



Laser Development Testing

By Dave Maddock

Recently, I spent a few mid-April days in Louisiana with Chustz Surveying testing the latest laser acquisition code in HYSWEEP®. In the past, Chustz had helped us test the initial RIEGL 2D laser driver and the simultaneous bathy/laser update included in HYPACK® 2012. They are some of the longest and most experienced users of these devices in HYPACK®. The latest changes to HYSWEEP® provide a separate processing chain and logging message for the laser devices, updated acquisition windows, and updates to MBMAX64 (the 64-bit HYSWEEP® EDITOR) to read the new HSX “TOP” message.

METHODOLOGY CHANGES

The current methodology in HYSWEEP® is to treat topographic lasers essentially as up-pointing multibeam sonars—it uses the same display and logging code for both. The primary goal of the HYSWEEP® update is to process laser data separately—**with new topographic display windows and HSX logging message (TOP)—so that lasers are not subject to the 1440 per ping beam limit that multibeam sonars are. For backwards compatibility with MBMAX32 (32-bit HYSWEEP® EDITOR), a compatibility mode will allow laser data to be logged using the old message (RMB), downsampling as necessary.**

The second goal is to treat yaw offsets in a common way for all laser devices. Before the new development, each driver handled yaw offsets differently. Some required an offset change when shooting the port side of the boat, some did not. Each case is documented in the interfacing notes, but as more laser device drivers were added over time this approach became increasingly confusing and arbitrary. The new HYSWEEP® is consistent: **all lasers are logged as XYZ relative to its natural coordinate system. A yaw offset is entered in HYSWEEP® HARDWARE if the device is mounted rotated relative to the boat coordinate system (eg. -90° for port, +90° for starboard).**

VESSEL HARDWARE AND CONFIGURATION

The vessel was outfitted with a Reson 7101 multibeam and RIEGL LMS-Q120 2D laser scanner, both synced with PPS. The sonar, MRU, and laser are all mounted in a vertical column above a moon pool in the center of the vessel. Since 2012A, Chustz habitually logs simultaneous bathy and laser data with HYSWEEP® during their normal operations. During our testing, we operated in the same manner using the HYPACK® 2013 release, modified with a beta HYSWEEP® patch to test the new laser features.

DATA ACQUISITION – DAY 1

Because we were interrupting a paid survey job, we operated in the area of the river they were currently surveying. It was relatively nondescript – typical foliage-covered banks, etc. – but we did collect a scan of the *American Queen* steamboat which happened to be moored nearby.

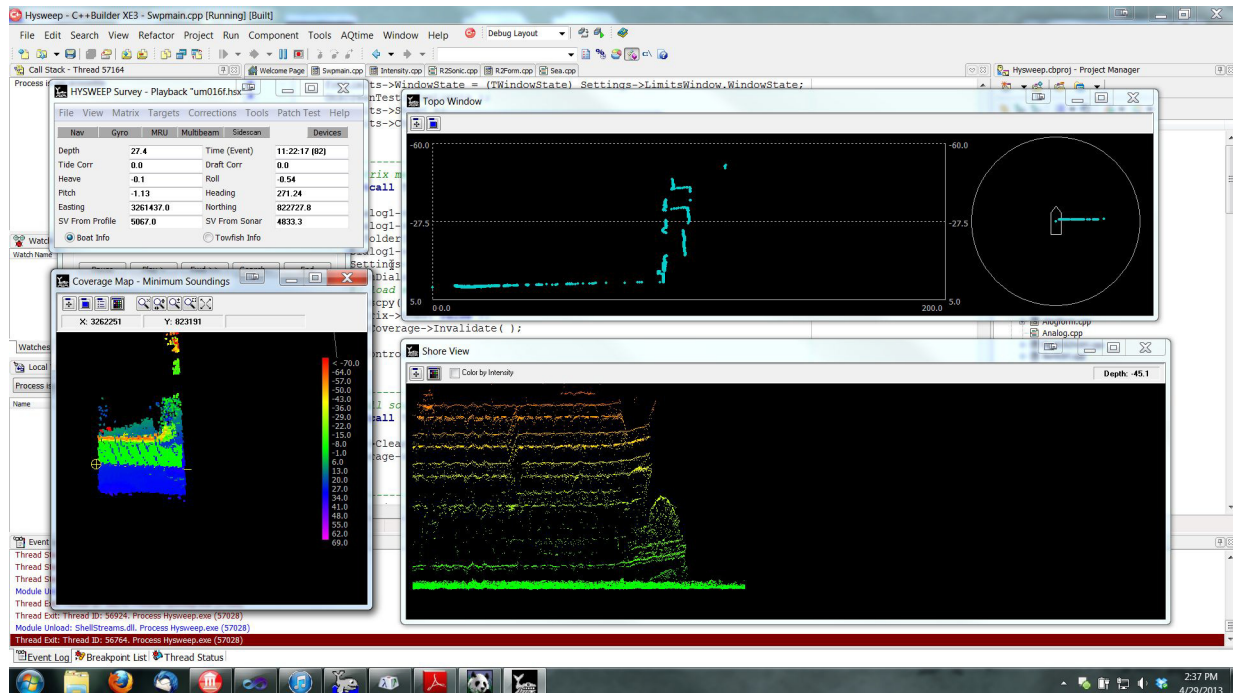
FIGURE 1.



We ran three passes along the bank: a line in 2012A for control purposes, a line in compatibility mode, and a line with the new TOP message. There were a few minor bugs to squash, but by the end of the day the new acquisition was fully functional.

One small hiccup was that when the HYPACK® HARDWARE ini was imported into our 2013 project, the PPS box sync options were not enabled. This introduced some latency into our data on day 1. (Fixed for day 2.)

FIGURE 2. A Screenshot of the Updated Acquisition Windows



New to this HYSWEEP® is the “Topo Window” which is similar to the “Beam Profile.” The Coverage Map can paint a matrix with both multibeam and the new TOP data or draw topographic coverage as “sticks.”

FIGURE 3. *Here's the American Queen From the Top*

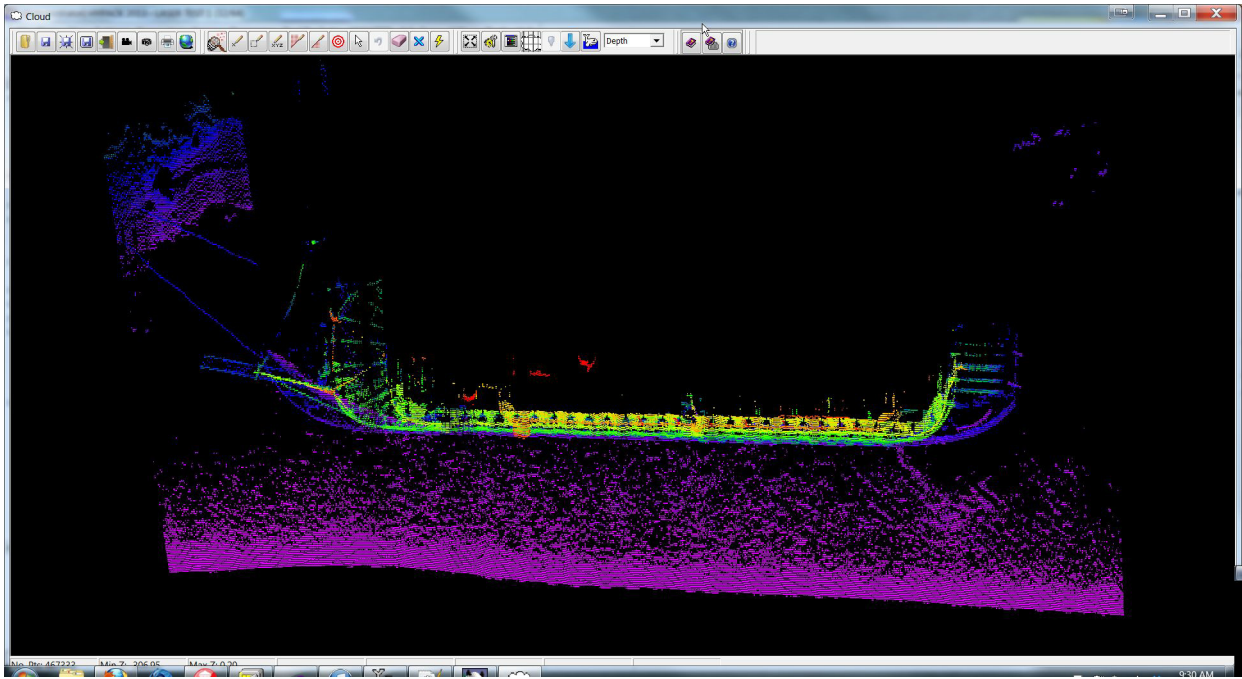
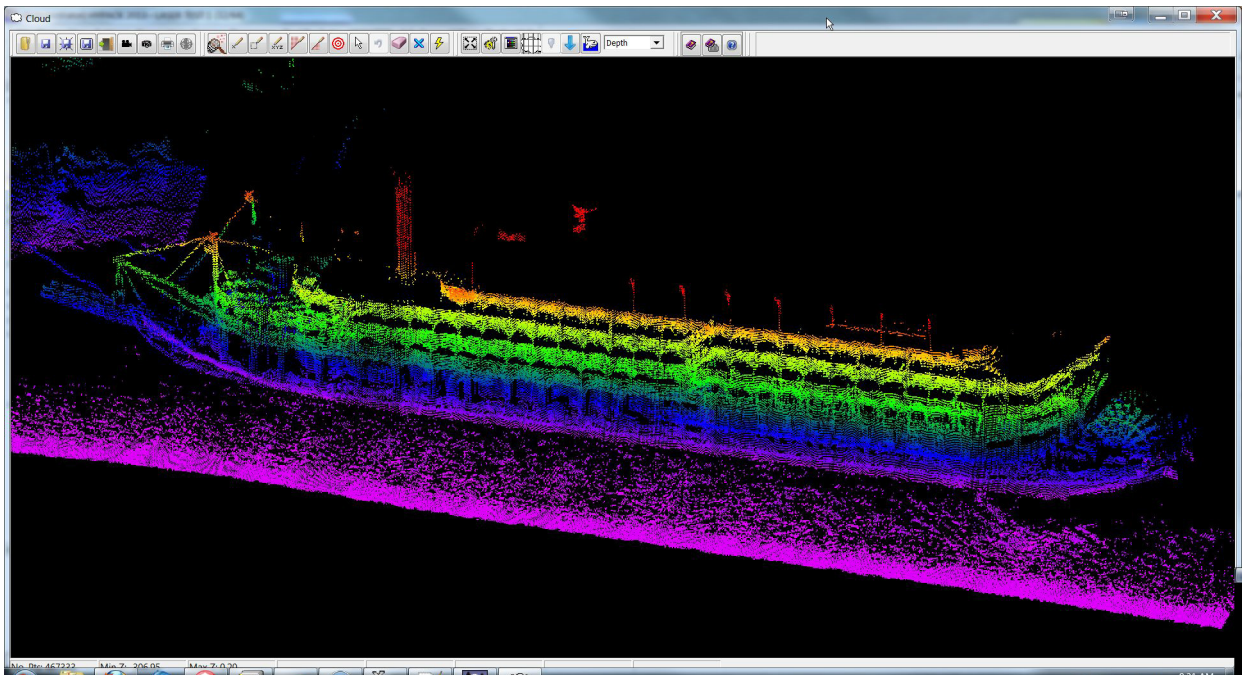


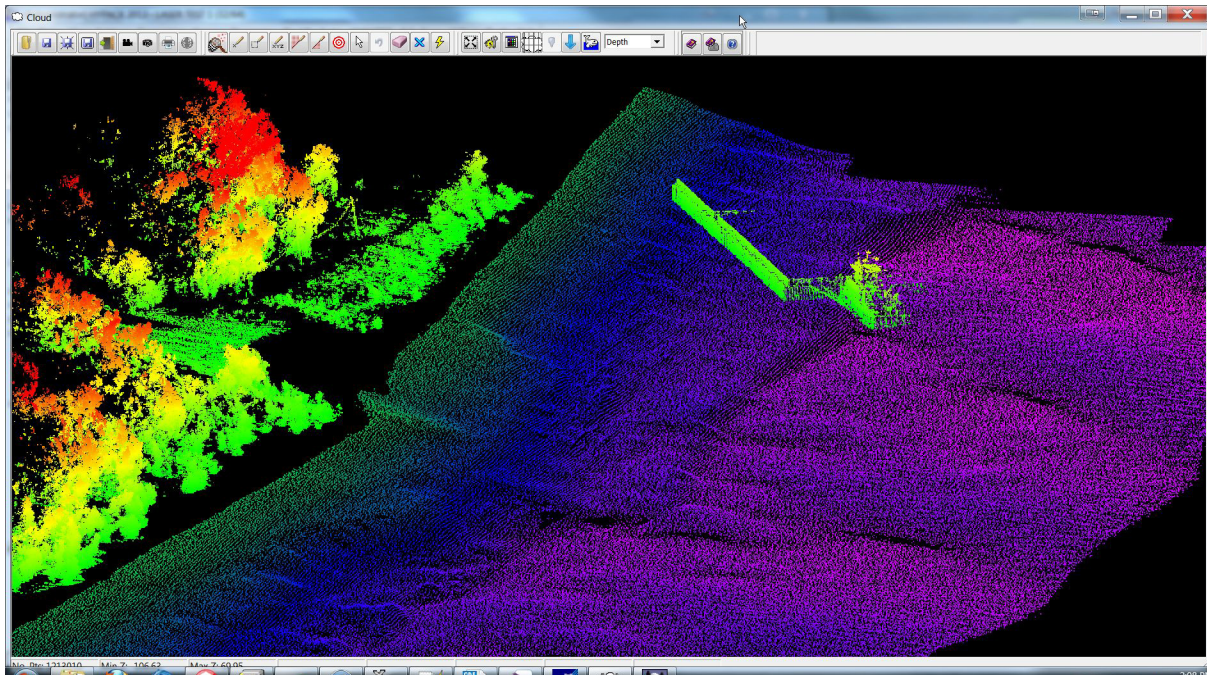
FIGURE 4. *And Again From the Side. Check out the water wheel and rigging:*



DATA ACQUISITION – DAY 2

Rain limited our ability to log laser data, but we were able to shoot the shoreline again as well as a nearby barge.

FIGURE 5. A Combination of Multibeam Bathymetry and Laser Scans From Day 2



PROCESSING

Laser data can be logged in two modes: RMB (aka. “compatibility”) mode and TOP mode. These terms refer to the kind of message used inside the HSX file when the data is logged. RMB data can be processed in 32-bit or 64-bit MBMAX; TOP data can only be processed in MBMAX64. Therefore, compatibility mode is turned on by default. The new TOP message can be enabled in FILE->LOGGING OPTIONS... in HYSWEEP®.

Look out for a HYPACK® 2013 service pack later this year which enables these new features!