

An Integrated Curriculum For The Washington Post Newspaper In Education Program

Antarctica Explored

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its highs and lows



NATIONAL GEOGRAPHIC EXPLORER-IN-RESIDENCE ENRIC SALA

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What Scott learned

He lost the race to the South Pole and died on the way back. But the knowledge amassed by his team has been used by scientists for 100 years.

BY ERIC NILER

Special to The Washington Post

A century ago, British naval Capt. Robert F. Scott and four members of his polar expedition trudged across the forbidding Antarctic landscape, "man-hauling" sleds across 800 miles of ice and snow in a desperate push to make it back to their base.

The Englishmen were suffering from frostbite, malnutrition, dysentery and probably heavy hearts: They were coming home with the knowledge that a competing expedition, led by Norwegian Roald Amundsen, had beaten them to the South Pole.

But halfway back to their base, Scott did something quite extraordinary. He stopped at the foot of a mountain range and sent one of his men to collect some unusual rocks.

"I decided to camp and spend the rest of the day geologising," Scott wrote in his journal on Feb. 8, 1912. "It has been extremely interesting. ... (Edward A.) Wilson, with his sharp eyes, has picked several plant impressions, the last a piece of coal with beautifully traced leaves in layers."

The team loaded 35 pounds of these fossils onto their already packed sleds and pushed off down the Beardmore Glacier. It was a treacherous route across



NATIONAL SCIENCE FOUNDATION
Upper Beardmore Glacier photographed by Comdr. Jim Waldron USNR (ret.) during Austral summer 1956-57. On this glacier Scott and his men loaded 35 pounds of fossils onto their packed sleds.

deep crevasses, and one of the men — Petty Officer Edgar Evans — fell twice. He died two weeks later from injuries and exposure.

By mid-March, the remaining four men were running out of food and water, and their fuel supplies were dangerously low. On March 17, Capt. Lawrence Oates left their encampment and wandered off by himself; his famous last words, recorded by Scott, were: "I am just going outside and may be some time."

The last three men tried for two weeks to push forward but were forced to remain inside their tent, buffeted by a storm. Scott's final diary entry is dated

March 29, its last words referring to his family: "For God's sake, look after our people." Nine months later, the bodies of Scott, Wilson and Lt. Henry Bowers were found frozen in their tent, 100 miles from their permanent base.

And those fossilized plants were eventually sent back to London.

So how to judge Scott and his expedition? As the 100th anniversary of the "Race to the South Pole" is marked this winter, it reinvigorates a long debate over Scott's judgment and preparation. Was he a victim of bad

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SCOTT POLAR RESEARCH INSTITUTE

A photo from October 1911 shows Capt. Robert F. Scott writing in his journal shortly before he and four of his men set out for the South Pole. They reached their destination on Jan. 17, 1912, only to discover that they were not the first to get there.

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luck and unusually cold weather, as he wrote in his diary, or bad planning and dumb decisions, as some historians have written?

One thing experts seem to agree on: Scott's British Antarctic Expedition of 1910 to 1912 laid the groundwork for understanding climate, paleohistory, oceanography and biology in the most remote continent on the planet.

"Scott's legacy is really science," said Edward Larson, historian and author of *An Empire of Ice: Scott, Shackleton, and the Heroic Age of Antarctic Exploration*. Amundsen's expedition, he said, "was a mere dash to the pole. But Scott's expedition was remarkably successful. He ended up producing a composite picture of what Antarctica was all about."

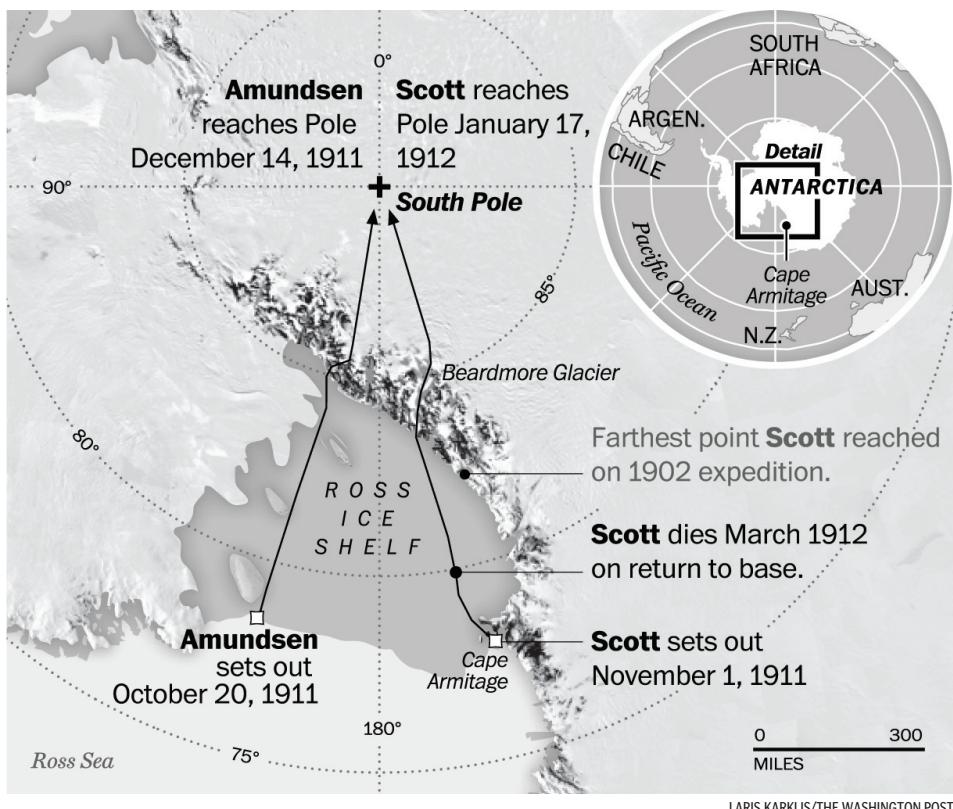


The two expeditions could not have been more different.

Amundsen, who turned his attention to Antarctica only after he learned that somebody else had beaten him to the North Pole, brought 19 men aboard his ship, the *Fram*. They were selected for their ability to ski fast, survive and navigate across the featureless Antarctic landscape, and to run sled dogs. Amundsen used only dog teams

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because he believed they were the best form of transportation, something he had learned from the Native peoples he encountered while exploring the Arctic years before.

In contrast, Scott's crew of 65 men aboard the *Terra Nova* included physicists, meteorologists, zoologists, glaciologists and a photographer with a complete darkroom. The men camped at several locations during the year and a half they spent in Antarctica. To traverse sea ice, glaciers and the vast ice sheet that covers much of Antarctica, Scott brought not only dog teams but also four motorized tractors (one of which broke through the ice and sank; the others broke down) and several dozen Siberian ponies (whose hooves sank in the snow).

Before sailing from London in June 1910, Scott announced to the world that he was headed south to find the pole. Young men clamored to join his expedition, many paying a thousand pounds to join the adventure. By the time Scott reached Australia in October, the expedition had turned into a race: He received a telegram from Amundsen — who had thus far kept his plans secret — saying that he, too, was sailing to the continent at the bottom of the planet.

Both teams reached Antarctica in January 1911. While Amundsen spent all his time preparing for a lightning-fast dash to the South Pole once the summer began in November, Scott was busy launching scientific side trips, including a geology trip to Antarctica's Western Mountains and another to collect emperor penguin eggs in the animal's winter rookery.

"Scott was a British gentleman, and at

that time science was part of the standard British expedition," Larson said. "He was determined to lead it in a way that facilitated the work of scientists."

Scott's expedition certainly produced scientific results:

- Shipboard oceanographic measurements on the *Terra Nova* led to the discovery that marine currents, colder than the surrounding water, circle the Antarctic continent. Since then, scientists have concluded that these currents form a natural barrier that has allowed Antarctic marine life forms to develop along their own evolutionary paths. Scott's scientists at both the winter quarters on Ross Island and on ship voyages also pulled up dozens of examples of strange, previously unknown sea life.

- Weather balloons launched daily by meteorologist George Simpson and other members of the expedition recorded temperature, wind and barometric pressure data that scientists are still using today as a base line to measure climate change. These balloons also measured the high-altitude winds that circle the Antarctic continent and since then have been found to affect weather around the globe. To expand the temperature data, Simpson assigned a night watchman to take readings at midnight as well as noon.

- Before leaving base camp for the pole, Scott and three other men explored the Dry Valleys along the western Antarctic coast. This two-week, 150-mile "jolly excursion," as one man described it, brought back fish fossils and rocks that gave clues to the continent's early history. Scott also made the first measurements of the movement of the region's glaciers using flags that had been planted in the ice a year earlier.

- Physicist Charles Wright made detailed studies of Antarctic ice sheets, how sea ice forms and how the air and

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STEVE ROOF/NATIONAL SCIENCE FOUNDATION

"I decided to camp and spend the day geologising. ... [Edward A.] Wilson, with his sharp eyes has picked several plant impressions, the last a piece of coal with beautifully traced leaves in layers." AE

Robert Scott, in his journal, February 8, 1912

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snow together form ice crystals on different structures. He also reexamined the nature of icebergs, according to Larson, and how they break off from glaciers moving slowly from the polar ice cap toward the ocean.

- Scott allowed three men to travel 70 miles each way across Ross Island to retrieve the eggs of the emperor penguin during the midwinter of 1911. It was a harrowing trip that zoologist Apsley Cherry-Garrard wrote about in *The Worst Journey in the World: Antarctic 1910-1913*. The eggs helped biologists figure out the life cycle of this rugged animal.

Years later, studies on the bird's embryos disproved a theory that these penguins were descended from lizards.



In November 1911, Scott left from Cape Evans for the 800-mile trip to the South Pole. Five men made the final push and arrived on Jan. 17, 1912 — only to find a Norwegian flag and a message from Amundsen, who had gotten there on Dec. 14. Then Scott and the four others headed back on that final, doomed journey.

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In the Know

Ascidian
Barometric pressure
Catabolic winds
Coal
Compass
Crevasses
Crystallized chemicals
Currents
Fossils
Geologising
Marine life
Microscope
Parasites
Protozoa
Rookery
Specimen
Weather balloon

**Careers
on the Expedition**

Biologist
Botanist
Cook
Geologist
Glaciologist
Meteorologist
Oceanographer
Photographer
Physician
Physicist
Sailor
Zoologist

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DEREK ADAMS/NATURAL HISTORY MUSEUM

Specimens collected by Scott's team include these starfish-like brittle stars.



NATURAL HISTORY MUSEUM

Emperor penguin eggs were gathered on one of Scott's scientific side trips.

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When the surviving crew of the *Terra Nova* sailed back to England in 1913, the ship was carrying 40,000 specimens — rocks, corals, freshwater algae, sponges, mollusks, petrels, microbes, worms, lichens, fossilized fish, mummified seal skulls — none of which had been collected before.

The fossils that Scott and Wilson picked up in the weeks before they died turned out to be *Glossopteris*, an extinct fern that had previously been identified in India, Australia, Africa and South America. That chance find — when examined years later by geologists — proved that Antarctica was once part of the super-continent Gondwana, which broke up 180 million years ago.

The fossils had been found alongside the bodies of Scott and his men.

Scott's scientific legacy is the subject of an exhibit opening Jan. 20 at the Natural History Museum in London. "Scott's Last Expedition" features hundreds of items, including scientific instruments such as microscopes and compasses, the specimens they collected, the iconic black-and-white photographs taken of the expedition by Herbert Ponting, and original diaries.

"Scott's expedition was the broadest and the biggest scientific program at the time," said curator Elin Simonsson. "This is the first time in a hundred years that the artifacts and the specimens they collected have been reunited to tell the story of the expedition." ■

Geography

Antarctica
Argentina
Australia
Beardmore Glacier
Gondwana
New Zealand
Ross Ice Shelf
Ross Island
Ross Sea
South Africa
South Pole
Tasmania

Places

Base camp
Darkroom
Kennel
Laboratory
Pantry
Shipboard
Sled
Supply depot
Tent

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QUESTIONS TO CONSIDER

He lost the race to the South Pole but made discoveries for science

As two polar expeditions are commemorated, historians, scientists and the general public are considering the success and failure of both. In the one hundred years since British naval Capt. Robert F. Scott and Norwegian explorer Roald Amundsen set their sights on the South Pole, who has had a lasting influence?

Eric Niiler in his article, “What Scott learned: He lost the race to the South Pole and died on the way back. But the knowledge amassed by his team has been used by scientists for 100 years,” focuses primarily on the Scott expedition. Read the article and answer the following questions.

1. Locate Antarctica on a map. Which is the country nearest to this continent? What other countries are closest to Antarctica?
2. As you read the article, locate these additional places: Ross Ice Shelf, Ross Island, Beardmore Glacier, the South Pole and the location where the remains of Capt. Scott, Edward Wilson and Lt. Henry Bowers were found.
3. What were the reasons that Roald Amundsen and Capt. Robert Scott were attempting to reach the South Pole?
4. In the first two paragraphs of the article, underline adjectives and adverbs and circle verbs. What attitude is emphasized through the word choice?
5. The third paragraph begins with “but.” What does this word signify? The quotation from Scott’s journal (the fourth paragraph) helps readers to understand Scott’s action in these circumstances. Why do you think Scott made the stop?
6. Create a timeline of the Scott expedition, beginning January 1911.
7. Compare and contrast the expeditions of Amundsen and Scott.
8. Niiler states that experts seem to agree Scott’s expedition of 1910-1912 “laid the groundwork for understanding climate, paleohistory, oceanography and biology in the most remote continent on the planet.” Select two of these areas of study and give examples of discoveries made by Scott and his team.
9. Al Fastier, program manager for the New Zealand Antarctic Heritage Trust, states that Scott “wanted to be the first to the pole and wanted to do a lot of good science. He was a product of his time.” To what might Fastier be referring in the phrase “product of his time”? Can you give examples of explorer-scientists from the first half of the 20th century?
10. Fastier also states, “The heroic era was the last of a very special time. That’s when people went out and they really pushed the boundaries, and we really don’t do that today.” Do you agree with Fastier’s evaluation of today’s expeditions? Agree with him, disagree with his conclusion or qualify the extent to which you agree or disagree with examples.

Name _____ Date _____

Commemorate the Scott Expedition

You have been asked to organize an exhibition to commemorate the 100th anniversary of Capt. Robert F. Scott's British Antarctic Expedition of 1910 to 1912. As you prepare for this exhibit, answer the following questions.

1. What concepts do you want to convey about the Scott expedition?
2. How will you give viewers historic perspective on the early twentieth century?
3. How will you give viewers scientific perspective on the early twentieth century?
4. What artifacts will you include?
5. What would each specimen represent?
6. What sources will you use for eyewitness accounts?
7. Will you include the Amundsen expedition? Why or why not?
8. What images do you want to use?

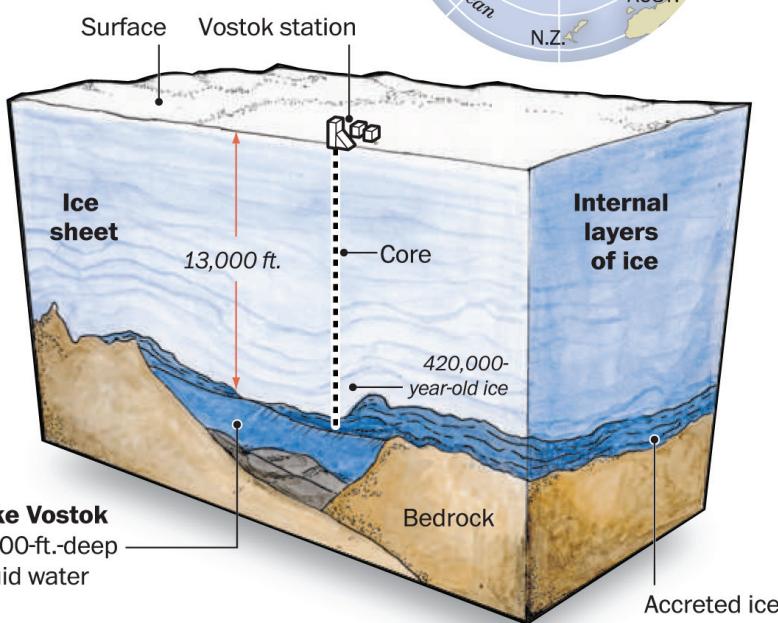
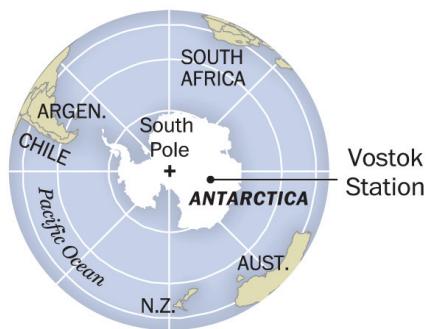
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Research | Lake Vostok

The research

Situated under 13,000 feet of ice, the freshwater Lake Vostok has remained untouched and unchanged for millennia.



Sources: NOAA, Lamont-Doherty Earth Observatory

MARC KAUFMAN AND ALBERTA CUADRA/THE WASHINGTON POST

On February 7, 2012, Marc Kaufman reported in “Russians drill into lake below ice of Antarctica”:

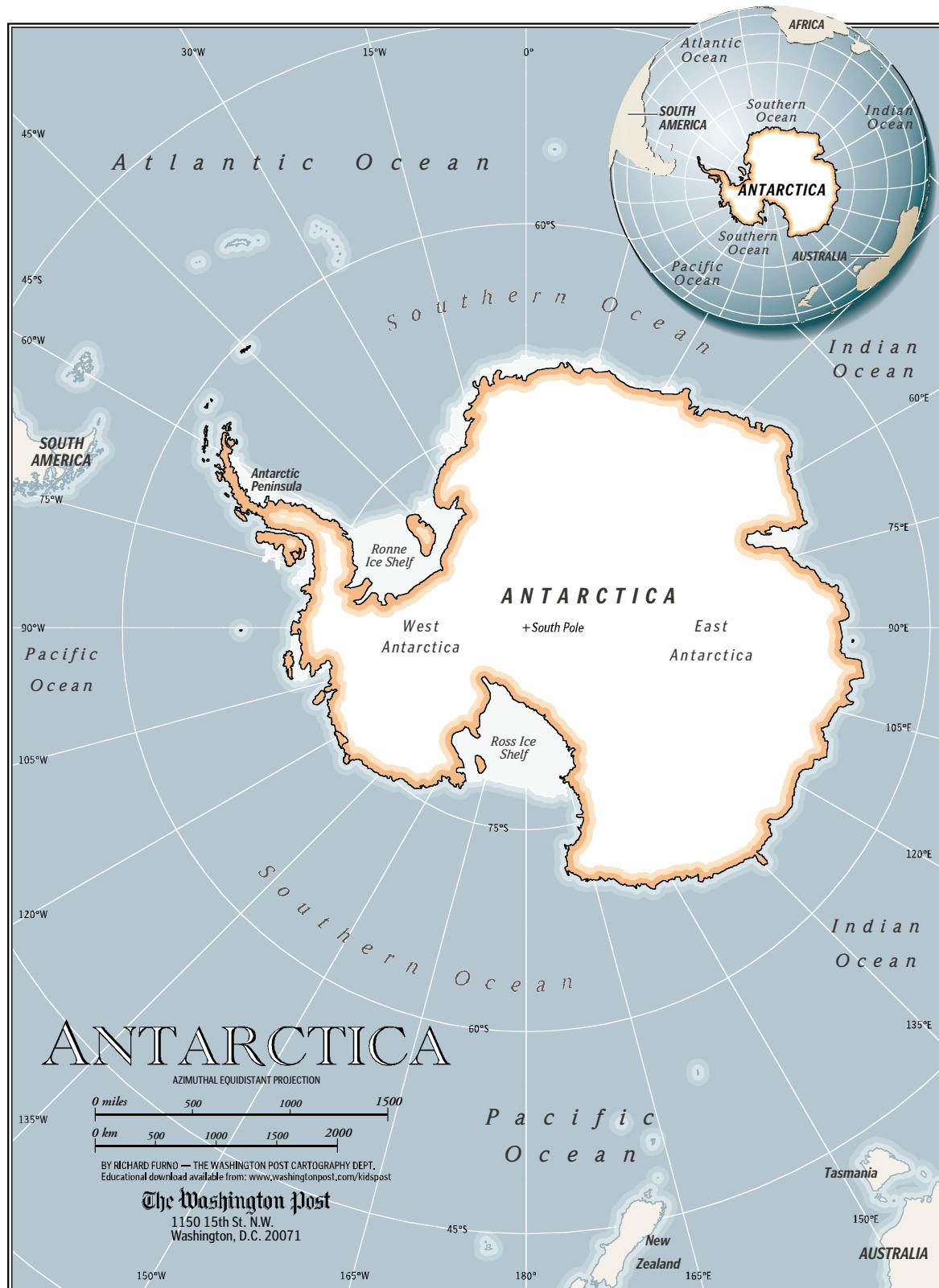
Russian scientists have drilled into the vast, dark and never-before-touched Lake Vostok 2.2 miles below the surface of Antarctica, the state-run Russian news agency RIA Novosti said Monday.

“Yesterday our scientists stopped drilling at the depth of 3,768 meters and reached the surface of the subglacial lake,” the news agency quoted a source as saying. The team had “finally managed to pierce” the ice sheet into Vostok, the source said.

Use the e-Replica alert feature to follow the Lake Vostok research project. As winter approached in Antarctica, activities shut down at the Vostok station.

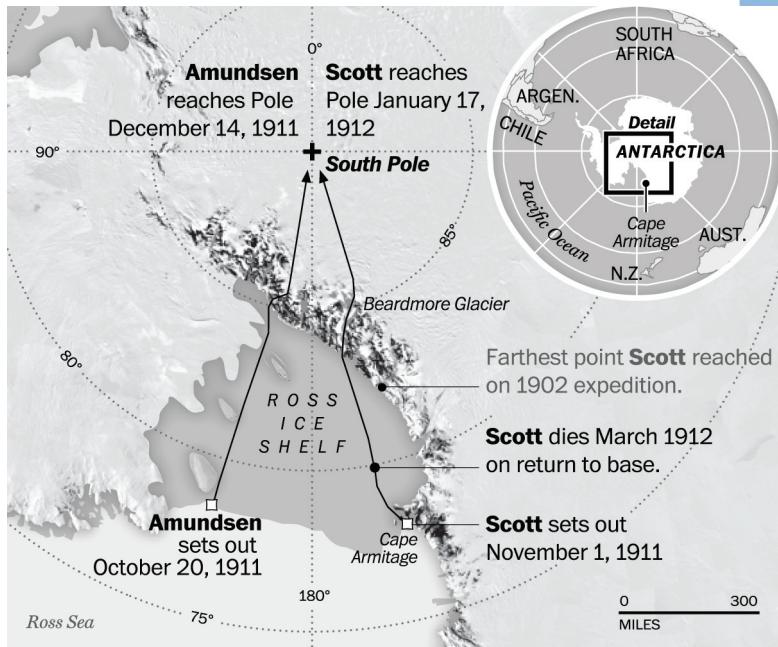
- What were Vostok scientists able to do after February 7, 2012, before suspending activities?
- What concerns did scientists have about drilling to Lake Vostok?
- Have these concerns been addressed?
- What discoveries were made?

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Antarctic Expeditions 1911-1912



April 2, 1911, sunset from Hut Point. Published in *Scott's Last Expedition*, this photograph was taken by one of Scott's team of explorer-scientists.



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A cross on Antarctica's Ross Island commemorates Capt. Robert F. Scott and the explorers who died with him.

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Beneath the ice, a continent reveals its highs and lows

Antarctica has been hiding something. It may look like a fairly flat, snow-covered wasteland, but scientists have pulled back the ice sheet to reveal the mountainous topography of the continent underneath.

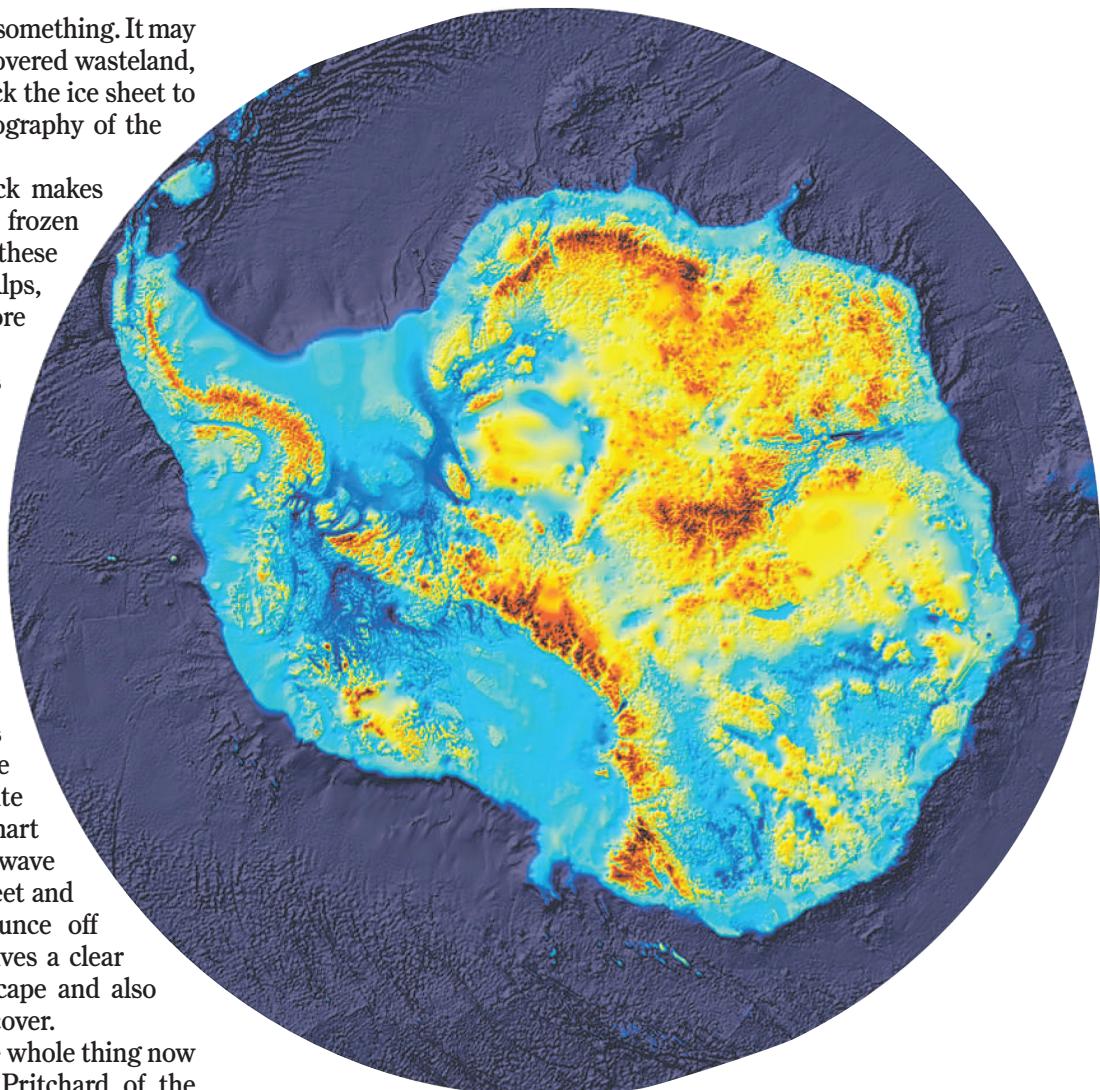
Only 1 percent of this rock makes its way to the surface of the frozen terrain. Although some of these mountains are as tall as the Alps, they're still obscured by more than 3,200 feet of ice.

The highest elevations are marked in this image in red and black, and the lowest are shown in dark blue. The light blue area shows the extent of the continental shelf.

Using radar to map the landscape, scientists at the British Antarctic Survey (BAS) have pooled data from decades of polar expeditions to create the most accurate and detailed map of the "white continent" ever made. To chart the terrain, planes send microwave pulses through the upper sheet and record the echoes that bounce off the underlying rock. This gives a clear picture of the hidden landscape and also reveals the depth of the ice cover.

"It's like you've brought the whole thing now into sharp focus," Hamish Pritchard of the BAS told BBC News.

— **New Scientist**



HAMISH

D.