

# KEEPING THE POLES CONNECTED

The arctic territories contain a wealth of information about the Earth's weather systems. Learn how the Antarctic Circumnavigation Expedition (ACE) made startling discoveries about the region with the help of Iridium.

#### THE CHALLENGE

Polar expeditions are underappreciated yet vital scientific undertakings. Conditions at the poles both reflect and affect climate across the rest of the globe, making understanding the Antarctic a priority for climate and environmental scientists. In the words of David Walton, chief scientist on the Antarctic Circumnavigation Expedition (ACE), the first such expedition organized by the newly created Swiss Polar Institute, "Antarctica is a remote, challenging continent, and understanding it is a crucial part of the future of everyone on Earth."

ACE was a three-month voyage through the Southern Ocean, circling Antarctica aboard the Russian-flagged research vessel (and icebreaker) "Akademik Tryoshnikov." ACE's mission was to enhance international relations and collaboration between countries, as well as motivate the next generation of explorers and scientists in polar research. The expedition conducted 22 different research projects in climatology, glaciology, oceanography, biology, and biochemistry.

The Tryoshnikov set sail from Cape Town, South Africa in December 2016, and returned in March 2017. The voyage comprised three legs,

with the ports of Hobart, Australia and Punta Arenas, Chile serving as waypoints. The team visited several Southern Ocean islands as well as the continent of Antarctica on each leg.

Mounting such an ambitious expedition requires a robust data solution. Keeping a team of scientists from Switzerland, Spain, France, the United Kingdom, Russia, South Africa, Canada, Australia, and the United States connected to their home research teams — and their friends and families — during four months at sea presented a daunting challenge. The extreme conditions and high latitudes of the Southern Ocean would make communicating with geostationary satellites difficult.

Furthermore, people who are not used to working in harsh conditions at remote sites are often ill-prepared for the bandwidth challenges that come with these conditions. Home internet connections are often more than 40-times faster than what satellites can provide.

#### THE SOLUTION

ACE organizers turned to Iridium to outfit the Akademik Tryoshnikov for the voyage. The unique design of the Iridium<sup>®</sup> satellite constellation makes it the most reliable mobile satellite service for such expeditions. The network of 66 cross-linked satellites in polar orbit blankets the entire globe in signal. This means that even when travelling at the extreme latitudes where geostationary satellite signals are weak or cannot reach, Iridium provides connectivity.

And the L-Band signals Iridium uses don't require a large and expensive antenna that must stay pointed at a satellite to work. Even in the heavy seas common in the Southern Ocean, Iridium's signal gets through.

Armed with that knowledge, the team installed two Iridium Pilot<sup>®</sup> terminals on the ship, providing a total of 256 kbps of bandwidth. While

## COMPANY

···:, iridium<sup>®</sup>

ACE was the first project carried out by the Swiss Polar Institute (SPI), dedicated to researching the Earth's poles and other extreme environments with a decidedly international mission. From December 2016 to March 2017, worldwide scientific teams took part in the expedition to expand our understanding of the White Continent by conducting various research projects.

## CHALLENGES

- Scientists from multiple countries needed a robust voice and data solution during the expedition to stay connected with home research teams and report on observations and experiment status
- Researchers needed reliable connectivity on land and at sea to communicate with friends and family

### BENEFITS

- Iridium provides connectivity even in the extreme latitudes where geostationary satellite signals are weak or cannot reach
- Iridium uses L-Band signals that don't require a large and expensive antenna
- Iridium's L-Band frequency is unaffected by weather conditions



no one would be streaming the latest blockbuster to their laptops, the solution provided more than enough bandwidth to send and receive data collected during experiments. The team also restructured and optimized their email system to ensure messages got through efficiently, and in other cases relied on messaging apps to communicate.

The ship's two helicopters were outfitted with tracking devices from Iridium partner Spidertracks, enabling the crew to know where the aircraft were at all times. Scientists who went ashore on the many islands carried Iridium GO!\* devices with them, which enabled them to use their own smartphones to communicate with the ship, with other crews, and with their home labs, as well as marking their positions in case of emergency while ashore.

Lastly, the six telephone lines provided by the Iridium Pilot terminals allowed researchers and the ship's crew to speak with their families on the other side of the globe at any time.



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#### THE IMPACT

Using Iridium technology to stay connected, ACE collected reams of data — 26,637 individual samples including 3,916 ocean water samples, ice cores, CO2 levels, and phytoplankton samples. The expedition was able, according to chief scientist Walton, "to do things which most expeditions don't get a chance to do, like see islands without clouds and land high up to collect ice cores," including what he believes to be the first cores from the portion of the Antarctic continent, on the Mertz Glacier, where the team went ashore.

Interesting, even startling, data is already coming out of the expedition, such as the discovery that the Antarctic atmosphere is cleaner than a laboratory clean room.

Scientists on the expedition used Iridium to maintain a blog describing their experiments and initial observations. Ornithologist Peter Ryan of the University of Cape Town blogged extensively while

## Iridium technology aided ACE to do things which most expeditions don't even get a chance to do.

David Walton, chief scientist

on the voyage, keeping readers apprised of the numbers of different birds he observed on islands along the way. Ryan discovered that the population of King Penguins on one of the islands in the Crozet archipelago has declined by approximately 1 million birds, losing three-quarters of its previously observed population. Ryan has not determined if those birds died or migrated to another colony, but he intends to publish his conclusion.

"The future of the expedition," Walton said, "is of course to make the most of the data and the samples we've got, that lead up to a series of scientific papers that record for everybody the things we've discovered down here."  $\star$ 

