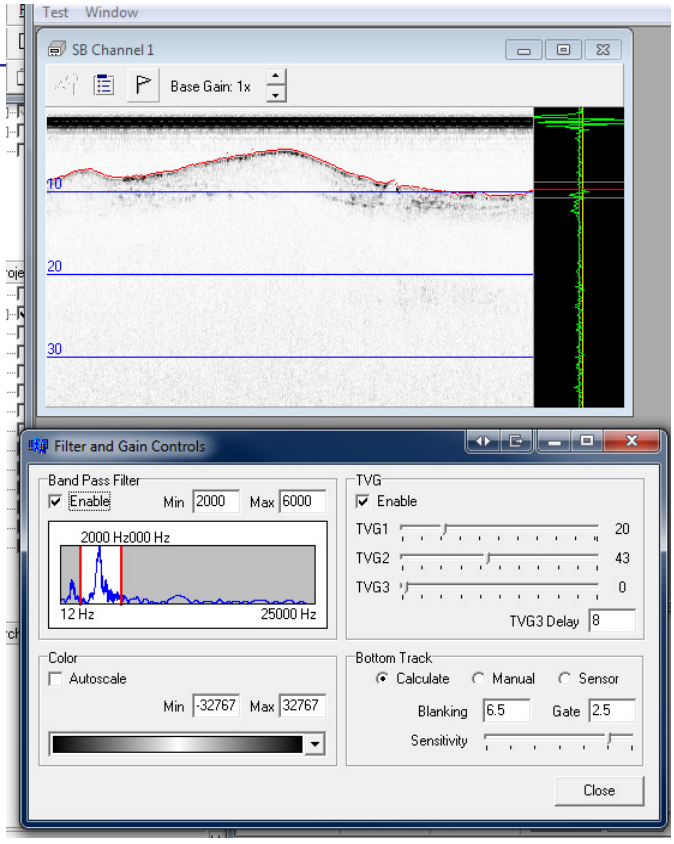

FIGURE 1. *Bottom Tracking in the Sub-bottom Profiler*

The new bottom tracking algorithm can be used for any profiler, analog or digital. By default, the driver will accept the depth as reported by the profiler (aka. 'Sensor' Mode). 'Manual', as expected, will set the depth to a level you specify. 'Calculate' will detect the bottom from the observed signal. You specify a blanking, gate, and sensitivity. Anything before the specified blanking time will be ignored and should be set to at least ignore the bang pulse. As data comes in, the gate follows along the detected depth and the algorithm looks within it for the observed signal to break the yellow threshold level.

On the voltage trace display, the sensitivity level is drawn as a yellow line, the gate high and low levels are gray, and the detected depth as red. At any point you can click on the voltage trace and the bottom track will jump to that point. This is helpful to 'seed' the algorithm when the driver first starts, or if it loses its lock on the bottom.

The bottom track depth is reported to HYPACK® SURVEY for display and logging and is also logged in the SEG/Y file.

BASE GAIN

In order to get the best imagery possible from analog profilers, it is imperative that the National Instruments A/D converter is configured with min/max voltage levels as close to the observed voltage peak from your profiler. Typically, this is either the peak of the bang pulse, the peak of the first bottom return, or somewhere in between. This optimal setting insures that you are getting the best resolution you can from the analog-to-digital conversion process.

In earlier versions, you were limited to digitizing +/-5V. A new 'Base Gain' setting allows you to dial in the voltage range from +/- 10 to +/- 0.25, which to the eye works as a base gain. Note that it is critical that the base gain is not set so high that it clips your data! (It's okay if you clip the bang pulse somewhat.)

TVG

Three Time Varied Gain (TVG) windows can be specified to improve the displayed imagery. In each, the amount of gain applied to the signal increases with time and is in dB units over 1 second. For example, in Figure 1, TVG1 is set to 20; this means that the TVG curve is configured so the sample 500 milliseconds down the signal trace will be amplified 10dBs, 1 second down by 20dBs, and so on.

TVG1 begins at the start of the signal. Don't overdo this one as it will amplify the bang pulse and water column noise in addition to everything else. Sliding TVG1 all the way to the left will set it to 'B' (for blanking). This mode will hide water column data on the display.

The **TVG2** window begins at the bottom detect. It is the most useful since you can increase the gain of the imagery of the sediments without affecting the water column noise. Of course, for TVG2 to work correctly it is important that the bottom tracking be accurate.

Finally, for deep surveys you can set a **third TVG** curve to begin at a specified time in milliseconds.

TWO ANALOG PROFILERS

Lastly, the subbot.dll driver has been updated to allow 2 channels of sub-bottom data to be acquired simultaneously, such as a pinger and a boomer. Currently, this mode will only passively listen for two trigger signals, it will not create them. Each channel has an independent display and logs to independent SEGY files.

To enable the second analog channel, just add a second instance of subbot.dll to your HYPACK HARDWARE configuration and check the 'Channel 2' box on the setup form.

Figure 1 shows some pinger data. Here is a look at some boomer data logged with this 2-channel method:

FIGURE 2. *2-Channel Data*