

**Smithsonian at the Poles: Contributions to International Polar Year Science, edited by Igor Krupnick, Michael A. Lang, and Scott E. Miller**

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Source: Arctic, Antarctic, and Alpine Research, 42(1) : 131-132

Published By: Institute of Arctic and Alpine Research (INSTAAR),  
University of Colorado

URL: <https://doi.org/10.1657/1938-4246-42.1.131>

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SMITHSONIAN AT THE POLES: CONTRIBUTIONS TO INTERNATIONAL POLAR YEAR SCIENCE. Edited by Igor Krupnick, Michael A. Lang, and Scott E. Miller. Washington, D.C.: Smithsonian Institution Scholarly Press, 2009. 405 pp. Print copies of the paperback book are free upon request while supplies last at [schol\\_press@si.edu](mailto:schol_press@si.edu) or download the entire volume or individual papers at [www.scholarlypress.si.edu](http://www.scholarlypress.si.edu). ISBN 0-9788460-1-X.

SMITHSONIAN AT THE POLES is a symposium volume containing 31 papers by polar researchers from the Smithsonian Institution and their collaborators. It is based on a symposium convened on 3–4 May 2007 to celebrate the beginning of the 2007–2008 fourth

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International Polar Year (IPY). Contributions are mostly review articles that have been loosely organized under six themes.

Under the first theme, “IPY Histories and Legacies,” five papers review the history of IPY expeditions in 1882–1883 and 1932–1933 and the morphing of the third IPY into the 1957–1958 International Geophysical Year (IGY). International cooperation in the polar regions has been at the forefront of all these efforts, which includes understanding Earth magnetism and global weather. Communications, geophysics technology, and Earth-orbiting satellites have greatly enhanced our understanding of the polar regions.

In addition to important scientific discoveries during the IGY, such as the Van Allen belts and the thickness of the Antarctic ice sheet, international cooperation fostered the negotiation of the Antarctic Treaty in 1961, which is one of our most important international agreements. IGY was the beginning of the many national scientific programs that are active over the entire continent of Antarctica. Programs cooperate and share data under the guidance of the Treaty.

Although IGY and the beginnings of the Space Age were only a little more than 50 years ago, two papers discuss efforts to preserve artifacts from this period. Some of what we used to think of as junk at McMurdo Station has been cleaned up, probably to the chagrin of potential historical archeologists. An interesting topic was an analysis of soils at the camp on White Island where balloonist André and his party perished in 1897 in an attempt to reach the North Pole. Although not proved by recent work, botulism seems to be the most compelling hypothesis for their demise.

The second theme, “Cultural Studies,” includes six papers on the Arctic. A recurring theme in these papers is collaboration between the Smithsonian and Northern Native peoples in interpreting cultural objects collected in Arctic Alaska and Canada during the past 150 years. Visits by elders to the Smithsonian and the opening of displays in Alaska are aiding science as well as instilling pride and self-respect in native peoples. Another topic is the effects of global warming on northern societies and the historical perspective that they can give us related to climate change.

Biology is covered under three themes: “Systematics and Biology of Polar Organisms” (5 papers), “Methods and Techniques of Under-Ice Research” (5 papers), and “Environmental Change and Polar Marine Ecosystems” (5 papers). Most of the papers deal with the southern polar region because of the advantages of having excellent logistical support from U.S. bases and oceanographic ships in Antarctica.

One paper discusses the abundance and diversity of benthic fauna in Antarctic waters, which have to cope with cold and ice. Populations on the continental shelf have been fragmented during glacial maxima, possibly enhancing speciation, and a topic of interest to paleontologists. Another paper associates increases in octopods with overfishing. Are fish populations anywhere in the world’s oceans safe from trawlers?

If you are interested in the odd-looking Arctic narwhal, a paper analyzes the peculiar tusk that gives this whale its unicorn appearance. The authors suggest that the tusk may have sensory capabilities such as detecting salinity changes.

Great strides in using diving as a tool to examine undersea life in very cold water have been made since the wet-suit days of 40 years ago. Biologists can now study the abundant life under the ice. These organisms have evolved to be exposed to the extreme conditions of near-freezing temperatures, possibly through gene regulation. What could we know about the lives of emperor penguins and Weddell seals without access to waters under the sea ice? Attenuated light beneath sea ice affects plant life for part of the year. Krill, which depend on phytoplankton associated with sea ice, are of basic importance in the Antarctic food web, supporting larger fish, mammals, and birds. Evidence in the Ross

Sea suggests that increased UV radiation associated with depletion of atmospheric ozone may be inhibiting phytoplankton and bacteria productivity during the spring. In another paper it is reported that productivity in the Southern Ocean as a whole has increased significantly over the last decade.

Do Weddell seals store enough energy for reproduction and lactation, or do they have to forage for additional food? Apparently it is related to size. The larger seals are less dependent on foraging. Mothers apparently fast during the first week of lactation, but most dive after that, presumably to forage. Even the pups may forage in the latter part of the six- to eight-week lactation period.

Invasive species have not yet been a problem in the polar regions. Cold water and the Antarctic convergence are apparently a significant barrier in the Southern Ocean. However, the decline of sea ice and increased shipping in the Arctic may eventually present problems.

The final section of the volume, "Polar Astronomy: Observational Cosmology," includes three papers on cosmology/astronomy and a paper on meteorites. The lack of water vapor at high elevations on the Antarctic ice sheet provides ideal observational conditions similar to those in outer space, but at much less cost. Observations from the South Pole have already demonstrated a flat geometry for the universe. One clever author uses the analogy of a Thanksgiving feast, after several million years of fasting, for the gobbling up of a platter of dust and gas by a black hole at the center of a galaxy. Two papers discuss international collaborative research with new technology that will be conducted at the highest point on the Antarctic plateau toward understanding the evolution of stars and galaxies.

The last paper summarizes the search for Antarctic meteorites that has been going on for almost 100 years. Meteorites that fall on the Antarctic ice sheet are buried to great depths and eventually transported with the ice to the margins of the ice sheet where they come to the surface by ablation. USAP has collected 16,000 meteorites, more than had been collected previously over the entire Earth. Meteorites have been identified as coming from Mars, the moon, and other parts of the solar system.

I am pleased to have SMITHSONIAN AT THE POLES on my bookshelf. The volume is well edited and contains many interesting papers on a wide variety of polar topics. The volume is illustrated with black and white photos and maps, and includes glossy paper for colored figures. The contributions on history and culture are readable and of interest to polar enthusiasts. The contributions on biology and astronomy require a science background. This volume, with many review papers, is an excellent way to learn about an unfamiliar subject and find additional references. An 11-page index provides easy entry to the many topics. Missing are contributions on climate, geology, and glaciology. Oddly, no mention was made about one of the earliest of the Smithsonian's collections, those from the 1842–1844 Wilkes Expedition.

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