

## “A Tour of the Cryosphere 2009” Transcript

Though cold and often remote, the icy reaches of the Arctic, Antarctic, and other frozen places affect the lives of everyone on Earth.

We start our tour in Antarctica. Where they meet the sea, mountains of ice crack and crumble. The resulting icebergs can float for years. Ice shelves surround half the continent. They slow the relentless march of ice streams and glaciers like dams hold back rivers. But the region is changing. As temperatures increase, we see a growing number of melt ponds. As this heavy melt water forces its way into cracks, ice shelves weaken and can ultimately collapse. After twelve thousand years, the Larsen B ice shelf collapsed in just five weeks.

Offshore, sea ice forms when the surface of the ocean freezes, pushing salt out of the ice. The cold salty surface water starts to sink, pumping deeper water out of the way, powering global ocean circulation. These currents influence climate worldwide.

Most ice exists in the cold polar regions, but we see glaciers like these in the Andes all over the world. Most are shrinking.

Here in North America, millions of people experience the cryosphere every year. Eastward moving storms deposit snow like thick paint brushes. Mountain snow packs store water. Snow melt provides three-quarters of the water resources used in the American west. Substantial winter snows produced a green Colorado in 2003, but dryer conditions the previous year limited vegetation growth and increased the risk of fires.

In the Rocky Mountains, there are patches of frozen ground called permafrost that never thaw. These regions are unusual in the mid-latitudes. But farther north, permafrost is more widespread and continuous, covering nearly a fifth of the land surface in the Northern Hemisphere.

Sea ice varies from season to season and from year to year. Data show that Arctic sea ice has shrunk dramatically in the last few decades. The effects could be profound. As polar ice decreases, more open water could promote greater heating. More heating could lead to faster melting, reinforcing the cycle. If this trend continues, the Arctic Ocean could be ice-free in the summer by the end of the century.

These changes in ice cover are not limited to oceans. Greenland's ice sheet contains nearly ten percent of the Earth's glacial ice. Glaciers in western Greenland produce most of the icebergs in the North Atlantic. After decades of stability, Greenland's Jakobshavn ice stream, one of the fastest flowing glaciers in the world, has changed dramatically. The ice has thinned, and the front retreated significantly. Between 1997 and 2003, the glacier's flow rate nearly doubled to five feet an hour.

These are just some of the cryospheric processes that NASA satellites observe from space. Continued observation provides a critical global perspective, as our home planet continues to change - day to day, year to year, and further into the future.