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Magnetometer Selection in HYPACK

by Joseph Adamski

If you are not familiar with our magnetometer driver, it is a bit unique for HYPACK in that it is a one-stop shop for over 20 different magnetometer devices (Table 1). The latest addition for HYPACK 2019 is the GEM Systems GSMP-35UC which is a potassium magnetometer specifically designed to be used with an unmanned aerial vehicle (UAV). At less than 1 kg, the magnetometer fits into the often limited payload of UAVs. With such a large selection of devices, I would like to explore the key differences between them in terms of HYPACK workflow.

TABLE 1. *Supported Magnetometers*

Geometrics 881
Geometrics 882
Marine Magnetics Seaspy
Marine Magnetics Explorer
Marine Magnetics Seaspy Horizontal Gratiometer
Scintrex Envigrad
JW Fisher Proton 4
JW Fisher Pulse 12
DF 1000
SMM II
UC MAG
Geometrics G-858 Mag Mapper
IXSEA Magis
Marine Magnetics Seaquest
GEM Systems GSM-19 Magnetometer
GEM Systems GSMP-35UC Magnetometer
Geometrics G-882TVG Cesium Mag &Transverse Gradiometer
Geometrics G-882TVG Cesium (SLAVE)
JW Fisher Proton 3 Magnetometer
Quantro Sensing Magnetometer"

RAW FILE DIFFERENCES

Some magnetometers have less output parameters than others which lead to a difference in the *.RAW file collected during surveying. Simpler devices store the Gamma as a “depth” in the raw file which can be seen as EC1 records if the file is opened in a text editor.

Devices with more than two parameters store the data as Specialized Marine Instrument records (SMI) in the data file. For instance, the Marine Magnetics Seaspy logs gamma, depth, altitude and gratiometric readings as an SMI record for each sample. Table 2 shows the devices which write SMI records and what items the user will see upon loading the file into a processing program.

TABLE 2. *SMI Record Labels*

Geometrics 882	Gamma, Altitude, Depth, Total, Gratiometric, Signal
Seaspy Standard	Gamma, Depth, Altitude, Gratiometric
Geometrics G-858 Mag Mapper	Gamma1, Gamma2, Difference
Marine Magnetics Seaspy Horizontal Gratiometer	Gamma1, Gamma2, Gradient Value, Altitude
Marine Magnetics Seaquest (3 channel)	GammaP, GammaT, GammaR, Pitch, Roll, Heading, Depth, Altitude
Insight Marine Geometrics 881	Gamma, Altitude, Depth, Total, Gratio, Gamma2
Geometrics G-882TVG Cesium Mag & Transverse Gradiometer	Gamma, Altitude, Depth, Gratio, Gamma2, Altitude2, Depth2, Gratio2, Gradiometer
Geometrics G-882TVG Cesium (SLAVE)	Gamma, Altitude, Depth, Gratio
JW Fisher Pulse 12	Fish1, Fish2, Fish3

SPECIALTY WINDOWS

Three of the magnetometers sport their own specialty windows which range from custom displays to control panels where you can interact with the device. The most robust is the Marine Magnetics Seaspy window (Figure 1) which allows you to see all output from the device in a spreadsheet along with methods to control the device. These controls include setting the cycling rate, time syncing the device, zeroing the depth sensor and turning auto-tuning on and off. Additionally, you can set altitude alarms in order to notify you if the device is in danger of hitting the bottom.

Two other devices have custom windows, Geometrics G-858 Mag Mapper and Marine Magnetics Seaquest, which are just simple data displays.

FIGURE 1. *Figure 1: Seaspy Window*