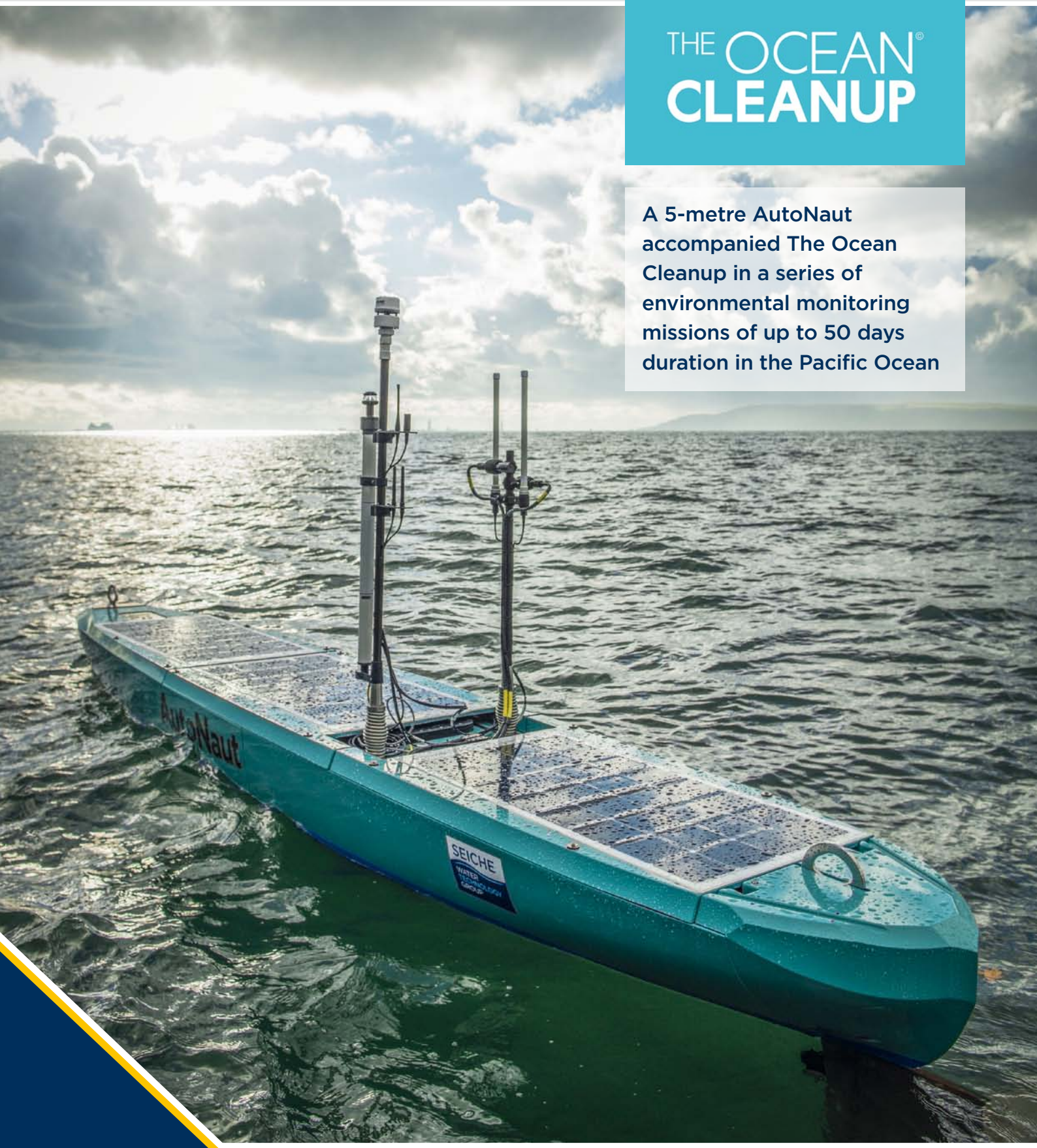
case study | ENVIRONMENTAL MONITORING

THE OCEAN CLEANUP



A 5-metre AutoNaut accompanied The Ocean Cleanup in a series of environmental monitoring missions of up to 50 days duration in the Pacific Ocean

AutoNaut

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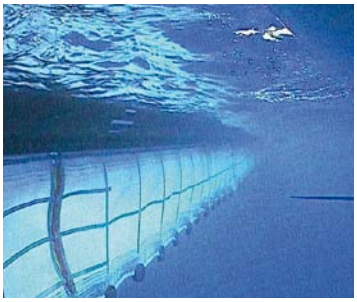
The primary role was the acquisition of data on ocean current, meteorological and oceanographic parameters. Both in close proximity to the plastics removing device and in the far-field for supporting data. The ultimate aims being to better understand the local environment and inform understanding of the interactions between aggregations of plastic litter and The Ocean Cleanup barrier. Transmission of these data streams was conducted in near real-time over WiFi and Iridium RUDICS. A secondary task was for AutoNaut to visually inspect the system and surrounding environment – equipped with cameras both above and below the water-line.

Oceanic conditions included sea states of up to Beaufort 7, surface currents of up to 1.5 knots and sea swells of up to 3 metres. AutoNaut was required to maintain consistent track-keeping and positional accuracy within a maximum of 5 metres margin of error.



For close-pass manoeuvres, operators on the nearby Maersk vessel (supporting the cleanup system) utilised wireless comms and kept line of sight to the USV in daylight hours. In hours of darkness (local time), protocols switched to data collection in the far field and were overseen by operators based onshore at AutoNaut's UK headquarters via Iridium satellite link.

The mission demands guided the development of an enhanced AIS-based autonomy. This innovation enables the USV to operate in a "track-and-follow" pattern, by using transceivers on the offshore asset and autonomously tracking by use of dynamic waypoints generated onboard. First and foremost, this allows the USV to maintain a safe and consistent distance to a moving offshore installation, without necessity for human intervention. Secondarily, the system also has the ability to switch between survey modes according to behaviour/direction of the offshore asset.

Mission Summary

Location: Pacific Ocean
Duration: Several missions of up to 50 days
Conditions: Up to Beaufort 7 and 3 metre swells

Technical Specification

AutoNaut Dimensions
Length: 5 metres
Beam: 0.9 metres
Displacement: 250kg

Power
Wave foils
Auxiliary thruster
Batteries: 4x90Ah 12V Lithium Batteries
Solar: 300 Wp Photovoltaic Panels

Sensors
YSI Xylem EX02:
- Dissolved Oxygen
- Conductivity, Temperature and Depth (Pressure)
- pH

Aanderaa Motus 5729 wave sensor
Nortek Signature 1000 ADCP

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