First Hydrographic Survey in Cumberland Bay, South Georgia

The team onboard RRS *Discovery* recently completed 104 casts as part of the ORCHESTRA project, measuring conductivity, temperature and depth along three sides of the Scotia Sea and into the Weddell Sea, as well as conducting the first hydrographic survey in the western arm of Cumberland Bay, South Georgia.

By measuring where and how much of properties such as heat are stored in the Southern Ocean, and how they are exchanged between different ocean basins, these hydrographic surveys help enhance our understanding of the role of the Southern Ocean in absorbing and storing heat and carbon.

Two Main Hydrographic Sections

NOC scientist Dr Yvonne Firing, who led the research expedition, said: “The two main hydrographic sections of this research expedition are part of a long-running data set of physical properties of the Southern Ocean, such as temperature, salinity and currents. These long-term measurements are rare in the Southern Ocean, and are important for enabling us to distinguish trends from variability in deep ocean temperature, as well as what drives them.

“As time goes on, we will add new types of measurements, which can then take advantage of the context and knowledge provided by the existing data sets. Some may be built into new ongoing time series themselves. One of my personal sightseeing highlights of the expedition was an iceberg that appeared green, rather than blue, because of where it formed and the different index of refraction of salty ice", Dr Firing said.

The scientists onboard also sampled microplastics in the water, oxygen and nutrient isotope ratios, and environmental DNA. These measurements will reveal insights into sea ice and glacial ice melt, as well as the marine life present.

About the ORCHESTRA Project

ORCHESTRA is a NERC-funded long-term science programme that involves scientists from many NERC centres. This ambitious five-year project began in spring 2016 and will use a combination of data collection, analyses and computer simulations to radically improve our ability to understand and predict the circulation of the Southern Ocean and its role in the global climate, with particular emphasis on the way that the Southern Ocean absorbs and stores heat and carbon.

Schematic of the ORCHESTRA Fieldwork

ORCHESTRA is led by BAS, with NOC playing a major role, particularly in the measurement and modelling aspects of the project. These pages focus on NOC’s role, with information about the NOC staff and points of contact, and links to current projects that may be of interest as well as some of NOC’s historic work in the Southern Ocean that informs our current research.

Range of Models

The intensive five-year observational programme will involve ORCHESTRA scientists undertaking 12 expeditions on research ships in the Southern Ocean, with US collaborators performing a 13th. Ten of these expeditions will be annual north/south transects across the Antarctic Circumpolar Current, to evaluate how the ocean changes from one year to the next. The other three will form ‘boxes’ around the Atlantic sector of the Southern Ocean so that budgets can be performed. All these data, along with historical measurements, will be combined and analysed together. The observations will be used to inform and test a range of models.