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## ESSENTIAL INTELLIGENCE

Quiescent Imaging For Deep-Sea Science: Advances In Technology And Productivity [pg. 10](#)

Back In The Patch: The Ocean Cleanup Deploys Again [pg. 20](#)

The Discovery Of The Capitana San Jose [pg. 24](#)

# AUTONAUT'S ADVANCED USVs PROVIDE ENVIRONMENTAL MONITORING FOR THE OCEAN CLEANUP



» AutoNaut USV conducting close-pass operations on The Ocean Cleanup system.

AutoNaut Unmanned Surface Vessels (USVs) have been collecting vital environmental monitoring data in the Great Pacific Garbage Patch in support of The Ocean Cleanup.

Beginning in November 2018, a 5-meter AutoNaut accompanied the 600-meter plastic removing device, System 001 or "Wilson" in a series of missions of up to 30 days in duration in the Pacific. This summer, AutoNaut's new boat EVE (see front cover) is at sea alongside System 001/B helping the offshore crew monitor the marine life through 2019 and beyond.

The wave-propelled USV has two roles. First, it acquires data on ocean current, meteorological and oceanographic parameters. Second, it is equipped with live streaming, under- and above-water cameras to visually inspect the



» Inspecting the barrier using an underwater camera mounted on AutoNaut's hull.

System and the environment surrounding it. The autonomous vessel is also fitted with cutting edge sensors, including a YSI Xylem EXO2 multi-parameter water quality sonde, an Aanderaa Motus wave sensor, and a Nortek Signature 1000 ADCP. Transmission of data streams in near real-time assists operational decision-making in the field, and the data is vital because the area known as the Great Pacific Garbage Patch has not been extensively studied. The information also increases the team's understanding of interactions between aggregations of plastic litter and, the clean-up system's structural integrity.

AutoNaut USV has shown resilience operating in testing conditions. Even with sea states up to Beaufort 6 and surface currents of up to 1 knot, AutoNaut operates in close proximity to the clean-up System. With consistent track-keeping within 5 meters, the AutoNaut has delivered data that would have been prohibitively hazardous and costly by other means.

Complete reliability is required, not just mechanically but of the command and control system and working procedures for remote operation. In daylight, remote operators on a supporting vessel utilized wireless comms and often kept line-of-sight for close-pass manoeuvres. Shore-based remote operators located in AutoNaut's UK headquarters (in a

different time zone), oversaw USV operations during night-time periods over iridium satellite link, during which time protocols switched in favour of data collection in the far field to ensure safe operation at sea.

EVE is also fitted with an enhanced AIS-based autonomy system. This allows the USV to complete transects in a "track-follow" pattern—remaining at a consistently safe distance from the System. By autonomously tracking AIS transceivers on the system, dynamic waypoints are generated, which are followed at an appropriate distance and which enables switching between survey modes according to behaviour/direction of the offshore asset.

The AutoNaut is built to remain at sea for many weeks but, for The Ocean Cleanup operations, the USV is frequently launched and retrieved directly to the support vessel. The simplicity and robustness of the design ensures this is a straightforward and safe operation, though the craft is quite capable of returning independently to an onshore slipway.

EVE is one of a new generation of 5-meter AutoNaut USVs that have completed projects around the world for oil and gas, defence and marine science applications, including close pass operations and deployment in otherwise inaccessible regions. The versatile USV boasts a high-power balance in a modular, renewable energy-based platform, along with a sizeable payload capability.

Flexibility remains a guiding ethos for both sensors and data delivery. Data services are offered to meet client needs, be that for direct secure transfer of raw files or full analysis and reporting. Instruments for ADCP, fisheries sonar, passive acoustic monitoring, MetOcean, communications gateway, and surveillance have been installed and integrated. Projects on the horizon include endurance missions to harsh environments—from equatorial waters to polar seas. The new-generation fleet is complemented by the 2019 launch of the AutoNaut 3.5, built to be even easier to deploy and retrieve.

Through projects such as The Ocean Cleanup, UK-based AutoNaut Ltd has undergone rapid development in the last two years.

For more information, visit  
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