

Utilising A NORBIT iWBMSe sonar to assess the impacts of winter storms and to survey a protected Bronze Age wreck site in collaboration with the University of Plymouth



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Background

NORBIT UK loaned a WBMSe sonar unit to the University of Plymouth (UoP) as part of an effort to support the Hydrography and Marine Science programmes at the University, and give the hydrography trainees literacy in their systems







Utilisation

Aaron Barrett, Dr Tim Scott and Adam Bolton worked with NORBIT as representatives of the University of Plymouth during the summer fieldwork season, the iWMBSe unit was used for two major tranches of work.

It was first deployed to a large NERC funded research project called BLUECoast; focusing on assessing the impacts of winter storms on Start Bay in South Devon.

It was subsequently then deployed as part of student project work using an inshore Unmanned Surface Vessel (USV), surveying a protected Bronze Age wreck site, in a combined MBES and Magnetometer survey.





Work Tranche One: Assessing Storm impacts

A year after the 'Beast from the East' and storm 'Emma' that heavily impacted the coasts of south England, a team of scientists from the <u>Coastal Processes Research</u> <u>Group</u> (CPRG) at the University of Plymouth returned to Start Bay, South Devon, to continue their pre and post-storm monitoring of coastal sediment budgets in the region. This work is part of a Natural Environment Research Council project called BLUECoast that is striving to improve our understanding of the impacts extreme storms have on our coastline.







NORBIT Subsea, Assessing storm impacts and surveying a bronze age wreck with the University of Plymouth

Introduction

Assessing coastal sediment budgets requires the regular collection of high-resolution topography and bathymetry across the challenging nearshore environment from beyond the waves, through the surf zone, to the landward side of the mobile beach. The field team from Plymouth achieve this through multi-method surveying combining drone-based photogrammetry for the dry beach and intertidal zone, and singlebeam and multibeam echosounder for the subtidal region.





This year the CPRG trialled the NORBIT iWBMSe multibeam system, polemounted on the university's flagship research vessel Falcon Spirit. The swathe width and data quality of the outer beams in shallow water was excellent, and for the first time the team managed full overlap with drone photogrammetry meaning a singlebeam survey was not needed. The iWBMSe sonar was run alongside an additional industry standard multibeam system and performed comparably despite its considerably smaller footprint and lower power demand. This research is providing us with new insights into coastal dynamics and is enabling coastal managers to make informed decisions about how to manage our coasts.



Merged UAV-derived topographic survey and subtidal multibeam (NORBIT) for Strete Gate, Start Bay, Devon (main). NORBIT iWMBSe multibeam system pole mounted on RV Falcon Spirit (inset)



Work tranche two – Survey of nationally important marine archaeological site

University of Plymouth staff and students recently trailed the use of a low cost ASV to undertake high resolution geophysical surveys over one of the UKs Protected Wrecks - the Erme Estuary Ingot Site (South Devon, UK). The site is the location of the remains of a cargo vessel that sank circa 400BC and gives interesting information about the nature and status of UK industrial trade at the time. The survey area included a treacherous reef that is exposed at low water and can only be surveyed by extremely shallow drafted vessels.



Introduction

This study was designed to test the feasibility of using a small low-cost ASV combined with advanced hydrographic survey sensors to undertake a combined high resolution bathymetric and magnetic surveys for archaeological monitoring and exploration. The study provided data for several MSc dissertations and contributed to the monitoring and preservation of this important site.



'Yellow Pig ASV'

The 'Yellow Pig' ASV used for this project was built in-house using off the shelf components and open source guidance software.

ASV Details: 2.5m Inflatable Tender (Floor removed)

Propulsion: 2 * 480 W Electric Trawl motors

Power:3x 84Ah LeadAcid Leisure Batteries

Duration: 5 hours at 3kts





NORBIT iWBMSe

The NORBIT iWBMSe sonar unit was the key piece of equipment that facilitated this piece of work. The small size of the sonar unit and the associated electronics, and the low power requirements meant that the device was easily configurable to work on the Yellow Pig platform.

Because of its small size, it was easily possible to construct a vertically sliding retractable pole mounting for the NORBIT system in the moon pool of the USV, to protect it during launch and recovery.





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This was the first time ever that this reef has been surveyed in high resolution with a multibeam system, as it has previously been avoided by all deeper draught survey vessels. The USV was taken to the location on the deck of the University vessel RV Jojo and deployed over the side by hand. The iWBMSe was controlled by a VNC link via a 4G connection into the PC aboard the USV, that was running both the NORBIT software and the QINSy survey package





The ability to rig a lightweight NORBIT iWBMSe on a small USV that drives sharp accurate lines at a steady speed meant that the returned data quality was exceptional as shown below:

This survey data was added to a previous data set collected in the early 1990s, and because of the improvement in technology, was able to remove some of the ambiguity of the original hand drawn maps, as well as pointing divers toward the discovery of new artefacts that greatly enhance the archaeological understanding of the site.



MBES and magnetometry data from the Erme Estuary archaeological site



Future deployment

The vessel will be deployed in a number of settings but will primarily be deployed and embedded in the teaching of undergraduate and masters Hydrography programmes, to future-proof the skill sets of the graduates to these courses. An important core capability of the USV's primary sensing systems is anticipated to be a multibeam sonar. The integration of a lightweight MBES system such as the NORBIT iWBMSe will be the optimal solution for the commissioned system ahead of deployments scheduled New Year to December 2020.



C Worker 4 USV due delivery to the University of Plymouth winter 2019



Summary

The University of Plymouth would like to take this opportunity to thank NORBIT UK for the loan of a multibeam system that has impressed our team and added significant value to university teaching and research programmes.

The NORBIT approach to light weight low power MBES design is seen by UoP as a crucial component of the unmanned future of hydrographic survey. The UoP team remain keen to see the relationship with NORBIT UK continue as we embed cutting edge skills within our Hydrography graduate talent that provide such a significant resource to offshore industry.