

## ACE completes its voyage around Antarctica

**The Antarctic Circumnavigation Expedition (ACE) reached Cape Town on Sunday, 19 March, completing its three-month voyage around the great white continent. But the scientific adventure has only just begun: it's now time to analyze all the data that was collected. This will improve our understanding of the effects of global warming on the Southern Ocean and the broader implications for our planet as a whole.**

On Sunday, 19 March, the Antarctic Circumnavigation Expedition (ACE) reached Cape Town, South Africa. This marked the end of its trek around the southernmost continent, which began in this same port on 20 December 2016. The expedition was organized by the Swiss Polar Institute (SPI) and carried by the *Akademik Treshnikov*, a Russian research ship. By the end of the three-month voyage, a total of some 150 researchers had carried out 22 projects, selected from 93 proposals.

The overall aim of the projects, which covered fields such as oceanography, climatology and biology, was to learn more about the Southern Ocean. This will help scientists predict how the climate will change in the coming years. The Antarctic region is crucial to the planet's health for a number of reasons. First, it serves as a major carbon sink. And in addition to influencing weather conditions in the southern hemisphere, the Antarctic continent plays a key role in how the oceans circulate around the world.

"This expedition is a first in several respects," explained David Walton, the chief scientist on board. "Until now, no one had ever gathered data over an entire season on one expedition or simultaneously conducted land, ocean and atmospheric research. Taken together, these projects will give us a fuller picture of Antarctica and the Southern Ocean."

### Land and ocean research

The researchers looked at a wide range of issues in their effort to identify the effects of climate change. For example, data on how air particles form (aerosols) will be used to study the interaction of the ocean and atmosphere in new ways. And the water-column readings that were taken regularly throughout the expedition will provide researchers with detailed information on chemical changes in the ocean, including salinity levels and whether certain metals are present in the water.

Samples gathered during stops on a number of Sub-Antarctic islands – Marion, Crozet, Kerguelen, Balleny, Scott, Peter I, Diego Ramirez, South Georgia, South Sandwich and Bouvet – will provide key insights into how plant and animal life there evolves and adapts to extreme environments. And data collected by sonars capable of detecting distant sounds will

be used to estimate the blue whale population. The sonars showed that the ship was never far from these creatures.

Other researchers observed the effect of waves on ice formation and the shape of island coastlines. This had never before been looked at in depth and will teach us more about the interplay between the islands and the ocean. Ice samples taken on the islands and on the mainland will enlighten us with valuable details on our climate's history. And samples of phytoplankton, which are at the bottom of the food chain, will show how the various regions react to ocean warming.

The ubiquity of microplastics, even in the most remote locations, was a troubling discovery. "There was little in the way of plastic shards, but we found synthetic fibers – mainly the result of washing clothes – at all the sites we visited," said Peter Ryan, the researcher in charge of this project. It is not yet known how this type of pollution will affect the food chain or, more specifically, large sea birds, which were also observed and counted during the expedition.

### **An ambitious international project**

The expedition provided an opportunity for researchers from 18 different countries to work together. They broke down cultural barriers and worked across fields in their quest for significant new knowledge. Their task was made easier by generally mild weather.

"Running so many projects was very ambitious, and it wasn't always easy to meet everyone's needs," said Frederik Paulsen, philanthropist, polar explorer, and the chairman of ACE Foundation. "Overall, it was a great success. But things are really only getting started: we have years of work ahead of us to analyze all the data that was collected."

The researchers have two years to publish their findings. The data will then be made available to the wider scientific community. But several events are planned before then. A symposium on polar issues will be held in Crans-Montana, Switzerland on 11 and 12 September, and the project leaders have a follow-up meeting planned for the spring of 2018.

### **Press pack:**

<http://bit.ly/ACEexpedition>

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#### ACE in figures:

- Samples taken: 26,637
- Data-collection opportunities: 3,106 in 96 different places
- Liters of water collected with the rosette (an instrument for analyzing ocean water): 3,916
- Number of Agassiz trawls: 64
- Number of radiosondes released: 90
- Number of helicopter hours flown in 19 flying days: 107
- Number of landings in 14 different locations: 494
- Kilometers traveled: 33,565
- Number of researchers on the first leg: 75, of which 54 scientists
- Number of researchers on the second leg: 80, of which 55 scientists
- Number of researchers on the third leg: 80, of which 55 scientists
- Number of researchers participating in all three legs: 31, of which 16 scientists
- Number of researchers participating in two of the three legs: 14, of which 12 scientists
- Total number of researchers: 159
- Number of research institutions represented: 73
- Number of countries represented on board (scientists only): 23
- Crew of Akademik Treshnikov: 60

#### Some facts and important firsts:

- Number of island groups visited: 12
- ACE is the first expedition to do such a journey for science for at least 60 years
- Microplastics were discovered all around Antarctica, even in the most remote areas.
- This was the first scientific expedition of this size in at least 60 years.
- Samples were taken up to 3,000 meters below the ice.
- The air on the continent turned out to be cleaner than air in laboratory cleanrooms.
- 3D models were made of Young, Buckle and Sabrina Islands (part of the Balleny Islands).
- Ice cores were taken on Young, Siple, Peter I and Bouvet Islands.