

# BIO-Carbon: NZOC science mission opportunity

## Context

NERC's Net Zero Oceanographic Capability (NZOC) programme aims to enable the adoption of new, carbon neutral technologies for ocean observing. Understanding how to most effectively use these new technologies and exploit new data sets is fundamental to their success. The BIO-Carbon NZOC science mission opportunity capitalises upon the improved reliability and capability of long range Marine Autonomous System (MAS) platforms, biogeochemical sensors and near real time data transmission, to allow a series of shore launched autonomous missions deploying the latest biogeochemical sensors to address the BIO-Carbon programme's research challenges.

## Funding

The BIO-Carbon NZOC science mission opportunity has a separate budget of £1M for access to NERC's marine facilities to support proposals submitted to the current BIO-Carbon call for proposals. This budget is exclusively for use to cover costs associated with autonomous deployments, including those associated with purchase or hire of additional sensors not available in the National Marine Equipment Pool (NMEP).

For this BIO-Carbon call for proposals, (in a change from the standard process) completion of the autonomous deployment application form (ADF) for the science mission will be undertaken by the Bio-Carbon Champion.

The final ADF plan for the science mission deployments will need to efficiently accommodate all aims of the awarded BIO-Carbon grants within the £1 million funding available. In extreme instances, NERC may ask principal investigators to adjust science plans for the science missions so that an affordable plan can be agreed, and grants can be awarded.

## Further Information

A webinar to give further details and to respond to questions is planned for 1500 on the 31st January. Please register [here](#).

All queries concerning the BIO-Carbon NZOC science mission opportunity should be directed to BIO-Carbon Champion Adrian Martin ([adrian.martin@noc.ac.uk](mailto:adrian.martin@noc.ac.uk)) in the first instance.

## Delivery

NERC envisage the science mission deployments will occur in the 2024/2025 NERC Marine Facilities Programme to coincide with the ship-based BIO-Carbon fieldwork. Deployments are expected to be undertaken in the NE Atlantic subpolar region over a maximum of a ~3 month period. NERC's Marine Autonomous and Robotic Systems platforms will be launched and recovered from a UK port (e.g. Plymouth, Oban or Lerwick) transiting to a primary work area within ~500km of the launch site (e.g. Rockall Trough, Faroe–Shetland Channel). Transiting times are included in the three month period.

## Vehicles

The heterogeneous fleet is envisaged to comprise some or all of:

- 3 x Slocum underwater gliders
- 2 x 1500m depth rated Autosub Long Range (ALR1500) AUVs.

ALR1500 are medium size underwater robots (3.5m long and 700kg dry mass) capable of travelling roughly 50km/day for multi-month deployments. Being substantially larger than Slocum gliders they are able to carry a larger number of payload sensors. ALRs are propelled by a propeller rather than a buoyancy engine so are able to operate at constant depth or constant altitude as well as profiling through the water column.

National Marine Facilities (NMF) are exploring options to also enable access to a long range uncrewed surface vehicle. Further details will be released if this becomes an additional option.

## Sensors

The sensor packages for the vehicles will be agreed with the successful projects subject to budget, space and power constraints. It will not be possible to fit all sensors to all platforms.

Slocum gliders can be requested from NMF with the following standard sensors available within the NMEP:

- CTD
- Dissolved Oxygen
- ADCP
- Microrider Turbulence Probe
- PAR
- Fluorescence

Additional non-standard sensors may be available for Slocum gliders subject to funds being available within the £1M budget:

- Lab on Chip (Total Alkalinity\*, DIC\*, pH, Nitrate/Nitrite, Phosphate, Silicate, Iron) - maximum 1 parameter per vehicle
- UVP6<sup>+</sup>
- User supplied sensors

ALR1500 AUVs can be requested from NMF with the following standard sensors:

- CTD
- Dissolved Oxygen
- ADCP (up/down)
- Microrider Turbulence Probe
- Wetlabs ECO BBRTD - turbidity
- Wetlabs ECO FLCDRTD - CDOM
- Wetlabs ECO FLNTURTD – fluorescence and turbidity
- Wetlabs Triplet Puck

Additional non-standard sensors may be available for ALR1500 vehicles subject to funds being available within the £1M budget

- Scientific Echo sounder (EK80)<sup>+</sup>
- UVP6<sup>+</sup>
- RoCSI environmental sampler\* (suitable for e.g. eDNA sampling)
- PAR
- Lab on Chip (Total Alkalinity\*, DIC\*, pH, Nitrate/Nitrite, Phosphate, Silicate\*, Iron\*)
- Primary productivity
- User supplied sensors

\*These sensors will be provided by NOC's Ocean Technology Engineering Group (OTEG) and their costs will be included in the £1M budget.

\*NMF are hoping to purchase these sensors for the NMEP and would expect them to be available as standard sensors.