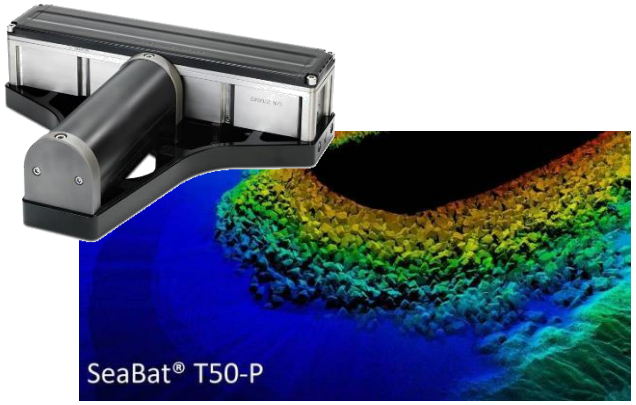
Mikolaj Wydrych
Sales Manager EMEA
RD Instruments

TELEDYNE TECHNOLOGIES
Everywhereyoulook™

May 20th, 2025

Maritime

Ocean Science, Unmanned Underwater Vehicles, Underwater Imaging, Navigation Systems



Teledyne Marine

Technology Verticals

SEISMIC

AG Geophysical • Bolt
Geophysical Instruments
Real Time Systems

INTERCONNECT

DGO • Impulse
Impulse PDM • ODI
Storm Cable • VariSystems

IMAGING

BlueView • Bowtech
Odom Hydrographic
PDS • RESON

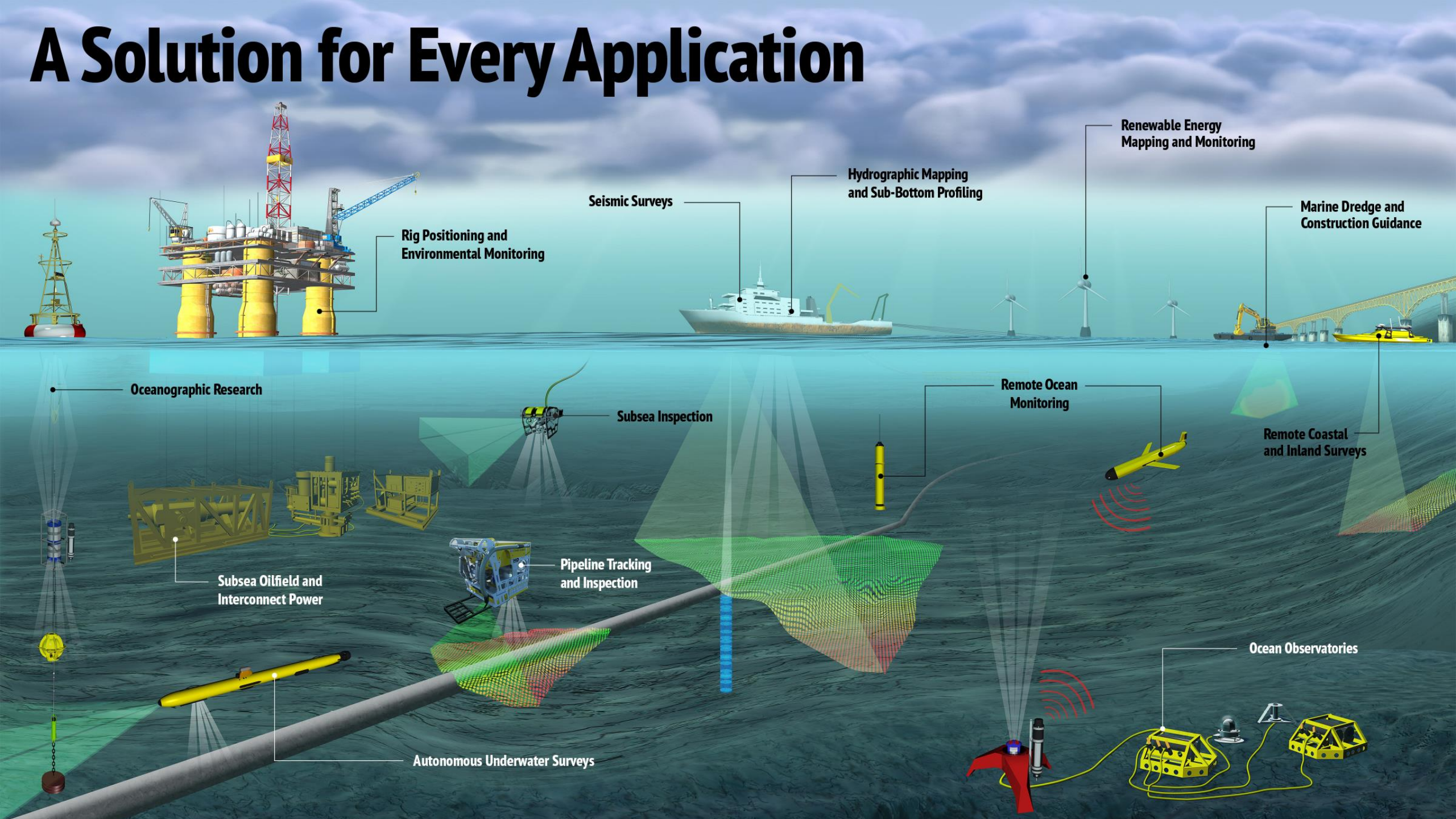
INSTRUMENTS

Benthos • Cormon
RD Instruments • TSS
Valeport

VEHICLES

Gavia • Oceanscience
SeaBotix • Webb Research

A Solution for Every Application



Teledyne RDI

Founded in 1982, acquired by Teledyne in 2005

Employees: 100+

Acoustic Doppler Current Profilers (ADCPs)

Doppler Velocity Logs (DVLs)

~55,000 ADCPs/DVLs sold

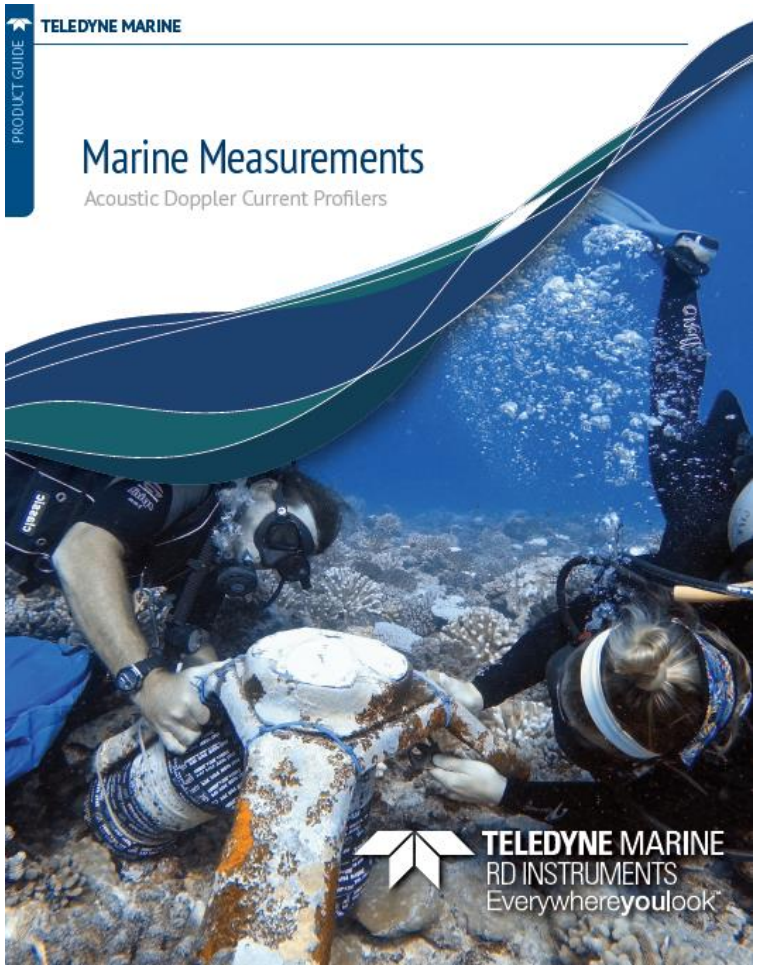
Three global locations

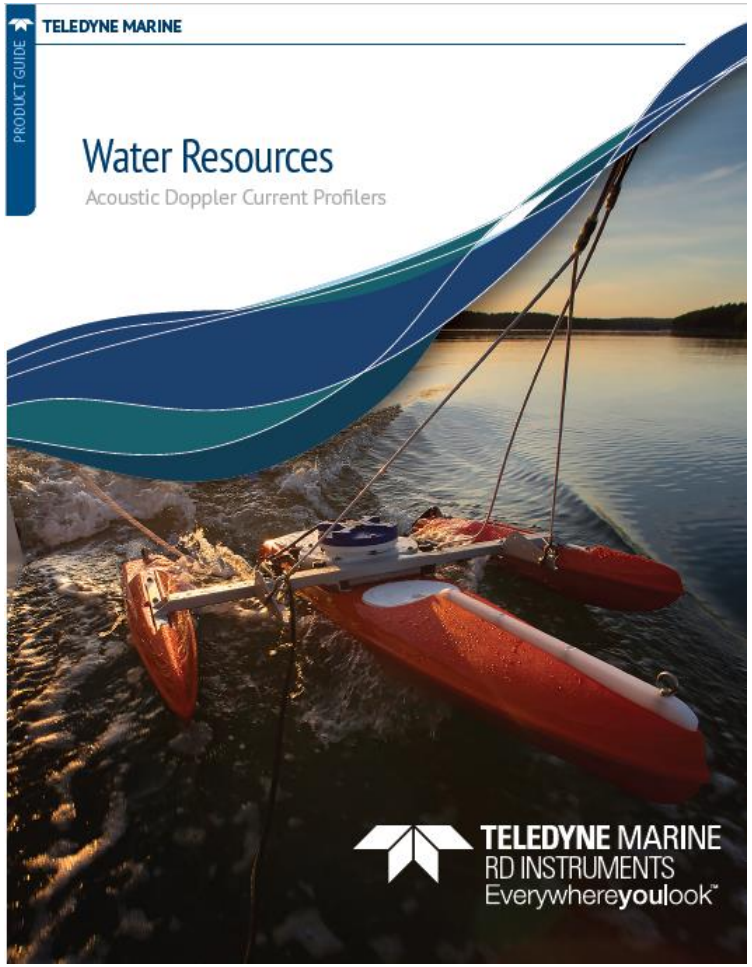
Poway, CA, USA

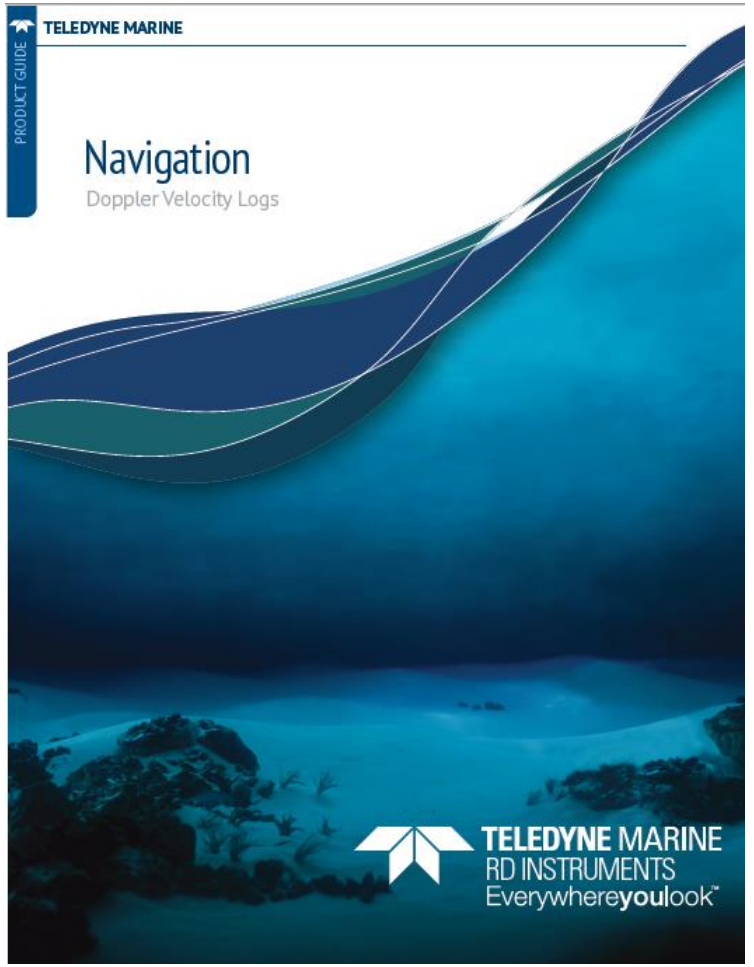
La Gaude, France

Shanghai, China

Three Product Lines

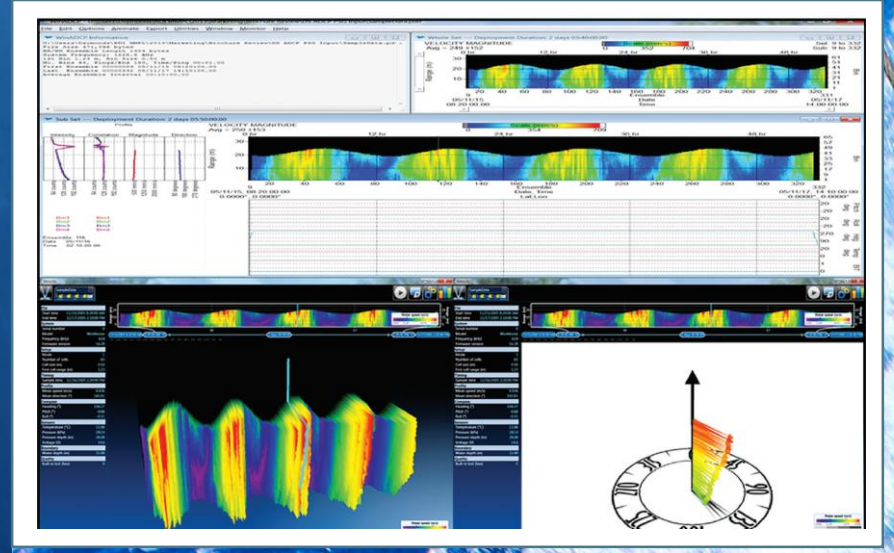






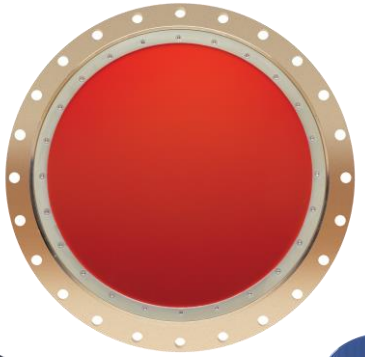
What is an ADCP?

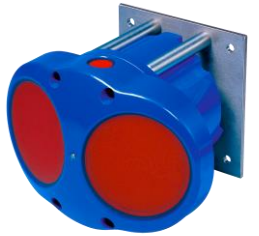
An Acoustic Doppler Current Profiler (ADCP) is a type of sonar that measures and records **water current** velocities over a range of depths via a single instrument. It can be used to measure **wave height** and **direction** as well.

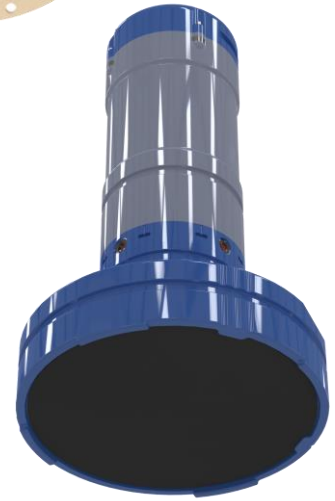


RDI's ADCP heritage

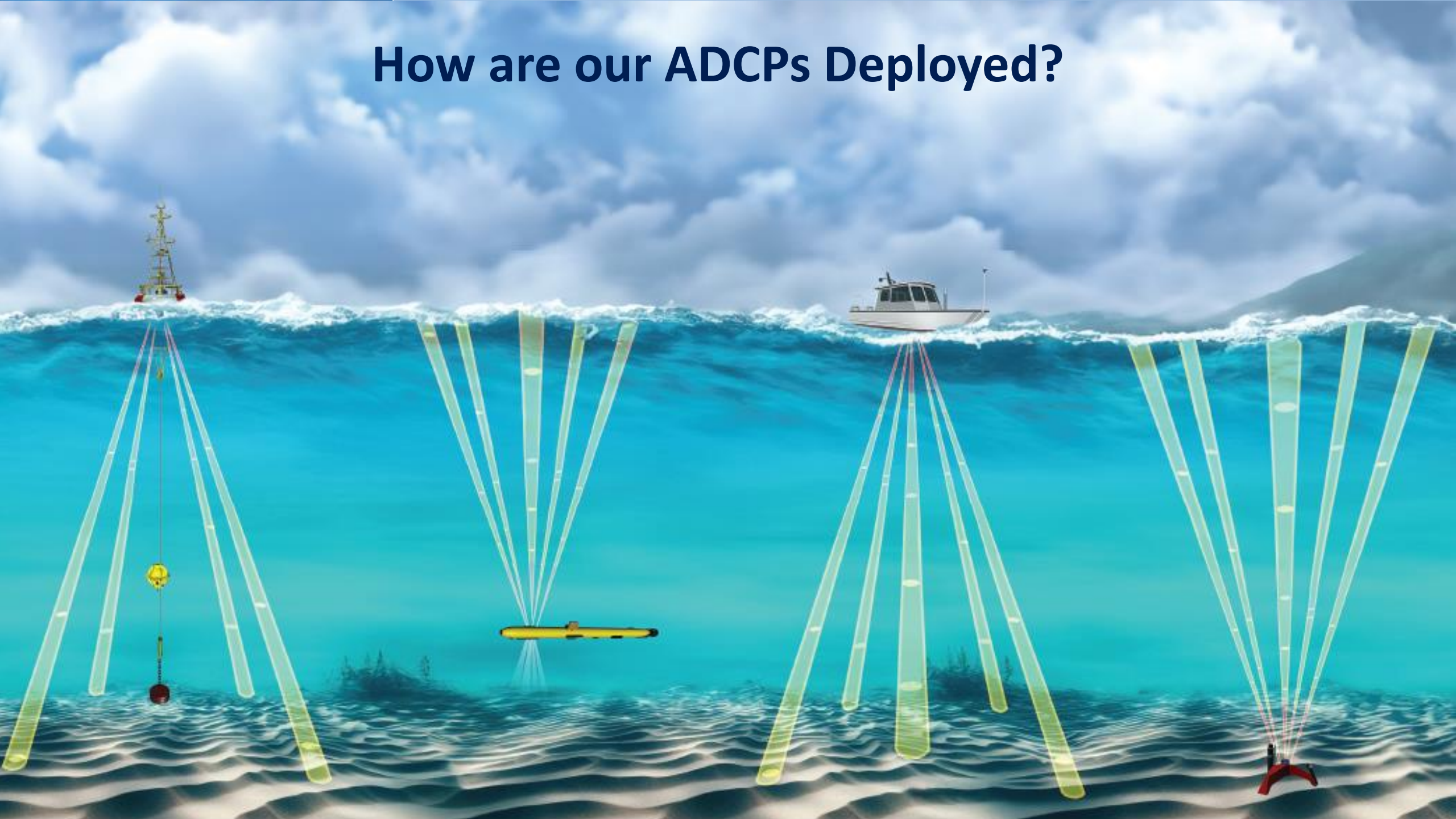
- 1981 Narrowband ADCP
- 1991 Broadband ADCP
- 1995 Workhorse ADCP
- 1999 Phased Array Ocean Surveyor
- 2003 Stream Pro and Channel Master
- 2007 Doppler Volume Sampler (DVS)
- 2009 Phased Array River Ray
- 2012 Sentinel V ADCP
- 2019 Phased Array Pinnacle
- 2022 Workhorse II
- 2024 Workhorse Proteus





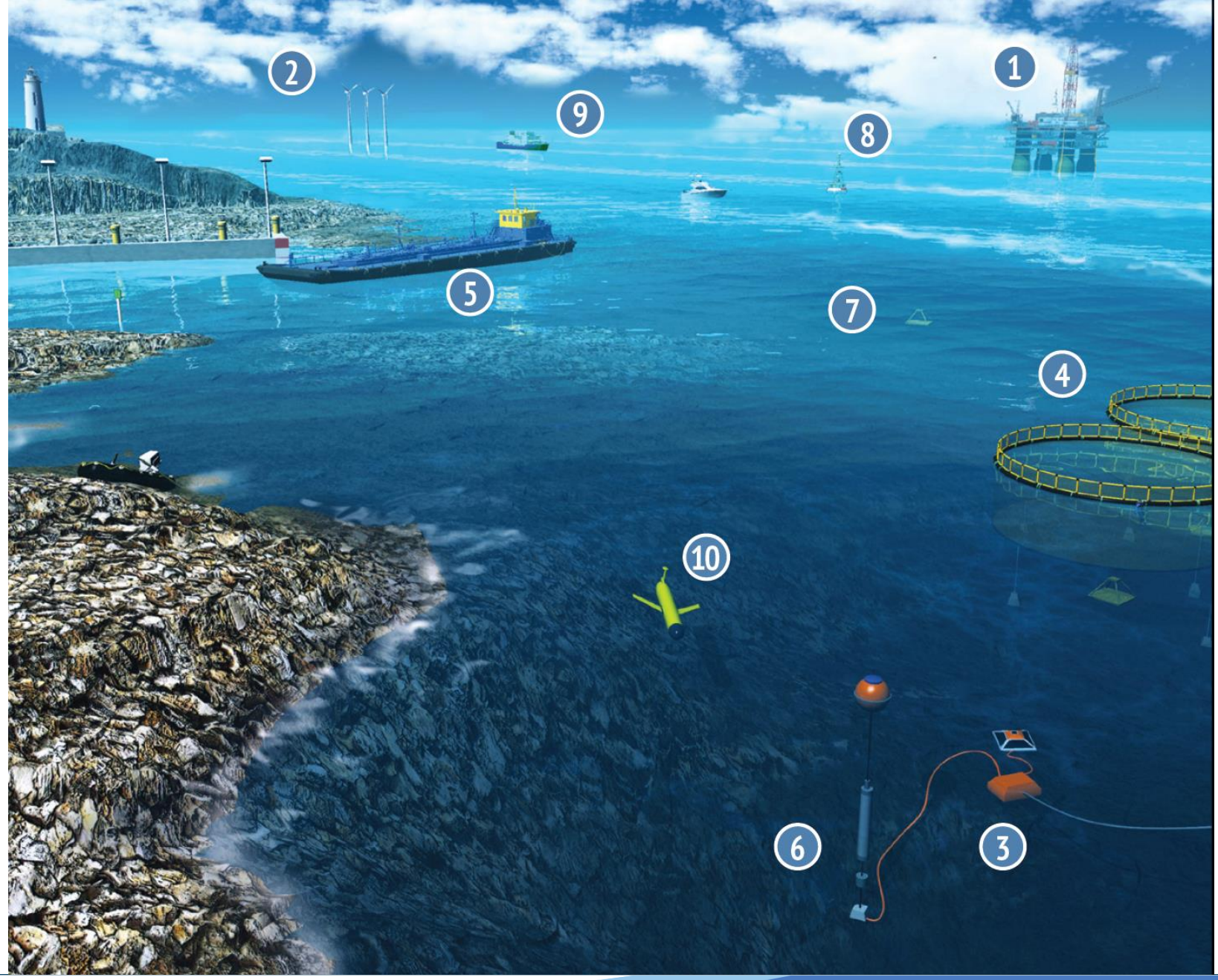


How are our ADCPs Deployed?



Where are ADCPs used to collect current and wave data?

1. Offshore Oil & Gas
2. Renewable Energy
3. Biological Oceanographic
4. Fisheries / Aquaculture
5. Navigation Safety
6. Coastal and Ocean Engineering
7. Ocean Observatories
8. Deep & Mid-water Moorings
9. Oceanographic Research Vessels
10. AUVs & Gliders



WORKHORSE

proteus

Your instrument for
the changing ocean

Significant Features of the Workhorse Proteus

1. Proteus Advanced Doppler Sonar Platform (ADSP)
2. Catalyst processor
3. New RDI AHRS
4. Dynamic bin mapping (acceleration-compensated pitch/roll)
5. 20° beam angle
6. Compact size with no performance tradeoff
7. 5 beams with equivalent sized VB
   - High-resolution vertical profiling
   - High-resolution echosounding/RSSI/"biological"
   - High-resolution surface detection and waves
8. 64 GB recorder, industrial grade
9. Adjustable transmit power
10. Concurrent configurations with easy setup software
11. Combined Serial and Ethernet on single instrument
12. Captive hardware

Trending research and operational needs amid climate change and economic and workforce change

- Climate change
- AUVs/ASVs
- Shipboard operational costs—deployment lengths
- Offshore and Port increasing throughput, maximizing profit, maintaining safety, meeting environmental regs
- Economic realities—budgets require doing more with less
- Less skilled and/or more diverse workforce

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Hardware features

Targeted innovation where it matters

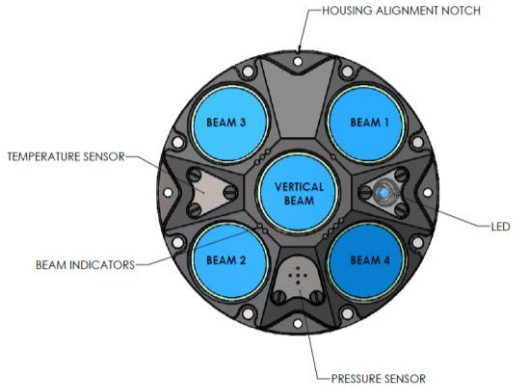
Hardware overview – Product lineup

- Housing is narrower (but slightly longer) than original Workhorse/WHII
- 1200 kHz model is DR only (external battery only)
- Depth rating = 300m

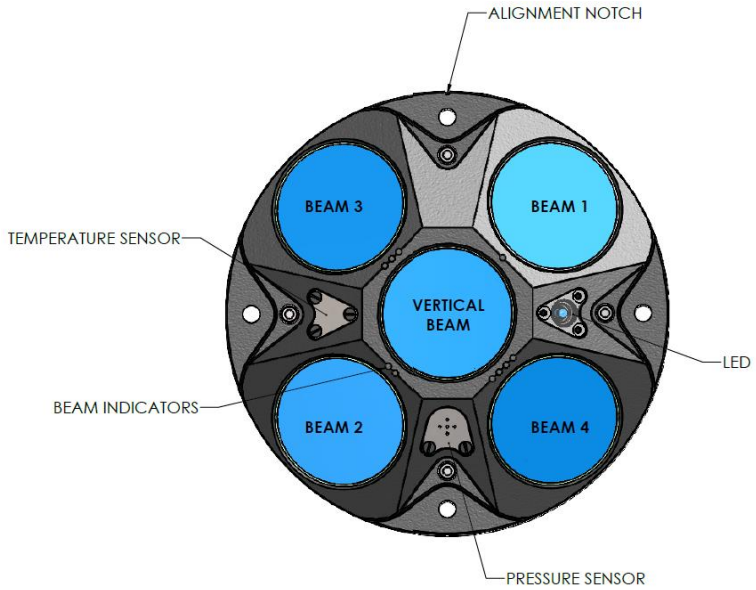
Hardware overview – Transducers

Ceramics are smaller (600/1200 kHz) or same size (300 kHz) but optimized to retain/gain performance

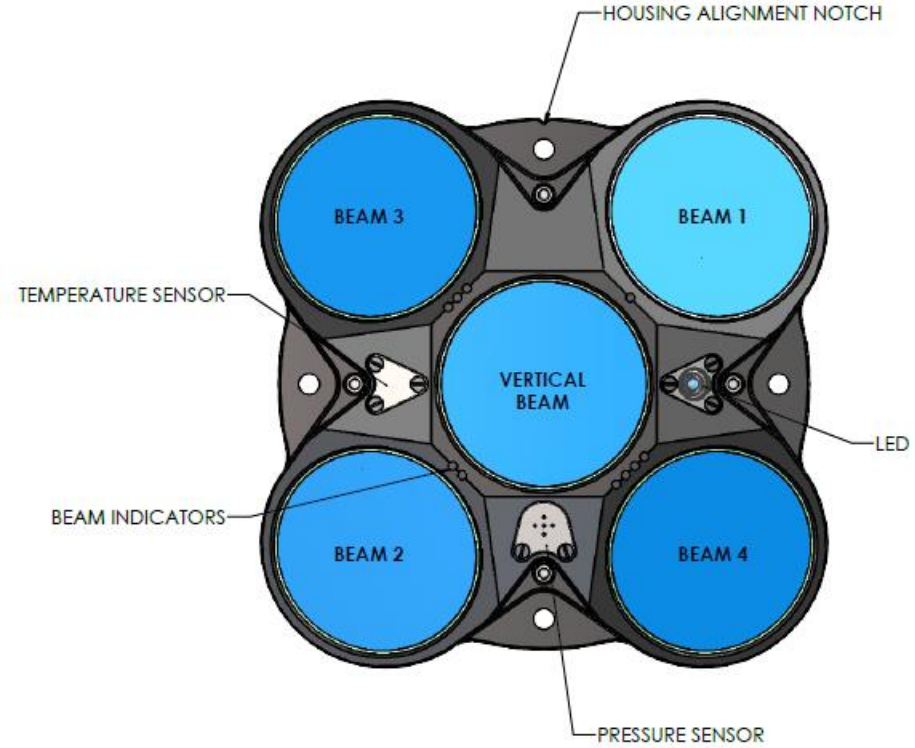
- 1200 kHz



- 600 kHz



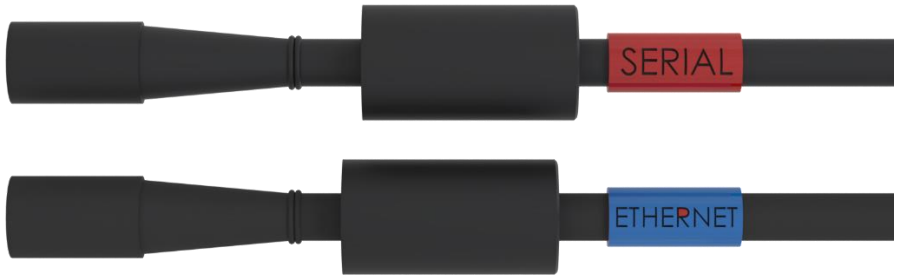
- 300 kHz



- Transducer diameters
  - 1200 kHz is MUCH smaller than WH (including large 5th beam)
  - 600 kHz is similar to WH (with large 5th beam)
  - 300 kHz is slightly larger (due to large 5th beam)

Hardware overview – Endcap and connectors

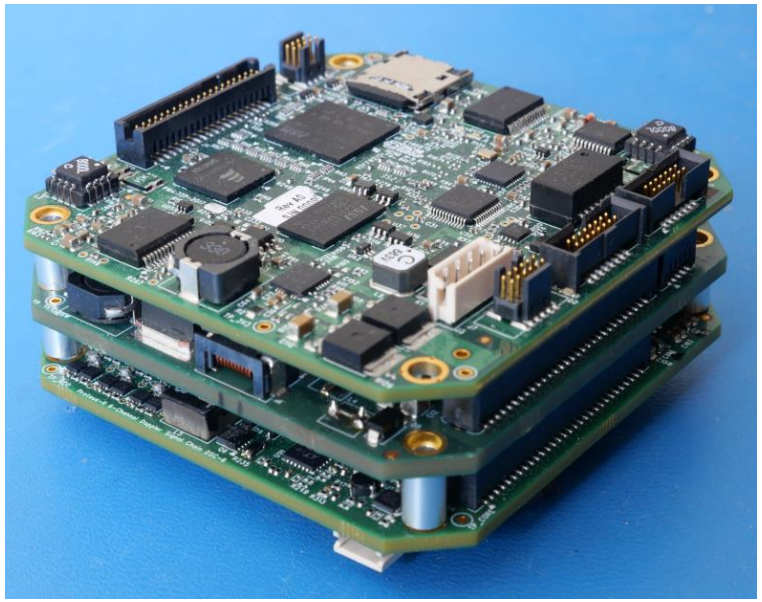
Combined Serial and Ethernet on single instrument



- Both serial and Ethernet can output data simultaneously
- Power/battery can be applied to both ports simultaneously
- Flexibility for current and future deployments
- Ability to share the instrument among departments and colleagues
- Standard 8-pin MCBH/MCIL is easily procured by RDI or the customer

Proteus electronics - Advanced Doppler Sonar Platform (ADSP)

The newest, most advanced Doppler processing platform

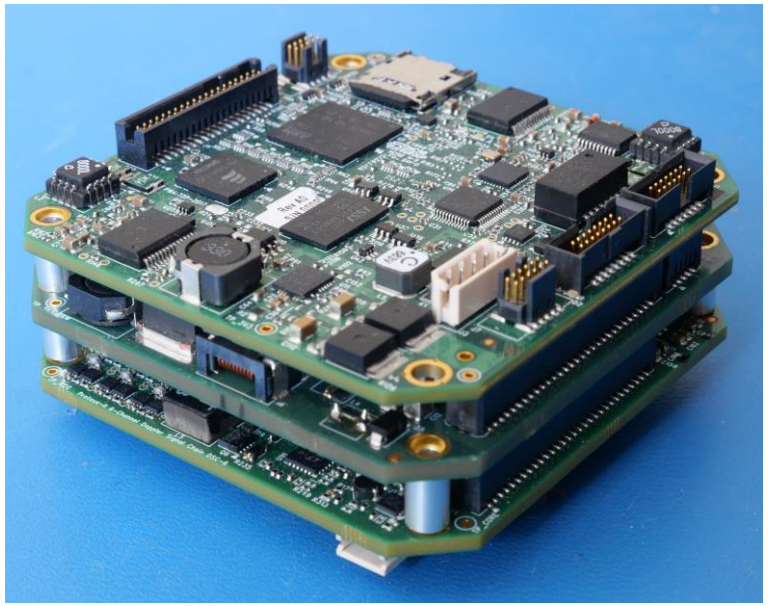


- Enables smaller form factor
  - “Credit card” –sized footprint (same as Wayfinder DVL)

- Improved receiver sensitivity and precision
  - Better SNR and bottom/surface detection capability
  - Particularly useful for high-resolution vertical beam applications (see separate slide)
- Efficient processing
  - Fast pinging
  - Capability for more sophisticated pinging and sampling schemes to achieve precise research goals.
- Power reduction in both active and sleep modes (vs WH)
- Variable transmit power
  - Allows user to extend or reduce range to prioritize goals (battery life or profiling range)
- Power boost converter
  - Consistent profile range despite battery voltage drop
  - Benefits echo intensity applications such as sediment and biological scattering

Catalyst processor

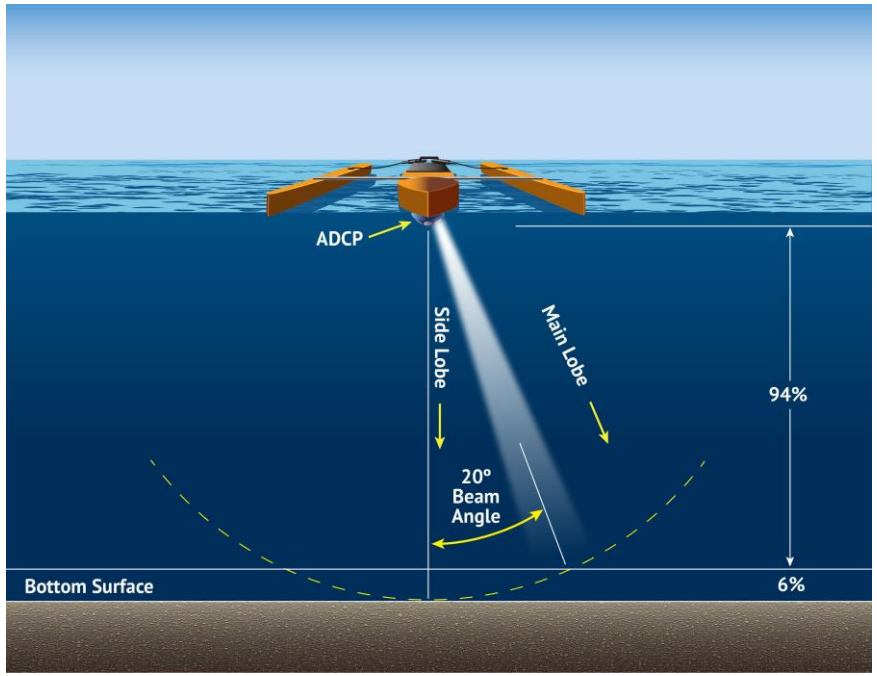
Data processor separate from Doppler processor



- "Catalyst" is also descriptive of its function
  - It takes the raw received data and turns it into data deliverables (i.e. currents and waves, corrected, motion compensated)
  - It will transform how processed, actionable data will be delivered to the customer straight from the instrument
- Fast, "edge" processing, integrating sensors, running algorithms (e.g. real-time waves, date TBD).
- Post-processes data while preserving raw data
- Reliable internal and external comms; reliable data logging. Easy to integrate and communicate with your electronics platform, esp. low-bandwidth to output ensemble averages.
- Communicate with the ADCP without interrupting data collection
- Future potential for adding capability to the ADCP. Apps that could deliver critical real-time data (e.g. QA, statistical analysis, turbulence, vessel motion)

20° beam angle

RDI's beam angle is still best for maximizing useable data

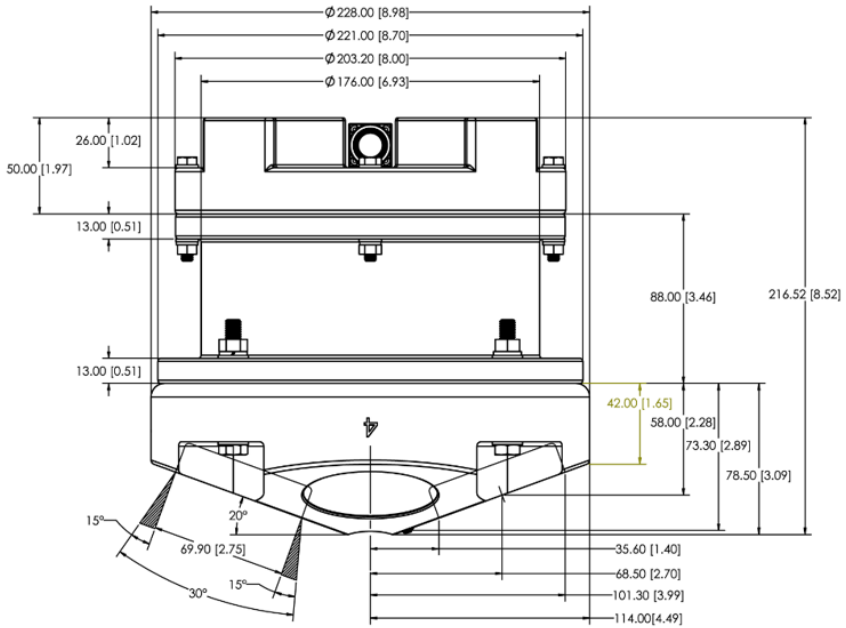


- Side lobe contamination makes the near-boundary data unusable
- RDI uses a 20° angle → 6% cut off
- Nortek and Sonardyne use a 25° angle = 10% cut off
- More data near the boundary can be critical in properly extrapolating and estimating the unmeasured area, whether near surface or bottom

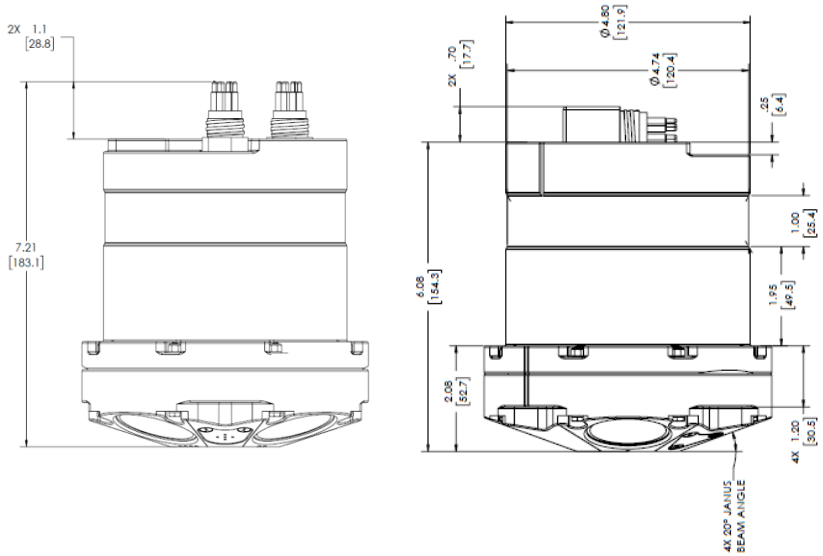
Compact size with no performance tradeoff

In fact, ***better*** performance with Proteus processor (receiver sensitivity, ping rate, comms, processing power, AHRS, etc.)

1200 kHz WH II
OD: 228 mm (8.98”)
H: 217 mm (8.52”)



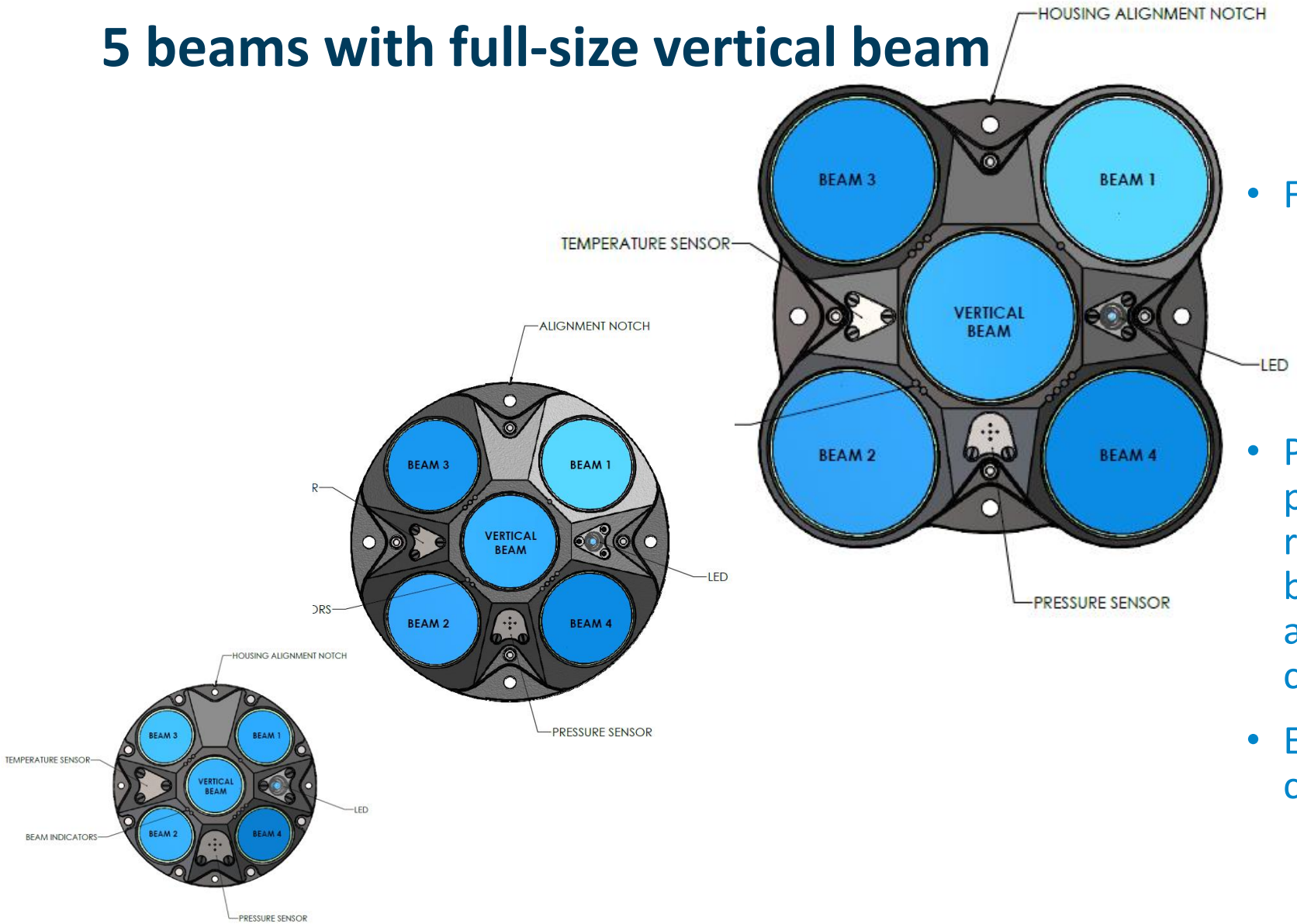
1200 kHz WH Proteus
OD: 144 mm (5.65”)
H: 183 mm (7.21”) vert. pins
H: 172 mm (6.77”) horiz pins



Proteus is the smallest high-frequency ADCP!


SERIAL CABLE
Refer to manual prior to connection.
Install dummy plug when a cable is not connected
WORKHORSE
proteus
PROTEUS 1200KHZ
WHPXXXXYYY12345
12345
2024/08/27
Frequency / System ID / Serial / Mfg. Date
TELEDYNE MARINE
Everywhereyoulook
Workhorse II
707-9135-EC
S/N: 01000
Mfg. Date: 2023/08/30
ENABLED FEATURES
BOTTOM TRACK (BASE ACCURACY)
BOTTOM TRACK (HIGH ACCURACY)
SHALLOW BOTTOM MODE
WAVE GUAGE
RS232 MODE
RS422 MODE
CIRCLE FILLED WHITE = ENABLED

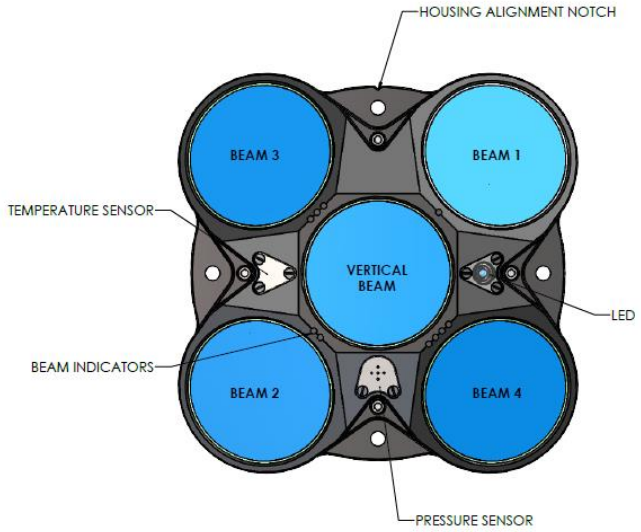
5 beams with full-size vertical beam

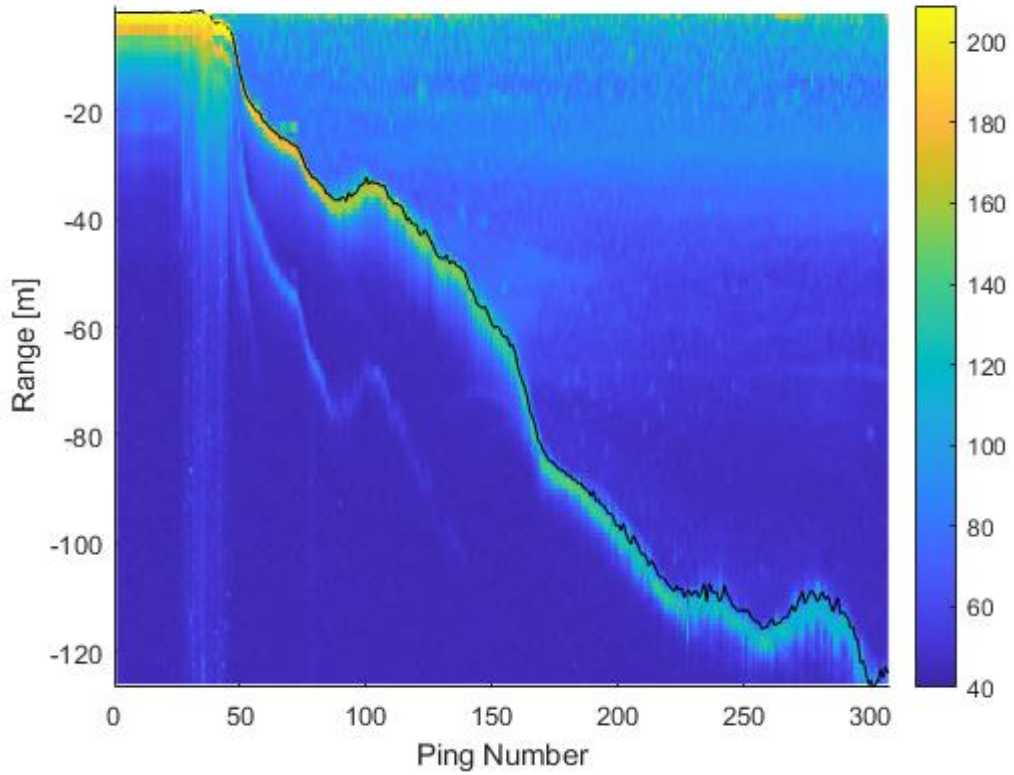


- Full size beam =
  - Narrow 3.33° beam width (300 kHz)
  - Narrow 2.26° beam width (600/1200 kHz)
  - Full range
- Provides vertical profiling with high precision velocities and high-resolution echo for sediment, biological, and wave measurement applications under wide-ranging conditions.
- Expands your research and collaboration capabilities

Additional capabilities of the full-size vertical beam

WH Proteus was bottom tracking while also collecting these two vertical beam data sets





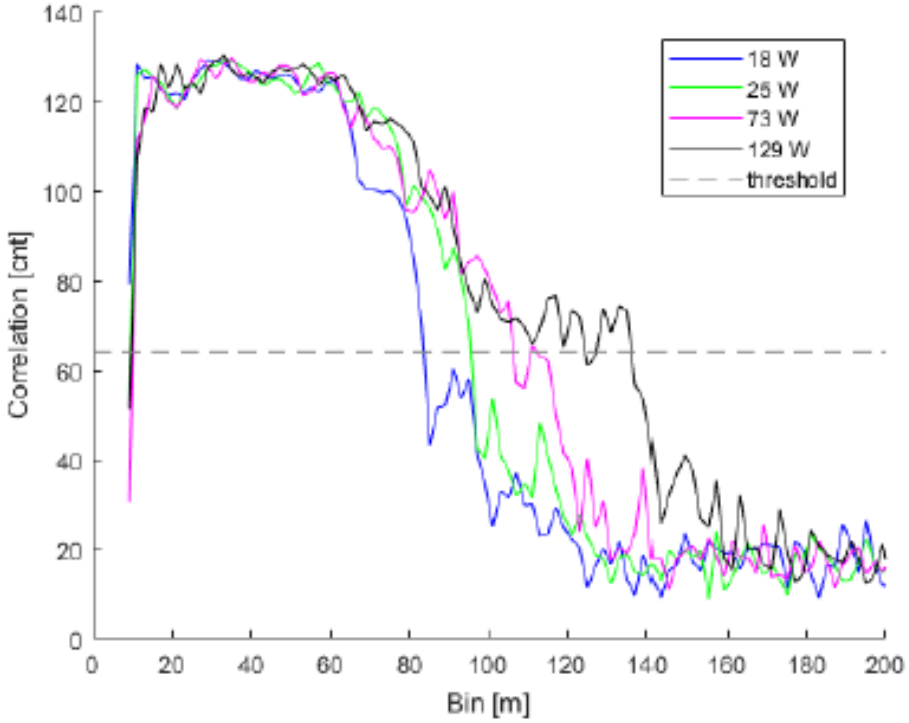
Plot showing 1) Vertical-profiling ping RSSI amplitude and 2) Overlaid vertical-ranging ping (echosounder) measurement

Adjustable transmit power

Significant range improvements, despite warm, clear water

TABLE I: Predicted and measured water-profiling range.

ADCP	Bandwidth %	Cell Size m	Power W	Range Predicted m	Range Measured m
WH	25	4	25	83	66
	6.25	8	25	120	92
WHP	25	4	18	79	69
			25	83	73
			73	94	77
			129	99	87
	6.25	8	18	115	85
			25	120	97
			73	132	[illegible]
			129	137	137



(b) Bandwidth = 6.25% and cell size = 8 m

Fig. 7: Workhorse Proteus correlation profiles for different bandwidths, cell sizes, and transmit power levels

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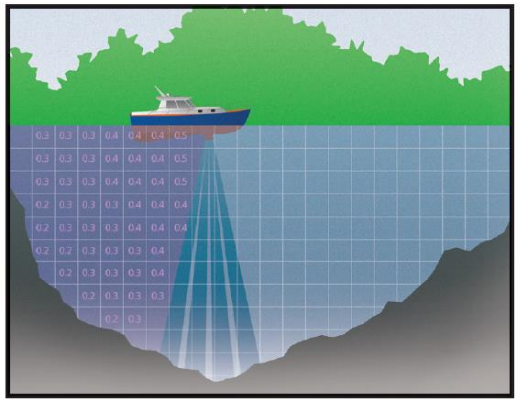
Water Resources ADCP

Acoustic Doppler Current Profilers for Water Resources Applications

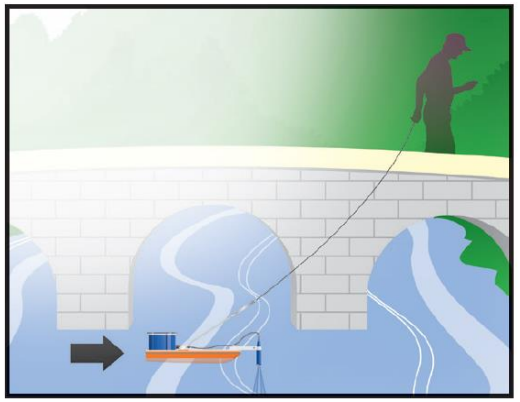
An Acoustic Doppler Current Profiler (ADCP) is a type of sonar that measures and records **water current** velocities over a range of depths via a single instrument. This data is calculated to measure river flow and discharge.

How are ADCPs Deployed for River Discharge Measurement?

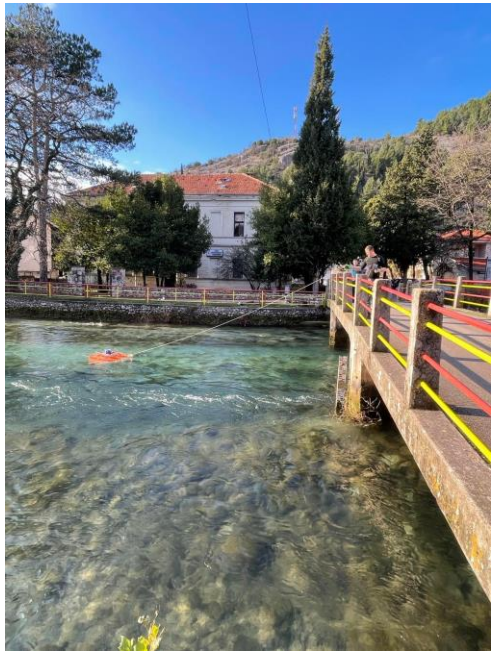
- Boat Mount
- Float Mount
- Fixed Mount

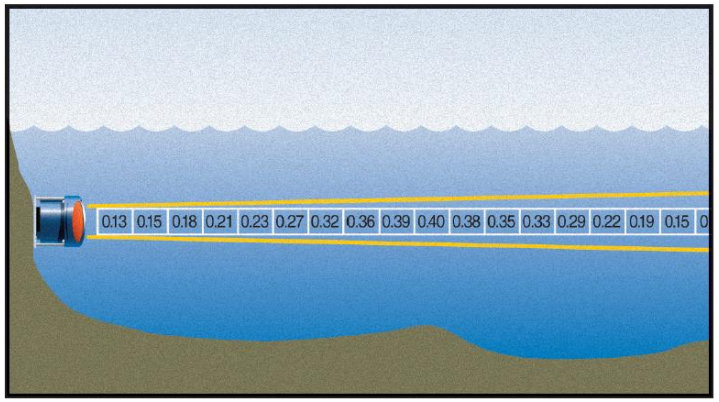


Boat Mount:
Collect current profiles and discharge measurements from a moving boat or platform.



Float Mount:
Collect velocity and discharge measurements in shallow-water environments without entering the water.

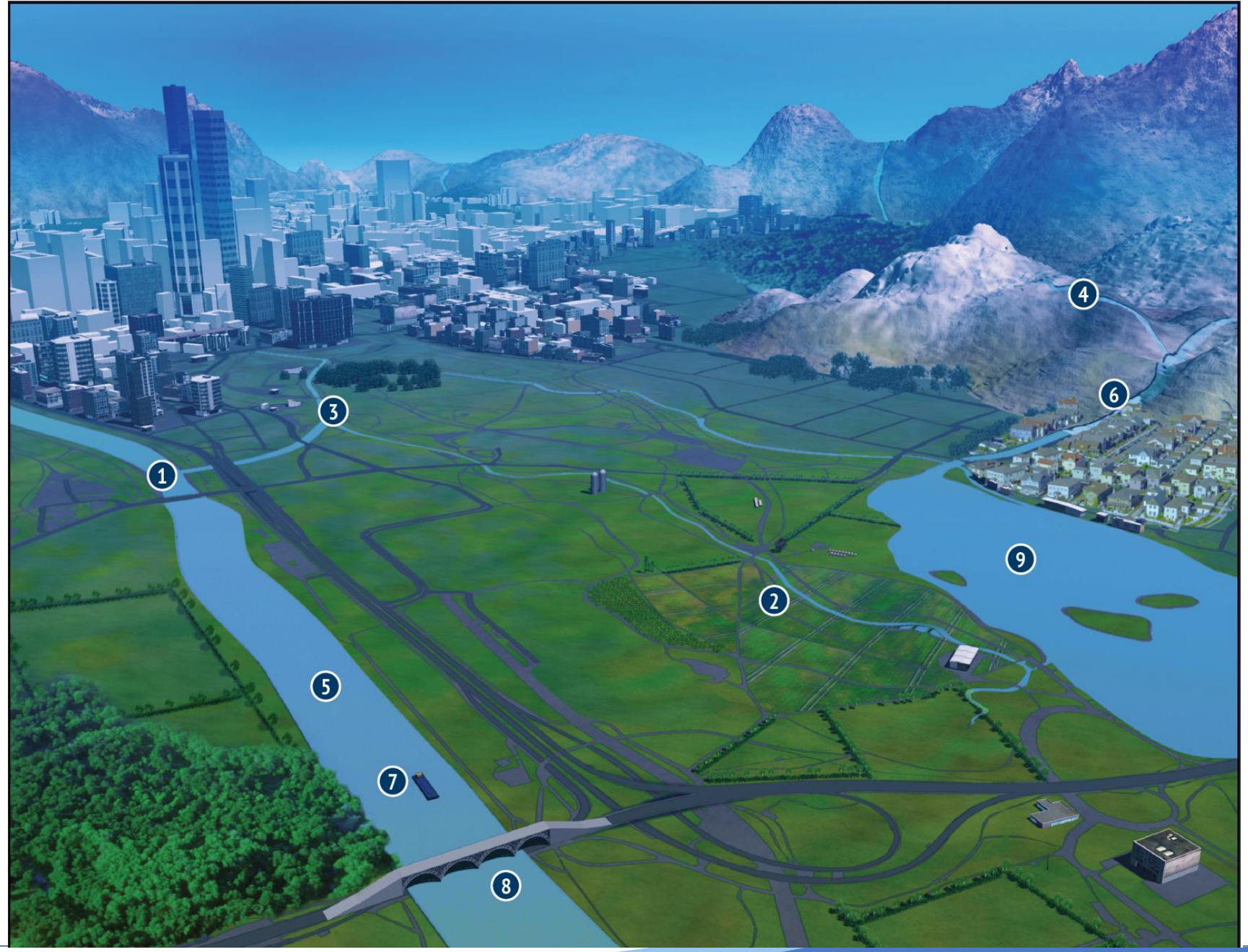




Fixed Mount—Side:
Collect water velocity, stage, and discharge data across an entire waterway.

Where are ADCPs used to collect flow and discharge measurements?

1. River Hydrology
2. Irrigation Monitoring
3. Environmental Impact Studies
4. Fisheries Studies
5. Flood Warning
6. Safe Navigation
7. Bridge Scour
8. Circulation Studies

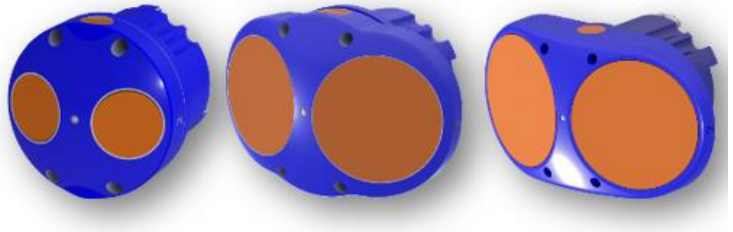


New WR product lineup

RiverPro

RiverRay

StreamPro



ChannelMaster

RiverPro 600 kHz

Water Resources ADCPs

Quick Comparison

RiverPro

RiverRay ADCP

StreamPro

Channel Master

RiverPro 600

Frequency (kHz)	1200 {600}	600	2000	300, 600, 1200	600 {600}
Transducer(s)	4 Slant (20°) & 1 Vert.	Phased Array (30°) & Vert.	4 Slant (20°)	2 Horizontal & Vert.	4 Slant (20°) & 1 Vert.
Communication	Serial & Bluetooth	Serial & Bluetooth	Bluetooth	Serial & SDI-12	Serial & Bluetooth
Deployment	Boat & Float	Boat & Float	Float	Fixed Side Mount	Boat & Float

StreamPro

Shallow streams

10 cm - 6 m*

*6m velocity profiling range & 7m Bottom Track range

System Overview

- Separate transducer and electronics housing
- 2,000 kHz Frequency
- 4 beams with 20° beam angle
- Powered with 8 AA batteries
- Manual Mode included
- Section by Section (SxS) available
- GPS option available

System Overview

RiverPro

Deep streams to shallow rivers

20 cm - 25 m

- Dual Frequency 1200/600
- Auto-adaptive mode
- 4 beams with 20° beam angle
- Powered via 12v battery or power supply
- Manual Mode included
- Section by Section (SxS) available
- External devices compatible (GPS, echosounder, heading)

System Overview

RiverRay

Shallow to deep rivers

40 cm - 60 m

- 600 kHz frequency
- Auto-adaptive mode
- Phased array transducer with 30° beam angle
- Powered via 12v battery or power supply
- Manual Mode included
- Section by Section (SxS) available
- External devices compatible (GPS, echosounder, heading)

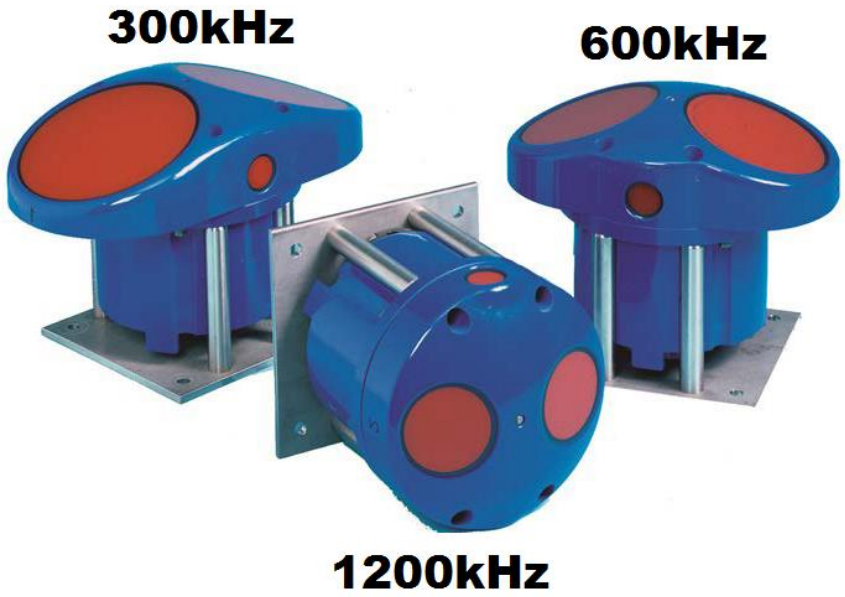
ChannelMaster

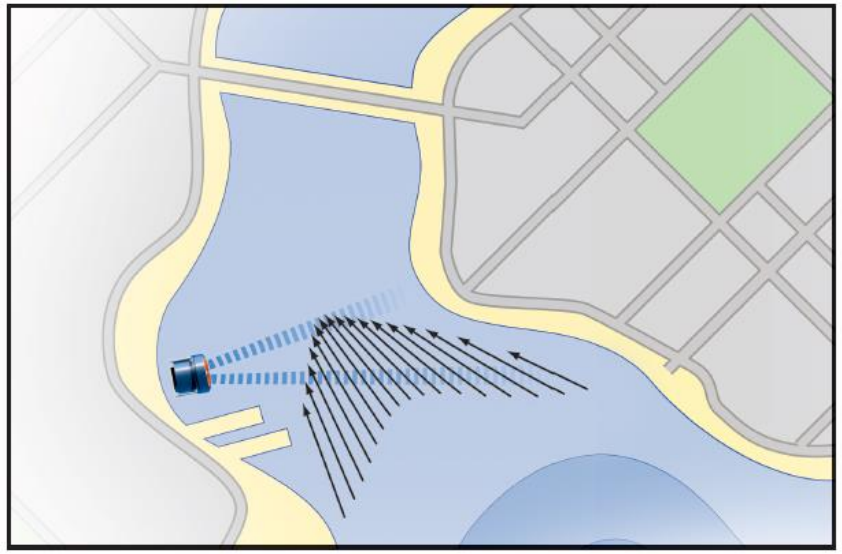
Profiling range:

- 25m
- 90m
- 300m

System Overview

- Contains 2 horizontal transducers and 1 vertical transducer
- 3 standard system frequencies: 300kHz, 600kHz, 1200kHz
- Power with DC supply from 10.5v to 18v



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Thank you! Questions?
mikolaj.wydrych@teledyne.com
Our passion runs deep.