



Proposed and ongoing IPY science activity in the Antarctic Peninsula

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The Antarctic Peninsula (AP) represents a near-perfect natural laboratory for understanding the complex, interlinked changes that can occur in a rapidly-warming Antarctic region. Small enough to be studied in detail with available logistics, it is at the same time large enough, and complex enough, to encompass all aspects of the Antarctic ice, climate, ocean, and biologic systems. Moreover, climate change is occurring rapidly, compressing what would be decades to centuries of change in other regions (at their present rates) into just a few decades. The AP spans many degrees of latitude, crossing boundaries in both climate and ocean circulation, allowing us to examine the effects of ongoing change at various stages within the two-year period of the International Polar Year (IPY). These changes include glacial responses, ocean circulation shifts, and profound ecosystem adjustments. There is also a wealth of information about past climate and ice sheet configuration stored in the ice and sediment of the region.

The most stunning events in the region have been the rapid ice shelf retreats of the Larsen A and B ice shelves, in 1995 and 2002, respectively. In both cases, large long-lived ice plates disintegrated within just a few weeks after several years of unusually high temperatures and extensive surface melting. Climate analysis of station weather data, and recent mass-balance and ice retreat studies, have shown that these abrupt events were preceded by decades of warming and smaller retreats, both in the shelves and in glaciers all along the Peninsula. Following the shelf break-ups, glaciers showed an immediate, profound acceleration, coupled with a significant sur-

face lowering. This pattern mimics changes now seen in Greenland, and underway for decades in Alaska. The peninsula has shown extensive shifts in sea ice extent, oceanographic flow, and penguin species habitats. The retreat also revealed new polar chemoautotrophic ecosystems based on gas seeps (methane? or sulfide?) on the sub-shelf seabed.

Major international, interdisciplinary research efforts are planned for the IPY period in the AP. One major proposed effort is based on a cruise of the *R.V. Nathaniel B. Palmer* to the Larsen B embayment, to conduct ice coring, glaciological and geophysical measurements, marine geology mapping, and biological investigations of the transition to open sea-ice from ice shelf. A second effort seeks a detailed glaciological and climate investigation of the southern Larsen C region, identifying precursor characteristics to its potential break-up in the near future. A third effort will focus on land- and ocean-terminating glaciers in the northernmost peninsula, tracking the history and current rates of ice retreat, and the changes in vertical uplift rates, and exposure, caused by past and current ice sheet shrinkage. Several efforts are also proposed by the British Antarctic Survey, investigating ice shelf basal melting and northern AP glacier history.

Outreach plans for the IPY efforts in the Peninsula are many and varied. Two notable plans include a book-writing effort summarizing the science conducted in the AP during IPY, and development of an undergraduate/graduate curriculum based on the investigations for a limited number of students at the partner Universities conducting the research. Additionally, many podcasts, other video productions, and various levels of participation by visiting tourists are envisioned.

The community conducting all three of these IPY-related efforts, and many related studies, meets regularly at the Antarctic Peninsula Climate Variability meetings, which are held every 18-24 months at different venues. The most recent meeting was in May, 2006, in Boulder Colorado; the next one is planned for late 2007 or early 2008 near Pasadena, California. An overview of the results of the recent meeting, and the ongoing development of the proposed research, will be presented.