**Deep in the Atlantic Ocean: high-tech sensors to gather long-term biogeochemical data**

**Press release: June 2017**

The crew of the Royal Research Ship Discovery, a scientific research vessel of the United Kingdom, recently deployed high-technology biogeochemical sensors onto existing 'Overturning in the Subpolar North Atlantic Program' (OSNAP) moorings in the Rockall Trough, a major deep-water area in the North Atlantic Ocean. By taking continuous measurements in this important yet remote location, the sensors will contribute much needed long-term biogeochemical data to further our understanding of the interactions occurring in our ocean.

The North Atlantic Subpolar Gyre, located in the North Atlantic subpolar region, is a large system of rotating ocean currents which forms a key component of the global climate system. In this region, the ocean warms the atmosphere (keeping northern Europe relatively mild) and atmospheric carbon dioxide is drawn into the deep ocean. The flow of energy and elements through the North Atlantic Ocean ultimately drives patterns of marine biodiversity at the ocean basin scale (www.ukosnap.org).

OSNAP is an international program designed to provide a continuous record of physical ocean properties in the subpolar North Atlantic through an array situated on moorings which cross the Atlantic. The newly deployed equipment consists of sensors to additionally measure levels of nutrients, oxygen and pH in the Rockall Trough. A Remote Access Sampler (RAS) will simultaneously collect samples of seawater to validate and complement the automatically recorded data from the sensors.

As Professor Stuart Cunningham, from the Scottish Association for Marine Science (SAMS) explains, adding these new sensors to the existing infrastructure is an important step: "So far, only the physical parameters of ocean circulation data can be measured at the OSNAP array. Combining this data with the new biogeochemical measurements will, for the first time, give us a long time-series of changes of ocean currents, nutrient concentrations and more. This will be a big advance in our ability to understand the interactions of ocean physics with ocean ecosystems, particularly the cold-water coral systems of the Atlantic."

This work was undertaken as part of the multidisciplinary EU-funded Horizon 2020 ATLAS project which aims to improve our understanding of the complexity of deep-sea ecosystems, and to predict future shifts and vulnerabilities of these ecosystems and their associated species. For more information on ATLAS, please visit: www.eu-atlas.org.

The biogeochemical sensors that have been deployed are not new developments in themselves. However, as Prof Cunningham explains, "We are using them in a novel way. Combining biogeochemistry on this large physics array is ground breaking! By adding new observations of biogeochemical properties to existing large scale observing infrastructures we can make

biogeochemical measurements at broader scales, matching the current physical observations. As a result, the possibilities and implications for understanding the critical processes occurring in our oceans are vast."

Implementing key agreements to protect biodiversity and support adaptive ocean management requires improved knowledge on the Atlantic Ocean basin scale. ATLAS will contribute by enhancing the purpose-built trans-Atlantic array to deepen our understanding of the importance of ocean currents. Improved knowledge gained through the use of this unique basin scale infrastructure will help predicting ecosystem tipping points and understanding the link between ocean currents, species distribution and connectivity. This will, in turn, drive forward an ambitious new decision support tool for integrated Maritime Spatial Planning (MSP) of the Atlantic Ocean.

**For more information on the sensors please contact:**
Prof Stuart Cunningham: Stuart.Cunningham@sams.ac.uk

**For more information on the ATLAS project, please visit: www.eu-atlas.org, follow @atlas_eu on Twitter or email Dr Claudia Junge (claudia@aquatt.ie).**

**Notes for Editors**
**ATLAS** is a research and innovation action funded under the European Union's Framework Programme for Research and Innovation, Horizon 2020, grant No 678760. It is the largest integrated study of deep Atlantic ecosystems ever undertaken. The four-year project was launched in May 2016 and has a total budget of €9.1 million.

Led by the University of Edinburgh (Scotland, UK) ATLAS brings together 24 partners (and one linked third party) from 10 European countries, the USA and Canada. It consists of 12 universities, four national research institutes, five small and medium sized enterprises (SMEs) and four government agencies. AquaTT (Ireland) is the project dissemination partner.

SAMS, as the ATLAS partner in charge of the sensor deployment, have also been partly funded by the Horizon 2020 AtlantOS project to instrument part of the OSNAP array with these biogeochemical sensors, to contribute to exciting new work on our deep ocean.

The Rockall Trough is a major deepwater area which lies to the west of Ireland and the United Kingdom. Enhanced hydrographic mixing, upwelling and down-welling around the adjacent Rockall Bank may give rise to localised and specialised biological communities such as sponge aggregations, *Lophelia* reefs, and coral gardens. The Rockall Bank supports large and productive stocks of fish, and has been proposed as an "Ecologically and Biologically Significant Area" under the Convention on Biological Diversity.

The existing OSNAP moorings run across the Atlantic Ocean, from Canada to Greenland and from Greenland to Scotland. This array measures the circulation and heat and fresh-water fluxes to better

understand the role of the Atlantic overturning circulation in Earth's climate. For more information, visit: www.ukosnap.org/project-information


*CAPTION: Testing new oxygen sensors (combined with sensors to measure temperature, salinity and pressure) at SAMS' Scottish Marine Robotics Facility, alongside two of its gliders ©Estelle Dumont.*


*Caption: John Beaton and Sharon McNeill (both from SAMS) setting up the automated water sampler on board RRS Discovery ©Penny Holliday (NOC Southampton)*