

## **INTERNATIONAL POLAR YEAR AND FOLLOW-ON SATELLITE ACTIVITIES**

The session is informed on the International Polar Year (IPY) satellite activities carried out by space agencies through the Global Inter-agency IPY Polar Snapshot Year (GIIPSY) project and the IPY Space Task Group (STG). The main achievements made by space agencies during the IPY as a result of a coordinated approach were recently reviewed by STG and its SAR working group meetings. According to their conclusion, exceptional progress was made during IPY which includes: acquiring L, C and X- band SAR imagery over the polar ice sheets and acquiring pole to coast InSAR data for ice sheet surface velocity; optically derived, high resolution digital elevation models of the perimeter regions of ice caps and ice sheets; coordinated campaigns to fill gaps in Arctic and Antarctic sea ice cover; extensive acquisitions of optical imagery of permafrost terrain; and observations of atmospheric chemistry using the Sciamachy instrument.

STG's next steps are to focus on the generation of higher level scientific products; and to ensure access to acquired snapshots, space agency IPY portfolios and data products. The purpose is to leave a legacy data set compiled from multiple space agency satellite data portfolios comprising a broad range of "polar snapshot" products and propose a cooperation arrangement between major satellite agencies ensuring coordination of their polar observations beyond IPY. This cooperation arrangement would establish a preliminary structure for sustaining observations and pave the way for a future Polar Satellite Constellation.

### **Action/Recommendation proposed:**

CGMS recommends that WMO and space agencies establish a close collaboration with the WMO EC Panel on Polar Observations, Research and Services (EC-PORS) and the IPY Space Task Group (STG) in an appropriate form to carry out joint activities taking into account the lessons learned from IPY, the needs of climate research and the expected implementation of a Global Cryosphere Watch.

## **IPY SATELLITE ACTIVITIES**

### **1 INTRODUCTION**

To realize the benefit of the growing constellation of international satellites to the scientific objectives of the International Polar Year (IPY), the Global Inter-agency IPY Polar Snapshot Year (GIIPSY) proposal was selected as an IPY flagship project. The goal of GIIPSY is to develop consensus polar science requirements and objectives that can best and perhaps only be met using the international constellation of Earth observing satellites. Requirements focus on all aspects of the cryosphere and range from sea ice to permafrost to snow cover and ice sheets.

The functional link between the GIIPSY science community and the international space agencies was established through the IPY Space Task Group (STG) convened by the World Meteorological Organization. STG membership presently includes representatives of 14 space agencies (ASI, BSNC, CMA, CNES, CSA, DLR, ESA, EUMETSAT, INPE, JAXA, NASA, NOAA, ROSHYDROMET, and USGS) with secretarial support provided by WMO. The primary objectives of the STG meetings are to review requirements, to provide space agency reports on progress in support of IPY, and to identify and solicit new members.

### **2 IPY SATELLITE ACTIVITIES**

In the period between the 36<sup>th</sup> and 37<sup>th</sup> sessions of CGMS, the STG continued coordination of the activities carried out by space agencies to meet four primary data acquisition objectives adopted by STG 1 (Geneva, 2007) for its contribution to the IPY which include:

- Pole to coast multi-frequency InSAR measurements of ice-sheet surface velocity;
- Repeat fine-resolution SAR mapping of the entire Southern Ocean sea ice cover for sea ice motion;
- One complete high resolution visible and thermal IR (Vis/IR) snapshot of circumpolar permafrost.
- Pan-Arctic high and moderate resolution Vis/IR snapshots of freshwater (lake and river) freeze-up and break-up.

The fourth session of IPY STG (WMO HQ, Geneva, February 2009) and its SAR working group meeting (ESA ESRIN, Frascati, June 2009) reviewed the main achievements made by space agencies during the IPY as a result of a coordinated approach and concluded that exceptional progress was made towards these objectives including: acquiring L, C and X band SAR imagery over the polar ice sheets and acquiring pole to coast InSAR data for ice sheet surface velocity; optically derived, high resolution digital elevation models of the perimeter regions of ice caps and ice sheets; coordinated campaigns to fill gaps in Arctic and Antarctic sea ice cover; extensive acquisitions of optical imagery of permafrost terrain; observations of atmospheric chemistry using the Sciamachy instrument. Most recently, the SAR-WG chose to take a step beyond data acquisition and to investigate coordinated product development.

These efforts during the final year of GIIPSY and the IPY will be largely devoted to producing polarization image mosaics of Antarctica, image mosaics of Greenland and X, C and L band interferometrically derived velocity fields for Greenland and Antarctica.

STG's next steps are planned to focus on the generation of higher level scientific products; and to ensure access to acquired snapshots, space agency IPY portfolios and data products. An initiative entitled Polar Satellite Constellation was proposed as part of the IPY legacy (*Drinkwater, Jezek, Key, 2008*). The purpose of this initiative is to leave a legacy data set compiled from multiple space agency satellite data portfolios comprising a broad range of "polar snapshot" products and propose a cooperation arrangement between major satellite agencies ensuring coordination of their polar observations beyond IPY. This cooperation arrangement would establish a preliminary structure for sustaining observations and pave the way for a future Polar Satellite Constellation. It is especially important in the light of the idea of an International Polar Decade expressed by the WMO Executive Council at its sixtieth session (June, 2008) and positive feedback at several international forums.

The 36<sup>th</sup> session of CGMS recommended that WMO keep STG as an appropriate mechanism to promote cooperation between major satellite agencies ensuring coordination of their polar observations beyond IPY. In view of the WMO Executive Council's recent establishment of the Panel on Polar Observations, Research and Services, it would be highly desirable if the STG could join the Panel to continue their coordination of international efforts in securing collection of space-borne "snapshots" of the Polar Regions with the goal to achieve a Polar Satellite Constellation as a significant part of the IPY legacy. This is especially important in the light of future development of the Global Cryosphere Watch (GCW) initiative and the preparation of a GCW implementation strategy for consideration by the WMO Congress in 2011. In this context the STG should be asked to reconstitute its mission statement based on the lessons learned from IPY, the needs of climate research, and the implementation of the GCW to meet recommendations of the IGOS Cryosphere report. It is planned that this issue be discussed at the fifth session of STG hosted by WMO, which will take place in Geneva, Switzerland from 30 November to 2 December 2009. CGMS Members are invited to participate in the session.

### **3 CONCLUSIONS**

IPY satellite activities carried out by space agencies within GIIPSY IPY project and actively coordinated by IPY STG have provided the unique opportunity to obtain a "polar snapshot" and leave a legacy data set. The next step is to encourage space agencies to continue this coordinated approach beyond IPY to secure the IPY legacy.

#### **Reference**

M. Drinkwater, K. Jezek & J. Key, Coordinated Satellite Observations during the International Polar Year: Towards Achieving a Polar Constellation, 2008, Space Research Today, No 171, p.6-17.