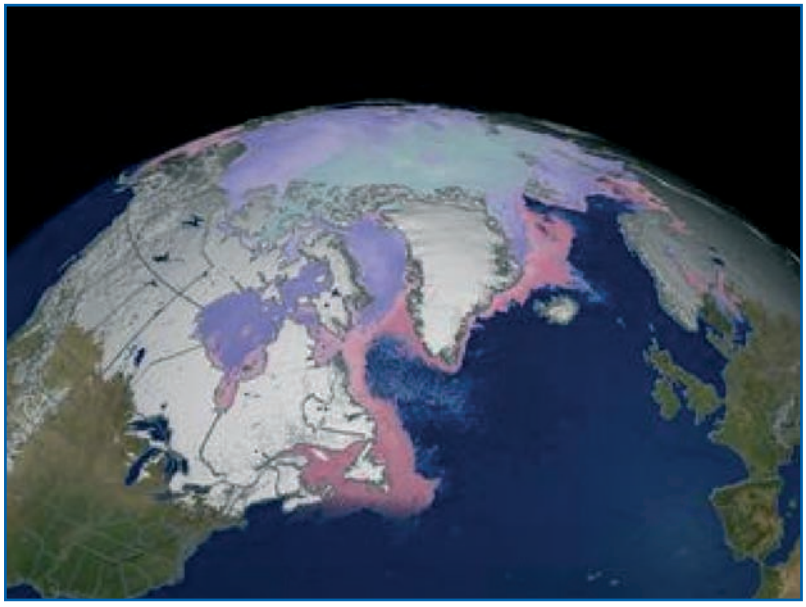
The Cryosphere Observing System: Legacy of the International Polar Year 2007-2008

Description

The International Polar Year 2007-2008 (IPY) provides a unique opportunity to develop polar observing systems and, by doing so, closes one of the most drastic gaps in global observations. The World Climate Research Programme (WCRP) Climate and Cryosphere (CliC) Project and several partners are developing the conceptual framework for the Cryosphere Observing System (CryOS) - a sustained, robust observing system for the cryosphere and a crucial element of the future multidisciplinary observing system. Current observational capabilities, requirements for observations and higher-level products, and recommendations on actions needed to further develop CryOS are documented in the recently approved IGOS-P (Integrated Global Observing System Partnership) Cryosphere Theme Report (http://igos-cryosphere.org). The initial phase of CryOS development coincides with IPY. The approach is to engage relevant IPY projects and increase coordination between them with the objective of producing legacy datasets and the capability to continuously extend them after the end of IPY.

The first achievements of CryOS are in the area of coordination of satellite observations of the cryosphere. An IPY project entitled "Global Inter-agency IPY Polar Snapshot Year (GIIPSY)" was created to improve the coordination of space observations in the polar regions during IPY. Some of the requirements will be satisfied through routine operations, but some will call for non-routine tasking, processing, and data distribution. GIIPSY will generate a number of unprecedented datasets contributing to studies of sea-level rise, ocean circulation and polar air-sea interactions, regional climate, polar precipitation and hydrology, permafrost and Arctic aquatic ecosystems, transportation, and hazards.



(Courtesy of NASA/Goddard Space Flight Center Scientific Visualization Studio)

The CryOS vision offers high potential to realize a complete picture of cryosphere components within the next 10-15 years. This satellite picture (MODIS) of snow cover, sea ice temperature, glaciers and ice sheets across the Arctic illustrates the diversity of the cryosphere.

Added value

GEO can assist first by assuring that the IPY Data Legacy goal is fulfilled, and secondly that the requirements documented in the IGOS Cryosphere Theme Report for a sustained and robust observing system are subsequently met in the post IPY timeframe. The key elements requiring attention are to stop the degradation of key in-situ networks and ensure balanced in-situ system capabilities. GEO can help to ensure that gaps in the satellite component of CryOS infrastructure are addressed, and that key missing elements such as solid precipitation, snow-water equivalent, and SAR interferometry of polar ice sheets are addressed via the development of future observing system capabilities. The benefits to GEO are in the development of capabilities to meet key UNFCCC requirements, together with a number of benefits in key societal benefit areas (SBAs).

Relevance to GEO

Comprehensive, coordinated and sustained observations of, and information on, the cryosphere are essential to improve monitoring of the state of the Earth, increase understanding of Earth processes, and enhance prediction of the behavior of the Earth system. The cryosphere, found in about 100 countries, and is especially important to the GEOSS societal Benefit Areas for Climate, Disasters, Water, and Energy, and makes a significant contribution to Weather, Agriculture, Human Well-Being and Ecosystems. The Polar Regions and the global cryosphere have been shown to play a pivotal role in climate, and improved information is essential to fully assess, predict, and adapt to climate variability and change. Success depends on understanding the mechanisms responsible for abrupt climate change and the contribution of the cryosphere to sea level rise.

The cryosphere, being frozen water, is an intrinsic part of the global water cycle, impacting Weather, Water, Energy and Agriculture. Accurate determination of precipitation, including the solid component, is essential to understanding the global water cycle (but at present accurate determination is not possible at a global scale. Snow- and glacier-melt are critical sources of water for agricultural, domestic and industrial water supply and hydropower production, and directly contribute to flood and drought hazard conditions. Other short and long term hazards directly related to the cryosphere include avalanches, glacier lake outburst floods, subsidence due to thawing permafrost, snowstorms, blizzards, icing, coastal erosion, and of course sea level rise. Lake-, river- and sea-ice directly affect high latitude transportation and ecosystems, including regional and global transportation routes, regional economic development, and the well-being of northern peoples.

GEO Work Plan reference
CL-06-05. Coordinator: WCRP.

Participants

Coordination of CryOS tasks by WCRP/CliC and ICSU/SCAR including participation by following other organizations: WMO, CEOS Space Agencies (CSA, ESA, JAXA, NASA, NOAA/NESDIS), and several others.

Current Status

The Space Task Group for IPY was recently established under the mandate of WMO/ICSU IPY JCOMM. Its purpose is the coordination of polar satellite data acquisitions from major space agencies. The GIIPSY portal for data access has been initiated and several Announcements of Opportunity have been issued. The WMO Congress XV approved the WCRP/CliC proposal to initiate the establishment of a Global Cryosphere Watch as an IPY legacy.

Next Steps

With the recent establishment of the Global Cryosphere Watch, resources for its initiation must now be identified. Similarly, the search for agents for the coordination and implementation of the IGOS Cryosphere Theme will continue. A meeting to engage more IPY projects into the coordination of observations and data exchange will be planned.