Simrad EM3002D in HYPACK®

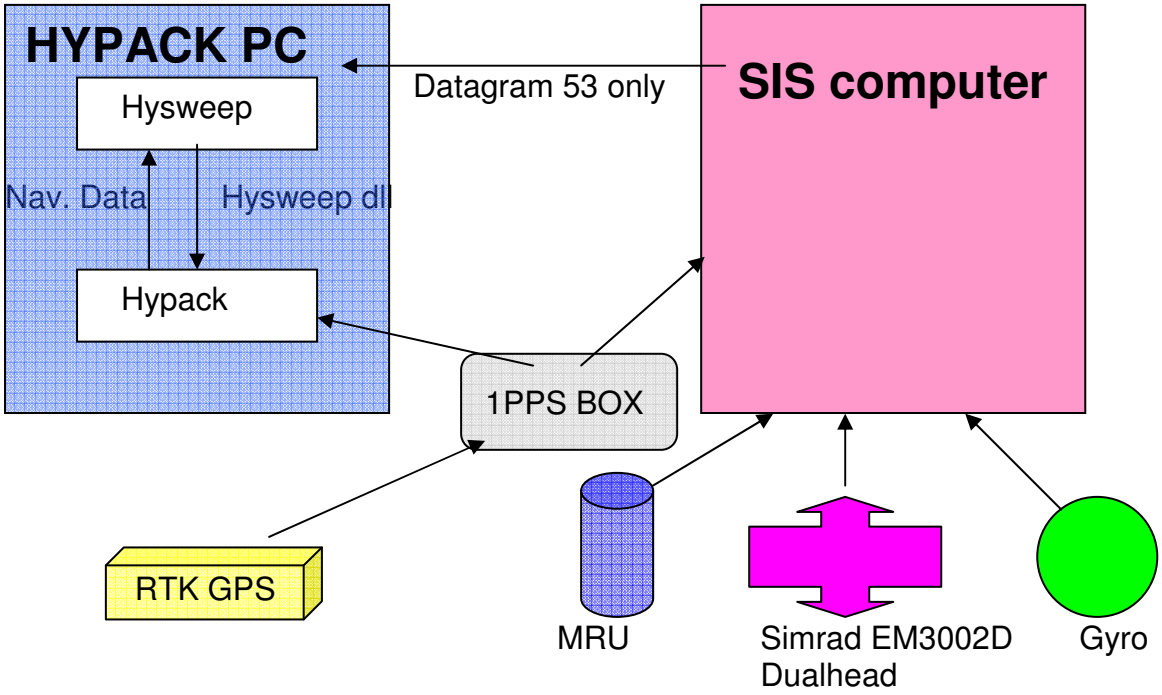
By Ivan Izaak

I recently worked with the LP Port Authority in Las Palmas, Gran Canaria, Spain to set up a Simrad EM 3002D multibeam echosounder in HYPACK® 2008. The following article describes the hardware configuration and shows some models of the resulting data.

The Simrad EM3002D is a dual head system from the Kongsberg Company. The mode of operation—equidistant or equiangular—is selected in the SIS software.

The following is a list of equipment used:

Device	Driver
MBE Simrad EM3002D	Simrad EM 3002D.dll
MRU Seatex	Set in SIS
TSS Motion Sensor type 335	Set in SIS
RTK GPS Trimble	Kinematic.dll
SVP (I've forgotten the brand)	



Simrad EM3002D Connection Scheme

The SIS software is responsible for receiving data from the Simrad 3002D and from the attitude devices (Gyro and MRU). In this software, you must set all offsets for both antennas and for the attitude devices.

The SIS software is installed on a separate PC and configured to output the following datagrams to HYPACK®:

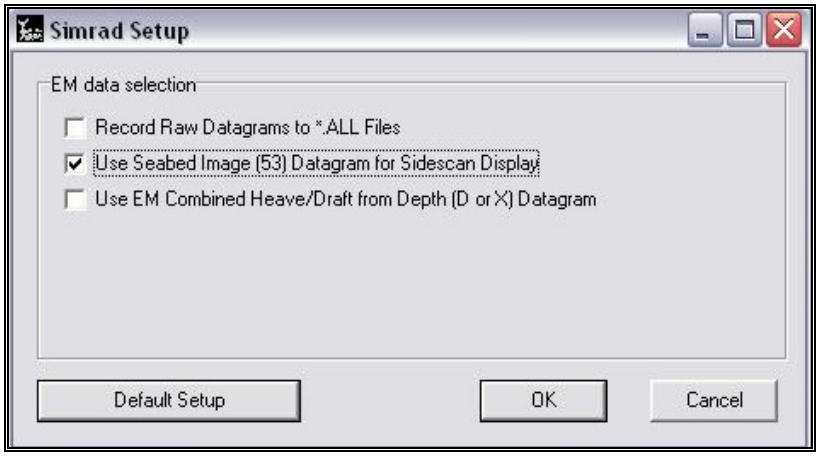
- Attitude (A),
- Depth (D),
- Sound Velocity profile (U)
- Seabed image (S).

As SIS is installed on a different PC than the HYPACK® survey computer, you must run a Kongsberg program--"Datadistrib.exe"--on the SIS PC to transfer Simrad datagrams to the HYPACK® PC over Ethernet connections.

On the HYPACK® computer, the GPS receiver is set, as usual, in Hypack Hardware using either the GPS.dll or Kinematic.dll.

In Hysweep Hardware, add only two devices: Hypack Navigation and Simrad EM3002D.

Setup Window for Simrad EM3002D Device in HYSWEEP® Hardware



The Setup options for the Simrad EM3002D are as follows:

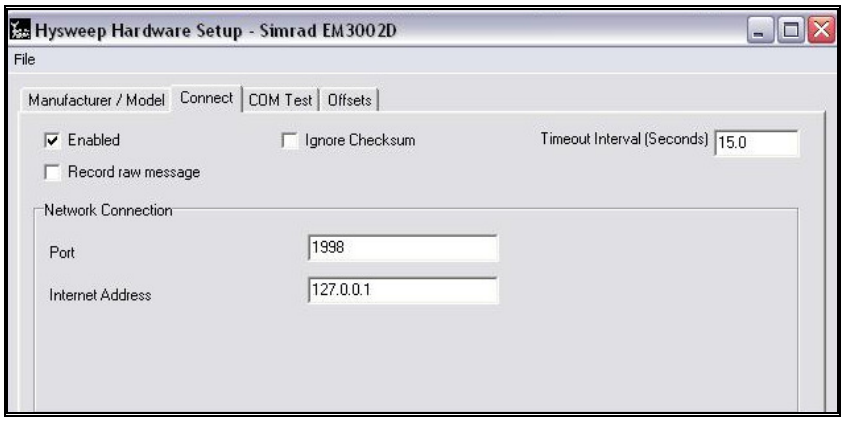
- **Record Raw Datagrams to *.ALL Files:** Applies to all EM models. When this option is selected, each received datagram is logged to an *.ALL format file.
- **Use Seabed Image (53) Datagram for Sidescan Display:** When this option is selected, the Seabed Image datagram is converted to digital sidescan which is logged and shown in the HYSWEEP waterfall display.
- **Use EM Combined Heave/Draft from Depth (D or X) Datagram:** When this option is selected, depths are corrected with the combined heave & draft field from the EM depth (D or X) datagrams. When not selected, the heave from the Attitude datagram (A) and the draft from Hysweep Hardware setup are applied.

We played with all three options. I have noticed, that when the last option is checked, there are gaps in the data in Hysweep Survey. For this reason, we preferred to enter vertical offsets for both antennas in Hysweep Hardware and those two were the only offsets entered in hardware setup.

Connection Settings:

We used the default connection settings.

Connection for Simrad EM3002D in Hysweep Hardware



Offsets

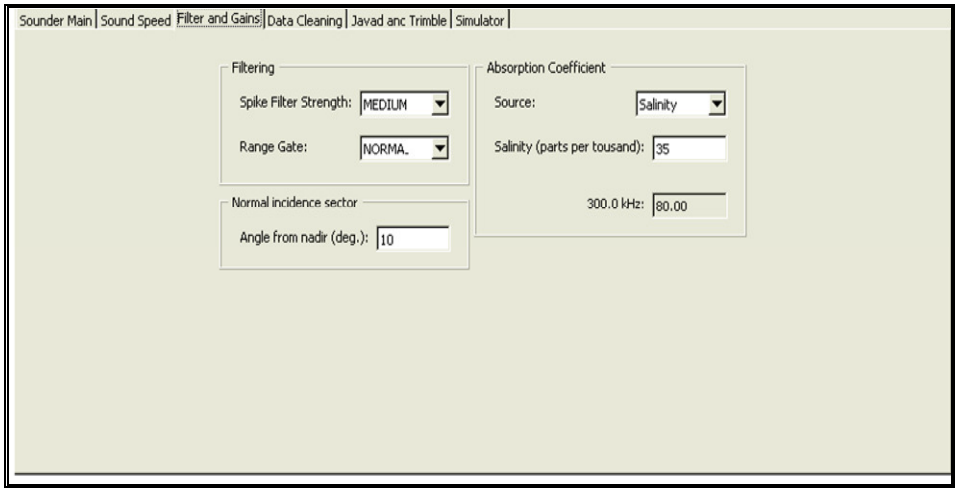
The installation of the Simrad EM 3002D was performed by Simrad personnel. They also have performed all necessary measurements of the offsets (static and rotational ones). All offset, received during the Patch Test, are entered in the SIS software, because all data coming from the SIS computer are already corrected for Heave, Pitch, Roll and Heading.

Enter static offsets (Starboard, Forward and Vertical) and Latency time for Hypack Navigation in Hysweep Hardware and, if you're not receiving "Combined Heave and Draft", also enter the vertical offset for both transducers.

Sound Velocity profile is entered in SIS software and you can't change it during post-processing in MB Max.

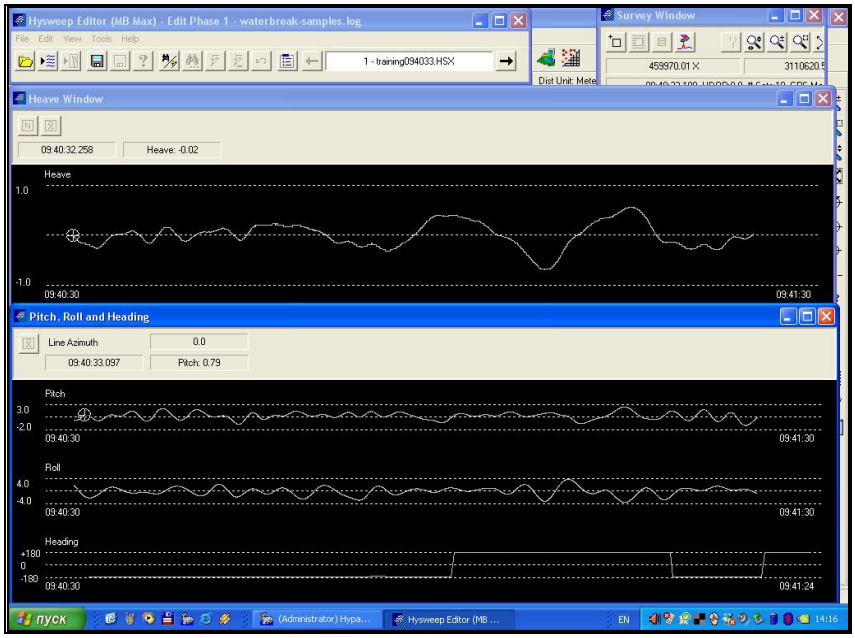
During our test we have noticed we were not able to see a vertical wall in our data because of the filter options inside SIS. If you have the same problem, set the filters as shown in the picture below:

Filters in SIS

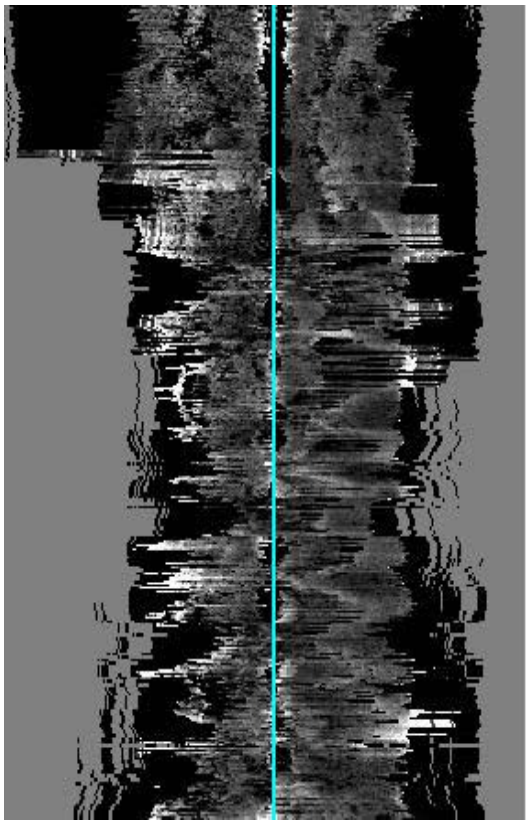


As sound velocity data are entered in SIS, we can not modify those corrections in MBMax. I would prefer to have the option to change or check your SV profile, but it is not possible at this time.

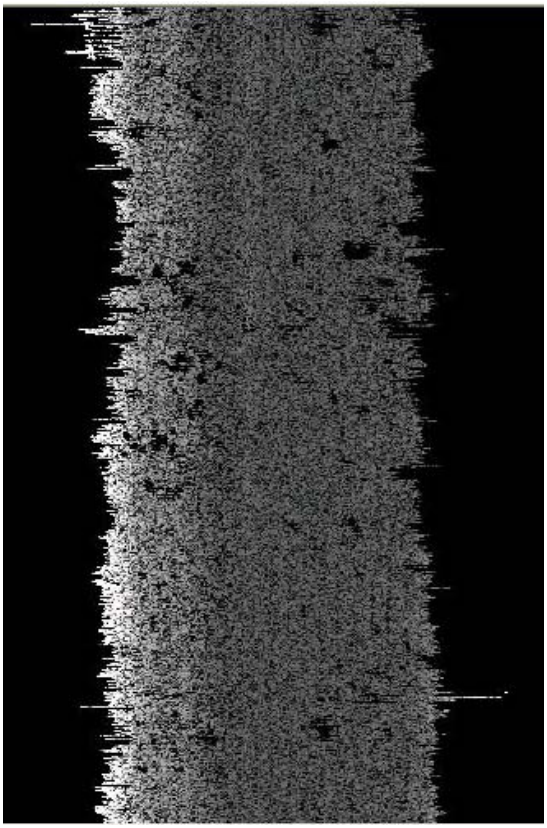
Corrections in MB Max, Phase 1



We have done a lot of testing over different types of terrain. The backscatter image quality is quite nice over a flat bottom, but not very good over obstacles.

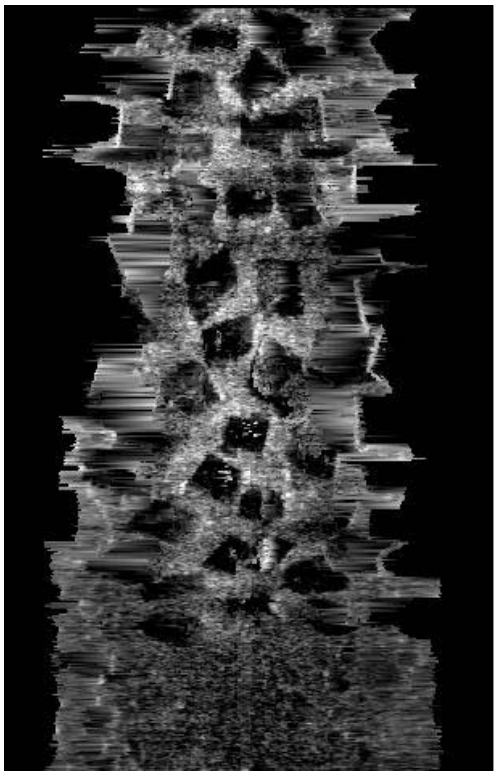


Backscatter images: Area with Blocks



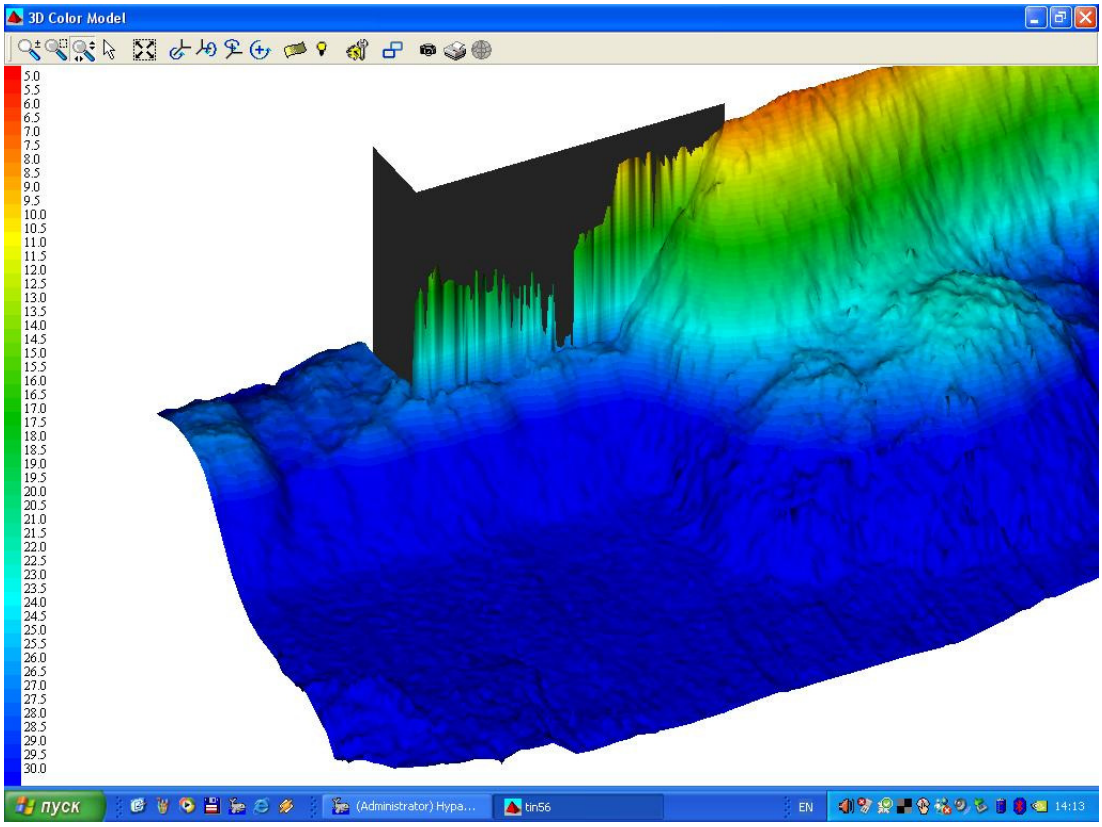
Relatively Flat Bottom

But the Simrad 3002D system sends the Intensity datagram into HYPACK®, so it can replace Backscatter data.



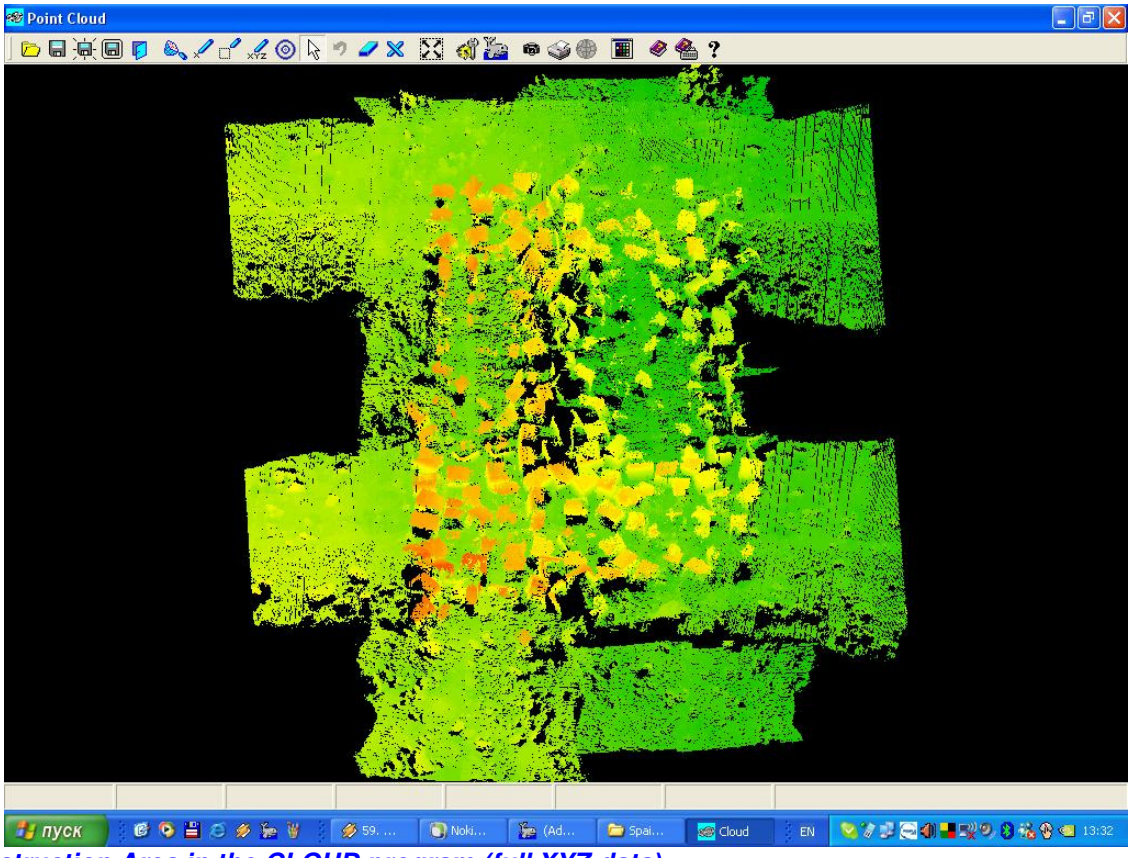
Intensity Waterfall over the blocks area

TIN Model is also a good tool with which to visualize the bottom.

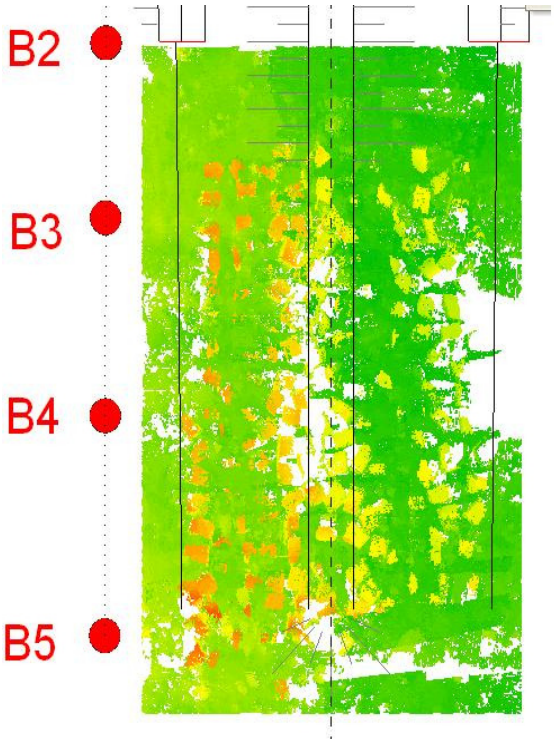


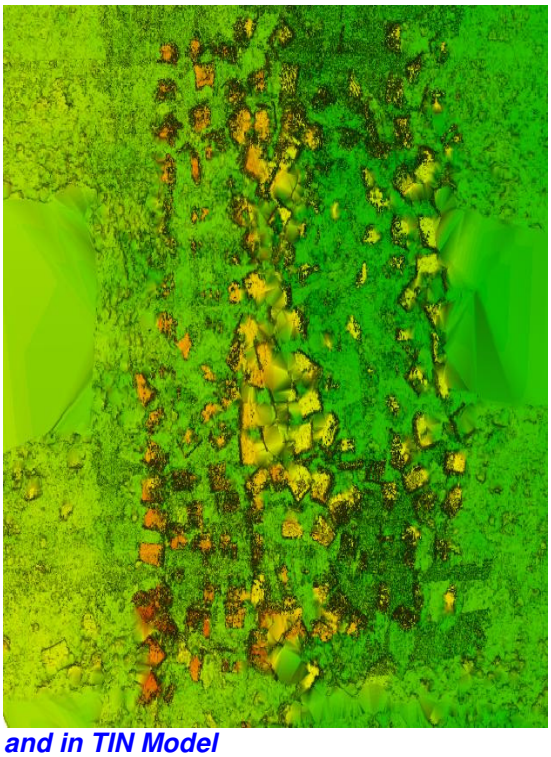
3D model, created in TIN Model, Hypack®.

But the best visualization tool is the new CLOUD program which was implemented in the HYPACK 2008 release. I've loaded processed data in XYZ format. (I did not reduce the data set.) The result is impressive.



Construction Area in the CLOUD program (full XYZ data)





GeoTIF, of the ful data set created in CLOUD ***and in TIN Model***

In my article I have used “Hysweep Interfacing” document by HYPACK® and also the data, collected in Las Palmas, Gran Canaria, Spain with Simrad EM3002D system, owned by LP Port Authority.