



# Working with us

## Defence

National Oceanography Centre

**WORLD CLASS MARINE SCIENCE AND TECHNOLOGY FOR YOUR BUSINESS**



National  
Oceanography Centre  
NATURAL ENVIRONMENT RESEARCH COUNCIL

[noc.ac.uk](http://noc.ac.uk)

**NERC** SCIENCE OF THE  
ENVIRONMENT

The National Oceanography Centre is the UK's leading institute for integrated ocean research and technology development from the coast to the deep ocean. Working with our partners, we provide large scale, long-term, marine science capability including: major facilities, sustained ocean observing and modelling, mapping and survey, data management and scientific advice.



## Defence

The National Oceanography Centre works collaboratively with government, industry and academia across the four main pillars of ocean security:

- Maritime Defence
- Maritime Homeland Security
- Marine Environmental Security
- Maritime Cyber Security

The NOC has a long established and highly respected record for delivering applied marine science and technology to meet the maritime part of the stated defence missions. Our capability in supporting the maritime defence missions continues to evolve to meet new challenges. This evolution has seen the NOC investing in maritime cyber security in respect of the operation of its two global class research vessels the RRS *James Cook* and the RRS *Discovery*. The growth in the ownership, development and

deployment of marine unmanned systems by NOC has also sought to establish research to understand risk to missions from cyber-attack.

In several areas of research the NOC has lead the way for changes now being made by the defence maritime community; an important example being the Centre's novel work in the area of Marine Autonomous Systems, pressaging the trend towards Off Board Systems in today's navies. The NOC has had a Memorandum of Understanding [MoU] with both the Royal Navy and the UK Defence Science and Technology Laboratory [DSTL] for the last three years. The focus of this MoU has been around Marine Autonomous Systems. An example of the success of this relationship saw the NOC train members of the RN hydrographic and oceanographic community to set up to and operate their newly acquired Webb gliders.

This collaboration saw two RN gliders being operated for a period of 22 days. To date the longest deployment of an RN glider.

The NOC is a founder partner of the National Centre for Ocean Forecasting, and works closely

with the UK Met Office on ocean modelling and on new ways of gathering data from the oceans and disseminating relevant and timely products to users. The UK Met Office marine meteorological unit is collocated on the NOC Southampton site.

## Our Science and Technology

The NOC's science and technology developments are broadly applicable to the current maritime defence missions, some example projects and programmes include:

### Micro-Sensor Development

With current technology, dissolved organic nutrients cannot be measured routinely *in situ*. NOC addresses this critical technology gap, building on successes in the development of robust, accurate and sensitive instrumentation. The NOC is developing sensors for determination of dissolved inorganic nutrients *in situ* based on lab on chip (LOC) technology. The centre is developing a device

that converts dissolved organic nutrients into inorganic forms that can be readily measured with technology that we have already developed. This technology has application in the ASW/NAD areas.

### Marine Autonomous Systems (MAS)

Our work requires a persistent presence in the ocean. The NOC is progressively relying on MAS to provide this presence as research ship time is costly and the use of MAS enables more cost effective data collection. The NOC hosts the largest research fleet of marine autonomous vehicles in Europe



and has over 20 years experience of developing and deploying said vehicles. NOC is working collaboratively to advance MAS, projects include:

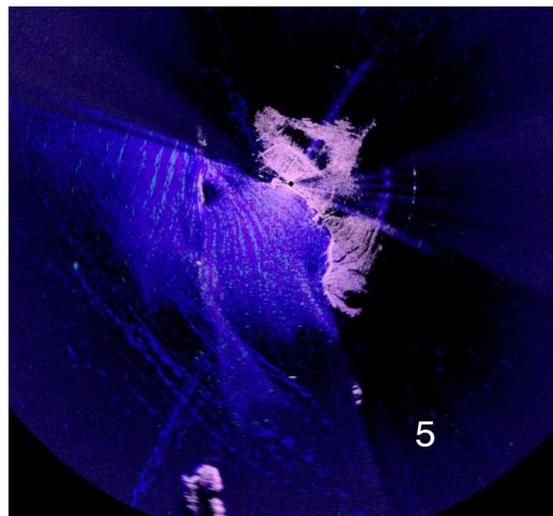
- Funding the development of Long Endurance Marine Unmanned Surface Vehicles for long term data collection
- Industry collaborations to develop an autonomous underwater vehicle (AUV) that can be launched and recovered from an Unmanned Surface Vehicle (USV) as well as another project to create a fully integrated autonomous surface and sub-surface survey system
- Funding the development of autonomous adaptive ocean sensing networks, a project that will enable the coordination of a suite of autonomous vehicles to work collaboratively and responsively to ocean features.

The RN are investing in a MAS fleet

of its own focusing on ASW, MCM and GEOINT. The work highlighted above has direct applicability in these mission areas.

### Marine X-Band Radar

Ship mounted Marine radars provide insights into ocean behaviour from distances of several km, giving wider context to the environment around a ship. It has been possible for sometime to map shallow water bathymetry and currents using radar from shore-based stations. However, a longstanding question from military and hydrographic communities has been whether such techniques can



be applied to radar data collected by moving vessels. [Presenting the possibility of mapping large areas of shallow or coastal seas prior to a vessel having to travel into potentially dangerous areas.]

Trial sets of radar data were recorded by the Canadian Forces Auxiliary Vessel Quest using a WAMOS radar digitiser connected to a DECCA navigation radar during deployments around Nova Scotia in 2008 and 2009. Geo-referencing corrections derived from the existing ship navigation systems were sufficient to allow the application of the existing depth inversion analysis designed for static radar installations.

This programme as mentioned impacts on GEOINT, MCM and Amphibious warfare.

## LAMP

Luminescence And Marine Plankton (LAMP) was a blue skies project funded by the MoD and NERC, which investigated several aspects of upper ocean bioluminescence including its molecular markers, spatiotemporal distribution and predictability. The project provided an operational extension to current UK capability to predict mesoscale phytoplankton distributions: predicting the distributions of organisms that are currently most relevant to an operational knowledge of the oceanographic environment.

LAMP benefited from NOC's world leading research into physical and biogeochemical oceanographic processes and its expertise in multidisciplinary approaches to assess the marine environment.

The LAMP programme has applicability in both ASW and NAD.



## Collaborative Opportunities

The NOC engages in a number of Defence related initiatives. We jointly fund development of innovative technologies for marine science with Dstl, collaborate with industry and academia on MoD funded opportunities and regularly engage key decision makers in the RN.

Through collaborating with the NOC on a Defence project you will have:

- Access to NOC facilities resources, expertise and data
- Access to efficient, authoritative and rigorous science research services, responsive to changing industry needs
- Opportunities to test software and data-products and access licences to use NOC information products
- Access to powerful tidal modelling software and extensive data sets through our Marine Data Products Team

## NOC Facilities

### Marine Robotics Innovation Centre

The National Oceanography Centre's Marine Robotics Innovation Centre provides additional resource and capability for working collaboratively with innovative companies which are developing technology for marine autonomous systems.

The centre also provides information about regulation and legislation, risk and reliability, communication, and control relating to marine autonomous systems.

### Rock Physics Laboratory

The Rock Physics Laboratory measures seismic and electrical properties on rock or sediment samples, saturated with different

pore fluids, under simulated *in situ* conditions of pressure and temperature. Our measuring capabilities include seismic velocities, attenuations and electrical resistivities, which can then be related to other rock and sediment properties such as mineralogy, porosity, permeability, oil-gas-water saturation and hydrate content.

### **British Ocean Sediment Core Research Facility (BOSCORF)**

BOSCORF provides specialist non-destructive logging facilities, measuring physical property and high-resolution geo-chemical data from cores. BOSCORF is the national ocean sediment core repository offering access to the most comprehensive suite of scanning,

logging, data management and visualisation facilities in the UK.

### **British Oceanographic Data Centre (BODC)**

The British Oceanographic Data Centre (BODC) is a national facility for looking after and distributing data concerning the marine environment. BODC maintains an extensive database of biological, chemical, physical and geophysical data, containing measurements in excess of 25,000 variables. BODC has unique experience of managing marine data collections and through the development of information technology, ensures that data are documented, stored and accessible to both public organisations and commercial companies.

If you are interested to discuss this opportunity, please email us at: [business@noc.ac.uk](mailto:business@noc.ac.uk) or call: 023 8059 6095

We look forward to hearing from you

