

# International Polar Year: Science at the Ends of the Earth

In response to unprecedented changes in the fragile polar regions of our planet, the International Polar Year (IPY) 2007-2008 will encompass many scientific studies designed to improve our understanding of polar change and its effects on Earth's ecosystems and people. For 2 years, U.S. Geological Survey (USGS) researchers will don arctic gear and join scientists from more than 60 countries to conduct coordinated research and analysis in the Arctic and Antarctica.

Polar regions play a critical role in the global climate system—and changing conditions in these often remote areas greatly affect biological, atmospheric, and human systems around the world. In the 50 years since the last IPY, scientists have seen that Antarctic ice shelves and glaciers worldwide are thinning and retreating, permafrost is thawing, and Arctic sea-ice cover is decreasing. The loss of sea-ice cover adversely affects marine mammal populations and leaves coastal Alaskan villages vulnerable to winter storm erosion. Thawing permafrost threatens the integrity of roads, buildings, and other vulnerable infrastructure and affects the mobility of local populations.

## USGS Work in Polar Regions

During the IPY, scientists will conduct research at both poles, collecting information on polar conditions and studying their interaction with and influence on oceans, the atmosphere, land masses, and ecosystems to understand current and forecast future global climate. The USGS has a long tradition of research in the polar regions and, through IPY 2007-2008, our scientists will lead many polar projects, including the ones highlighted here:

### Glacier Studies Project

Most of the world's glaciers have decreased in size and volume in the last decade, raising sea level globally and depleting centuries-old stores of freshwater in high-mountain regions. USGS scientists are working with more than 130 U.S. and foreign researchers to study

planetwide changes in glaciers as part of the U.S. Climate Change Science Program. The project will culminate in the production of a satellite image atlas of the world's glaciers, as well as coastal-change and glaciological maps of Antarctica.

### Sea-Ice Change and Arctic Life

The future of many Arctic animals and ecosystems is linked to the fate of the Arctic ice pack. At the USGS Alaska Science Center, scientists study polar bears, walruses, and their essential sea-ice habitats. As ice moves farther north or degrades due to climate warming, animals are forced to migrate to less favorable areas. USGS and Canadian scientists have already documented a decline in the Western Hudson Bay polar bear population. Researchers are also examining changes in freshwater discharges and shifts in the distribution of plants, fish, migratory birds, and other wildlife. This timely research helps provide solid information on which to base critical decisions.

### Arctic Petroleum Resource Assessment

The USGS World Petroleum Assessment of 2000 indicated that a large portion of the world's remaining oil and gas resources may occur in the Arctic. In 2003, the USGS began a thorough and rigorous assessment of the petroleum resources in the Arctic. The first results of this study will be completed during the IPY.

### Landsat 7 Image Mosaic of Antarctica (LIMA)

In cooperation with the British Antarctic Survey and the National Aeronautics and Space Administration (NASA), the USGS is creating a high-quality remotely sensed mosaic of Antarctica from more than 1,200 Landsat scenes. The LIMA IPY Web portal will provide a site for scientists to view maps, share research activities and resources, and distribute data. The portal is designed to aid online access to

the Antarctic Landsat mosaic and the underlying scenes used in the mosaic, which will be available for download.

### Arctic Permafrost Thawing in the Yukon River Basin

USGS scientists are working with U.S. and Canadian agencies, universities, and tribes to understand and predict climate-induced changes to the air, water, land, plants, and animals within the Yukon River Basin. The study is a benchmark for understanding and tracking changes to biological communities, stored carbon, the water cycle, and human infrastructure in the Arctic and sub-Arctic region as a result of permafrost thawing and landscape change.

### The U.S. Antarctic Photography Collection

This is the world's largest and oldest collection of Antarctic aerial photography, consisting of about 400,000 photos dating back to the 1940s. It represents a valuable source of historical data. Users will be able to download these images from the Internet at no cost.

### Benchmark Glacier Program

Glaciers grow and shrink in response to climate variations. USGS scientists are measuring winter snow accumulation, summer snow and ice melt, glacier geometry, climate variables, and stream runoff at three U.S. glaciers. These glaciers, located in Washington State, coastal Alaska, and interior Alaska, represent three regions with different climates, each containing a large number of glaciers. This ongoing 50-year record—the longest such record in North America—is improving our understanding of the effects of climate change on glaciers, water resources, and glacier-related hazards.

For more information on IPY and related USGS activities, please visit:  
<http://www.usgs.gov/ipy>

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