IPY in the Antarctic Peninsula-Ice Shelves, Oceans, and Climate

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An integrated multi-disciplinary field program is outlined that addresses the rapid and fundamental changes now taking place across the Antarctic Peninsula region. By making use of a marine research platform we can bring glaciologists, oceanographers, marine geologists and biologists together on the same team, working collaboratively to answer vital questions with regard to:

1) the stability of the Larsen Ice Shelf and Antarctic Peninsula ice sheet
2) the integration of paleoclimate records from marine and lacustrine sediment cores
3) the response of, or contribution of, oceanographic systems to ice shelf disintegration
4) the climate history of the Peninsula as recorded in ice cores, and
5) biotic changes in the ocean, including wide ranging shifts in benthic ecosystem dynamics.

Although the logistics of such a program are multilayered, the field work makes use of existing technologies aboard the *N. B. Palmer* and will allow access (via helicopter support) to a wide range of glacial systems adjacent to the Larsen Ice Shelf system. At these locations we will conduct both dynamic monitoring of glacial flow and recover high resolution ice core histories using light-weight drilling equipment, successfully tested at other sites around the world. We will also maximize the use of seafloor imaging systems of the *Palmer* by extending existing swath mapping coverage, into previously unexplored regions. Recovery of long sediment cores (up to 26 m) will be facilitated by use of a proven jumbo piston core system and will target newly discovered sedimentary sections of expanded resolution now lying exposed in the Larsen B embayment. Long-term monitoring of deep water outflow will, for the first time, be integrated into changes in ice shelf extent (bottom water source) by linking near source observations (five instrumented moorings are now in place in front of the Larsen A, B and C) to distal sites of concentrated outflow (the South Orkney Plateau channel now has 10 + years of bottom water flow data). Sediment traps are now connected to both proximal and distal moorings and the records of sediment flux can be linked directly with existing ice dynamics (post break-up surging of tidewater glaciers) and future changes in the ice shelf extent. Finally, the robust space and dynamic positioning of the *Palmer* will allow an international team to deploy a remotely operated vehicle (ROV) to examine, map, and sample a newly discovered chemotrophic ecosystem that was uncovered by the loss of the Larsen B ice shelf in 2002. Such access is vital to assessing life in extreme environments and understanding the role of rapid (climate) change on the ice shelf and benthic ecology.

The results of this international, multi-disciplinary effort will significantly advance our understanding of linkages amongst the earth's systems in the polar regions and are proposed in the true spirit of IPY.