

## Related Resources

### NSF and Education and Outreach:

An essential element of the mission of the National Science Foundation (NSF), which manages the U.S. Antarctic Program and South Pole Station, is support for science and engineering education.

The resources on this page are geared to the general public and explore Amundsen-Scott South Pole Station, the science it supports, and the history of the South Pole from a variety of perspectives, from those of educators to those of writers and museum curators

### Supporting Educators:

PolarTREC (Teachers and Researchers Exploring and Collaborating), is a National Science Foundation-funded program in which K-12 teachers spend two to six weeks participating in hands-on field research experiences in the polar regions.

PolarTREC's goal is to invigorate polar science education and understanding by bringing K-12 educators and polar researchers together. By fostering the integration of research and education, PolarTREC the program aims to meet the following objectives:

- Improve teacher content knowledge of multidisciplinary polar science.
- Improve teacher instructional practices.
- Improve polar researchers' understanding of and engagement in K-12 education to strengthen and enrich the outreach and dissemination of their research.
- Increase students' understanding of and engagement in the polar regions and interest in polar science, technology, engineering, or mathematics careers.

For more information, see: [www.polartrec.org](http://www.polartrec.org)

The following links lead to journals kept by PolarTREC teachers whose field experience took them to the South Pole or who expect to deploy to the South Pole this year:

**Michelle Brown**, O. Henry Middle School in Austin, Texas / Deploys Dec. 15, 2011 / Studying Space Weather

<http://www.polartrec.org/expeditions/space-weather-monitoring-on-the-antarctic-plateau>

**Katey Shirey**, Washington-Lee High School in Arlington, Virginia / Deployed November to December 2010 / Worked with the IceCube Neutrino Detector

<http://www.polartrec.org/expeditions/icecube-in-ice-antarctic-telescope-2010>

**Casey O'Hara**, Carlmont High School in Belmont, California / Deployed November 2009 to January 2010 / Worked with the IceCube Neutrino Detector

<http://www.polartrec.org/expeditions/icecube-in-ice-antarctic-telescope>

**Elke Bergholz**, United Nations International School, New York, NY / Deployed December 2007 to January 2008 / Measured ozone levels at the South Pole

<http://www.polartrec.org/expeditions/south-pole-ozone-changes>

**Video reports from *Ice Stories*: an education project of The Exploratorium, the hands on San Francisco Science Museum:**

*Ice Stories: Dispatches from Polar Scientists* was produced with NSF support during the International Polar Year (2007-2009). The International Academy of Digital Arts and Sciences honored the *Ice Stories* Web site with the 2008 Webby Award for Best Events and Live Broadcasts in the Online Film and Video category.

The now-archived site contains video dispatches from scientists who worked in Antarctica and who were given cameras and other equipment to document their work.

For more information, see: <http://icestories.exploratorium.edu/dispatches/>

The following Ice Stories dispatches focus on researchers at the South Pole.

**Kathryn Schaffer Miknaitis** / South Pole telescope:

<http://icestories.exploratorium.edu/dispatches/author/kathryn-schaffer/>

**Mark Krasberg** / IceCube Neutrino Detector:

<http://icestories.exploratorium.edu/dispatches/author/mark-krasberg/>

**Nick Morgan** / Measuring Atmospheric Carbon Dioxide at the South Pole:

<http://icestories.exploratorium.edu/dispatches/measuring-atmospheric-carbon-dioxide-at-the-south-pole/>

**Nick Morgan** / South Pole Ozonesonde launch:

<http://icestories.exploratorium.edu/dispatches/south-pole-ozonesonde-launch/>

**Nick Morgan** / The Ozone Hole: It's Still There!:

<http://icestories.exploratorium.edu/dispatches/the-ozone-holeits-still-there/>

**Nick Morgan** / A Midwinter Toast:

<http://icestories.exploratorium.edu/dispatches/a-midwinter-toast/>

**Education and Outreach by NSF-supported Experiments:**

**IceCube:** The University of Wisconsin manages the NSF-supported IceCube Neutrino Detector. The Icecube Web site contains information for the general public about this cutting-edge science:

<http://icecube.wisc.edu/outreach>

**Education and Outreach contact:**

Laurel Bacqué  
Communications Manager  
UW IceCube Research Center  
608.890.0369

**The South Pole Telescope (SPT)** is the largest telescope ever deployed at the South Pole. This telescope provides astronomers a powerful new tool to explore dark energy, the mysterious phenomena that may be causing the expansion of the universe to accelerate.

<http://pole.uchicago.edu/>

South Pole Telescope multimedia  
<http://pole.uchicago.edu/public/multimedia.html>

The American Museum of Natural History's Science Bulletin on the DASI telescope (2001) "CMB: The New Cosmology"

<http://www.amnh.org/sciencebulletins/?sid=a.f.cmb.20030301&src=b>

Youtube Videos:

□ Dr. Stephan Meyer's "Fireside Chat" about what the SPT is and hopes to do:  
<http://www.youtube.com/watch?v=R1ImH8oFZIY>

□ A time-lapse video of SPT construction:  
<http://www.youtube.com/watch?v=cpG1XJy6K9U>

□ A tour of the South Pole Station by the SPT team:  
<http://www.youtube.com/watch?v=ed08siB6BOE&feature=related>

Education and Outreach contact:

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**Atmospheric Research Observatory (ARO):** The National Oceanic and Atmospheric Administration (NOAA) maintains ARO at the South Pole to monitor levels of ozone and other atmospheric gases. The longest continuous record of atmospheric carbon dioxide levels was compiled in part from measurements taken at the South Pole:

<http://www.cmdl.noaa.gov/obop/spo/>

**Video: "Race to The End"**

Ross MacPhee, curated *Race to the End of the Earth*, an NSF-funded exhibit at New York's American Museum Of Natural History, about the competition between Norwegian Roald Amundsen and Briton Robert Falcon Scott to be the first to stand at the Geographic South Pole, a century ago this year.

In a lecture taped in 2011 he discusses his book about the rivalry *Race to The End: Amundsen, Scott, and the Attainment of the South Pole*.

For more information about the exhibit, see: <http://www.amnh.org/exhibitions/race/>

### **NSF's Antarctic Artists & Writers Program:**

NSF's Antarctic Artists and Writers Program supports writing and artistic projects specifically designed to increase public understanding and appreciation of Antarctic science and the unique role of the southernmost continent in the scientific realm.

The proposals to the program are merit-reviewed in the same way that science proposals are. Program Participants do not receive grants, however, but operational support while in Antarctica to complete their projects.

For more information, see: [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=503518](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503518)

## **A CONVERSATION WITH "ED" LARSON ABOUT THE ROLE OF SCIENCE IN THE 1911-1912 "RACE TO THE POLE"**

Edward J. Larson is University Professor of History and holds the Hugh & Hazel Darling Chair in Law at Pepperdine University. He won the Pulitzer Prize for his book *Summer for the Gods: The Scopes Trial and America's Continuing Debate over Science and Religion*

He visited Antarctica under the auspices of the Antarctic Artists & Writers Program to research the 1911-1912 "Race to the Pole," between Norwegian Roald Amundsen and Briton Robert F. Scott.

*An Empire of Ice: Scott, Shackleton, and the Heroic Age of Antarctic Science*, his new book, published by Yale University Press, grew out of that experience. It characterizes the British expeditions to Antarctica of the early 20<sup>th</sup> Century, contrary to the popular narrative, as a massive scientific enterprise in which reaching the South Pole was but a spectacular sideshow.

In this brief conversation, Larson expands on the findings in the book and discusses the importance of visiting Antarctica to him as a historian. *The opinions expressed are strictly his own and do not necessarily represent those of the National Science Foundation.*

- Q) In essence, you argue that the popular shorthand for the Amundsen-Scott rivalry, the "race to the pole," badly mischaracterizes what was actually going on in 1911 and 1912. Why is that? How do you describe it?**
- A) Certainly Amundsen was on a race to the pole, and he won it with an amazing display of courage, skill and fortitude. It was a remarkable achievement. Scott, however, did not know he was in a

race with Amundsen until it was too late to change his approach. He was planning a slow, safe trek to the pole involving dogs, ponies, motorized tractors and (in the end) man-hauling. Further, Scott's trek south was simply part of a larger, complex expedition that supported teams of scientists doing impressive research in Antarctic geology, geography, meteorology, biology, paleontology and oceanography. This scientific work inevitably diverted men and resources from Scott's pursuit of the pole.

**Q) How did this familiar narrative, as described above, get shaped and Scott's contributions to science largely forgotten?**

A) The "Race to the Pole" was simply too good a story. The media loved it and focused international attention on it. Further, Scott's death reinforced it as he, in his final written words, emphasized the courage and tragedy of the Polar Party's death march. As a result, despite all the initial attention on science, the tale of the race and the explorers' deaths captured the headlines then and dominate the storyline thereafter. Given the drama of Scott's death, the remarkable efficiency of the Norwegian effort, and the worldwide attention focused on the supposed race to the pole, it is not surprising that historians and popular writers alike have focused the narrative on quest for the pole virtually to the exclusion of science.

**Q) Although you focus on the British and their contributions to Antarctic science in your work, it would be wrong to assume from your narrative that it is a story about "heroes" and "villains"; your assessment of British motivations and successes should not be taken as criticism of Amundsen's methods or motives in reaching the Pole, correct?**

A) Being of Scandinavian descent, I grew up with an admiration for Roald Amundsen that I maintain to this day. Of all the explorers during the [Heroic Era], he was the only one to make it to the South Pole with his men and safely return. Where others suffered or died in the attempt, he made it look relatively easy and even gained weight on the 99-day trek. This was a remarkable human achievement, and one we rightly celebrate. In his subsequent account of the expedition, Amundsen clearly affirmed that his sole goal on this particular expedition was to reach the South Pole first, not to do science. He knew the difference. He had done science on his earlier Northwest Passage expedition. My book, *Empire of Ice*, was more about science during the Heroic Age of Antarctic Exploration than about the race to the pole—so it necessarily focused more on the British than the Norwegians. If I was invited to go to the pole with either Amundsen or Scott, however, I'd choose Amundsen in a heartbeat.

**Q) How would you describe Scott's legacy to posterity and to science?**

A) Of course, Scott's legacy will always be dominated by this polar quest—both as a "courageous hero" and as a "heroic blunderer." With good reason, people remember him both ways—and that will remain his legacy. But he was also the leader of two remarkably successful scientific expeditions to Antarctica that, combined with Shackleton's *Nimrod* expedition and Heroic Era expeditions by the Germans, Australians, Scots, Swedes, and French, literally opened a previously unknown continent for science. Before Scott sailed south in 1901 with his *Discovery* expedition, little was known for sure about the South Polar Regions—it was not even known if there was an Antarctic continent. By the time data from Scott's *Terra Nova* Expedition was compiled and digested, science had a pretty complete understanding of Antarctica and its remarkable geological history.

**Q) What was the value to you in travelling to Antarctica to research this work?**

A) Traveling south with NSF's Antarctic Artists and Writers Program enabled me to examine virtually all of the sites where scientists on Scott's two expeditions and Shackleton's *Nimrod* expedition conducted their field research. Because of the nature of the records they left behind—mostly in published scientific papers and private diaries and field notes—it was only by visiting the sites that I could obtain a full understanding of their research efforts. It was a remarkable opportunity for a historian.

**Q) What should people know or remember about Scott and Amundsen and their Antarctic expeditions, especially Scott's last, that they do not?**

A) People should know about the race, the Norwegians' remarkable achievements, and the British tragedy -- including Scott's role in it. This story is well told by many historians, and my book contains an account of it as well. I believe that people should also know about the scientific objectives and accomplishments of Scott's *Terra Nova* expedition and see it in its social, cultural, and political context. Scott's expedition was as much about science and empire as it was about getting to the pole first.

**Q) What should I have asked you and didn't?**

A) You've asked great questions. I would just like to add what a privilege it has been for me to study these topics. Through my research and writing, I gained added respect for Amundsen, Shackleton, and Scott—which is somewhat remarkable given how many people choose sides among them. In the end, however, my heroes of these expeditions were not the three leaders but the scientists, like Raymond Priestley, Douglas Mawson, Edgeworth David, Edward Wilson, James Murray, and others, who repeatedly risked their lives for science in efforts that had nothing whatsoever to do with polar glory.

-NSF-

**Artists & Writers Program Participants whose Works Focus on the South Pole:**

**Anil Ananthaswamy.** Science writer. His book, *To the Edge of Reason: Pilgrimages to the Holy Sites of Cosmology*, tells the story of cutting-edge cosmology in a unique and innovative way

**James H. Barker.** Ethnographer-photographer. Conducted photographic documentation of the people of Antarctica. <http://www.acsalaska.net/~jbarker/antarctica/>

**Xavier Cortada.** Painter. *ANTARCTIC Art Message Mural*: a three-part series of site-specific work. <http://artantarctica.blogspot.com/>

**Neelon Crawford.** Photographer. Produced exhibitions at galleries and the *Southern Lights Portfolio* (photogravures etchings). <http://www.polarfinearts.com/>

**Ann Parks Hawthorne.** Photographer. Numerous photo credits in domestic and international books and magazines.

**Werner Herzog Filmmaker.** Produced the Academy Award-nominated documentary film *Encounters at the End of the World*.

**Edward J. Larson** Historian of science. Wrote a book-length history of Antarctic science.  
<http://yalepress.yale.edu/book.asp?isbn=9780300154085>

**Joan Myers** Photographer. Produced exhibitions and book (with writer Sandra Blakeslee), *Wondrous Cold* as well as a Smithsonian travelling exhibit by the same name.  
<http://www.joanmyers.com/Smithson.htm>

**Mary K. Miller** Developed a Web exhibition for the Exploratorium, the San Francisco Science Museum <http://www.exploratorium.edu/origins/antarctica/>

**Anthony B. Powell.** Photographer. Created a high-definition video library of Antarctic time-lapse photography. <http://www.antarcticimages.com/>

**Kim Stanley Robinson.** Writer. Author of the science fiction novel *Antarctica*.

**Sara Wheeler.** Writer. *Terra Incognita: Travels in Antarctica, Greetings from Antarctica*

#### **Contemporary Resources:**

The National Science Foundation (NSF), through its Office of Polar Programs, manages the U.S. Antarctic Program (USAP). USAP's mission includes making grants to scientists whose research is centered at the South Pole: <http://www.nsf.gov/div/index.jsp?div=ANT>

For a general overview of research supported by the NSF's Office of Polar Programs, see:  
<http://www.nsf.gov/news/overviews/arcticantarctic/index.jsp>

Raytheon Polar Service Co., of Centennial, Colo., NSF's logistics contractor in Antarctica, maintains a Web site about the USAP that includes articles from the Antarctic Sun, a newspaper published at McMurdo Station, the main U.S. research facility on the southernmost continent:

<http://www.usap.gov/>

#### **Historical Collections:**

The Byrd Polar Research Center at Ohio State University contains a searchable, historical collection of material pertaining to the United States' exploration of the southernmost continent and includes a special section called "Conquering the Ice" that commemorates the 75th anniversary of Adm. Byrd's flight to the South Pole. See: <http://library.osu.edu/sites/archives/polar/flightexhibit/byrdflight.htm>

The Scott Polar Research Institute at Cambridge in Great Britain has a searchable archive of documents and photos related to polar exploration, including Robert F. Scott's second South Pole expedition. See: <http://www.spri.cam.ac.uk/library/>

#### **Related NSF Web Special Reports:**

Aviation Opens Antarctica: [http://www.nsf.gov/news/special\\_reports/byrd/overview.jsp](http://www.nsf.gov/news/special_reports/byrd/overview.jsp)