Ocean Floor Geophysics (OFG) offers the only Self Compensating Magnetometer (SCM) system that can operate with the sensor mounted inside an Autonomous Underwater Vehicle (AUV) to acquire high resolution, high quality magnetic data that is automatically compensated and corrected to remove the effects of the vehicle on the magnetic data.

Magnetic data is an essential mapping tool for geological, mineral, archeological, geotechnical, resource, and environmental applications. However, a magnetometer when installed inside an AUV, records the magnetic field of these features and is often overwhelmed by the heading- and attitude-dependent magnetic fields of the vehicle. Magnetometers can be mounted away from the AUV with specialized mounting apparatuses (e.g. a towed body or pole-mounts), but at the cost of increased complication to launch and recovery operations and risk to vehicle safety. To produce useful data from a magnetometer mounted inside the body of an AUV, it is necessary to compensate not only for the attitude of the AUV in the earth’s field, but also for secondary effects related to the strength of the electric currents flowing in the vehicle propulsion and vehicle control circuits.
OFG has solved this problem by developing the patented OFG SCM—a system containing procedures and software that correct and compensate for the internal magnetic field caused by the heading, attitude and electric current effects of the AUV.

The figure shows an example of magnetic data collected and processed by OFG on a deep sea AUV survey with the raw magnetic data (left) and the final processed residual magnetic field (right). The same processes used to generate the data shown in these plots have been integrated into the OFG SCM system. The OFG SCM system outputs the raw magnetic field readings and the corrected magnetic field in real time.

The OFG SCM system is a combination of a subsea magnetometer sensor (100 m and 6000 m depth rated), processor/data logger, mechanical calibration procedure, and proprietary software algorithm that computes a suite of correction coefficients and applies them to calculate the compensated and corrected magnetic data in real time.

**Applications**
- Geological mapping
  - Exploration
  - Geological units
  - Alteration definition
  - SMS detection
  - Geological domain and lithology definition
  - Environmental baseline surveys
  - Structural interpretation
  - 3D inversion models of susceptibility
- Geotechnical applications
  - Pipeline or cable tracking: magnetics are capable of following buried pipelines or cables where acoustic imaging becomes compromised
  - Seafloor debris
  - Anthropogenic objects
  - Archaeology
- Other applications
  - Sea floor debris
  - Anthropogenic objects
- Archaeology

**High Level Technical Feature**
- Provides a simple and robust compensation for the changing magnetic signature of the AUV that overlays the magnetic signal of interest
- Real-time recording and output of high quality compensated and corrected magnetic data (<< 20 nT to 10 nT) from magnetometer installed inside the AUV body
- No expert or knowledge of magnetic data processing is required to calculate the changing magnetic signature and compensation coefficients in order to remove the varying field of the AUV
- No knowledge of the local magnetic reference field (IGRF) is required by the sensor or the user to calculate and apply the compensation coefficients needed to remove magnetic variations
- Vehicle compensation manoeuvres can be executed near the bottom regardless of magnetic gradients near the seafloor
- Compact 100 m/6000 m depth rated DELRIN/Ti pressure vessels
  - Sensor: 2" diameter x 10.25" length including bulkhead connector
  - Processor/data logger: 3.5" diameter x 8.5" length including bulkhead connectors
- 3-axis 0.5 nT magnetometer
  - Corrected magnetic intensity for three components and total field
  - Raw magnetic intensity for three components and total field
- Simple and robust data exchange between SCM and host AUV
  - ASCII messages over Ethernet UDP/IP
  - User-configurable UDP ports
- Single standard subsea connector for power and data
- Low power consumption (12 VDC, 65 mA)
  - < 1 W sensor power draw
  - < 7 W processor/data logger power draw

1 Other depth ratings available upon request for which OFG will pressure test to Customer specifications
2 No SCM processor/data logger is required with the SCM models for Kongsberg Hugin AUVs; the SCM software runs on the Hugin payload processor. Software can be adapted to run on other client-supplied AUV payload processors upon request.
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OFC applies and adapts state-of-the-art geophysical technology beyond the traditional marine acoustic and seismic methods. We provide data acquisition and analysis services that were previously unavailable by combining our specialised expertise in subsea operations, sensor design and sensor integration with geophysical technologies beyond the scope of traditional marine geophysical surveys. Using magnetic, EM, CSEM/MT, VCS, gravity, chemical, and hydrographic sensors and systems deployed on ROVs, AUVs and deep tow systems OFG helps you acquire and interpret data in challenging subsea environments so that you can make your offshore exploration and development decisions with more confidence.

Since its inception OFG has consistently invented, adapted, deployed and operated marine geophysical systems to provide new perspectives of our client’s projects. We provide you with tools to help you make better decisions and lower your exploration and development risk.