

The International Polar Year

Change is ubiquitous in Earth's history, and evidence is clear that Earth's climate is changing rapidly now. The harbingers of change can be seen vividly in the polar regions. The Arctic ice cover is melting, ice shelves in Antarctica are crumbling, glaciers in temperate regions are disappearing, some ecosystems are changing, and permafrost thawing is causing the collapse of roads, buildings, and pipelines. Are we witnesses to an extreme in natural variability, the threshold of an abrupt change, or something more subtle? How will changes first seen in the polar regions affect us all?

Plans are under way for the International Polar Year (IPY) 2007–2008. Previous IPYs (1882–1883 and 1932–1933) and the International Geophysical Year (1957–1958) (which began as an IPY) produced unprecedented exploration and discoveries in many fields of research and fundamentally changed how science was conducted in the polar regions. IPY 2007–2008 will benefit society by exploring new frontiers and increasing our understanding of the key roles of the polar regions in globally linked systems. Recent technological developments give us a new ability to investigate previously unexplored areas, using new tools and new ways of looking to understand once-unanswerable questions. Autonomous vehicles, genomics, and remote sensing instruments and networks are just a few of the technologies providing new tools for investigating previously inaccessible realms. The polar regions also continue to loom large in facilitating our understanding of the processes by which solar activity may seriously disturb Earth's space environment, affecting the performance of modern technologies deployed in space and on Earth. We believe that research is needed now, so that future generations may mitigate vulnerabilities and adapt to potential change.

Many important broad and interlinked research challenges exist today. To name just one example, how and why are the changes in polar regions occurring, and how can we predict and mitigate the outcome? Changes in ice mass are linked with regional and global environments and atmospheric and oceanic processes; implementing polar observation systems would help document these changes. Clues for understanding how and why similar changes occurred in the past remain stored in polar earth and ice; sediment and ice coring would help us understand past changes. Polar changes are interlinked with the behavior and survival of ecosystems, from microbial life to large organisms, including humans; studies in polar biology are needed. Keys to fundamental discoveries for understanding change may spring from new modes of exploration that range from using autonomous underwater vehicles under the ice to the use of genomics for investigating adaptation; exploration reveals surprises. Communications technologies such as television and the Internet, combined with changes in the environment, are challenging traditional human lifestyles in our cold regions and elsewhere. Yet these same technologies hold the potential for sharing ideas and experiences in both polar regions and for promoting global understanding; Internet-based efforts in global data collection, sharing, and education are needed.

Various international organizations and individual nations are actively planning for the IPY. The International Council for Science (ICSU) formed an international planning group to catalyze IPY development across national boundaries. The World Meteorological Organization also has identified IPY as a major new initiative. Other endorsements to date include the Scientific Committee on Antarctic Research, the International Arctic Science Committee, and the Arctic Council. Interested countries have begun to form national committees and develop a consensus regarding scientific themes that will form the backbone of the activities. In the United States, the Polar Research Board of the National Academies has formed a committee* to facilitate IPY planning.

In a world of much uncertainty and change, citizens turn to science for answers. The polar regions play an important role in providing these answers. A framework such as the IPY can provide the impetus to undertake projects that normally could not be achieved by any single nation, reaching beyond our traditional borders toward a new level of cooperative international science. Our vision for IPY 2007–2008 is that it will be the dawn of a new era in polar science, kicked off by an intense internationally coordinated campaign of activities. IPY 2007–2008 will address research in both polar regions, which have strong linkages to the rest of the globe. It will be multi- and interdisciplinary in scope and truly international in participation. It will educate and excite the public and help produce the next generation of engineers, scientists, and leaders.

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*The U.S. National Committee to the IPY actively welcomes input from the science community (www.us-ipy.org).

