Blue Insight

Geomatics

Geomatics – powered by Blue Insight digital platform

Collect, catalogue, and distribute ocean data

Geomatics is designed to meet the increasing demand for accurate information from the oceans. It preserves and presents environmental, geospatial, and temporal data so that vessel operators can be assured their ocean data management requirements are met.

Geomatics focuses on organizations that generate large volumes of subsea and oceanographic data and require secure, collaborative workflows.

- Marine Research & Ocean Science Institutes who manage multi-sensor datasets
- Geophysical Survey Contractors with multi-vessel campaigns using AUV/USV/ROV fleets
- Maritime Surveillance & Security with focus on maritime domain awareness, surveillance, and secure data collaboration

Simplified data management for vessel operators

- Manage bathymetric and water column data in one system
- One view across all observation plattforms (AUV, USV, RV)
- Adhere to FAIR data management principles (Findable, Accessible, Interoperable and Reusable)
- Faster access to interesting data

KEY BENEFITS

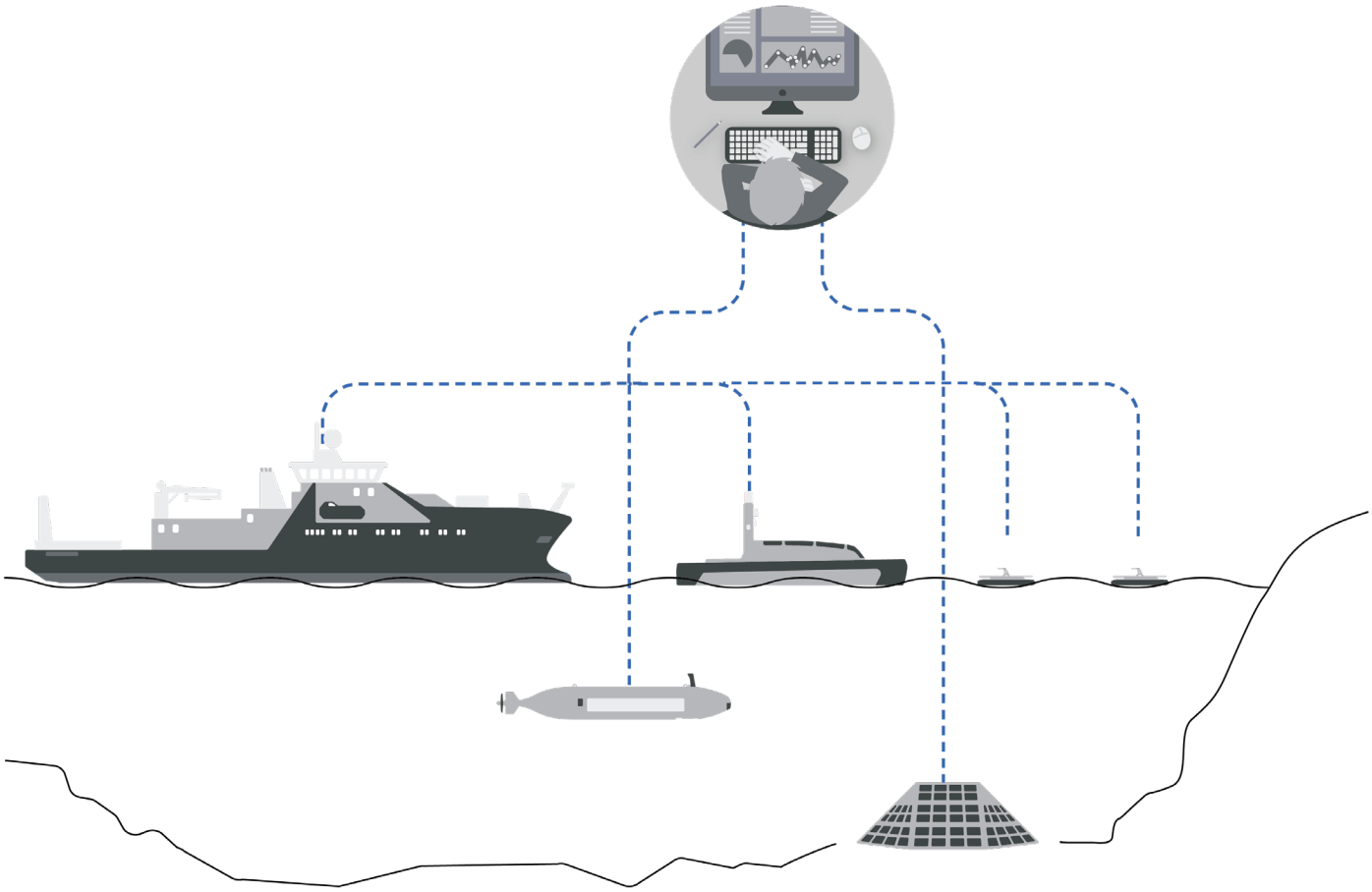
Operational efficiency

- Streamlined data collection: Automated data ingestion, reducing manual effort and time.
- Real-time instrument insights: Intuitive instrument dashboards, ensuring seamless performance monitoring.
- Global accessibility: Enables full access to data anytime, anywhere, whether onboard or via the cloud*

Mission-critical insight

- Advanced exploration and visualization tools for in-depth analysis, supporting operational decisions in energy, defense, and research.
- Metadata integrity: Complete control of metadata for chain-of-custody requirements, enhancing data reliability and traceability.
- Machine Learning (ML) integration: Automated ML-capabilities, facilitating advanced analytics and predictive modeling.

** Cloud access is optional and available upon request*



Deployment scenarios

Geomatics offers flexible deployment options that accommodate a wide range of marine operations, platform types, and data management needs. Whether installed on research vessels, uncrewed platforms, or cloud infrastructures, the system ensures consistent data quality, secure workflows, and seamless collaboration across teams.

Onboard deployment

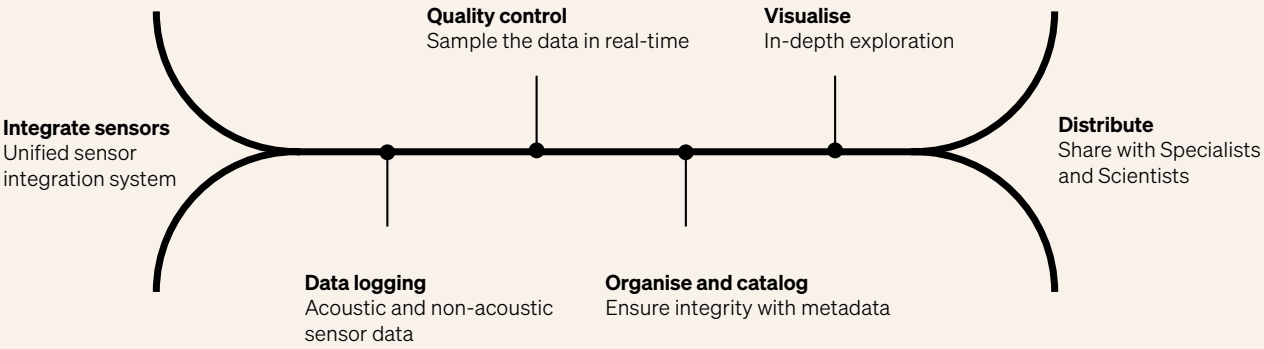
Deploy Geomatics on crewed vessels equipped with advanced hydroacoustic and environmental sensors. The system integrates seamlessly with multiple data transport protocols (UDP, TCP, MQTT, Modbus, NMEA) and provides real-time dashboards and map-based applications for onboard teams. Scientists benefit from immediate access to QA/QC tools, metadata management, and discovery interfaces, ensuring high-quality data collection during complex missions.

Cloud-only deployment

Ideal for platforms with limited onboard compute or those preferring centralized processing. Geomatics enables direct data upload via ingest APIs or blob storage, running full ingestion and processing pipelines in the cloud. This approach ensures scalability and continuity for fleets of autonomous assets surfacing periodically for data offload.

Hybrid vessel-cloud deployment

Geomatics processes data locally while syncing prioritized datasets to the cloud for fleet-level monitoring and distributed access. Ideal for autonomous operations of USVs. Smart Cloud Sync prioritizes navigation-critical and survey data for efficient transmission, even under bandwidth constraints. Cloud-hosted dashboards and monitoring tools allow operators to track sensor health and data quality remotely.



Geomatics

Process flow

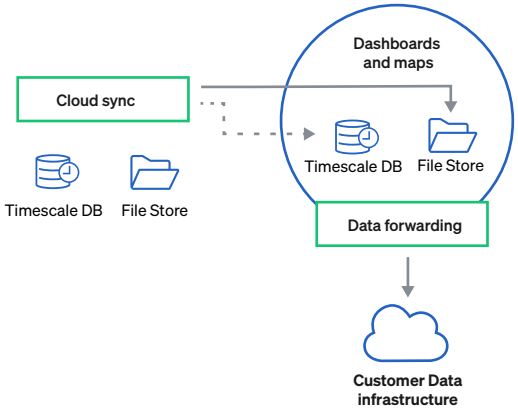
The Geomatics system leverages a modern microservices and web-based architecture to support the seamless collection, processing, and analysis of ocean data. Designed for versatility and scalability, it accommodates a wide range of data sources and operational needs, ensuring accurate and actionable insights for ocean observation.

Sensor system

The sensor system handles environmental, oceanographic, and navigational data integrated through transport like Serial, UDP, TCP, Modbus, MQTT or ZeroMQ. The Datalogger can be expanded to support new protocols through a plugin interface.

- The Datalogger uses one of its 60+ parsers to extract the payload parameters.
- The parameters are published as a JSON payload via an MQTT broker so that other components can subscribe to receive the message stream.
- A time series database listens to the topic, receives the payload, and stores the data.
- A quality assurance system ensures further filtering, decimation, and down-sampling is completed.
- Hydroacoustic sensors are often set up to write data to files, typically vendors provide their own proprietary formats. An indexer service parses new files, extracts metadata, and stores file indexes and events in a geospatial database.
- Scheduled exports of CSV or NetCDF files from the time series database can be configured.

Geomatics offers a reliable file synchronization system that allows users to manage which files are uploaded to the cloud, set the sequence for syncing, and determine the priority of each dataset. This ensures that mission-critical data is delivered first, while less urgent files can be scheduled or deprioritized as needed. Separately, operational messages and data notifications are transported using RabbitMQ — a high-performance message broker — which reliably delivers messages to cloud applications in real time. This dual approach guarantees secure, efficient sharing of both files and operational data, empowering teams to collaborate and act on the latest information with confidence.



Sync selected data to cloud for controlled sharing

Discovery system

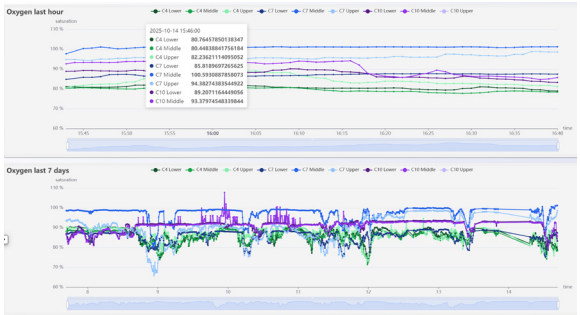
The Discovery system is designed for visualising and exploring time and geographically recorded data. This system enables researchers and operators to interact with the collected data, providing detailed analysis and insights.

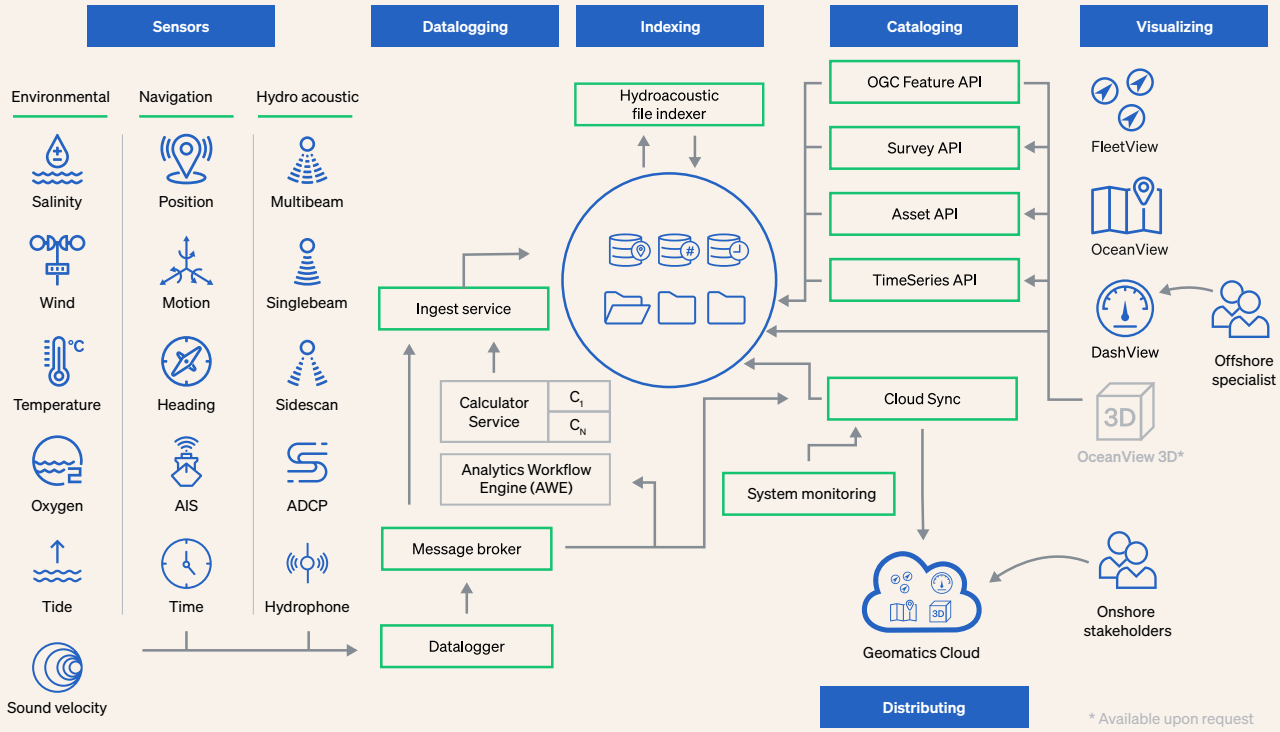
To support the application layer with programmatic access to geospatial information, the system supports the OGC Feature API. This intermediary layer ensures that data is tailored and optimised for various user needs, delivering a smooth and intuitive experience for different use cases. By simplifying complex backend operations, it enhances the overall accessibility and usability of the system.

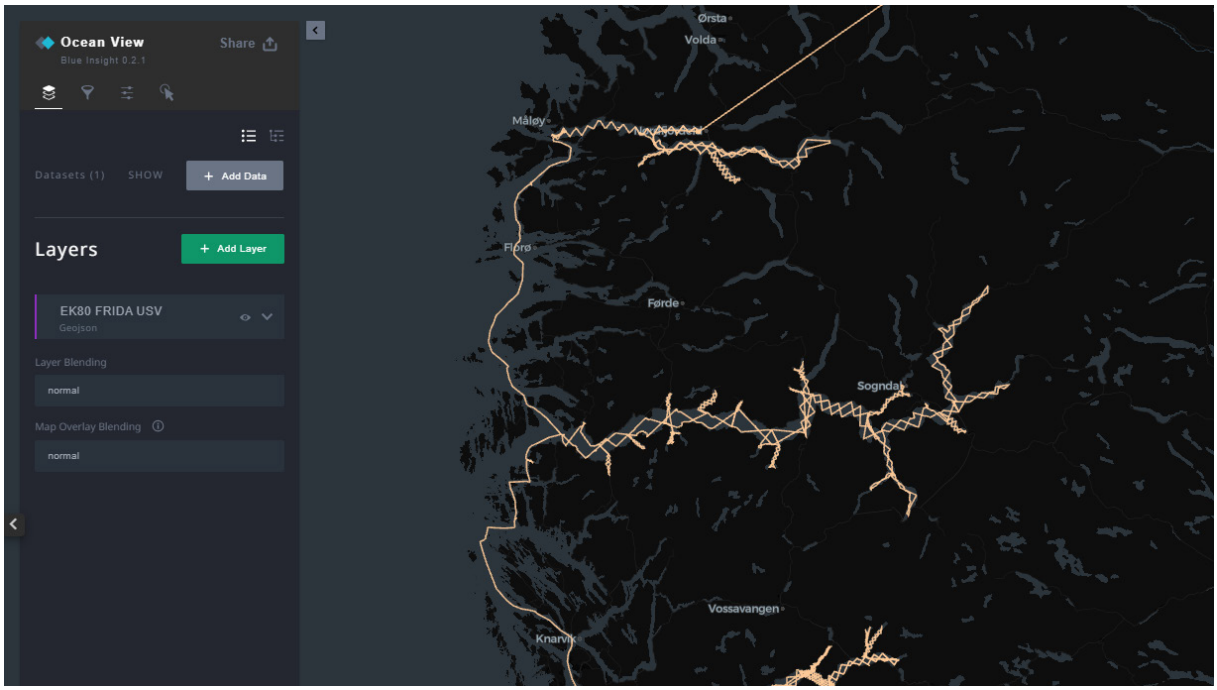
The Asset API delivers geospatial asset data, including video, CSV, images, and GeoTIFF map files. The Survey API provides access to survey data, and together they offer a complete, linked catalogue of survey assets for streamlined workflows. The System Monitoring Service gives real-time insights into system health, including sensor metrics, compute, memory, and disk utilization, as well as acoustic ping schedules and status.

Geomatics enables users to interact directly with their data through several browser-based interfaces. It is important to ensure the quality of data collected is of the highest standard.

Dashboards provide clear visibility into data structure, quality, and format – critical throughout all survey stages. They enable specialists to detect trends, patterns, and anomalies, supporting deeper analysis and informed decision-making. For low-latency needs, dashboards can be configured to bypass indexing and storage, streaming data directly. For example, monitoring winch operating status in real time.







The OceanView application provides a map interface with options for both historic and near real-time views. Blending data provides situational awareness for ongoing survey operations. Data can be seamlessly loaded as new data layers into the OceanView from OGC endpoints, local file systems supporting formats like CSV, JSON, and GeoJSON, Cloud-Optimized GeoTIFFs, OPeNDAP catalogs, historic sensor datasets, and WMS layers, ensuring flexible, interoperable, and scalable access for ocean data management and analysis.

The users can further apply multi-layered filters on the data to quickly zoom in on desired data. OceanView lets user define filters based on dataset columns: numeric fields, strings, timestamps/dates, etc. Once user add a filter, all layers on that dataset get filtered accordingly, so if user has a point-layer and a heatmap layer built on the same dataset, the filter affects both simultaneously. For temporal data (i.e. a timestamp or date field in the dataset), users can use a time-range filter, which enables time-based animation / playback of data - showing how spatial distributions change over time.

Since the pre-processing performed in the sensor and discovery systems creates links between surveys, vessels, sensors, and data, it is possible to display survey lines on the map with associated assets. By selecting a survey line, metadata can be inspected for quality control, and assets can be displayed in a media carousel inline overlay.

Sensors, data formats and protocols

Geomatics supports a large set of Kongsberg and third-party sensors

New instruments can be supported by adding custom parsing and ingestion handler

All geospatial, timeseries, mission and metadata available through Open Geospatial Consortium (OGC) APIs for support of FAIR principles (Fair, Accessible, Interoperable, Reusable)

Type of data	File formats
Water column data, incl ADCP	.raw, .netcdf. Zarr, .hdf5
Bathymetry data	.xyz, .las, .laz, .kmall/.all
Sidescan / SAS Sub-Bottom Profiler data	.xtf, .geotiff
3D models of objects from e.g., underwater laser scanner, photogrammetry	.gltf, .stl, .fbx, .obj
Videos incl. metadata	.mp4 + .geojson / companion file (lat long)
Photos / images, e.g. georeferenced	.jpg + .geojson / companion file (lat long)
Projected photos from e.g. Aerial drones, satellites	.geotiff
CTD & Sound Velocity data	.csv, json, txt, .netcdf, .svp
Hydrophone	UDP datagram, .wav

Protocol	Description
NMEA	ASCII over serial or UDP. Geomatics implements a Generic Driver for NMEA-like output from Instruments and some proprietary drivers for GPS, AIS & WeatherPak
MQTT	Publish/Subscribe interface to ingest and distribute datagrams locally on ship or to cloud
RS232/RS432	Sensors connected using a serial-to-ethernet converter to translate serial messages to UDP or TCP
Ethernet	Geomatics support sensors connected to the local network over UDP or TCP
Modbus	Application layer messaging used for sensors and automation systems

Hardware

- Requires a Hydrographic Workstation (HWS) ship-side.
- Integrates to onboard Network Attached Storage (NAS).

HWS

- Only 1U high
- 19” rack mount
- Only 3.6 kilos
- VESA mounts behind display and under-the-desk
- Supports four displays SSD or NVMe data disks IntelCore I7-8700T
- 32 GB RAM upgradable
- 115/230 VAC
- Max 170W, 65W typical, Windows® 10
- Maritime certification

Optional services

- NAS infrastructure incl HW can be provided upon request.
- Cloud access can be provided upon request.

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