

**Space Task Group (STG) of the IPY Sub-committee  
on Observations  
3-4 Feb. 2009, WMO, Geneva, Switzerland  
Minutes**

**1. Opening and approval of agenda**

E. Sarukhian welcomed the participants to Geneva for the fourth meeting of the STG. The STG co-Chair M. Drinkwater noted that he would Chair the meeting and welcomed new agencies representatives including Jorge del Rio Vera representing ESA, Katy Farness representing GIIPSY, and David Carlson Director of the IPY International Programme Office (see Annex 1).

The agenda was approved by the meeting with consolidation of agenda items 5 and 6 (see Annex 2). A brief introduction of activities to group was made together with noting the main milestones since last STG (see Presentation 1).

**2. Review of IPY and Securing the IPY Observing System Legacy (DC/ES)**

D. Carlson noted some of the general opinion of IPY regarding the successes stemming from IPY, and emphasized that the STG activities can be recognized as a success in terms of international coordination. Delays in funding and the financial crisis have delayed some field experiments, and there will be a substantial continued research over the course of the next year – including an Arctic field season and a further Antarctic field season. IPY field phase will therefore continue. D.C. noted that initial efforts are underway to grasp what is the IPY data legacy. A report is under preparation summarizing IPY data and data management. An estimated 50% of IPY projects have appropriate data management plans. He suggested that high level products will also be motivated by work towards preparing for COP-15 in Copenhagen in December 2009. Snow Water Ice Permafrost Assessment (SWIPA) – is an Arctic Council initiative which will help in this regard, by characterizing conditions on the basis of some of the existing in-situ and satellite data sets.

ES introduced document 2 (see Presentation 2) to describe some of the main initiatives contributing to the creation of an IPY Legacy. These include such initiatives as Sustaining Arctic Observing Networks (SAON) together with an integrated Arctic Ocean Observing System (iAOOS), PanAntarctic Observing Network (PAntOS) together with Southern Ocean Observing System (SOOS), Global Cryosphere Watch (GCW), Polar Satellite Constellation (PSC), and Polar Climate Outlook Forum (PCOF). Regarding SAON, a variety of meetings was held to formalize plans to sustain some of the measurement infrastructure. The Helsinki workshop in October 2008 discussed preparation of a scoping document for the SAON. A meeting organized by the EC in Monaco in November 2008 resulted in the Monaco Declaration, which resolved to uphold the impetus

launched by IPY. The declaration called to make an important European contribution to support the future of the Sustaining Arctic Observing Networks process. The main goal of the PAntOS was to address the scope and implementation strategies for the development of the multidisciplinary Pan-Antarctic observing network encompassing the Antarctic Continent and the surrounding Southern Ocean. The first step was taken by preparation of a Plan for development of Southern Ocean Observing System (SOOS) to provide integrated multidisciplinary observations in the Southern Ocean, which are necessary to understand key physical and biogeochemical processes in the Southern Ocean. This plan contains information on where monitoring networks are planned and where in situ experiments shall take place. Other developments such as Global Cryosphere Watch and Polar Satellite Constellation (PSC) are explicit Agenda items and will be discussed later. New coordination bodies are being established to contribute to securing the IPY legacy. One of them is the WMO EC Panel of Experts on Polar Observations, Research and Services. This body shall provide a high-level WMO partnership in the activities aimed to secure the IPY observing system legacy in communication with operational agencies in WMO Member countries. The another one is an IASC/SCAR Joint Bipolar Action Group which will be established to advise the SCAR and IASC Executive Committees on development of mechanisms to nurture the IPY legacy with focus on the roles of IASC and SCAR.

At its sixtieth session (June, 2008) WMO EC proposed to consider with ICSU and other international organizations a launch of an International Polar Decade. This should help consolidate achievements and allow longer-term programmes to continue.

Y. Crevier noted that STG was a unique forum to discussing interests articulated by the scientific community via IPY. The number of diverse activities is expected in the post-IPY era.

T. Mohr reminded we should focus on what we as representatives of Space Agencies are able to contribute in the future and present a preliminary idea.

### **3. Report on IPY STG SAR Coordination Workshop (YC)**

Y. Crevier informed the meeting that the SAR coordination workshop was held at DLR in October 2008, and presented the approach to SAR coordination (see Presentation 3). He recalled the assessment of SAR system capacity vs. IPY Science requirements, and documented the Space Agency response to addressing high level scientific goals. An exercise was performed to consolidate the acquisition plan in order to avoid gaps and overlaps, in order to optimize resources and to distribute the processing load. The intent was also to look at the short/medium/long term planning approach to securing the IPY legacy and to sustaining activities. YC noted that a summary table had been derived from the exercise which indicates that the 4 key high level science goals could be achieved with one or more SAR instruments (i.e. Radarsat-1/-2, ASAR, Cosmo-Skymed, TerraSAR-X, and PALSAR). A data processing strategy paper has been submitted to the meeting (see Doc 7). MDA could not cover the entire

Antarctic continent, and thus coordination with ESA will be required to make a pole to coast InSAR map, for instance. YC noted that the success of these activities will be weighed according to the quality of the derived data products produced from the data legacy. There is therefore a need to develop an outreach strategy.

F. Battaza (joined the meeting by phone) noted that the 3<sup>rd</sup> C-Skymed is facilitating repeat pass interferometry, in order to address decorrelation times of 1 day. This allows to elaborate interferometric applications in areas where temporal variability in the surface. Acquisitions planned on Jakobshavn glacier in Greenland – and other supersites. There are six projects in C-S AO which focus on Arctic and Antarctic, including the Arctic seas, etc. T.M. mentioned that coordination is necessary with DLR.

**Action STG4-A1** - ASI and DLR to further coordinate T-SARX and C-SK data acquisitions over supersites. F. Battazza (ASI) to fill in Summary table from SAR Coordination meeting, on the 4 science objectives, in connection with the C-SK AO investigations.

M. Gottwald reported on DLR T-SARX coordination performed by D. Floriciou (see Presentation 4) to respond to new acquisition planning – e.g. filling polar hole in left-looking mode. Acquisitions began in October 2008 through end January 2009 – in stripmap mode 30km swath at 3 meters resolution. Three complete coverages were acquired over Recovery Glacier. A next acquisition campaign will proceed in Trans Antarctic Mountains after Recovery Glacier is completed.

#### **4. Review minutes and Status of actions of STG-3 and 2nd SAR Coordination Workshop at DLR (MD/MG)**

MD/ES reviewed status of Action items from STG3 and SAR Coordination Workshop (see Presentation 1). Action status was reviewed and items closed in cases where presentations document response (see Annex 3).

#### **5. Response to key IPY Objectives & 6. Reports on new IPY Portfolio developments (Representatives of Agencies)**

Key IPY Objectives are:

- Pole to coast InSAR multi-frequency SAR - for ice sheet dynamics
- 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 - for circumpolar permafrost
- pan-Arctic high and moderate resolution Vis/IR snapshots - for lake and river freeze-up and break-up

- atmospheric composition

### **DLR**

MG made a presentation (see Presentation 5) on DLR contribution of GOME (ERS), GOME-2 (MetOp - Eumetsat) and Sciamachy (with Envisat) for the purpose of atmospheric and atmospheric composition measurements using absorption spectroscopy or emission spectroscopy. The combination of Sciamachy with MIPAS etc. on Envisat gives chance to retrieve more trace gases and aerosols, and cloud parameters. GOME, GOME-2 and Sciamachy all absorption spectrometers measuring upwelling radiance and the absorption of specific trace gases. Each trace gas has a specific wavelength absorption feature, allowing instrument bands to be designed accordingly. If specific IPY polar requirements exist, e.g. for Sciamachy measurements, then Operation Change Requests (OCR) are possible to modify planning accordingly. Operational products from GOME/GOME-2/Sciamachy are available from D-PAF (GOME; ERS-2), D-PAC (Sciamachy; Envisat), or Ozone monitoring SAF (Gome-2/MetOp). Examples shown from atmospheric products including tropospheric trace gases such as BrO, stratospheric ozone, and Mesospheric noctilucent clouds believed to be ice clouds (observed in limb profiles). DLR portfolio items on atmospheric composition would be extremely valuable.

**Action STG4 – A2 – JK and MG to ensure the Atmospheric Chemistry dataset URL Web links (see MG presentation) are uploaded to GIIPSY web site, under DLR portfolio.**

J.Key noted that it would be good for completeness if all atmospheric or atmospheric composition related datasets were explicitly linked from the GIIPSY web site.

### **CNES**

E.Thouvenot presented an update of activities on optical satellites (see Presentation 7).

He noted the Formosat cooperation which allowed monthly images to be acquired which ensure ice stream dynamics and other processes. Access to Formosat-2 data is possible to register a project at: [www.planet-action.org](http://www.planet-action.org). Planet action is an open initiative of SPOT image, and there are currently several projects approved to exploit the Formosat data already in the IPY archive. SPOT-5/HRS is focusing on obtaining high res. Data and DEMs at 40m resolution. Arctic Campaign is now closed. About 72% of original intended area was acquired. Antarctic campaign is still ongoing in austral summer 2009, through the end of March, in order to try to complete the acquisition plan in Antarctica.

SPIRIT has delivered 131 products to over 100 hundred users. About 50% of Arctic DEMs already produced, whereas for Antarctica a smaller proportion of DEMs have been produced. Current status is that SPIRIT will officially end at the end of June, though there may be possibilities for trying to justify continuity in the

activities via International Programmes. CNES has supported intensive satellite acquisition campaigns.

### **NOAA/NESDIS**

J. Key updated meeting on status of NOAA contributions to IPY (see Presentation 8). Some new products generated at direct readout sites as a result of funding for IPY activities: Fairbanks (Terra MODIS), Barrow (HRPT), Tromso, Svalbard (Terra MODIS) and McMurdo (Terra/Aqua MODIS ) and Rothera (HRPT AVHRR), Antarctica. Direct readout products can achieve the NRT 30 minute requirement, and the station mask affords good coverage. Products include Winds, Clouds (optical depth, particle size), temp and pressure, snow cover, ice cover, concentration, thickness, etc. New products include the extended AVHRR Polar Pathfinder products database – and reprocessing will take care of the entire archive. Examples include surface temperature, net cloud forcing. AVHRR Historical winds reprocessing undertaken, and to be completed by April 2009 so as to contribute to Antarctic reanalysis projects underway at JMA, ECMWF.

In the context of new Portfolio developments (see Presentation 9a) the AVHRR Polar Pathfinder extended dataset (APP-x) and CLAVR-X cloud datasets are relevant. Similar the Pathfinder Atmospheres products (PATMOS-x) are relevant to IPY. NESDIS also collaborating with Eumetsat to develop operational cloud products, and for which products are archived at NCDC. For Atmospheric composition and aerosol, products have been derived from Aura (OMI). Meanwhile sounder data is available from the TOVS Pathfinder-P – products. Global hyperspectral soundings are available from AIRS and ASI.

.JK reported on progress regarding **STG3-R2** recommendation for NOAA to investigate possibility to use HRPT archives to regenerate 1 km archives of NOAA satellite products (see Presentation 9b). He had contacted all HRPT stations to establish which ones are maintaining archives. Some complications include specific formatting of data (such as Terascan format). The existing data are from Rothera, Neumayer, Casey, and McMurdo, which could foreseeably allow construction of a 10 year record.

**Action STG4-A3 – J. Key to assemble the Antarctic HRPT record information contributed by the stations and see whether it is feasible to produce and archive an historical 1km AVHRR composite product prior to MODIS.**

The STG stressed that this action is to establish the feasibility of generating a value added product for the time interval preceding MODIS. It was noted that there are serious challenges associated with the data recovery and the fact that many of these data may not be permanently archived or maintained. AWI and Neumayer informed that it may be challenging to continue to maintain an archive of these data.

### **ESA**

J. del Rio Vera – presented the ESA contribution to IPY (see Presentation 12). He noted the recent additional AO for CryoSat-2. J d RV also noted the optimisation of coverage of the ASAR, and the additional optimisation of the orbit of ERS-2 to enable inter-satellite InSAR coverage (via optimisation of baseline),(short time separation of only 28 minutes).

The recent additional new items include development of the Webcam from Space monitoring of Wilkins Ice Shelf. JdRV showed the frequency of coverage of Antarctica over 35 day repeat cycles, and Arctic (**? E.S**). This highlighted where additional optimisation can be made to provide better coverage. J d RV noted additional initiatives such as MORSE (with CSA), GlobICE, GlobSnow and other initiatives..

### **CSA**

Y. Crevier gave status update from SAR coordination meeting in October at DLR. The sensor summary table (see Presentation 13) was used to relate the extent to which R1 and R2 can meet the intended high level objectives. Direct downlink of data to Tromso makes it critical to engage NSC and KSAT in processing of archives there – to achieve full Arctic snapshot. Coordination with ESA was provided to achieve regular full Arctic snapshot through complete coverage in ScanSAR and WSM, for Radarsat and Envisat, respectively.

Since October 2008, a full mosaic of entire Antarctica, in multipolarisation Radarsat 2 data has been acquired. This is the first time a complete mapping achieved since the R1 mosaic in 1997. The pole hole is currently being covered at 25 meters in InSAR mode using left-looking mode over three cycles. Coordination with ESA will be required to ensure a seamless pole to coast InSAR coverage and ice dynamics products.

Radarsat Constellation now in Phase B with 3 satellites ready to deliver operational data with < 32 minutes separation, for ship detection, ice applications, etc. Launch date planned in 2014. This will provide high frequency repeat. Together with Sentinel-1 the plan is to make the two sensors interoperable, via combined mission operations and data dissemination.

Problem of Radarsat 1 was solved via exchange of letters. The reception of R1 data is now since approved at ASF. The other remaining problem for NASA to solve is to facilitate data access by agreement with MDA.

YC noted the progress on PolarSAT - a Canadian project to develop a concept for counter rotating satellites in highly elliptical orbits (similar to “Arktika” of Roscosmos). The CSA had developed the satellite on the basis of requirements.

### **USGS**

J. Mullins (jointed the meeting by phone) updated STG on contributions of USGS in context of IPY (see Document suite 6) knew USGS would play a role in IPY given its mission. Principal contributions from Landsat imagery, and airborne, via coastal change mapping, USGS digitizing of Antarctic photography holdings, and LIMA.

As part of Glacier studies project, an Atlas of glaciers of the World produced as 10 volume series, from which 8 volumes are complete. The Alaska volume (see Doc 6(1)) is shown. For more information at [www.glaciers.er.usgs.gov](http://www.glaciers.er.usgs.gov) .

Coastal Change Mapping Program, using L-1, 2, 3, and L7. Objective is to determine coastline changes from 1970's to the present day. 23 maps published at 1:1,000,000 scale. Collaboration between USGS and BAS was pointed out. Floating ice fronts, grounded ice and grounding line is determined. An inventory of outlet glaciers is being compiled. 7 of the 23 maps completed, e.g. Larsen Ice shelf example sent in Doc. Suite. Planned completion of the series of 23 is within the next 2 to 4 years. Feature data should ultimately appear in the Antarctic Digital Database. Another USGS project is the digitization of US holdings of aerial photos (23 cm) at nadir and oblique viewing geometries, from interval 1946 to 2003.

The Landsat Image Map of Antarctica is a key contribution, via a cooperative effort between USGS, BAS, NASA and NSF. It is now online at <http://lima.usgs.gov>. Ultimately, 1100 scenes used on basis of consistent sun angle etc. All data online in geotiff tiled format. It is now the base for Antarctica in Google Earth. Glacier studies ongoing, as monitoring continues.

A circumpolar Arctic Landsat product would be an Arctic relevant product. Discussions with NSF should facilitate preparation.

**Recommendation STG4 – R1 – USGS to make efforts to secure funding for a circumpolar Arctic product similar to LIMA.**

Y. Crevier supported idea of CSA contributing.

**Action STG4- A4 - YC to contact USGS – J. Mullins to coordinate Canadian contribution to products over the Canadian Northern territories.**

B. Ryan noted that the idea to build the “LIMA North” discussions began at the Yellowknife GeoNorth conference in 2008. These products have broad application in all 9 Arctic countries. Paying for Landsat data also no longer required which will reduce the cost of producing a circumpolar North composite. A follow-on GeoNorth conference will be held this summer at which the idea can be investigated further.

## **7. Post-IPY Geophysical Data Processing Strategy (K F/K J)**

K. Farness presented GIIPSY contributions over the last months, including participation in DLR Workshop and mission planning support at the DLR SAR Coordination workshop.

Data Processing Strategy White Paper was introduced by K. Jezek (via teleconference) – (see document 7). The idea was for Agencies to share resources to economically process the voluminous amounts of data collected during IPY. The plan describes 3 strategic elements which include firstly

identification of the key science objectives to guide geophysical data processing. This is a logical GIIPSY task. The second element of a plan would be to seek concurrence on the plan from the STG members who will be responsible for securing resources for processing their own contributed data sets. The third element of a plan is the data fusion required prior to producing seamless products including development of data products. This must include data fusion protocols and procedures for assuring data product quality. A pole to coast Antarctic product might require contribution from a broad variety of datasets. However, first ground control points, registration procedures etc. must first be properly defined. This responsibility should fall to GIIPSY and STG.

A table constructed from Science products to be supported with SAR e.g. winter C-band SAR image of the Antarctic, or Pole to Coast surface velocity map of the Greenland or Antarctic ice sheets. Some efforts require combination of optically derived or altimetrically derived DEMs with SAR mosaic or InSAR data. One must consider how to broaden the task for generating DEMs from optical data to include PRISM and ASTER. Attention should be given to the science and research support required to produce the higher level products from the data. NSF could put finances into computational resources required for complex processing tasks like production of Continental scale interferometrically derived mosaics.

YC noted that the next SAR coordination meeting should focus on the elements outlined in document 7, regarding seeking concurrence on the plan from the STG. Specifically, on SAR data products. CSA has secured some money to try to address the first 3 SAR objectives.

DC noted that the Roadmap distinguishes the GIIPSY and STG. He is concerned about the breadth, and about relative less mature list of optical products.

MG identified that some value adding is required from Atmospheric composition communities before their time series could be best exploited by the IPY science community. Quality controlled surface and column data will be required to connect to projects like OASIS.

KJ noted that GIIPSY should strive to achieve the primary high level goals already posed and then to call it quits and declare victory. The IPY provided a good umbrella to get started. However, it may be necessary to restructure the GIIPSY at some points to address the evolving needs of other follow-on polar programmes like GCW, or the proposed "polar decade".

YC noted that the evolution of STG activities could move in the direction of CEOS, with a virtual constellation for Polar Regions. T M noted that it could also equally be viewed to serve the operational science aspects such as the Global Cryosphere Watch and it could be foreseen to complement or support the EC Panel on Polar Observations, Research and Services. GIIPSY has been the basis for the requirements driven process. Virtual constellations are a construct for CEOS member states to effect decisions on new missions.

MD noted that so far it had not resulted in significant progress or decisions that had influenced anything beyond new satellite approvals. STG has the blend of operational and R&D agencies and has a unique interface to the research



community. This is an attribute that is not common to the WMO EC Panel on Polar Observations, Research and Services, or other such advisory bodies.

**Action STG4-A5 - STG members to refine and elaborate details on the list of higher level products identified in document 7 (Data Processing Strategy) in order to fulfill the high level product goals.**

## **8. IPY Archival and Data Access Status (OG)**

O.Godoy presented status of cataloguing WMO essential data for IPY and developing the catalogue handling tools using the WIS framework (see Presentation 6).

ECMWF and HIRLAM NWP (MetNo) with online access, using OpenDAP, HTTP, and WMS. OSISAF has data with online access, and THORPEX data available together with MetNo surface obs data and working drifters (data from Woods Hole).

Limited funding for activities requires prioritisation of tasks. Focus meanwhile on ECMWF access and transformation, and this task is completed. Also focused on Metadata access and harvesting tools using a family of tools (OAI-PMH – open archive protocol – adopted by IPY, CEOS WGISS; and Catalogue Search for the Web – CSW 2.0.2. /ISO 23950. The Open Archive Protocol uses the DIF for exchange, similar to what is already adopted in the Global Change Master Directory. It implies a standard format for metadata.

Catalogue Interoperability requires harvesting of metadata, and DOKIPY allows harvesting of GCMD data. DOKIPY will also link with NSIDC IPY database. DAMOCLES will link with CADIS. IPY in Sweden is using the Open Source system for metadata developed by MetNo which Implements the AOI0PMH support (see [wiki.met.no/metamod](http://wiki.met.no/metamod)). ArcticNet asked for exchange of metadata. Marc Parsons is coordinating efforts with the others. An IPY discussion forum has been used to highlight problems to date, such as Insufficient ISO topic categories, harmonization of controlled vocabularies, etc.

Main showstopper so far has not been the implementation of software, rather handling of various controlled vocabularies and mapping between the two. Controlled vocabularies are essential for smooth catalogue interoperability.

No direct dialogue with Space Agencies since last meeting, but WGISS has ensured catalogue interoperability. Links to metadata portal and EO portal now made.

Due to constrained funding, it is most likely that INSPIRE must support Catalogue interoperability developments after IPY – in WIS and GEOSS framework. In the future focus will be on adaptation of existing tools into WIS framework.

TM questioned what lessons we draw from what O.G. regarding how to deal with the Space Data. <http://eoportal.org> efforts are a good way to focus space agency efforts towards catalogue interoperability. However these efforts need to be sharpened to make demonstrations of interoperability with other IPY databases.

**Action STG4-A6:** OG and STG members to establish concrete action plans for how Space Agencies can best move forwards in consolidating how IPY Data Portfolio's will be made available/visible, discoverable and accessible with pilot project demonstrations by 2010.

OG noted that it will be necessary to adopt CEOS WGISS interoperability standards in order to better share data. The goal should be by 2010 try to demonstrate pilot schemes for how interoperability allows discoverability of space agency catalogue holdings.

MD noted that the [eoportal.org](http://eoportal.org) is a good example of how well organised the space agencies already are in linking together their metadata resources.

**Action STG4-A7** –YC to contact Ellsworth LeDrew to encourage development of a link between ArcticNet ( <http://www.arcticnet.ulaval.ca/> ) and OG efforts to access IPY databases.

## **9. Global Cryosphere Watch (BG)**

B. Goodison introduced GCW (see **Presentation 10**) and the kinds of products which are relevant to the GCW. EuroCroClim is also proposing production of products. There are significant challenges to propose which products are relevant to climate, and sufficiently well validated to us useful for other applications. One popular kind of product which is considered is a sea-ice outlook – which tries to forecast the following year's ice minimum on the basis of the present year. GCW must be able to evaluate product quality and to validate them.

MD asked what does GCW believe is the use of the STG polar snapshots assembled through IPY, as an element of the GCW information layer. It is one way of gauging past and future change but it is not clear how frequently full polar snapshots need to be acquired.

JK was nominated as the STG point of contact to GCW, since he is familiar with the links to CryOS and the original intent of the IGOS-P Cryosphere Theme Team report objectives.

GCW requested STG to identify potential areas of specific interest of STG where GCW could help (research, observations, products, monitoring, assessment, prediction). What is the benefit of the STG to GCW? It seems like GCW is the umbrella programme analogous to IPY. Thus, the question is whether GIIPSY is relevant to GCW for science objectives. TM noted that GCW needs links to space and in-situ observational systems.

**Recommendation STG4 - R2** - STG to consider what the Global Cryosphere Watch (GCW) can do in a coordinated manner for Antarctica.

The place where STG related products can clearly support Antarctic research efforts is, for example in support of projects like ISMASS. Data are also seen as

beneficial in the context of the SOOS community efforts, and will be represented in the implementation plan.

### **10. CEOS Gap analysis (J.K)**

J. Key made a gap analysis based on high-level scientific questions like sea level change (see Presentation 14). Examples for Carbon cycle and Cryosphere, etc. were given.

A cryosphere thread had been developed to demonstrate the products and services required to meet the higher level goal. The IGOS Cryosphere Theme tables and mission timelines used as an input to the analysis. The tables were translated into the satellites required to fulfill a specific geophysical variable.

TM noted that the thread approach is required to boil down the message into an understandable message that can be consumed at the CEOS – and which can be used in Global Cryosphere Watch.

Ghassem Asrar, Director of WCRP noted that the gap analysis message should be delivered to GCOS.

### **11. WMO Space Programme (BR)**

Barbara Ryan, Director of WSP introduced WMO Space Programme and showed the evolution in satellites. WMO Space Programme activities span 38 years involving 177 countries, their space agencies and CGMS. WMO space office intends to plan and implement GOS, ensure satellite quality, enhancing data access and user products. WSP had linked to Group on Earth Observations in connection with System of Systems approach. Integration of observing systems nationally and internationally will allow to benefit from an improved distribution of observations of any given event. In the space-based component of the Observing System, the WMO's Global Observing System (GOS) is the traditional example of a system of systems. The GEOSS transition is a way for the WMO GOS to reach out the research and development driven space agencies

Global space-based inter-calibration system efforts (GSICS) are underway to ensure data quality. This involves 7 satellite operators. Regional Specialised Satellite Centres for Climate Monitoring (RSSC-CM) have developed and implementation plan for realising Essential Climate Variables with appropriate quality control, A general set of principles need to be developed for ECV product certification. An executive panel will be convened on 25-26 Feb, 2009.

The challenges which WMO space office would like to contribute to include helping the transition from research to operations, help in establishing data sharing principles, and new approaches to terminology amongst sectors/organisations to bring clarity to policy makers.

### **12. High-Res. optical data workshop status (ET)**

E.Thouvenot. had taken action (STG3- XXX) to coordinate with JAXA the possibility to organize a workshop together with ESA. Ichida Chu and M.

Shimada had no plan to initiate processing and analysis of PRISM and AVNIR-2, in order to bring material to workshop.

Currently there is a limited opportunity to organize a coordination workshop.

**Recommendation STG4 - R3** – JAXA to formulate a plan for how to exploit the archives of PRISM and AVNIR-2 in the context of meeting the high-level IPY Objectives

### **13. Links to GEO (GR)**

Giovanni Rum, representative of GEO Secretariat reminded of the need to extend the vision from IPY to the legacy. In his opinion, we rely on a certain number satellite systems, but we should try to tune the output to ECVs or perhaps simply Essential Variables for Societal Benefit Areas. GEO believes they can help to try to help advocate for the continuity in observing systems, and to try to support move from research and development.

With integration of IGOS-P into GEO framework, will allow to go beyond the observational needs along the value-adding chain to identify the user benefits in a societal context.

The GEO action which is the IPY Legacy Task is the means to realize an interoperable system for deriving added value user products. GR noted that an IGOS Workshop celebration (as part of a 2-day workshop) is proposed on around 18 November, 2009 in Washington DC prior to the GEO Plenary. This would provide the elevated platform to establish the needs for a Polar virtual constellation, and to highlight the needs for the polar observing constellation.

G.A implored that a composite picture must be portrayed about the need for an effective combination of in-situ and space infrastructure.

GR noted that the tasks should further a process to facilitate development of relevant services. He encouraged a few key messages from IGOS-Cryo should be taken to this meeting.

**Action STG4-A8** - ES and STG members to formulate ideas for presentation at the IGOS-P Workshop to be collocated with GEO plenary.

Wenjian Zhang, Director of Observations and Information Systems, noted the importance of the work of the STG to elevate the importance of the polar observing system component. The goal should be to promote NRT data delivery from the polar satellite infrastructure, so we can build credibility in developing operational products.

### **14. Review future STG Planning and Coordination needs**

The intent of a future SAR Coordination meeting should be to plan and coordinate the ways forwards for data processing dimension. YC noted the CSA financial planning constraints which require that he needs to establish a plan.

**Action STG4 - A9 - YC, KJ to plan and facilitate next SAR coordination meeting based on the benefits of first coordination exercises for purpose of preparation for next phase of product generation.**

The potential meeting location was discussed as being at ESRIN in around the May 2009 timeframe. This meeting should involve DLR, ESA, MDA, ESA, ASI as well as potential scientific stakeholders and the Science and Research funding Agencies (e.g. NSF) - This meeting shall determine the specifications of the Products.

TM encouraged a discussion at this meeting about the implementation planning for the processing of the data. A preliminary processing implementation plan should be the goal of this meeting. The objective should be to realize some demonstration products by the Oslo meeting

In order to engage NSC and KSAT a letter should be sent on behalf of the STG from the JC. This should remind them of the importance of their archive for benefit of Greenland and the Arctic snapshot.

**Recommendation STG4-R4 - Joint Committee for IPY to send a letter to Norwegian Space Center, Norwegian IPY Committee and KSAT by April 2009 to highlight the importance of the archival data in Tromso.**

YC will provide input for the letter content.

## **15. STG Communications (all)**

### **General Publication of STG Results**

A general discussion was held regarding general publication of STG results. D. Carlson agreed that outreach about Space Agency contribution to IPY should be an important focus. An example of a GIIPSY publication in Space Research Today, a COSPAR journal, was distributed as Document 5. One potential idea was proposed by MD for an EoS article. DC noted that though EoS provides a good opportunity, it unfortunately does not properly address the biological community who may be interested in the results.

GEO and Nat. Geographic were considered as other popular science journals that should be considered. The success story of IPY STG in WMO Bulletin was proposed by ES to coincide with open science conference – with required 1 year lead time.

**Action STG4-A10 - STG members to deliver their best results on 1 page with extended figure captions.**

### **IPY Oslo Science Conference**

The STG members should start to prepare for Oslo conference. It is important to bring our products to the public and the scientists at large. STG should consider

what kind of slogan and session should be run to highlight the importance of the STG and what it has done to drive IPY science. Highlight future plans of STG is also necessary. In the session on shrinking snow and ice STG should also consider advertising the high-level GIIPSY products.

DC implored that STG should show products at the event. An example is to organize a Space Agency drinks session with demonstrations of how to access

**Action STG4-11** - DC to coordinate with STG the idea of glossy IPY brochure via IPO illustrating the power of satellite in polar science.

#### **16. Planning of next STG Meeting and closure the session**

It was discussed that the present STG mandate continues through the Oslo meeting in 2010. Meanwhile, efforts should be focused on reaching that meeting milestone with the ability to promote the STG activities. It was discussed that an opportunity should be sought to coordinate the next meeting with the proposed IPY GCW workshop. This would suggest an STG meeting in the October 2009 timeframe. MD suggested that the members will be contacted to investigate the possibility of dates in October.

The meeting was closed at 13:00 4 February 2009 with expressions of thanks to Chair.

## STG4 Action Items - Overview

**STG4 - A1** - ASI and DLR to further coordinate T-SARX and C-SK data acquisitions over supersites. F. Battazza (ASI) to fill in Summary table from SAR Coordination meeting, on the 4 science objectives, in connection with the C-SK AO investigations.

**STG4 - A2** - JK and MG to ensure the Atmospheric Chemistry dataset URL Web links (see MG presentation) are uploaded to GIIPSY web site, under DLR portfolio.

**STG4 - A3** – JK to assemble the Antarctic HRPT record information contributed by the stations and see whether it is feasible to produce and archive an historical 1km AVHRR composite product prior to MODIS.

**STG4 - A4** - YC to contact USGS – J. Mullins to coordinate Canadian contribution to products over the Canadian Northern territories.

**STG4 - A5** - STG members to refine and elaborate details on the list of higher level products identified in document 7 (Data Processing Strategy) in order to fulfill the high level product goals.

**STG4 -A6** - OG and STG members to establish concrete action plans for how Space Agencies can best move forwards in consolidating how IPY Data Portfolio's will be made available/visible, discoverable and accessible with pilot project demonstrations by 2010.

**STG4 - A7** – YC to contact Ellsworth LeDrew to encourage development of a link between ArcticNet (<http://www.arcticnet.ulaval.ca/>) and OG efforts to access IPY databases.

**STG4 - A8** - ES and STG members to formulate ideas for presentation at the IGOS-P Workshop to be collocated with GEO plenary.

**STG4 - A9** - YC, KJ to plan and facilitate next SAR coordination meeting based on the benefits of first coordination exercises for purpose of preparation for next phase of product generation.

**STG4 - A10** - STG members to deliver their best results on 1 page with extended figure captions.

**STG4 - 11** - DC to coordinate with STG the idea of glossy IPY brochure via IPO illustrating the power of satellite in polar science.

## **STG4 Recommendations - Overview**

**STG4 - R1** – USGS to make efforts to secure funding for a circumpolar Arctic product similar to LIMA.

**STG4 - R2** - STG to consider what the Global Cryosphere Watch (GCW) can do in a coordinated manner for Antarctica.

**STG4 - R3** – JAXA to formulate a plan how to exploit the archives of PRISM and AVNIR-2 in the context of meeting the high-level IPY Objectives.

**STG4 - R4** - JC to send a letter by April 2009 to Norwegian Space Centre, Norwegian IPY Committee and KSAT by April 2009 to highlight the importance of the archival data in Tromso.



## List of participants

### STG members

1. Drinkwater Mark, Co-chair	ESA	
2. Battazza Fabrizio	ASI	(*by teleconference only)
3. Thouvenot Eric	CNES	
4. Crevier Yves	CSA	
5. Gottwald Manfred	DLR	
6. Del Rio Vera Jorge	ESA/ESRIN	
7. Key Jeff	NOAA	
8. Mullins Jerry	USGS	(by teleconference)
9. Jezek Ken	IPY GIIPSY	(by teleconference)

### Invited participants

1. Mohr Tillmann	IPY JC
2. Sarukhanian Eduard	IPY JC
3. Carlson David	IPY IPO
4. Farness Katy	IPY GIIPSY
5. Godoy Oystein	IPY Data coordinator
6. Zhang Wenjian	WMO/OBS
7. Asrar Ghassem	WCRP
8. Ryan Barbara	WSP
9. Goodison Barry	WCRP/CliC
10. Ryabinin Vladimir	WCRP
12. Rum Giovanni	GEO

**Space Task Group (STG) – Fourth session  
3-4 Feb. 2009, WMO, Geneva, Switzerland**

Agenda

1. Opening and approval of agenda
2. Review of IPY and Securing the IPY Observing System Legacy
3. Report on IPY STG SAR Coordination Workshop
4. Review minutes and Status of actions of STG-3 and 2nd SAR Coordination Workshop at DLR
5. Agency Reports: response to key IPY Objectives (each Agency presenting)
  - Pole to coast InSAR multi-frequency SAR - for ice sheet dynamics
  - 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 - for circumpolar permafrost
  - pan-Arctic high and moderate resolution Vis/IR snapshots - for lake and river freeze-up and break-up
6. Reports on new IPY Portfolio developments
  - USGS White Paper
  - NESDIS
7. Post-IPY Geophysical Data Processing Strategy
8. Archival and Data Access Status
  - Catalogue Interoperability status
  - WIS data handling - pilot project status
9. Global Cryosphere Watch
10. CEOS Gap analysis
11. WMO Space Programme
12. HighRes. optical data workshop status
13. Links to GEO
14. Review future STG Planning and Coordination needs
15. STG Communications
  - General Publication of STG Results
  - IPY Oslo Science Conference

16. Planning of next STG Meeting and closure the session

Annex 3 (To be done)

## List of documents

Document No	Title	Submitted
Doc 1	Provisional Agenda	M. Drinkwater
Doc 2	Legacy of the IPY 2007-2008	E. Sarukhanian
Doc 3	IPY Space Task Group Synthetic Aperture Radar (SAR) Workshop Minutes	Y. Crevier
Doc 4	Second STG/IPY SAR Coordination meeting Minutes	M. Gottwald
Doc 5	Space Research Today	M. Drinkwater
Doc 6	USGS IPY portfolio white paper	J. Mullins (by telecon)
Doc 7	A data processing strategy for IPY satellite data	K. Jezek (by telecon) Document is available
Doc 9	Global Cryosphere Watch	B. Goodison
Inf 1	List of documents	
Inf 2	STG 3 Minutes, Actions, Recommendations	M. Drinkwater
Inf 3	Preliminary list of participants	E. Sarukhanian

## **List of Presentations**

Presentation 1 – Legacy of International Polar Year

Presentation 2 – Ed Sarukhanian's Legacy presentation

Presentation 3 – Y. C. Presentation about SAR Coordination workshop

Presentation 4 – MG presented D. Floriciou's TSAR-X coordination since DLR Coordination workshop.

Presentation 5 – MG presented DLR's atmospheric/atmospheric composition response to IPY.

Presentation 6 – O.Godoy - IPY Data Management

Presentation 7 – E. Thouvenot – Formosat and SPOT update

Presentation 8 – J.Key – NOAA/NESDIS\_IPY\_portfolio update

Presentation 10 – GCW - Barry Goodison

Presentation 11 – Jorge del Rio Vera – ESA IPY Portfolio update

Presentation 12 – Y. Crevier – CSA

Presentation 13 – J. Key (NOAA) – additional atmos. composition IPY items

Presentation XX – J. Key – Action Items

Presentation XX – B. Ryan – WMO Space Programme