

Specification
Obstacle Avoidance Sonar (OAS) for Autosub2KUI
UK SBS PR17158

1. Introduction

The National Oceanography Centre is one of six centres supported by the Natural Environment Research Council (NERC), and funded to work on national capability programmes. Funding for the work we undertake is also secured from other sources including NERC competitive funding, EU grants and from commercial organisations. The NOC has two sites, Southampton and Liverpool, and employs around 650 staff. We are co-located at both sites with leading UK Universities, giving us a unique position in UK marine research.

To ensure the UK remains at the forefront of global marine science and technology innovation, the Natural Environment Research Council (NERC) has made a £10m investment in marine robotics, entitled Oceanids, focused at the NOC. With so many unanswered questions about the physical, chemical and biological processes in our oceans, these ocean robots could help provide data to meet the big environmental challenges facing our Earth.

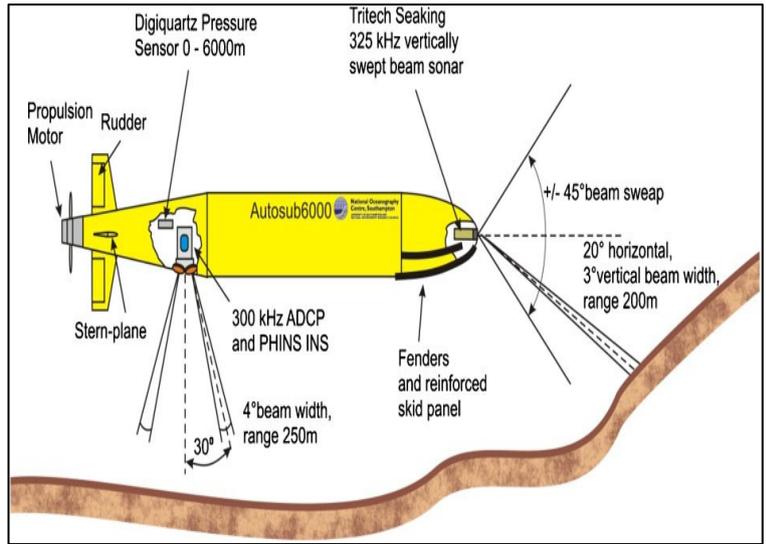
Oceanids includes development of a new 1500m depth-rated Autosub Long Range (ALR1500) and a new 2000m depth-rated high power autonomous underwater vehicle for under ice operation (Autosub2KUI). This will support future under-ice and deep-ocean science, including a number of upcoming major marine research programmes.

Engineers at the NOC will also develop new command-and-control (C2) systems for efficient Marine Autonomous System (MAS) fleet management.

2. Aims

This tender is to procure two obstacle avoidance sonar (OAS) systems (1 primary and 1 spare) for use primarily on our new high power AUV system Autosub2KUI. Further details of the existing Autosub6000 and Autosub3 AUVs can be found at <http://noc.ac.uk/facilities/marine-autonomous-robotic-systems/autosubs>. The OAS is intended to provide the vehicle with sufficient situational awareness to enable the AUV to conduct low altitude benthic camera surveys, operation in canyons or operate under ice.

The following figure shows the current mechanically scanning OAS setup on Autosub6000.



For terrain following and under ice applications the sonar fan will be orientated in the vertical plane to enable an estimate of forward bathymetry or ice structures (as in the above figure). For operation in canyons the fan would be orientated horizontally to track the canyon walls.

Question AW6.1 relates to the following Mandatory Pass/Fail Requirements and Bidders should respond within the Emptoris e-sourcing portal with completion of the matrix attached to this question.

In the event of a Bidders failing to pass all the requirements of the Mandatory Pass/Fail matrix in question AW6.1, the Contracting Authority reserves the right to disqualify the Bidder and not consider evaluation of any of the Award stage scoring questions.

Mandatory Pass/Fail Requirements			
	Requirement	Rationale	Response required
1.	System must have a sonar operating range in excess of 150m	At typical survey speeds of 1.2m/s that would give the AUV 125s to react to obstacles as they appear	Provide details of the maximum sonar operating range as well as optimal sonar operating range
2.	A multi-beam system with a field of view of at least 120° with at least 120 beams	The multi-beam will be mounted so the field of view is in the vertical plane, allowing the AUV to understand the forthcoming terrain The large field of view is required for under ice operation were the AUV needs to understand the seabed and ice topology	Provide details of the field of view and number of beams
3.	System must have an update rate of at least 1Hz	Required for terrain following	Provide details of the range of available update rates
4.	Maximum power consumption must be below 30W	To meet the power available on Autosub2KUI	Provide details of the maximum power

5.	The OAS must be connected to the AUV control computer via RS232, RS485 or Ethernet	Connectivity with proposed AUV control system	Describe the proposed solution in order to meet the required connectivity
6.	The OAS must be capable of operating utilizing one of the standard voltages provided by the vehicle 12V, 24V or 48V	Compatibility with proposed AUV system hardware	Describe the proposed solution in order to meet the required operating voltages
7.	Must be manufactured from materials suitable for long term (6 month) immersion in water (e.g. Titanium or Plastic). Lifetime of the OAS should be in excess of 10 years	Support long term deployments, including loss case	Describe the proposed solution in order to meet the required long term immersion in water and detail the expected lifetime of the OAS
8.	The wet mass of OAS must not be more than 10 kg		State the wet mass
9.	The OAS will be housed in a suitable pressure vessel(s) designed for operation at a nominal diving depth of 6000m	Operating depth of the vehicle	Describe the proposed solution and operational depth rating
10.	The OAS must be capable of operating in water temperatures from -2 °C to 36 °C. The system will be utilised worldwide and may be exposed to Air Temperatures between -30 °C to 55°C; with air at up to 100% humidity	Support worldwide operation including underice	Provide details of the safe operating temperature range in air and in water
11.	A Software Development Kit or clear interface document must be provided to enable integration of the OAS into the AUVs control software running Linux	To enable integration into the AUVs	Describe software integration of the OAS

Questions PROJ1.1, PROJ1.2 and PROJ1.3 relate to the following Desirables and Bidders should respond to these questions within the Emptoris e-sourcing portal.

Desirables				
Scored Requirements	Rationale	Response required	Selections	
1.	Average power consumption below 10W is desirable when pinging at 1Hz with a look ahead range of 150m	Minimising power consumption extends range	Respond from the selection and give details of the average power consumption pinging at 1Hz with a look ahead range of 150m	With an average power consumption pinging at 1Hz with a look ahead range of 150m Average power consumption less than or equal to 10W = Scores 100 Average power consumption exceeds 10W = 0
2.	It is preferable that the OAS should be fitted with a Subconn wet mateable connector, but a suitable equivalent would be considered	To maintain consistency with connectors currently used on the vehicle	Details should be given of the brand of underwater connector to be utilised Any additional costs associated with provision of a Subconn connector should be provided in the question AW5.2 Price Schedule Additional Upgrades	Subconn connector can be provided = Scores 100 Subconn cannot be provided = Scores 0
3.	The provision of existing drivers	To enable	Confirm if drivers are available	Linux and ROS drivers are available

	for integration in Linux and ROS would be advantageous	integration into the AUVs		= Scores 100 Linux and ROS drivers are not available = Scores 0
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Questions SEL1.3, SEL1.4 and SEL1.5, along with PROJ1.4 and PROJ1.5 relate to the following For Information Only requests and Bidders should respond to these questions within the Emptoris e-sourcing portal.

For Information Only			
1.	Approximately how many units have been sold of this design?	Evidence of design quality. Risk reduction	State Number
2.	How many customers have purchased this design?	Evidence of design quality. Risk reduction	State Number
3.	For how many years has this model been on sale?	Evidence of design quality. Risk reduction	State Number
4.	Documentation required: Operators Manual Installation Guide 3D CAD file		Provide requested documentation
5.	The integration of the multi-beam sonar should not result in export restrictions which restrict worldwide operation of the AUV	Autosub cruises should be possible worldwide if a suitable science case is presented	Describe any known export Restrictions It is preferred that designs can be freely exported from the UK to both EU and non EU destinations