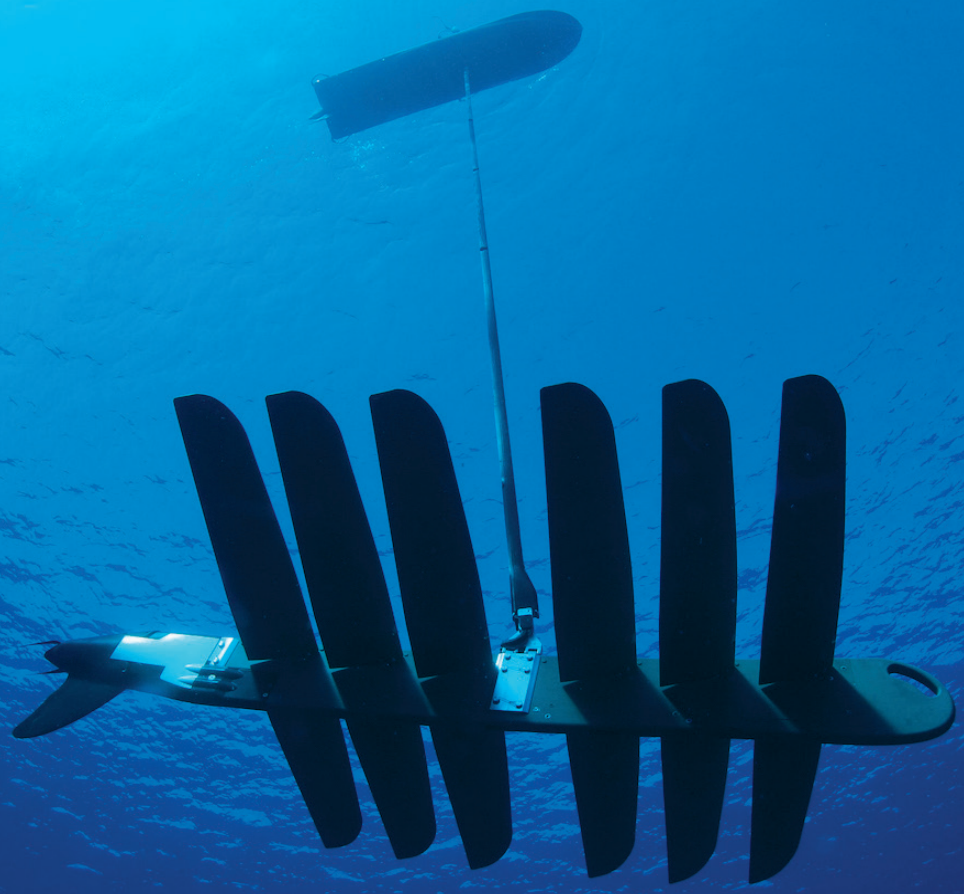
LIQUID ROBOTICS
A Boeing Company



The Wave Glider®

Powered by Nature, Fueled with Knowledge & Experience

The need for persistent, yet flexible, ocean monitoring is greater than ever. Whether it's above the surface, below the surface, or in greater depths—the ocean holds a wealth of information to tap into. The Wave Glider revolutionizes how we explore and understand the world's ocean by collecting data in ways or locations previously too costly or challenging to operate. Powered by waves and solar energy, the Wave Glider is the most experienced uncrewed surface vehicle (USV) that operates individually or in fleets, delivering real-time intelligence for a variety of applications.

15 YEARS
Proven Technology

Sustained & Sustainable Energy Harvesting

Convert Waves & Sun into Propulsion and Energy

The Wave Glider uses the latest advancements in energy harvesting and propulsion to enable a mobile sensor-hosting platform that can operate over long durations in the open ocean. The combination of wave-propulsion and stored solar energy enables persistence, continuous data collection, and real-time communications.

No Need for Fuel or a Crew

The Wave Glider converts wave motion into propulsion using a unique two-part architecture that leverages the difference in motion at the ocean surface and below.

And an Extra Boost from the Sun

A solar energy system powers sensors, communications, and enables a thruster propulsion system that provides additional navigational agility and thrust for challenging ocean conditions.

Water Speed	Up to 0.8 kt (WMO SS 2); 1.4 kt (SS 3); 2.0 kt (SS 4+)
24/7/365 Payload Power	Up to 25 W Additional surge power available
Max. Solar Collection	225 W (nominal)
Battery Capacity	0.9 - 6.8 kWh rechargeable
Communication	Cell, Satellite, Wi-Fi, Line of Sight Radio

The Wave Glider Advantage

24x7 Long-Duration Operations

Station keeping or mobile data collection for up to 12 months* with no fuel, emission, or crew at sea

Real-Time Communications Gateway: Linking Seabed to Space

Provides immediate situational awareness and accelerated decision making

Mature Technology

Highly advanced platform for versatile solutions relying on over 15 years of operational experience and Technology Readiness Level 9

Proven at Sea

Over 2.7 million nautical miles traveled and more than 65,000 days at sea with successful operations through doldrums, hurricanes/typhoons, and high latitudes

Open & Extensible Platform

Add new sensors and software capabilities; integrate and operate with other systems

Safer, More Cost-Effective Operations

Do more with less for longer while keeping people out of harm's way

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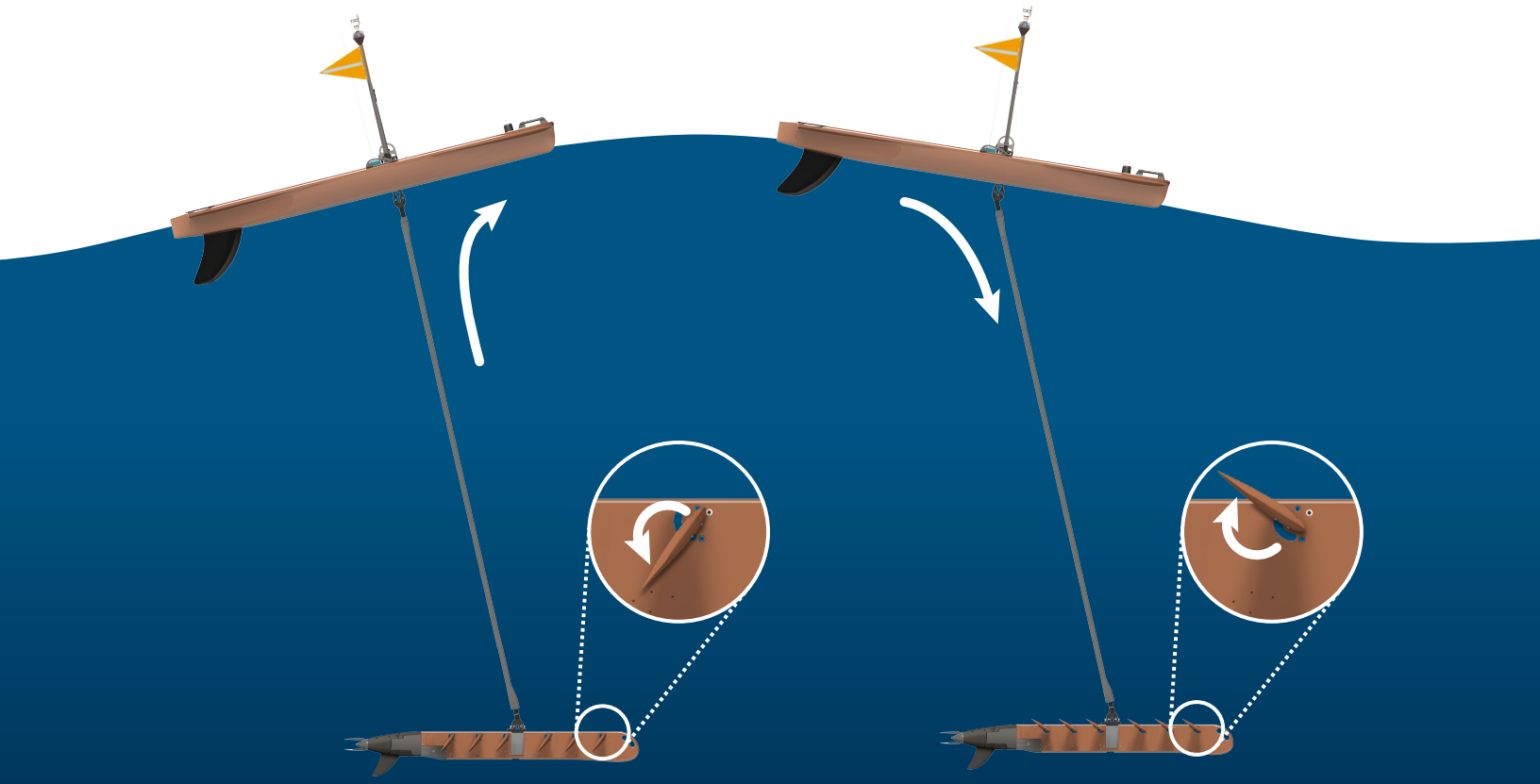
* Mission duration varies based on operating conditions and location; maintenance recommended every 4-6 months



Automated Navigation: Real-Time Communications

Wave Gliders can operate individually or in fleets to create a network for data collection and monitoring. Automated navigation and real-time communications are key capabilities that allow for low cost and dependable operations.

- Precise and programmable course navigation
- Station keeping within a 30 m radius*
- Vessel detection and collision avoidance (based on AIS)
- Multi-vehicle fleet operations
- Shore-side control and 3rd party navigation support

A variety of real-time communication options are available for transfer of mission commands and data.

Open Sensor & Payload Architecture

The Wave Glider offers unrivaled flexibility for sensor and payload placement and integration. The extensible payload design allows for easy reconfigurations or adjustments of the payloads. An optimized motion and sound isolation system makes the Wave Glider well suited for towed acoustic sensor applications.

- Plug and play payload component design
- Payload health check sensors
- Multiple sensor placement options on the platform, sub, and towed
- Supports towed payloads, with option to tow from winch at depths up to 150 m

Among other locations, payloads can be mounted to or towed from the sub or the sub-mounted winch.

Software to Build & Extend Solutions Quickly

Software lies at the heart of the Wave Glider and the solutions built upon it. Our open architecture software standards facilitate rapid solution design and integration with 3rd party systems. In order to ensure secure communication between the Wave Glider and its operator on land, the Wave Glider is equipped with an encryption solution to safely transfer data.

Regulus Operating System

The proven vehicle operating system, based upon Linux and Java, for on-board command and control of all Wave Glider functions, including sensors.

- Automated navigation following preset courses and way points
- Flexibility to reconfigure missions at-sea
- In-situ data processing enhances payload effectiveness with capabilities like pre-processing and data compression for real-time downloads

Wave Glider Management System (WGMS)

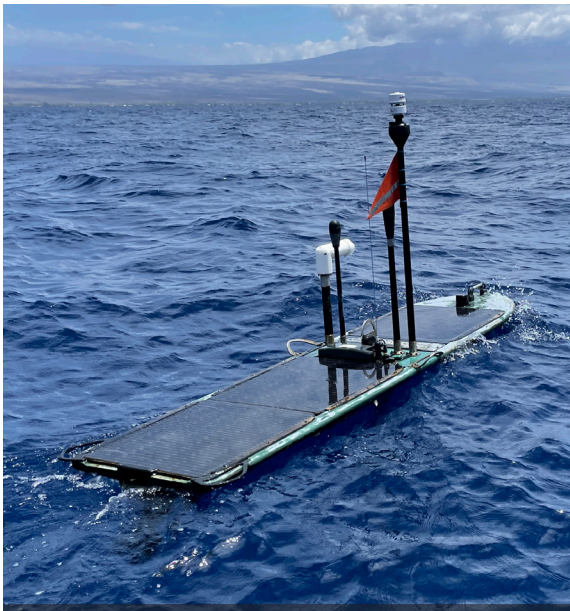
Our web-based user interface for mission management enables piloting and data management. WGMS is available to customers as both a cloud-hosted service by Liquid Robotics, and as a customer-hosted Enterprise Solution. Wave Glider missions can be run by Liquid Robotics, customers, or partners.

- Access piloting tools and program navigation
- Issue commands to vehicles and payloads
- Extract mission and sensor data for reporting or integration

Data Service

Data streams from Wave Glider missions can also be directly ingested through a JSON-based API for maximum flexibility on managing sensor and vehicle data.

- Set up and manage own database
- Ingest data into Matlab or other analysis and management applications
- Generate dynamic visualizations
- Integrate sensor data into 3rd party applications



The proven vehicle operating system, *Regulus*, enables flexible reconfigurations during missions.

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*Based on previous missions, observed station-keeping 90% of time (subject to sea state and navigation modes).

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STANDARD WAVE GLIDER COMPONENTS

WAVE GLIDER

Float, Umbilical, and Sub (with thruster)

COMPUTE & POWER

Command & Control Unit with Battery, Solar Panels

SENSORS

Automatic Identification System (AIS) Receiver, Water Speed Sensor, Weather Station, Additional Sensors Supported

PAYLOADS

Numerous Mounting Options for Sensors and Payloads* on Mast; In/On/Under Float; Attached to Sub or Optional Winch; Towed from Sub or Optional Winch

COMMUNICATIONS

Cell, Satellite, Wi-Fi, Line of Sight Radio

COMMAND & OPERATIONAL SOFTWARE

Regulus Operating Environment and Wave Glider Management System (WGMS)

SERVICE ITEMS

Tool Kit for Basic Service Requirements, Launch and Recovery Equipment, Reusable Crates

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* Both Liquid Robotics and partners support integration of sensors and payloads.

OPTIONAL WAVE GLIDER COMPONENTS

WINCH

TOWBODIES

SENSORS

BATTERY PACKS

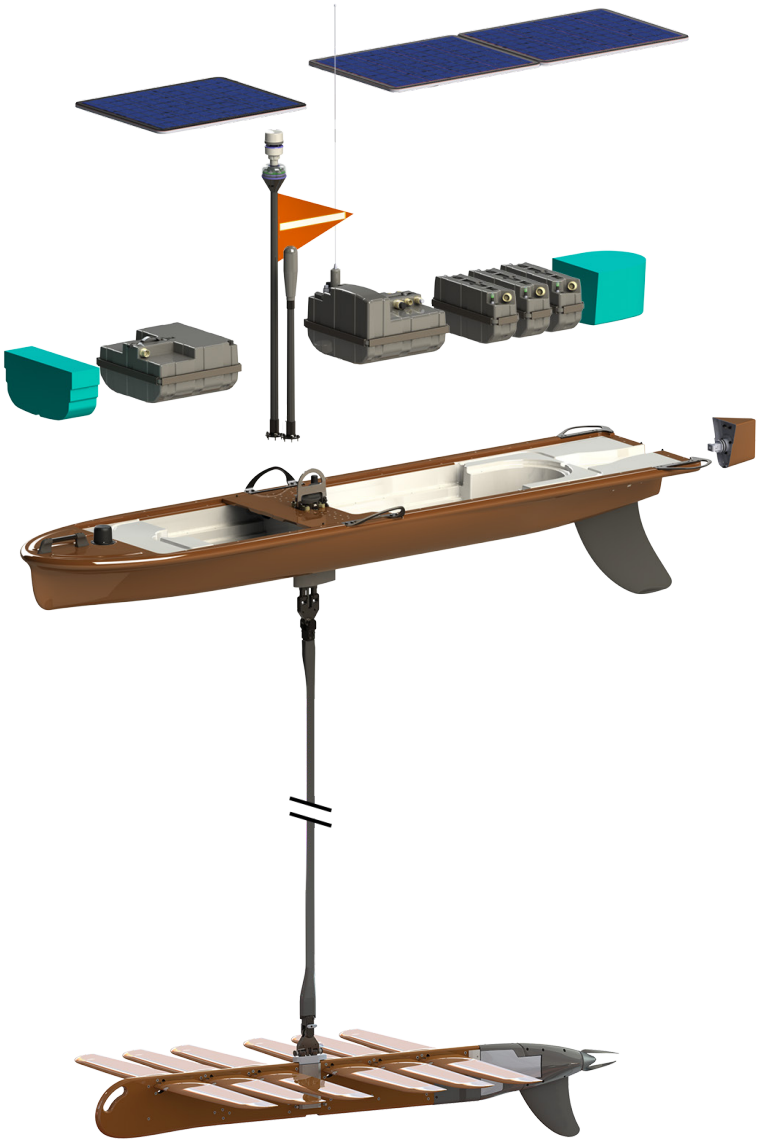
ALTERNATE COMMUNICATION CHANNELS

Visit our website or contact us for a full list of specifications, supported sensors, and to learn more about possible applications.

One Platform, Many Solutions & Applications

The Wave Glider platform can accommodate multiple sensors per mission. Along with a network of partners, Liquid Robotics develops, delivers, and supports solutions and applications for a variety of users and industries.

Defense	Anti-Submarine Warfare; Communications Gateway; Anti-Surface Warfare; Intelligence, Surveillance & Reconnaissance
Environmental Assessment	Meteorological & Oceanography; Tsunami & Seismic Monitoring; Fish & Marine Mammal Monitoring
Offshore Energy	Hydrocarbon Monitoring; Metocean; Seismic Survey; Communications Gateway



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