

Autonomous Hydrological Profiling: Key Concerns & Technical Proofs

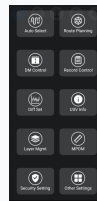
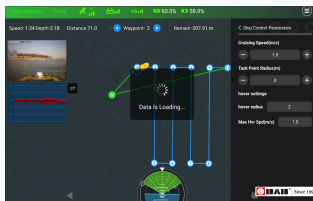
Addressing customer doubts regarding **system integration, high-turbidity flow accuracy, safety & endurance, deep/shallow adaptability, and report compliance** through field-proven synergy of the DADI · DUSV 8 USV and iADCP Acoustic Profiler.

TECHNICAL RESPONSES TO CORE CONCERNS (PART I)

CONCERN 01 Complex integration? Fragmented software between USV and ADCP?

"Operating separate USV navigation and ADCP acoustic acquisition software on-site is tedious, requires high skill, and easily leads to data loss."

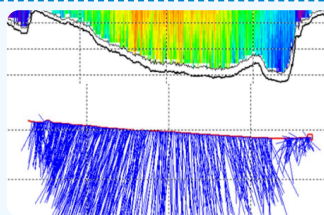
- **One-Click Native Integration:** The **iSail Operating System** natively embeds iADCP control and acquisition modules. Operators configure ADCP parameters, trigger profiling, and monitor acoustic echoes within a single UI.
- **Centralized Data Management:** All data (current velocity, direction, river discharge, GNSS track, vessel attitude, and speed) are logged into a unified database.



CONCERN 02 High sediment, rapid flow, or hull vibration causing velocity drift?

"In high-sediment rivers (like Yellow River) or choppy waters, ADCPs often lose bottom-tracking, causing severe flow calculation errors."

- **Enhanced Bottom-Tracking:** Advanced broadband Doppler processing maintains solid bottom lock even in hyper-turbid, high-suspended-sediment conditions.
- **Dual Motion Compensation & Heading Lock:**
 - **iADCP Gyro/Compass:** Built-in high-precision compass ($\pm 0.5^\circ$) and attitude sensor (roll/pitch $\pm 0.2^\circ$) updating at 1–10 Hz.
 - **DADI · DUSV 8 Dual GNSS:** Delivers precise heading/positioning to eliminate vessel sway, maintaining current accuracy at $\pm 0.25\% \pm 2 \text{ mm/s}$.



TECHNICAL RESPONSES TO CORE CONCERNS (PART II)

CONCERN 03 Heavy ADCP payload affecting stability? Battery life & safety in loss-of-signal?

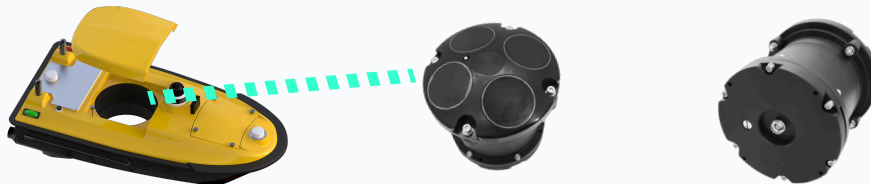
"Will ADCP weight cause instability? What if the battery runs out or communication disconnects mid-river?"

- **50 kg Payload Capacity & Ultra-Low Power:** DADI · DUSV 8 carbon-fiber/Kevlar hull carries up to 50 kg (draft ~10 cm). The iADCP weighs only 7.5 kg (5 kg in water) and consumes just **0.5W–3.5W**.
- **7-Hour Endurance & 4-Stage Fail-Safe:** Hot-swappable dual batteries supply 7 hours runtime (38 km range). Features 120° obstacle radar, low-battery auto-return, signal-loss return, and anti-winding reversible thrusters.

CONCERN 04 Extreme depth variations (1m streams to 100m+ reservoirs)?

"Our projects span shallow inland streams as well as deep reservoirs and coastal waters. Can one system handle both?"

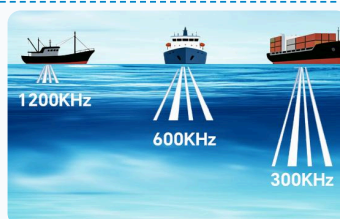
- **Full-Scenario Multi-Frequency Options (300k / 600k / 1200k):**
 - **RIV-1200 (1200 kHz):** Shallow & fine profiling (**0.1m – 40m** range, 0.02m cell size, up to 260 cells).
 - **RIV-600 (600 kHz):** Mid-deep universal type (**0.4m – 80m** range, bottom tracking up to 120m).
 - **RIV-300 (300 kHz):** Deep water & large river type (**1m – 120m** range, bottom tracking up to 200m+).
- **Modular Quick-Release Hatch:** DADI · DUSV 8 features a modular bottom hatch for rapid inter-changing of iADCP frequencies on site.



CONCERN 05 Post-processing compliance with hydrological standards? Open data access?

"Can results be directly exported as standard cross-sectional velocity charts and tables required by authorities?"

- **One-Click Standard Report Export:** iSail includes built-in hydrological modules to export standardized cross-sectional acoustic flow velocity distribution heatmaps and discharge summaries.
- **Open API & Protocol Compatibility:** Supports DXF/KML basemaps and exports TXT, CSV, DAT, DXF. Open Raw Data Protocol allows direct streaming to client cloud platforms.



KEY APPLICATION SCENARIOS & VALUE PROPOSITION

Scenario	Core Monitoring Need	DADI · DUSV 8 + iADCP Solution
Rivers & Lakes	Discharge measurement, lake circulation, flood monitoring	Automated waypoint route planning and cross-section profiling replace manned boats/cableways. Personnel remain safe onshore; efficiency increases 300%.
Ports & Waterways	Navigation safety, siltation monitoring, pre/post dredging survey	High cell density (up to 260 layers) and precise bottom tracking capture dynamic silt accumulation and section current distribution.
Estuaries & Coasts	Tidal current analysis, saltwater intrusion, coastal engineering	Dual-antenna heading and M-hull stability (rated for Level 4 wind, Level 3 wave) maintain high precision in strong currents.
Marine Ranches	Water exchange evaluation, cage site flow analysis	Combines iADCP velocity profiling with multi-parameter water quality probes for synchronized hydro-ecological mapping.

OPERATIONAL ADVANTAGES SUMMARY**• Safety & Efficiency**

- Full onshore remote control via 12" Sunlight-Readable U-Controller
- Eliminates hazards of manned boating in turbulent or hazardous flood waters
- Autonomous waypoint navigation ensures repeatable cross-section surveys

• Data Integrity

- Synchronized vessel position, attitude, depth, and acoustic profile data
- Real-time motion and heading error cancellation
- Seamless export to standardized hydrological reports and formats

INTEGRATED SYSTEM SPECIFICATION MATRIX

1. Platform: DADI · DUSV 8 Intelligent Autonomous Surface Vehicle

Hull Size & Material	1.28 × 0.58 × 0.43 m Macromolecular Polyester Carbon Fiber & Kevlar (M-Monohull)
Payload & Draft	Max Payload 50 kg (Safe Operating Draft ~10 cm)
Wind & Wave Rating	4th-Level Wind, 3rd-Level Wave Resistance
Propulsion & Speed	1100W Brushless Motor (Anti-winding, Auto-reversing) Max Speed 6 m/s
Endurance & Range	3h @ 2 m/s 7h @ 1.5 m/s Operating Range: 38 km
Communication & Base	2.4G (3 km) / 4G Unlimited 12" Sunlight-Readable (1200 nit) U-Controller Base Station

2. Acoustic Profiler Sensor: iADCP Series Specifications

Parameter	iADCP-1200 (RIV-1200)	iADCP-600 (RIV-600)	iADCP-300 (RIV-300)
Product Photo			
Acoustic Frequency	1200 kHz	600 kHz	300 kHz
Velocity Profile Range	0.1 ~ 40 m	0.4 ~ 80 m	1 ~ 120 m
Bottom Tracking Range	0.1 ~ 55 m	0.8 ~ 120 m	2 ~ 200 m
Cell Size (Bin Thickness)	0.02 ~ 2 m	0.25 ~ 4 m	1 ~ 8 m
Velocity Accuracy	±0.25% ± 2 mm/s	±0.25% ± 2 mm/s	±0.5% ± 5 mm/s
Max Number of Cells	1 ~ 260 Cells (High-resolution stratification)		
Internal Sensors	Attitude Accuracy ±0.2° Compass Accuracy ±0.5° (With Auto Calibration)		
Power Consumption	Ultra-low Power: 0.5W ~ 3.5W		
Weight (Air / Water)	7.5 kg (in air) / 5 kg (in water)		
Pressure Rating	Standard 100m (Optional Titanium Deep-water Type: 500m ~ 6000m)		

SOFTWARE ECOSYSTEM & DATA INTEGRATION

• iSail Control OS

- Multi-waypoint route planning & fail-safe auto return
- Real-time echo intensity, velocity vector display & depth overlay
- Automatic coordinate transformation & acoustic sounder integration

• Open Cloud Ecosystem

- Open Raw Data Protocol API for custom development
- Real-time data streaming to client cloud/hydrological platforms
- Multi-sensor expansion (Water quality, Side-scan, Multibeam)