

# Open access datasets from the Antarctic Circumnavigation Expedition

Jen Thomas, Swiss Polar Institute (Switzerland), [jenny.thomas@epfl.ch](mailto:jenny.thomas@epfl.ch)  
Carles Pina Estany, Swiss Polar Institute (Switzerland), [carles.pinaestany@epfl.ch](mailto:carles.pinaestany@epfl.ch)

## Antarctic Circumnavigation Expedition (ACE)<sup>1</sup>

During the austral summer of 2016/2017, the R/V Akademik Tryoshnikov embarked on an ambitious voyage around Antarctica. In December 2016 it set off from Cape Town, in South Africa making stops at Marion Island, Crozet Islands and Kerguelen Islands, then passing by Heard Island before completing the first leg of its journey in Hobart, Australia. The second leg of the journey saw ACE head directly to the Mertz Glacier, followed by the Balleny Islands, Scott Island, Mount Siple region, the rarely visited Peter I Island and the Chilean islands of Diego Ramírez before a short stop in Punta Arenas, Chile. Final stops were made at South Georgia, the South Sandwich Islands and the remote island of Bouvetoya before returning to Cape Town; a journey of 33,463 km over a period of 90 days.

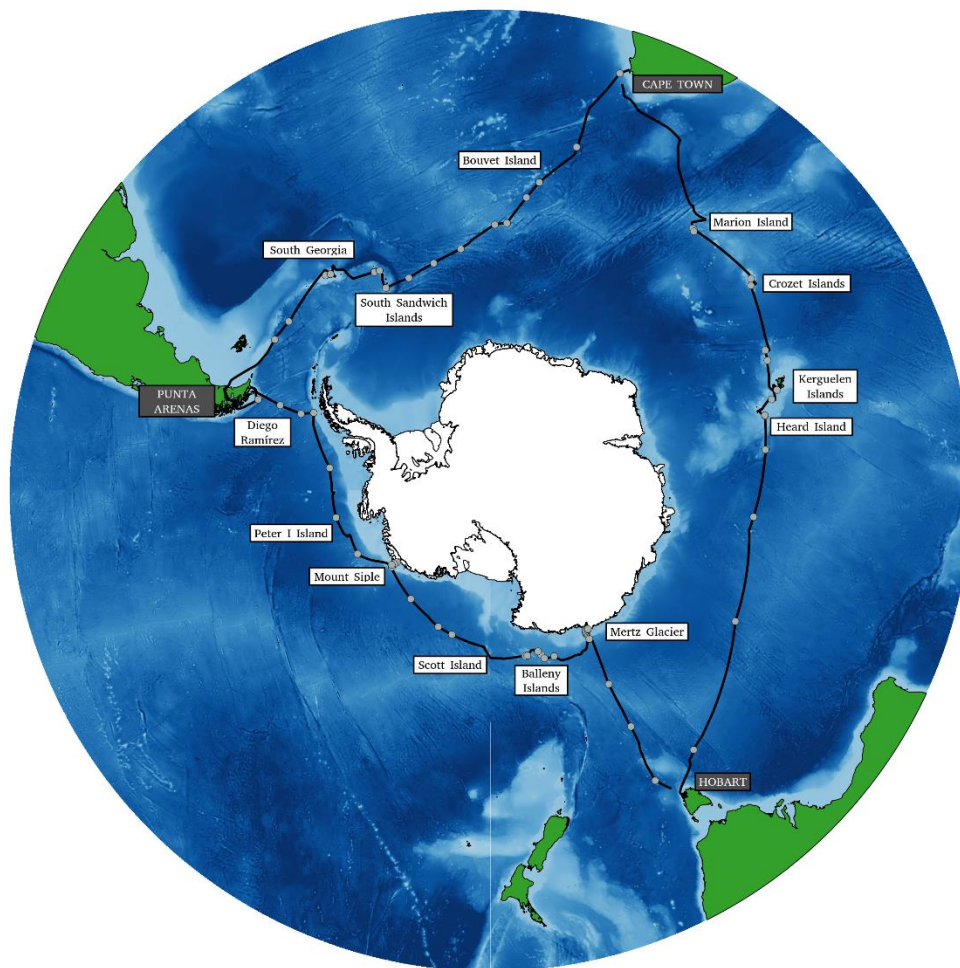


Figure 1: Track and sampling of the Antarctic Circumnavigation Expedition

With more than 150 scientists representing 21 countries participating in the expedition, ACE was an international expedition that brought together twenty-two distinct science projects which collected almost 30,000 air, water and biological samples and over 20 TB of data.

Here we present an overview of the data and samples that were collected during this expedition and where they can be accessed, as well as the tool that was used to record the expedition metadata on board.

Figure 1 displays the oceanographic sampling stations where CTD deployments for profile data and water sampling, neuston and bongo net deployments for micro-plastic sampling, profiles of optical properties and benthic organism sampling took place. To complement these observations continuous physical parameters of the seawater were recorded from the on-board Ferrybox and water samples taken from the underway line every three hours. Specific sampling sites on the upwind and downwind sides of island groups provided an interesting insight into island effects.

Simultaneous atmospheric and meteorological measurements were made throughout the cruise, providing a unique opportunity to complement the circumpolar oceanographic measurements.

### **Open source, on-board data management tool**

During ACE a Python and Django tool, science-cruise-data-management<sup>2</sup>, was built to record all sample and data collection events, metadata and provide simple data visualisation, reports and tools for researchers on board. This tool still today provides a very useful interface for checking the metadata behind the datasets collected on board, forming the basis of all data publications arising from ACE.

### **Open, discoverable and re-usable data**

Over 80 datasets have been published as of mid 2020, 70 % of which are open access. As further sample processing and data analysis take place over the coming months and years, the number of openly and freely accessible datasets will increase.

A Digital Object Identifier (DOI) can be used to identify and cite published datasets, the majority of which can be found in the Zenodo data repository<sup>3</sup>. Datasets are also discoverable using Google dataset search and repositories that harvest DataCite metadata<sup>4</sup> (such as DataCite themselves and Mendeley Data).

In some cases, data are being worked on and published in RENKU<sup>5</sup>, an open-source tool that captures dataset provenance, thereby improving reproducibility. In addition, these datasets will be accessible through the RENKU platform, providing them to a wider user base.

Data will be integrated over the coming months into the EMODnet Physics web portal<sup>6</sup>, consequently also making it discoverable through the Southern Ocean Observing System (SOOS) map<sup>7</sup>.

## **References**

<sup>1</sup> Walton, D.W.H and J. Thomas. (2018). Cruise Report - Antarctic Circumnavigation Expedition (ACE) 20th December 2016 - 19th March 2017 (Version 1.0). Zenodo. <http://doi.org/10.5281/zenodo.1443511>

<sup>2</sup> Zenodo. (2009-2017). CERN. <https://zenodo.org>

<sup>3</sup> DataCite Metadata Working Group. (2019). DataCite Metadata Schema for the Publication and Citation of Research Data. Version 4.3. DataCite e.V. <https://doi.org/10.14454/f2wp-s162>

<sup>4</sup> EMODnet Physics projet. European Marine Observation and Data Network. [www.emodnet-physics.eu/map](http://www.emodnet-physics.eu/map)