# Modeling Complex Objects in 3D MESH

By Ivan Izaak

One of the nice additions to HYPACK® 2017 version was the new 3D MESH program that allows building great 3D models of the terrain. The 3D MESH program generates a surface model from XYZ data using a 3D Poisson Mesh. This method takes longer to generate than the TIN model, but it generates a more accurate representation of vertical and concave surfaces.

I want to compare the complex terrain in some of HYPACK® tools for 3D visualization such as TIN MODEL, CLOUD and finally 3D MESH.

Let's consider the wreck survey. Back in 2016, I helped Odessa Port Authority, Ukraine, to interface their Reson T20P MBE and during the sea trials we surveyed the "Sulina" wreck. "Sulina" was a Romanian military transport ship that transported troops and supplies, and was sunk by a Soviet submarine during the WW2 near Odessa back in 1942.

In Figure 1, shows a photo of the ship and the XYZ dataset from the HYPACK® survey in 2016.

FIGURE 1. *Romanian Military Transport Ship SULINA sailing off Konstanca, Romania (left), HYPACK® XYZ Dataset. Black lines show the tracks of the HYSWEEP® SURVEY. (right).*
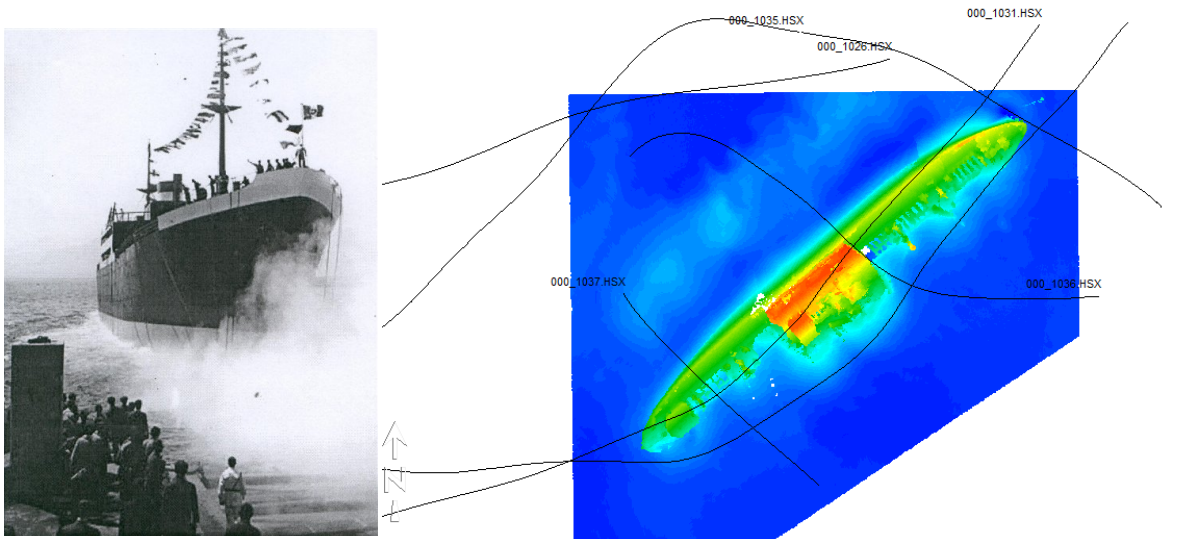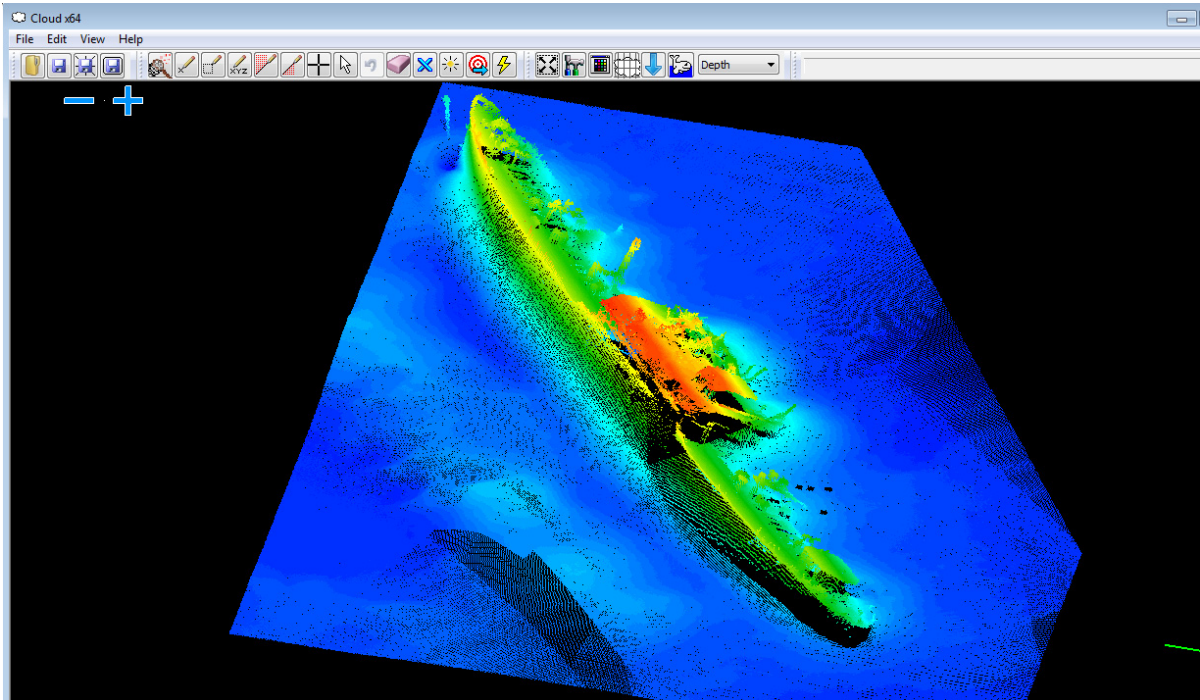
CLOUD

The CLOUD program works really fast (1156175 points were loaded in 1 second) and it is easy to work with. It also allows you to load a background file. It is not a modelling tool though since all it does is load the cloud of XYZ points, nothing more.

**FIGURE 2.** *Sulina Wreck in CLOUD*

TIN MODEL

The TIN MODEL creates an irregular triangular network, connecting the data points into triangles. The resulting model of a complicated terrain doesn't look very good (see the Figure 4).
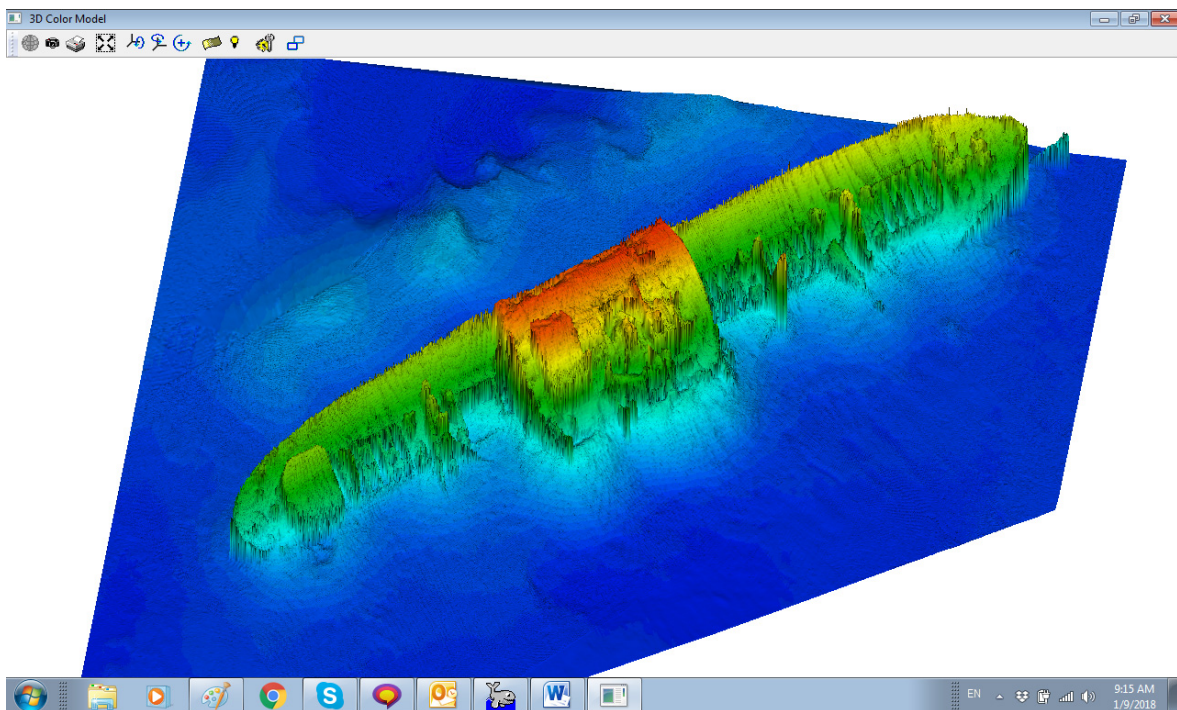
Pro:

- Quick and easy to manipulate
- Allows adding a GeoTIF overlay
- Output to GeoTIF
- Compute volumes
- Export contours

Con: The complicated model does not look great.

FIGURE 3. *TIN MODEL of the Sulina Wreck.*
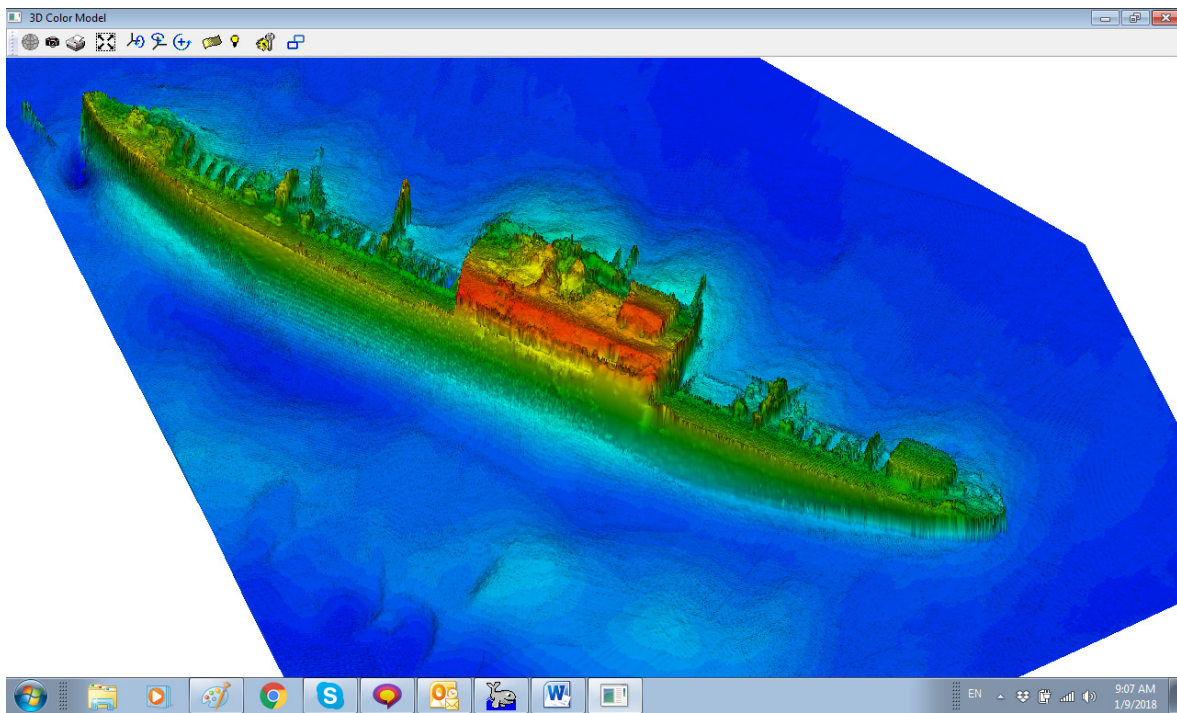
FIGURE 4. *TIN MODEL of the Sulina Wreck.*

3D MESH

Unlike the first two programs, 3D MESH requires a few more of clicks to create a model. The modelling time is increased (52 seconds for 1156175 points).

Now the pros and the cons:

Pros:

- The best model you can ever have! Check the Fig. 5 and 6 – you can even see the corridors along the main superstructure, the remnants of masts and cranes, the hatches on the main deck etc.
- You can create a constant rotation and log the video.

Cons:

- It takes longer time to build the model.
- There are some additional settings that you may need to perform.
- The manipulation is more complicated. (We're working to improve it!)
- No background
- No GeoTIF to import or export.

FIGURE 5. *3D MESH with the Sulina Model*
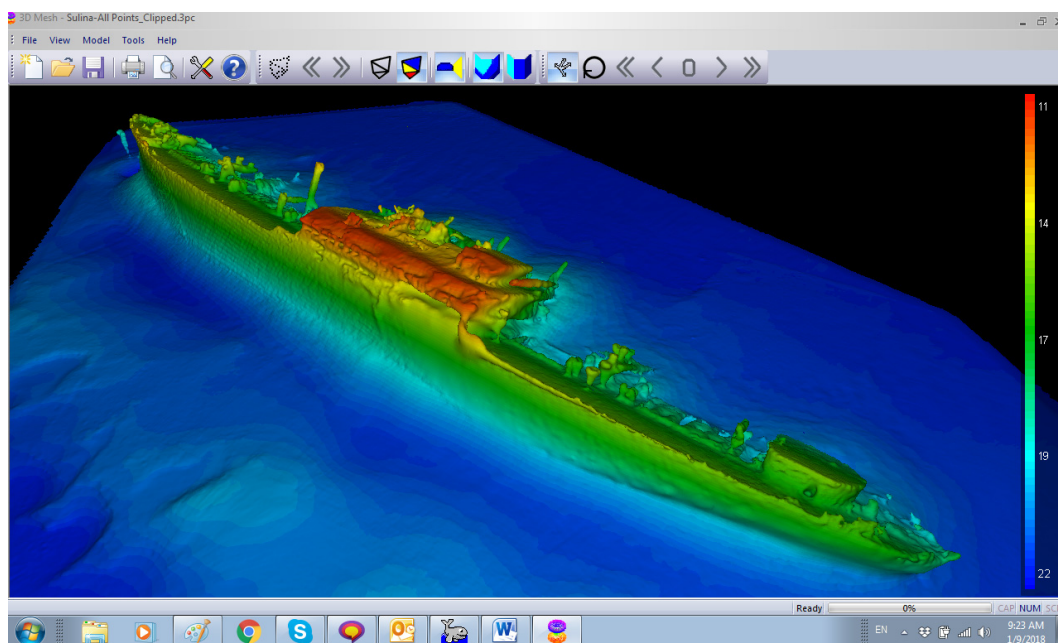
FIGURE 6. *3D MESH with the Sulina Model*