

Remotely Piloted Ocean Vehicles Conduct METOC and Turbidity pre-site surveys

Reliable and cost effective data acquisition platform used to collect critical data before and during a dredging operation.

CHALLENGE

Acquire data to establish a good baseline for meteorological and oceanographic conditions. Determine if environmental conditions are suitable for future sorties in the area.

SOLUTION

Deploy a Wave Glider to conduct a meteorological and oceanographic survey. The vehicle was remotely piloted around the survey area while reporting data in real-time.

RESULTS

The METOC sortie achieved its objective to survey the area and ensure currents and waves profile was conducive for optimum measurements for following sorties. The turbidity sortie gave a good baseline of particle suspension. The backscatter method appears to respond better to changes in the turbidity.



The Wave Glider platform

Liquid Robotics' Wave Glider® is the first marine vehicle that harnesses kinetic energy from wave action to produce locomotion in the ocean; in an environmentally friendly manner. The vehicles are completely self-sustaining, using solar panels to power their payloads. The platform includes navigational and control systems, and communicates to an operations center via satellite. Navigational and operational control with full security can be transferred to a local set-up via a master/slave system. This technology provides persistent ocean presence and a reliable data acquisition platform.

Efficient and cost effective data acquisition

This case study is focused on data acquisition and analysis conducted for a major operator off the coast of North West Australia, to demonstrate environmental compliance using this innovative technology. The project was conducted in two sorties :

- A METOC (meteorology and oceanography) survey was conducted over a 14 day lunar cycle that collected the currents profile and bathymetry of the region via a planned route.
- Followed by a detailed turbidity study including analyzing particle suspension in the water column conducted over a 14 day lunar cycle to collect baseline data using two independent sensor measurement techniques. This data was used as a pre-site survey prior to the start of a full scale dredging operation to lay a pipeline. Subsequent surveys conducted during the dredging and post dredging will refer to these surveys as baseline reference.



Autonomous marine vehicle, the Wave Glider conducting turbidity study off coast of Australia.

CASE STUDY: Remotely piloted ocean vehicles conduct METOC and turbidity pre-site surveys.

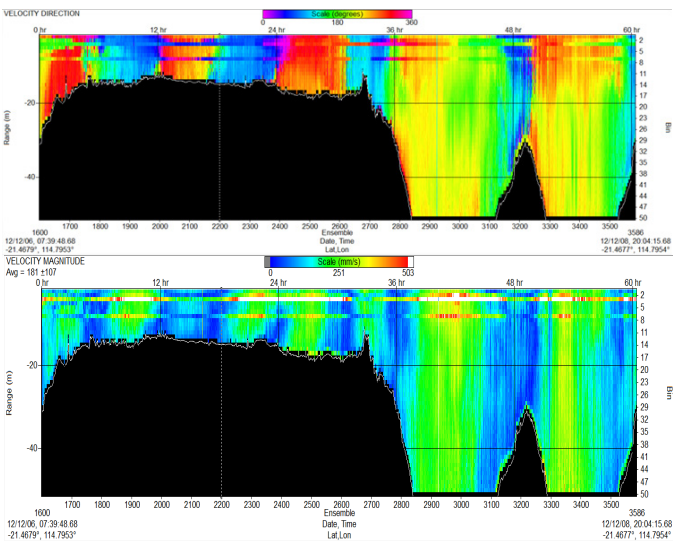
Reliable current and turbidity data collected

The METOC sortie provided data on the direction and magnitude of the currents. The data from the acoustic current profiler are processed for bathymetry and direction of current. A water depth of up to 60 meters can be mapped which is shown by the cut-off (top right). Also shown are the tidal currents at a period of about 6 hours in and out for the shallow areas during in the time interval from 0 to 36 hours. This effect is reduced in the open ocean (time >36 hrs to 60 hrs).

The turbidity sortie was used to estimate particle suspension in water. The transmissometer sensor was used to measure the transmissivity of light through water to determine the turbidity, in combination with a backscatter sensor which measures the back scatter of light due to the turbidity of water. Both techniques set up good baseline turbidity measurements.

Conclusion

The METOC sortie achieved its objective to survey the area and ensure currents and waves profile was conducive for optimum measurements for following sorties. The turbidity sortie gave a good baseline of particle suspension. The backscatter method appears to respond better to changes in the turbidity. Main limitation was bio-fouling of the turbidity sensors after 21 days operation.

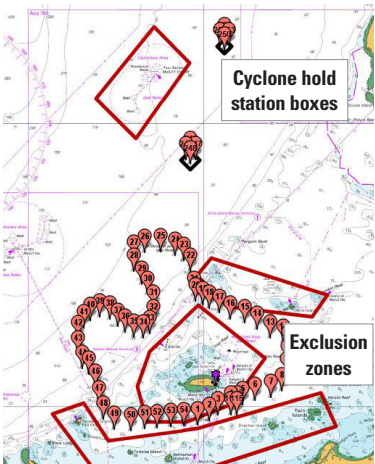


Current direction and magnitude profile over one circuit of island (post-processed ADCP data). ADCP bottom tracker feature allows the sea-floor bathymetry.

Specifications				
Sortie	Days in water	Average speed	Maximum speed	Distance travelled
Wuruwuru (METOC)	16	1.33 knots	2.15 knots	445 nm
SO2004 (Turbidity)	44	1.14 knots	1.89 knots	982 nm

Eco-Puck Flourometer			
Mechanical		Electrical	
Diameter	6.3 cm	Digital output resolution	12 bit
Length	5.0 cm	RS-232 output	19200 baud
Weight in air	0.28 kg	Connector	Customer-defined
Weight in water	0.02 kg	Input	7–15 VDC
		Current, typical	80 mA
		Sample rate	to 8 Hz

C-Star Flourometer			
Mechanical		Electrical	
	Height	Output resolution	14 bit
25 cm pathlength	47 cm x 6.4 cm x 9.3 cm	Power input	7–15 VDC
10 cm pathlength	29.2 cm x 6.4 cm x 9.3 cm	Data output	0–16380 counts, 0–5 V
Weight in air	2.2 kg (plastic)	Connector	MCBH-6-MP
	3.6 kg (aluminum)	Power input	7–15 VDC
		Operating current	35 mA (typ); 50 mA (max)
		Sample rate	to 8 Hz



Wuruwuru and SO2004 Track