

TOTAL FIELD MAP ← → ANALYTIC SIGNAL MAP

BOB

Magnetometer Survey Planning, Data Acquisition & Visualization Software

Features

Intuitive Assisted Setup

Connect your computer, mag and GNSS through COM or USB Port guided by BOB's simple Setup Assistant.

Mag Monitoring and Control

BOB monitors your connection and mag status, alerting you to signal strength, sample rate, synch, depth, altitude (above the seabed). Detailed diagnostic panels and terminal access facilitate troubleshooting & issue resolution.

(Fully) Review Plot in Time and Space

Magnetic field data rescales based on your level of magnification.

The interactive Survey Overview gives you instant access to any part of your survey.

Live Layback Correction

BOB calculates mag Layback in real-time to pin-point the mag's position even when making turns.

Data Portability

BOB's (robust, stable, secure & flexible) MS SQL database technology lets you:

- Store and move between multiple surveys naturally.
- Say goodbye to loose files. BOB automatically packs survey settings, setup parameters, and collected data.
- Annotate, export, archive and restore files.

And you can copy incoming mag and position data to an additional data-logging computer through a COM port.

Latest Features

Added Survey Type: AUV + Explorer

Import and process mag data from AUV surveys.

Enhanced Survey Planning

Create, save and import Guide Grids for future survey planning.

NavAssist

Take the pain out of planning surveys and accurately piloting your vessel with BOB's Guide Grid tool and Navigation Assistance.

BOB Analysis Module (BAM)

The new BAM add-on puts the ability to make Analytic Signal Maps quickly and intuitively in the hands of experts and amateurs alike.

BOB Workflow

1. Plan 2. Collect 3. Clean

1. Plan Your Survey

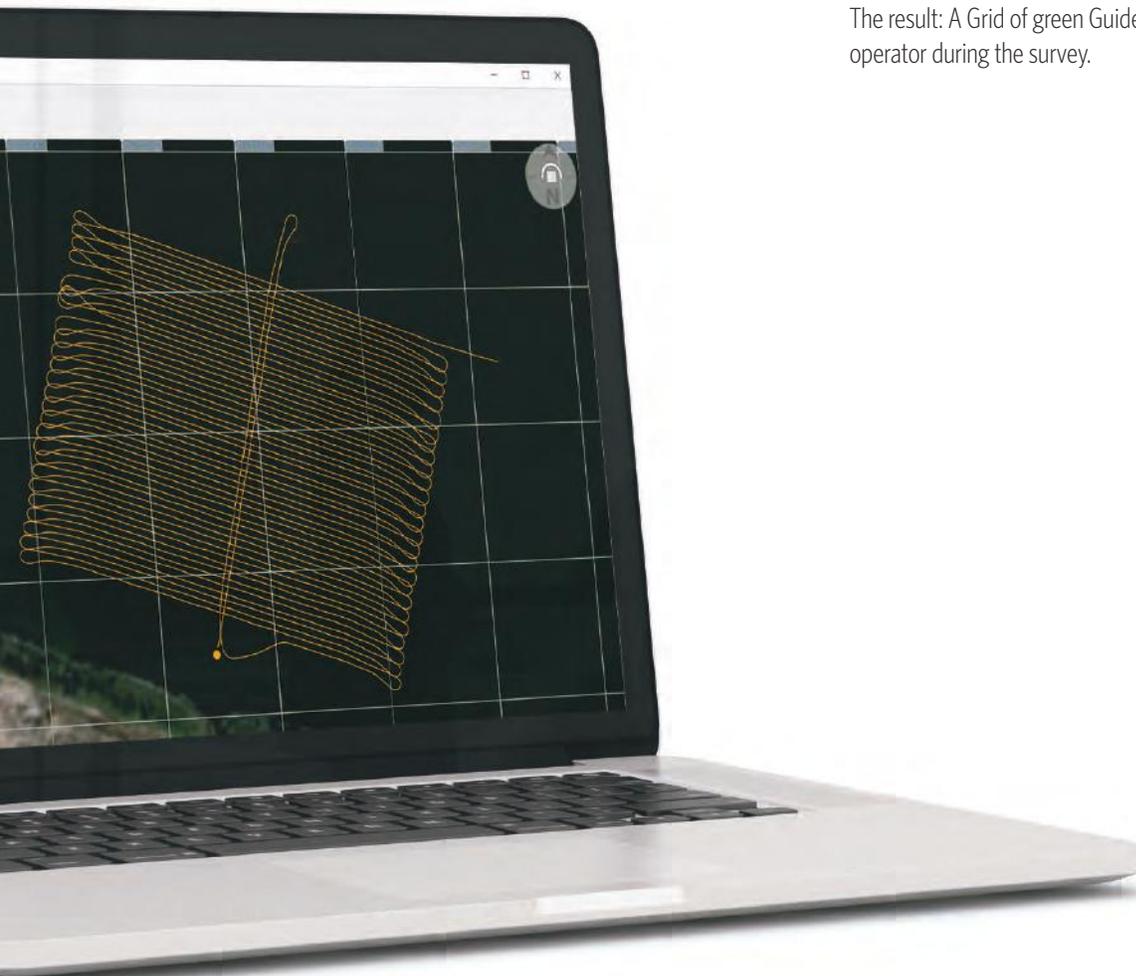
Specify Survey Parameters



Specify area and Guide Lines by defining the:

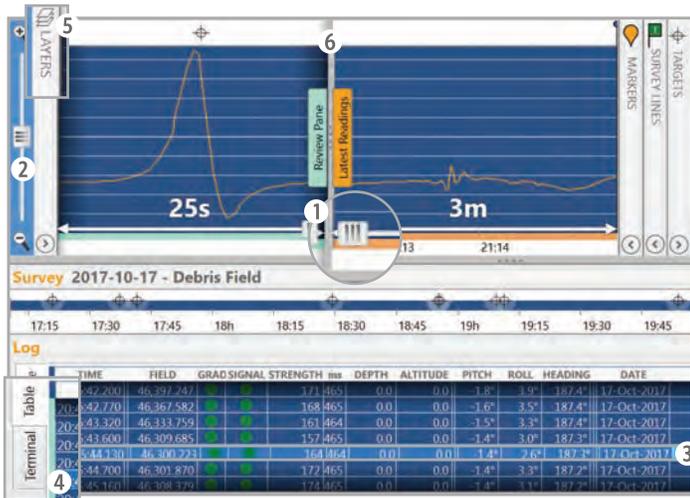
- Location of your Grid (1)
- Number of Survey Lines (2)
- Line spacing (3)
- Cross/tie lines (if needed) (4)
- Angle/bearing of the lines, if not North-South (5)

The result: A Grid of green Guide Lines NavAssist uses to guide the boat operator during the survey.



2. Collect Magnetometer Data

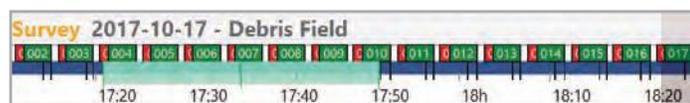
Plot, Record and View Data



Sensor readings plot as you survey.

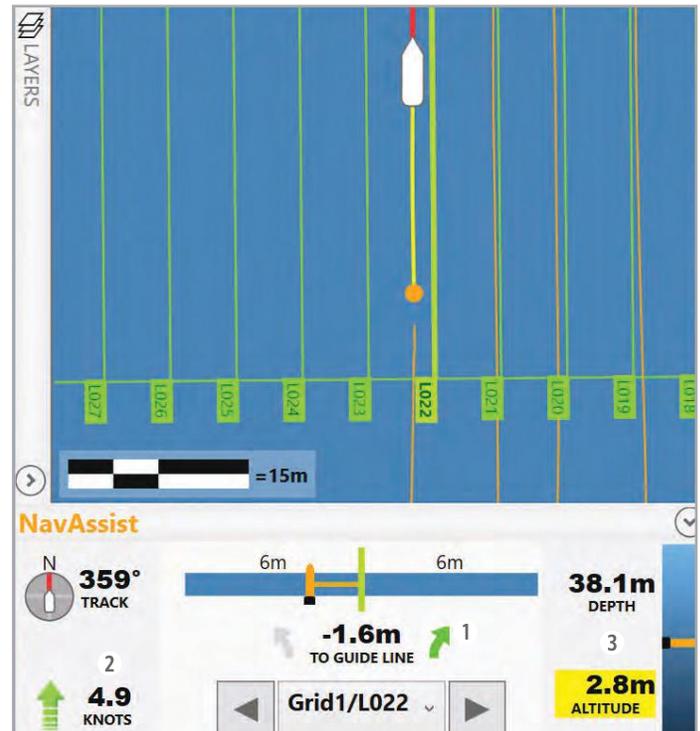
- Scale X (1) and Y (2) axes to find the patterns.
- Shift individual traces up and down for comparison.
- Move the cursor in the Plot to see readings highlighted (3) in the Log Table below.
- Terminal Tab (4): See and send raw communication directly to the mag (if you know the codes).
- Layers Panel (5): Select which sensor's data to display.
- Review Pane: Drag the Review/Real-Time Splitter Bar (6) to inspect data collected earlier while monitoring real-time data.

Zoom and Scroll Through the Survey Timeline



Navigate easily; the Survey Timeline lets you know what part of the survey you're viewing at-a-glance.

Geo Plot



The Geographic Plot shows paths of the GNSS/vessel and the towfish on a coordinate grid, as Latitude/Longitude format or in UTM projection with WGS84 datum. See the precise location of your readings, Markers and Survey Lines.

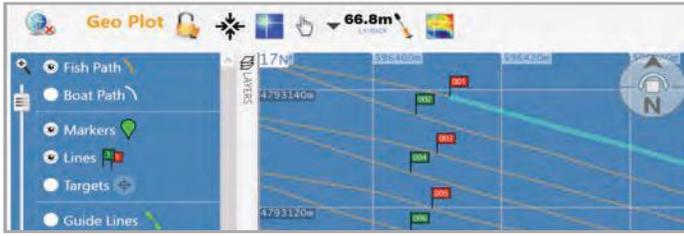
- Click on the mag's path to see the data at that location.
- See and edit Markers & Survey Lines directly on the map.
- Set background chart or map by importing geo-referenced images in GeoTiff format.
- 10Hz GNSS support provides unprecedented accuracy.
- BOB automatically interpolates between GNSS and mag sampling rates and tags readings with geographic coordinates.
- See NMEA GNSS information on-screen in real-time. This data is stored independently from the magnetometer data stream.

BOB's NavAssist feature presents useful survey parameters to the vessel navigator during the survey in a panel on the Geo Plot window, including:

- Distance from the current Guide Line (1)
- Vessel bearing and speed (2)
- Magnetometer depth and altitude in the water column (3)

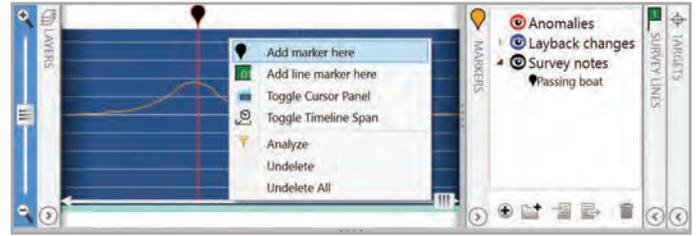
3. Clean Your Data

Create and Edit Survey Lines



- Mark your Survey Lines on the Geo Plot on-the-fly by dragging your mouse.
- Fine-tune the location of the Flags any time.
- Select a line to see the Plot one line at a time.
- Plan your survey by placing single Guide Lines or a Grid that includes ties spaced at regular intervals.

Create and Edit Markers

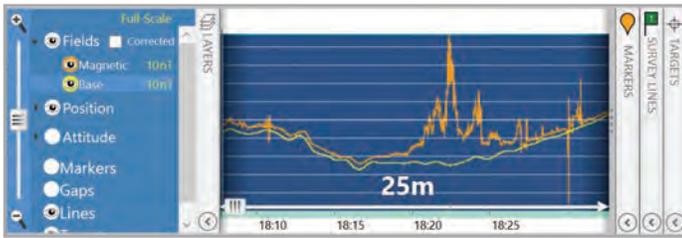


- Place Markers on the Profile Plot or Geo Plot in real-time.
- Color-code and group marked features.
- Place and move Markers any time.
- Place Markers automatically if your GNSS emits NMEA GPEVT sentences.
- Click on a Marker in the Geo Plot to jump to its information in the Mag Plot.

Below: Marine archaeologists Melanie Damour and Dr. Christopher Horrell use BOB to search for artifacts from the lost fleet of Hernan Cortes in Mexico, in collaboration with Marine Magnetics. Photo credit: Jonathan Kingston

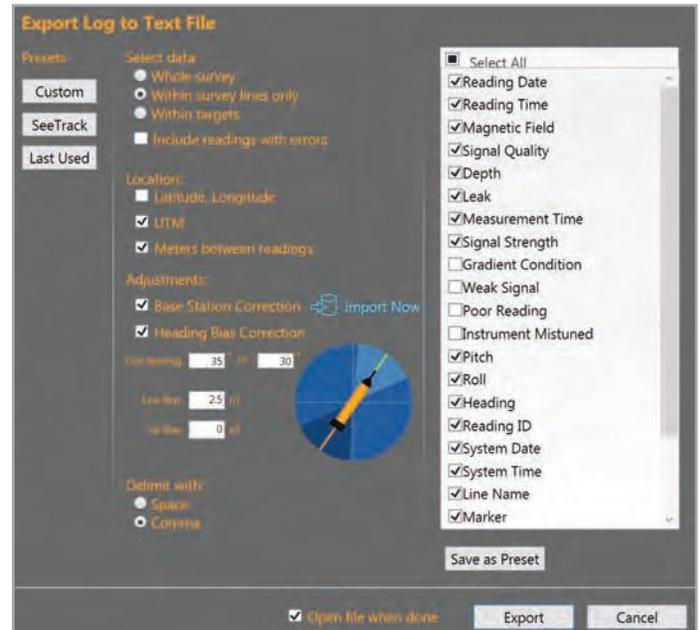


Base Station Correction



- Import data from the Sentinel or IAGA compatible data from magnetic observatories (e.g., Intermagnet.org). BOB automatically calculates the corrected data set.
- Review the Log Table or the Plot. BOB calculates the average field for comparison.
- Delete regions or individual readings safely. BOB preserves your original survey data. You can always start over without the fear of data loss or corruption.

Flexible .csv Exports



- Export your entire data set or just the lines you select to text files for other GIS systems.
- Save your favourite settings or use the SeeTrack predefined settings.

BOB Analysis Module (BAM)

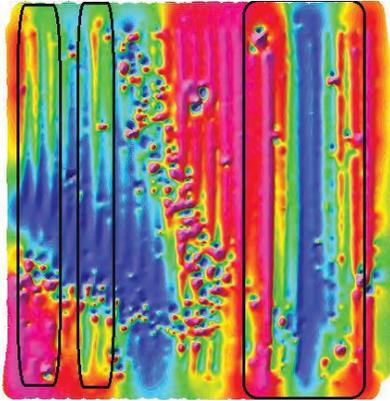
The new BAM add-on puts the ability to make Analytic Signal Maps quickly and intuitively in the hands of experts and amateurs alike.

- Dive confidently armed with a list of location targets and sizes.
- Targets: Activating BAM lets you mark targets on the map or the Profile Plot, label them, and see statistics to refine your analysis.
- Export maps as GeoTIFF. Grids can be exported numerically as Grid Exchange Format (GXF).



BAM Workflow

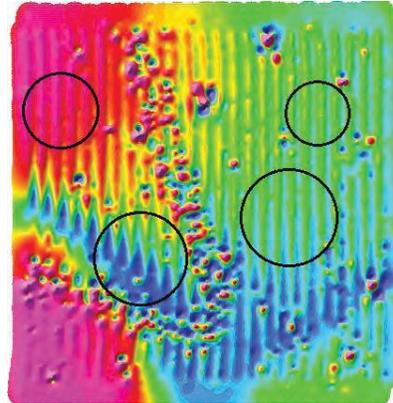
Plan, collect, and clean your survey data with BOB. Pinpoint with BAM.



1. Eliminate Diurnal Variation

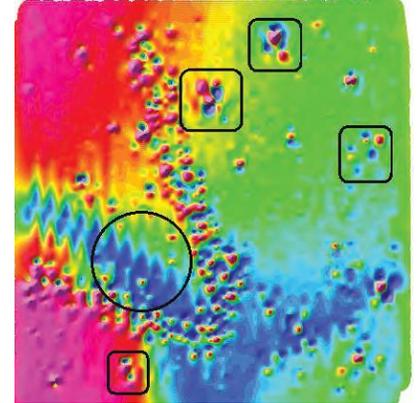
Subtle changes in Earth's magnetic field can obscure survey data or even render it unusable. Base Station Correction compensates for this effect.

Read more about 'Base Station Correction' on the previous page.



2. Correct for Heading Bias

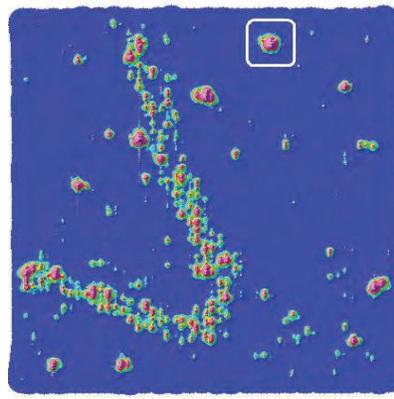
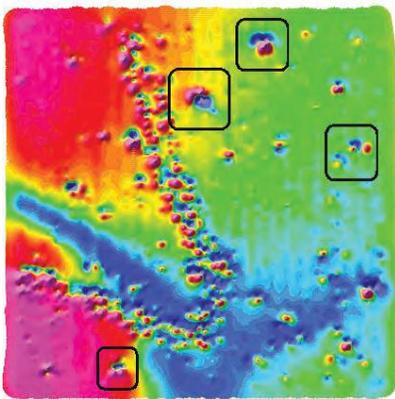
Heading Bias Correction removes 'corrugation' between lines surveyed in opposite directions. The resulting distortion, usually caused by the magnetometer being too close to the boat, is visible throughout the map.



3. Eliminate Layback (Lag)

Layback Correction eliminates alignment issues between adjacent survey lines (the jagged features highlighted with a circle).

Before Layback Correction, the anomalies (indicated in the boxes) look like multiple targets. After adjusting for Layback, the anomalies present as single targets (see #4).



4. Corrected Total Field Map Reveals Anomalies

Corrections for systematic errors applied, anomalies are evident. It's time to analyze them.

5. Transform to Analytic Signal Map

Analytic Signal Transform eliminates distracting gradual changes caused by distant geologic sources and emphasizes near-surface targets. The transformation in data display is stark (and exciting).



6. Choose Targets to Analyze

Click on anomalies to reveal basic analysis parameters and mark targets with the (cross-hair) icon.

Explorer

Mini Marine Magnetometer



3.8 kgs, Soaking Wet

Explorer is the world's smallest and lightest high sensitivity magnetometer. It's ideal for inshore, shallow water work, or offshore towed behind Side Scans, AUVs and ROVs.

One Man Operation

3.8 kgs (8.5 lbs) for the mag
6.9 kgs (15 lbs) for a 50m (164 ft) tow cable

High Sensitivity Without Export Restrictions

With 0.02 nT sensor sensitivity and 0.001 nT counter sensitivity Explorer maintains high sensitivity, without requiring an export permit.

Unmatched Absolute Accuracy

Explorer gives you consistent, repeatable data you can trust. At 0.1 nT it is orders of magnitude more accurate than all competing magnetometers.

2w Ultra Low Power Consumption

Explorer can be powered by a single car battery for up to 200 hours.

Applications

- Inshore geophysical survey
- Archaeology
- Wreck detection
- Magnetic mapping of harbours
- Ferrous target detection in lakes, rivers and estuaries
- UXO
- Underwater Archeology

Survey in Any Direction, Anywhere in the World

There are no limitations with our omnidirectional Overhauser sensors – they don't have a dead zone.*

That's why Explorer has a sleek design. You never have to rotate the sensor to try to minimize the dead zone, as you would with competing mags.

*A dead zone is an area where the mag can't take any readings.

No Heading Bias

No matter how our sensors are oriented, successive Survey Lines match up perfectly. You'll produce better quality magnetic maps and won't lose what you're looking for in mismatched Survey Lines. Heading bias is an offset in the mag data caused by changing direction with each survey line.

No Sensor Warm Up Time

Explorer works instantly on power up, regardless of the water temperature.

Maintenance-free Overhauser Sensors

Our sensors are omnidirectional, maintenance-free, and do not require realignment, or recalibration. Plus they don't contain any consumable parts, or toxic chemicals.

System Consists of:

Explorer Magnetometer Includes

- Overhauser sensor
- Electronics module with Larmour counter
- Leak detector
- Depth rating 800m (1200 psi)

Additional Components

- Power isolator
- 24V universal AC power supply or battery clip cable
- USB or RS-232 cable
- BOB data acquisition and visualization software
- Tow cable, length to be determined by customer
- A custom aluminium shipping case

Specifications

Performance

Operating Zones	Worldwide. Explorer collects accurate results regardless of how it's pointed in relation to Earth's magnetic field.
Absolute Accuracy	0.1 nT
Sensor Sensitivity	0.02 nT
Counter Sensitivity	0.001 nT
Resolution	0.001 nT
Dead Zone	NONE
Temperature Drift	NONE
Power Consumption	2 W
Range	18,000 nT to 120,000 nT
Gradient Tolerance	Over 10,000 nT/m
Sampling Range	4 Hz - 0.1 Hz
Communications	RS-232, 9600 bps
Power Supply	9-30 VDC or 100-240 VAC

Magnetometer

Length	86 cm (33.75 in)
Diameter	6 cm (2.875 in)
Weight in Air	3.8 kg (8.5 lbs)
Weight in Water	1.2 kg (2.6 lbs)

Tow Cable

Conductors	Four + Shield
Breaking Strength	2,500 kg (5,500 lbs)
Outer Diameter	1 cm (0.4 in)
Weight in Air	122 g/m (8 lb/100 ft)
Weight in Water	24 g/m (2 lb/100 ft)

"Years of survey experience have taught me that both your Explorer and SeaSPY magnetometers are the best on the market today. In the harsh conditions associated with remote sensing surveys your magnetometers have never let me down, not once."

Michael Krivor, Search Inc.

SeaQuest

3-Axis Gradiometer



The needle in a
haystack finder

SeaQuest is the ultimate magnetic target detection platform. It gives you more information, and helps you see just what you want to see.

Features

The Overhauser Effect

Marine Magnetics' SeaQuest gradiometer measures the ambient magnetic field using a specialized branch of nuclear Magnetic Resonance technology, applied specifically to hydrogen nuclei.

Highest Absolute Accuracy



SeaQuest has the best absolute accuracy of any marine gradiometer: 0.1nT.

High Sensitivity

SeaQuest sensors deliver high-resolution output with a noise level of 0.01nT; counter sensitivity is 0.001nT.

Worldwide Operation With No Restrictions



SeaQuest is entirely omnidirectional, meaning you never have to orient your sensor because it is already optimized to work around the world. As a result, regardless of where you are in the world and no matter what the magnetic field strength is, your SeaQuest sensors will continue to provide a strong signal and accurate data.

Maintenance-Free Sensors, No Realignment and No Consumable Parts

SeaQuest Overhauser sensors are entirely maintenance free and most importantly, SeaQuest's specifications do not degrade over time. As a result, SeaQuest sensors, unlike optically pumped sensors, never have to be realigned or recalibrated in order to meet the manufacturer's specifications at the time of shipping.

Stability and Durability



Accidents happen. SeaQuest's hard-anodized aluminum frame is ready for them, providing strength and rigidity while keeping weight down. Most of the frame is covered with an ultra-tough and flexible composite that forms the surface area of the wings protects the frame from impact.

All cables are contained within the pressurized sub-housings, or within the hollow free-flooded wings. This, coupled with its sleek, swept design minimizes the ability to snag foreign objects and debris. The entire structure is designed to deflect impact rather than absorb it.

The bottom-wing ballast weight keeps SeaQuest's center of gravity lower than the towing axis, keeping pitching and rolling motion to a minimum. The large surface area of the wings ensures that the platform will tow straight and smooth, even in high sea states. All this comes together to produce the highest quality data possible in a towed marine gradiometer.



SeaQuest 4 Sensor Gradiometer with Floats and GPS Integration

The four-sensor SeaQUEST provides horizontal, vertical, and longitudinal gradient measurements. A floatation sub-assembly keeps the gradiometer within metres of the water surface. An on-board GPS receiver enables the system to append a position to each measurement.

On-Board Sensors

In addition to our Overhauser sensors, accuracy is further improved by the integrated tilt sensor. The sensor continuously monitors the tiniest platform movements caused by rough seas, telling the operator exactly how 'horizontal' and 'vertical' the gradient measurements are. The echosounder/altimeter measures bathymetry with 0.1m precision, which provides a precise reference for the vertical gradient measurement, and allows continuous compensation for magnetic variation caused by igneous bedrock.

Floats

This makes deployment and retrieval very easy, as the vessel can be stopped and the tow body can be brought in by hand, with very little resistance.

The floats can be adjusted to sit more forward or aft on SeaQuest, presetting its natural pitch in the water. When the floats are forward, SeaQuest will remain at the surface at any speed. In aft positions, the SeaQuest wings act as a depressor, causing it to descend to a fixed depth at a fixed speed.

The floats are air-filled, and equipped with pressure relief valves. If the floats are damaged and leak under pressure, the valves will allow any internal pressure to dissipate slowly as SeaQuest is brought to the surface.

On-Board GPS



SeaQuest's floatation assembly can be equipped with a GPS mast. With the system configured to tow up to 1.5m below the surface, SeaQuest will position its gradiometer data with the onboard GPS, providing unmatched positioning accuracy. The GPS antenna is engineered for marine use, and is fully waterproof and submersible.

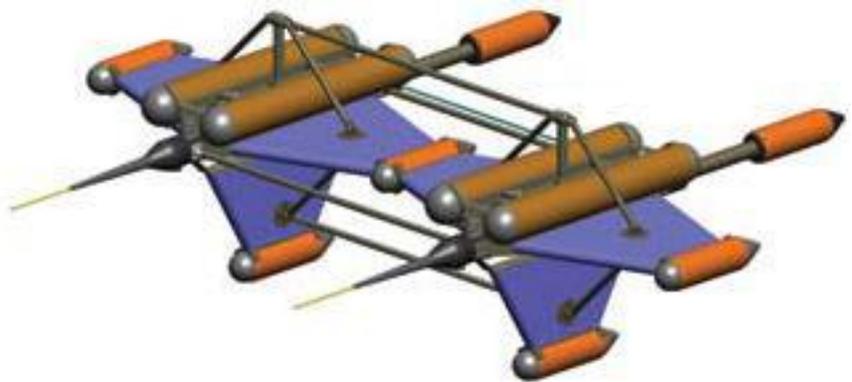
SeaQuest is Ideal For



- UXO and mine detection
- Cable and pipeline tracking
- Environmental survey
- Archaeology

I have been using a complete 2-unit SeaQuest array and have found the magnetic data delivered to be excellent, with less than one nano-tesla of variability in the total gradient (analytic signal).

Richard Funk, Geophysicist



SeaQuest 7 Sensor Array with Floats

The SeaQuest Array combines seven sensors to provide two sets of horizontal, vertical and longitudinal gradients.

Mapping Marine Ferrous Targets Using the SeaQuest Gradiometer System

The figures on the right show the results of a target survey conducted by the United States Naval Undersea Warfare Center (NUWC) - Keyport, WA. The images show the striking contrast between conventional magnetometer (total field) data and the high resolution gradient data obtainable with SeaQuest.

FIGURE 1 shows the total magnetic field data collected by the top sensor of the SeaQuest platform. This image represents data that would be obtainable by a conventional total field survey and is presented for comparison purposes. The total field image is dominated by north-south trending curvilinear anomalies, which are likely related to magnetic susceptibility variations in the bedrock. This strong background magnetic response makes it difficult to quickly identify anomalies associated with ferrous objects. Presenting the total field grid with a 'stretched' colour-scale allows identification of at least four potential ferrous targets in the western half of the survey site.

In contrast, the total gradient map (FIGURE 2) allows easy identification of at least 12 (high-confidence) ferro-magnetic objects within the survey block. The wavelengths associated with the geological magnetic effects are effectively suppressed in this image in comparison to the total field image. Targets are defined by simple 'bull's-eye type' positive anomalies, which are centered over the target position. In the western part of the survey block, a low amplitude NNW-trending linear anomaly is present. This anomaly corresponds to a known pipeline marked on the marine charts of the area. It is worth noting that the amplitude of the pipeline anomaly is less than 0.5nT/m, and yet it is clearly visible in the total gradient map.

Also of interest is the large anomaly east of the center of the map. Despite its size, the anomaly is obscured by geology in the total field data, yet it shows up prominently in the total gradient data.

It is easy to see that the total gradient (Analytic Signal) directly measured by SeaQuest provides the clearest results, effectively creating an intuitive magnetic 'image' of the sea bottom. While the single-axis gradient results enhance only certain types of anomalies based on their geographic direction, the total gradient is effectively a direction-independent result, enhancing all near-surface anomalies equally, and suppressing deep geology evenly.

Magnetic gradient is commonly used to enhance the signals from small, relatively close sources typical of iron manmade objects, and to suppress the signals from large distant sources associated with geological variation. The total gradient technique goes even further by eliminating the directional dependence of conventional gradiometer methods. This produces an easily interpreted magnetic 'image' of the sea floor, with target positions unambiguously marked by 'bull's-eye' type anomalies. Also, the total gradient anomalies are

expressed with a higher signal-to-background-noise ratio than with conventional techniques, enabling the identification of tiny targets that would otherwise be invisible.

The SeaQuest gradiometer platform enables the acquisition of high-quality total gradient data because of its hydrodynamic stability and the high absolute accuracy of its sensors, producing clean results free from heading errors and offsets. Despite high currents and demanding conditions, SeaQuest provided consistent results that did not require the filtering or level-shifting that are necessary steps, yet large sources of calculation error, for other gradiometer instruments.

For a more comprehensive discussion on the theory of total-field gradiometry see the detailed case study available for download from our website at www.marinemagnetics.com

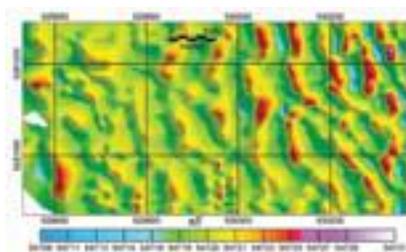


Figure 1: Total magnetic field map of the NUWC survey site. The image is dominated by North-South trending curvilinear anomalies related to buried geology. Only a few ferro-magnetic targets are identifiable. The Eastern part of the survey block is dominated by geological noise.

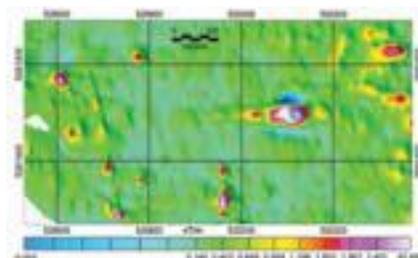


Figure 2: Total Magnetic Gradient (analytic signal) map of the NUWC survey site. The deep geological signal is eliminated, and extremely small targets can be easily resolved, including a faint linear feature in the west that was invisible in the total field data. The linear feature corresponds to a known pipeline.

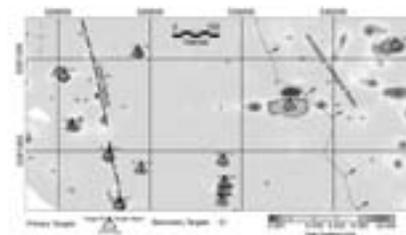
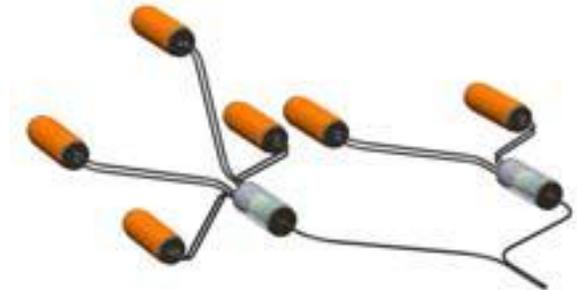
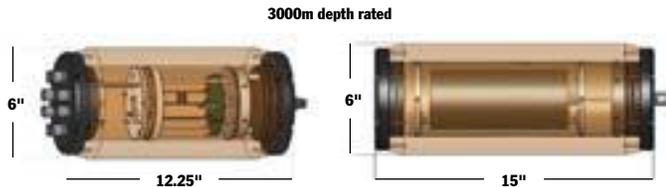


Figure 3: Interpretation of data products overlaid on grayscale total gradient map. Primary target depth estimates (see triangle symbols) obtained from Euler Deconvolution of the measured gradients. Total gradient grid values of the target position provide an estimate of the relative target.

A Gradiometer Solution for AUV & ROV Installations



SeaQuest 6 sensor gradiometer with 2 electronics modules

Electronics module

In Pressurized Housing

RATING LENGTH DIAMETER

300m	12.7"	0.5
1000m	12.75"	0.5
3000m	12.25"	0.6
6000m	12.25"	0.65

Sensor

In Pressurized Housing

RATING LENGTH DIAMETER

300m	15.5"	0.5
1000m	15.5"	0.5
3000m	15.0"	0.6
6000m	15.0"	0.65

It's expandable

Each SeaQuest is comprised of a single electronics module that can drive up to 4 sensors. Add as many SeaQuests as you need.

Auto synchronization - it just works

Multiple SeaQuests are always synchronized to each other via a sync line hardwired to each additional electronics module. Synchronization of SeaQuests is entirely seamless. You can even synchronize by sending communications from the host directly to the gradiometer.

The only gradiometer that delivers an expandable sensor array without compromise

- Worldwide operation, no dead zones
- No heading error
- Best absolute accuracy on the market 0.1nT
- 0.01nT sensitivity; 0.001nT counter sensitivity
- Ultra low power requirement
- Sensors do not degrade with time and never need calibration to meet our specs at time of shipping

Features

- Isolated inputs/outputs/RS232 no ground loops
- Auxiliary sensors include: 3D compass, tilt sensor, leak detector in E/M, pressure sensor, altimeter
- Sensor distance from another sensor: no restrictions, ie sensors can even touch
- Sensor distance from electronics module: 0.25m (10 inches) to 30m (98 feet)
- Entirely non magnetic construction. All aluminum and fiberglass
- Depth ratings available 300m, 1000m, 3000m, 6000m

Why SeaQuest?

You get more information

SeaQuest measures the gradient in all three axes simultaneously, so no matter how your heading changes no information is lost. Horizontal gradiometers, on the other hand, are limited by the fact that they can only measure the gradient in one axis (direction) at a time. When surveying with a one axis gradiometer and your heading changes by even a few degrees you are no longer measuring the same gradient.

Features at Glance

- Auxiliary sensors include: 3D compass, tilt sensor, leak detector in E/M, pressure sensor, altimeter
- Sensor distance from another sensor: no restrictions, ie sensors can even touch
- Sensor distance from electronics module: 0.25m (10") to 30m (98')
- Entirely non magnetic construction. All aluminum and fiberglass
- Depth ratings available 300m, 1000m

See what you want to see

SeaQuest suppresses geology and enhances small nearby targets, enabling you to see more of what you want to see, while suppressing what you don't want to see. Single-axis gradiometers and arrays enhance targets and geological features within the direction of their axis. Since SeaQuest measures the complete 3-dimensional gradient, it enhances signals from small targets uniformly, regardless of their geometry or position in space.

Specifications

Worldwide operation	No restrictions or dead zones
Highest absolute accuracy	0.1nT
High sensitivity	0.01nT
Resolution	0.001nT
Power consumption	2W standby, +1W persensor,+2W per altimeter
Maintenance free sensors	No realignment and no consumable parts
No heading error	Eliminates the need to level your data
No drift	A complete lack of 1/f noise providing a totally flat noise spectrum
No temperature dependence	Data accuracy does not change through a temperature range of -40C to +60C
Altimeter	0-100m range,0.1m step
Heading	3-axis magnetoresistive compass,0.1 degree step
Tilt sensor	Two-axis,0.1 degree step
Pressure sensor	300m range,0.1m step (others optional)

Marine Magnetics 

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SeaSPY2

Marine Magnetometer



Make Your Job Easier and Increase Your Accuracy

SeaSPY2 is a reliable high sensitivity magnetometer with unmatched absolute accuracy. It's the only mag that's been integrated inside an AUV and with a Glider. It's also the only longitudinal gradiometer on the market. Side Scan and ROV integrations are also available, as are horizontal transverse gradiometers.

One Man Operation

12 kgs (27 lbs) for the mag
7 kgs (15 lbs) for a 50 m (164 ft) tow cable

Proven High Sensitivity

Don't just take our word for it. We put our sensors through rigorous independent testing by a world authority belonging to INTERMAGNET - the global network of observatories, monitoring the Earth's magnetic field.

Unmatched Absolute Accuracy

At 0.1 nT SeaSPY2 is orders of magnitude more accurate than any other mag, ensuring that you always get the best possible data. Excellent accuracy characteristics and unmatched repeatability between sensors also improves the quality of gradiometer data.

No Heading Bias

No matter how our sensors are oriented, successive Survey Lines match up perfectly. You'll produce better quality magnetic maps and won't lose what you're looking for in mismatched Survey Lines. Heading bias is an offset in the mag data caused by changing direction with each survey line.

3w Power Requirement

1 car battery = 150 hours of continuous use
2 lantern batteries (26 Ah) = 104 hours of continuous use

Survey in Any Direction, Anywhere in the World

There are no limitations with our omnidirectional Overhauser sensors. They will collect good, accurate data anywhere - they don't have a dead zone. The **dead zone** is the angular region of **magnetometer** orientation in which the instrument produces poor or no measurements.

Sleek Design

Since you don't have to orient our sensors, SeaSPY2 has a sleek design that resists snags and minimizes impacts. The polyurethane coated tail with molded fins acts as a bumper, while creating a stable towing platform.

Works Instantly on Power-up

SeaSPY2 works instantly on power-up in cold, deep water without requiring warm up. Data collected at -40°C will be identical to data collected at $+60^{\circ}\text{C}$.

Innovation

Maintenance-Free Overhauser Sensors

Our sensors are omnidirectional, maintenance-free, and do not require realignment, or recalibration. Plus they don't contain any consumable parts, or toxic chemicals.

World's First Internal Magnetometer AUV Integration

We've integrated with the Iver3 and the results are incredible. Contact us for more details: info@marinemagnetics.com

Integrate with Side Scans, AUVs, ROVs and Gliders

A single tow cable is terminated with everything you need. Modifications to your mag or grad are not required.

Quick Glance Diagnostics

We added an LED to our isolation transceiver to let you know every time the mag takes a reading, if you didn't connected the system properly and if there is a short. In the case of a short, the transceiver also safely shuts down the output power in micro seconds.

If a drop of water gets inside the mag, a leak detector warning sounds providing the operator plenty of time to retrieve it and investigate the cause before the mag is damaged.

System Consists of:

SeaSPY2 Magnetometer

- Overhauser sensor
- Electronics module with Larmour counter
- Leak detector
- Depths ratings: 1000m (1500 psi), 3000m (5000 psi), 6000m (9000 psi)

Options

- Pressure sensor
- Altimeter
- Transponder
- Deck cable
- Tow cable termination kit
- Side Scan , ROV, AUV & Glider Integrations

Additional Components

- Tow cable
- Isolation transceiver
- Power supply or battery clip cable
- USB or RS232 Cable
- BOB data acquisition & visualization software
- Reusable aluminum shipping case

Specifications

Performance

Operating Zones	Worldwide. SeaSPY2 collects accurate results regardless of how it's pointed in relation to Earth's magnetic field.
Absolute Accuracy	0.1 nT
Sensor Sensitivity	0.01 nT
Counter Sensitivity	0.001 nT
Resolution	0.001 nT
Dead Zone	NONE
Heading bias	NONE
Temperature Drift	NONE
Power Consumption	1 W standby, 3 W maximum
Range	18,000 nT to 120,000 nT
Gradient Tolerance	Over 10,000 nT/m
Sampling Range	4 Hz - 0.1 Hz
Communications	RS-232, 9600 bps
Power Supply	9-30 VDC or 100-240 VAC

Magnetometer

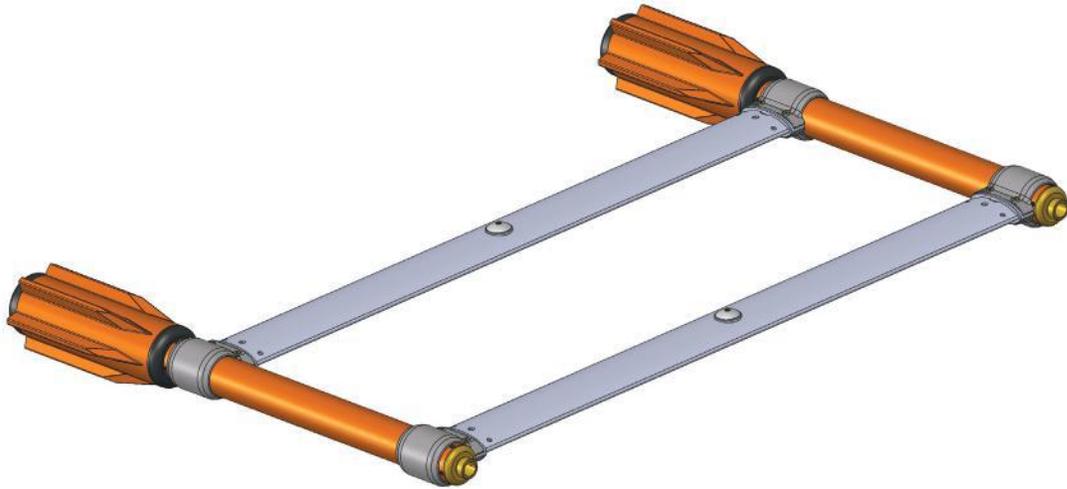
Towfish Length	119 cm (47 in)
Towfish Diameter	7.6 cm (3 in)
Towfish Weight in Air	12 kg (27 lbs)
Towfish Weight in Water	4 kg (9 lbs)

Tow Cable

Conductors	Twisted pair
Breaking Strength	2,500 kg (5,500 lbs)
Outer Diameter	1 cm (0.4 in)
Weight in Air	125 g/m (8.4 lb/100 ft)
Weight in Water	44 g/m (3 lb/100 ft)
Cable Termination	Field Replaceable

Floatation Cable

Conductors	Twisted pair
Breaking Strength	2,500 kg (5,500 lbs)
Outer Diameter	1.9 cm (0.74 in)
Weight in Air	125 g/m (0.084 lbs/ft)
Weight in Water	-20 g/m (0.03 lbs/ft)
Cable Termination	Field Replaceable



SeaSPY2 Grad

Horizontal Transverse Gradiometer v.2

Rigid frame gradiometers are best suited for short-baseline applications where relative positional accuracy is key. Each towfish can be used as a single magnetometer.

Applications

Cable/ Pipeline Survey

A horizontal transverse gradiometer can be effectively used to track cables or pipelines in real-time from relatively high towing altitudes. The addition of vertical gradiometer data allows accurate measurement of cable/ pipeline burial depth (see SeaQuest Multi Sensor Gradiometer brochure).

Detection of Small Ferrous Targets

Short-baseline gradient, whether measured in transverse or longitudinal direction, is useful for eliminating geological and diurnal interference, and providing data in real-time so that recovery efforts can be started while the survey is in progress, rather than waiting for the Total Field data to be processed.

V.2 Update

Sleeker, Stronger

Our new anodized frame is a sleeker design that reduces drag by a factor of 10. It's lighter to carry on land but actually stronger.

SeaSPY2 Grad



Longitudinal Gradiometer

Longitudinal gradiometers offer the largest variation in available baselines, from 1.5m to more than 500m. Long baselines provide superior gradient measurement sensitivity and increased detection ranges. They're also hydrodynamically stable when deployed. Each towfish can be used as a single magnetometer.

Applications

Shipwreck, Search and Salvage

Medium baseline measurement with a longitudinal gradiometer eliminates interference by geological bodies, while highlighting massive magnetic sources like steel hulls, boilers or engines. Smaller sources such as anchors or cannons will require a shorter baseline, and lower towing altitude.

Environmental Survey

Medium baseline measurement with a longitudinal gradiometer can highlight shallow magnetic sediments, while eliminating deeper geological influences. The baseline should be on the order of magnitude of the expected towing altitude.

Exploration Geophysics

Long-baseline measurement with a longitudinal gradiometer is ideal since the bodies of interest are often far from the sensor, and produce very small gradients. The baseline should be on the order of magnitude of expected depth-to-source.

Argos

Single Sensor Gradiometer



Extra Sensor Perception

Your mag survey found your anomalies. You're close. In the old days, you'd rely on luck to find your target buried somewhere below a flat, indistinguishable patch of sea floor. Or not.

Expensive multi-day searches that send surveyors home empty-handed are the norm because even a narrowed down target area can be a lot of ground to cover. Especially when some of that area is underground.

Now you can augment your efforts with the world's first handheld total-gradiometer. **Argos** is the kind of innovation that makes you wonder how you ever got by without it.

Technology

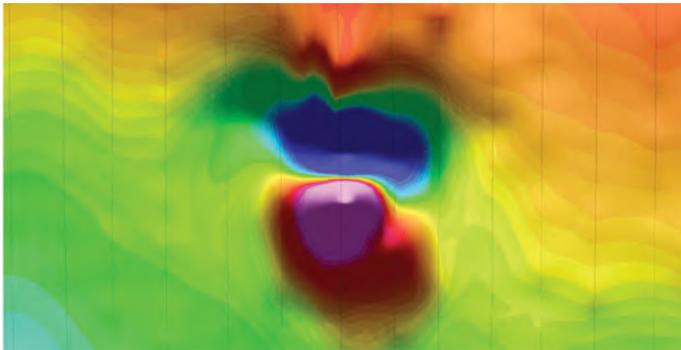
Argos measures the Analytic Signal in real-time, guiding you to the best place to dig for your target via LEDs and earpiece.

Applications

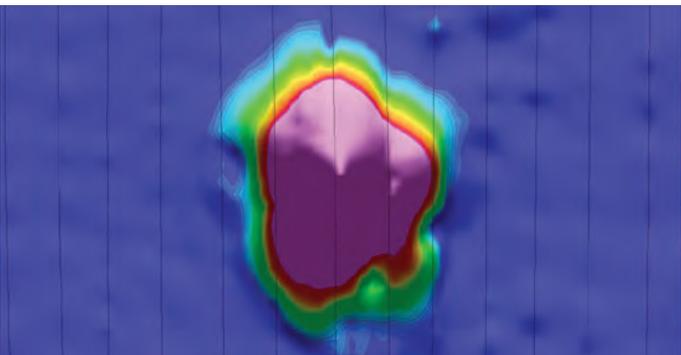
- UXO
- Underwater Archeology

Above: Dr. Christopher Horrell & Dr. Frederick Hanselmann use Argos to search for artifacts from the lost fleet of Hernan Cortes in Mexico. Photo credit: Jonathan Kingston

Argos in the Field: Anchor Discovered in 2019



Magnetic Map. Raw data collected by a boat-towed magnetometer survey captures many signals that make it hard to determine where near surface objects are located.



Gradient Map. The computed Analytic Signal or Total Gradient of the same area illustrates a clearly identified target region, but in a region several meters in diameter.



Discovery with Argos. The anchors that created the anomalies to the left were found in minutes by Argos. The anchor pictured was entirely buried; this image shows it post-excavation.

Specifications

Performance

Operating Zones	Worldwide. Argos collects accurate results regardless of how it's pointed in relation to Earth's magnetic field.
Battery Life	30 hours
Range	18,000 nT to 120,000 nT
Gradient Sensitivity	5 nT/m
Sampling Range	1 Hz - 5 Hz. The speed of feedback (pings) is proportional to how magnetic or close the target is.
Communications	RS-232, 9600 bps
Power Supply	9-30 VDC or 100-240 VAC

Argos Single-Sensor Gradiometer

Length	86.5 cm (34 in)
Diameter	7.6 cm (3 in)
Weight in Air	3.7 kg (8.2 lbs)
Weight in Water	-11 g (-0.4 oz)

Audio Interface

Length	1.5 m (59 in)
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System Consists of:

Argos Single Sensor Gradiometer

- Overhauser sensor and driving electronics
- Leak detector
- Depth rating: 100m (145 psi)

Additional Components

- Audio cable
- Battery charger
- PC interface cable
- Reusable plastic shipping case (Pelican case model 1740)

Options

- Ear muffs to minimize noise from scuba breathing
- Lightweight travel case