

**WORLD METEOROLOGICAL ORGANIZATION**

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**COMMISSION FOR BASIC SYSTEMS**  
**OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS**  
**EXPERT TEAM ON SATELLITE UTILIZATION AND PRODUCTS**

**EIGHTH SESSION**

**GENEVA, SWITZERLAND**

**14 - 17 APRIL 2014**

**MEETING REPORT**



## **WMO General Regulations**

### **Regulation 42**

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

### **Regulation 43**

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of the body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9(5).

## EXECUTIVE SUMMARY

The eighth session of the Expert Team on Satellite Utilization and Products (ET-SUP) was convened in Geneva, Switzerland from 14 to 17 April 2014.

The primary objective of the session was to advance the work programme defined by the World Meteorological Organization (WMO) Commission for Basic Systems (CBS) as concerns in particular the promotion of access and use of satellite data by WMO Members in support of all WMO programmes and WMO co-sponsored programmes.

In particular, the Team focussed on satellite data exchange, data dissemination and access on global and regional basis, Sustained Coordinated Processing of Environmental Satellite Data (SCOPE) mechanisms for nowcasting and climate monitoring, a range of satellite data applications (NWP, oceanography and marine meteorology, disaster response, atmospheric composition), and the preparation of users to the new generation of meteorological satellites, becoming available in the 2015-2019 timeframe. In the context of the GFCS, the Team further investigated case studies demonstrating the use of satellite data in climate services in the context of the Architecture for Climate Monitoring from Space. Training and education efforts supporting utilization of satellite data were also discussed.

In addition, the session:

- Promoted the work by Region-based satellite user groups
  - Discussed an updated Integrated Global Data Dissemination Strategy
  - Considered the availability of satellite data in the WMO Information System
  - Addressed interoperability and future upgrades to direct readout systems
  - Recommended steps towards consistent volcanic ash satellite products for aviation
  - Developed ideas for the use of satellites in emergency response situations
  - Advised WMO Secretariat on improving online resources in support of the Space Programme, and
  - Recommended topics for future capacity building events by WMO and COSPAR.
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*From left: Xiang Fang, Daniele Biron, Wenjian Zhang, Stephan Bojinski, Anthony Mostek, Anthony Rea, Suman Goyal, Richard Eckman, Jean-Louis Fellous, Jérôme Lafeuille, Hidehiko Murata, Sally Wannop, Mikael Rattenborg, Ignatius Gitonga, Luiz Machado, Volker Gärtner, Stephen English*

## **1. ORGANIZATION OF THE SESSION**

### **1.1 Opening of the session**

The meeting opened at 9.00 on Monday 14 April 2014 in Room 7 Lake in WMO Headquarters, Geneva, Switzerland. Anthony Rea (Australian Bureau of Meteorology) opened the session and mentioned that guidance from ICT-IOS-8 in the previous week should be considered in the ET-SUP work programme.

The Director of the WMO Space Programme, W. Zhang, pointed out the importance of meetings of IPET-OSDE, ICT-IOS and now ET-SUP for implementation of WIGOS, which aims to serve all WMO application areas. Priorities for WMO in the current financial period are GFCS, WIGOS/WIS, Disaster Risk Reduction, Aviation services and Capacity Building, to all of which ET-SUP was contributing. The new generation of meteorological satellites will provide increased capabilities, and with that comes the necessity for satellite data users to prepare adequately, and to receive timely and relevant information. This will ensure taking full benefit of these satellites, and minimize the risk of disruption in operations. Better access and information about satellite-derived products is required in this context. In light of the 2015 World Meteorological Congress, he invited ET-SUP to discuss potential decisions for consideration by Members.

### **1.2 Adoption of the agenda**

A provisional agenda was developed by the ET-SUP Chair and the Secretariat. The proposed agenda was accepted.

### **1.3 Working arrangements for the session**

Secretariat briefed participants on working arrangements. All meeting documents were made available in electronic form only on the ET-SUP-8 web page: <http://www.wmo.int/pages/prog/sat/meetings/ET-SUP-8.php>.

## **2. CHAIRMAN'S REPORT**

The ET-SUP Chairman provided background information on the WMO structure under which ET-SUP operates. He provided a recap of the outcomes of the previous ET-SUP session and outlined the major achievements since that session.

In particular, the Chair reported on the high level of WMO participation at CGMS-41 with a significant user focus, including presentations on SCOPE-Nowcasting and user preparation for the new generation of geostationary satellites. The positive reaction to these presentations and the actions taken within CGMS Plenary were also noted.

On training activities, he reported on a number of VLab events and regional requirements group and training events in RA V. Particular attention was given to the regional requirements group meeting and training event held in conjunction with the 4<sup>th</sup> Asia-Oceania Meteorological Satellite Users Conference held in Melbourne, Australia in October 2013.

The Chair provided details of the SCOPE-Nowcasting workshop held in November 2013, noting the progress made and also noting that this initiative will continue to be a focus of the group over the next two years of the inter-sessional period.

He outlined the key differences between different capability levels of users in the context of the satellite data value chain. Significant capability gaps for some users, in the areas of visualization and data acquisition, were also identified as an issue for ET-SUP consideration.

On the global user survey of satellite data utilisation, the Chair reminder the group of the plan to carry out the next one in 2016, and that this would not be considered until the next ET-SUP session. However, he indicated that regional surveys taken in the interim, such as that conducted recently in RA III/IV, were an important mechanism for keeping ET-SUP up-to-date with user needs and issues.

## 2.1 Status of previous ET-SUP Actions

Action 7.1: All ET-SUP members to analyze the WMO 2012 Survey on the Use of Satellite Data, with particular focus on results specific to their Region; Members to provide feedback to the ET-SUP Chair and the Secretariat; Deadline: 1 Sep 2013.	DONE; WMO Survey remains valuable; all technical aspects of the satellite data value chain should be probed at the next survey; space weather should be covered more thoroughly
Action 7.2: S. English and A. Rea to facilitate the invitation by CMA of an INPE/CPTEC observer to the next NAEDEX-APSDEU meeting in China 2014.	DONE, invitation was forwarded to INPE (Luiz, Daniel)
Action 7.3: Regional Satellite Data Requirements Groups should each designate a chair or co-chairs, if not already in place. Deadline: 1 Sep 2013.	DONE; RA V: Agnes Lane (BoM) is designated Chair of TT-SUR RA III/IV: Luiz Machado designated Chair; both need formalization
Action 7.4: S. Wannop, L. Machado, A. Rea, H. Kunimatsu and X. Fang to agree on a common template for gathering requirements for data access and exchange, based on their respective practices. Deadline: 1 Dec 2013.	OPEN; New deadline 30 Jun 2014
Action 7.5: RA II WIGOS Project co-leads (JMA and KMA) to address the deficiencies and challenges reported by Members in RA II in response to the 2010/2011 user survey. Deadline: 4th AOMSUC in Oct 2013 (for development of a work plan)	DONE; many countries report a lack of capacity in using satellite data - addressed by CB activities by JICA and JMA; req for sand and dust products, to be addressed through SCOPE-Nowcasting; report to ET-SUP-8
Action 7.6: WMO Secretariat, in collaboration with RA II WIGOS Project co-leads (JMA and KMA), to invite Lao PDR to become a member of the Coordination Group for the Project. Deadline: 1 Sep 2013	DONE ; Lao PDR invited in WMO letter (23 Sep 2013)
Action 7.7: ET-SUP task group (R. Eckman in Lead; J.-L. Fellous, I. Gitonga, A. Rea, Secretariat) to develop a paper demonstrating the value of satellite data for the GFCS. Deadline: 15 Dec 2013.	DONE; Progress reported to ET-SUP-8
Action 7.8: In consultation with CMA, JMA and KMA, to develop (i) a product specification document, and (ii) a product dissemination plan, for harmonized RGBs for nowcasting from imagers on Himawari-8, FY-4A and Geo-KOMPSAT-2A. Lead: A. Rea; Co-Leads: H. Kunimatsu, X. Fang.	Superseded by SCOPE-Nowcasting Action plan, with May 2014 timeline
Action 7.9: ET-SUP Chair and WMO Secretariat to explore how SCOPE-Nowcasting could be recognized as a catalyst for attaining globally harmonized satellite-based volcanic ash products for nowcasting. (contact points: D. Lockett, H. Pümpel (WMO); A. Tupper (BoM))	Superseded by SCOPE-Nowcasting Action plan, with May 2014 timeline
Action 7.10: Designated leads for the SCOPE-Nowcasting Pilot Project 4 (Ocean Winds) to revise the plan to include real-time provision of data from multiple sources, including ASCAT, Oceansat-2 and HY-2A, with the possible addition of AMV data. Deadline: 1 Sep 2013	Superseded by SCOPE-Nowcasting Action plan, with May 2014 timeline
Action 7.11: JMA and CMA to carry out test studies based on the GOES-R dust algorithm towards application to Himawari-8 and FY-4A data, and to compare results under a range of meteorological conditions (H. Kunimatsu, X. Fang).	Superseded by SCOPE-Nowcasting Action plan, with May 2014 timeline
Action 7.12: A. Rea to update the SCOPE-Nowcasting Concept to reflect the discussions at ET-SUP-7, and to develop a high-level summary of the Concept. Deadline: 1 Sep 2013	DONE; minor changes still pending
Action 7.13: WMO Secretariat to integrate data access information currently available on a static webpage into OSCAR. Deadline: 1 Nov 2013	DONE; was discussed at WMO Sec; cannot be addressed currently; due to lack of resources and other reasons, no major new features are expected to be added to OSCAR in the near future; data access through OSCAR should only address level 0/1 data (instrument-specific); higher-level data/products should be accessed through the online Product Access Guide

Action 7.14: WMO Secretariat to distribute promotional material on OSCAR through letters to WMO PRs, to the co-chairs of the International Scientific Working Groups, and through emails to user communities. Deadline: End 2013	DONE; OSCAR was advertised at major conferences and by email to user communities
Action 7.15: Members of ET-SUP to advertise the OSCAR tool through their own communication channels. Deadline: 1 Oct 2013	DONE ; Members should continue through to ET-SUP-8; S English: ECMWF advertised OSCAR in their satellite training course; T Mostek: emails were sent to various NOAA and COMET staff on the OSCAR tool. This tool is relevant as NOAA works to develop a similar capability.
Action 7.16: ET-SUP members to identify focal points in their institution that could provide input related to satellite data to the ICG-WIGOS Task Team on the WIGOS Metadata. Deadline: 30 June 2013.	DONE; Nigel Atkinson (UKMO), Guillaume Aubert (EUMETSAT), Leon Majewski (BoM) provided comments that were forwarded to Task Team on 28 Nov 2013
Action 7.17: WMO Secretariat to develop a template for a 1-page update provided by satellite agencies at future joint ET-SAT/ET-SUP sessions.	DONE; communication with CGMS considered more effective than with ET-SAT; 1-pager to be asked from agencies at ET-SAT when it meets in 2014, for ET-SUP information
Action 7.18: ET-SUP to identify amongst its members leaders for a task team further developing the satellite user perspective on data formats. Linkage to existing frameworks such as the WMO IPET-DRMM and the CEOS WIGSS should be sought. Deadline: 30 June 2013.	DONE; Enrico Fucile (ECMWF), Simon Elliott (EUMETSAT), Daniele Biron (METEOAM), Simon Keogh (UKMO) to discuss topic at 6 Dec teleconference
Action 7.19: CMA VLab CoE to arrange for a distance lecture on the FY-3 product suite for the benefit of all Regions.	OPEN; To be undertaken through a training event together with the 5th AOMSUC
Action 7.20: VLab CoE at the Hydrometeorology University of St. Petersburg (Russian Federation) to arrange for a distant lecture on the Meteor-M product suite for the benefit of all Regions in conjunction with a training event in Russia in 2014.	DONE; on the programme of the Vlab/COSPAR training event planned for 21 Jul-1 Aug 2014 at Tver' University, on Remote Sensing of Water Cycle and Climate Change; expected to cover this Action
Action 6.30: A. Mostek, with assistance from COMET and the WMO Space Programme office, to investigate whether ESRC (as a portal) and MetEd (as a repository of training material) can be registered in appropriate ways in the WIS, to allow for broad discover	CLOSED; COMET, ESRC and MetEd to become part of the global campus initiative

### 3. GUIDANCE FROM THE CHAIRPERSON OF OPAG IOS

Guidance to the session from the Chairperson of the CBS Open Programme Area Group on Integrated Observing Systems (OPAG IOS), Jochen Dibbern, was presented by the Chair (who is also co-chair of ICT-IOS).

A. Rea subsequently elaborated on aspects of WIGOS relevant to ET-SUP, in particular the discussion of a "Vision for WIGOS in 2040", which is starting to be developed with CBS leadership. He also described the plans for OSCAR development, the transition of operational responsibility to Meteo-Swiss, and the continuing co-responsibility of ET-SUP (with IPET-OSDE) for reviewing OSCAR content on satellite capabilities.

He also reported on relevant outcomes of the recent CBS Inter-Programme Expert Team on Observing System Design and Evolution (IPET-OSDE) Meeting, in particular the role of ET-SUP in reviewing the progress of specific satellite-related actions against the Evolution of the Global Observing System Implementation Plan (EGOS-IP). He noted that ET-SUP will need to review the relevant actions in the plan, once the final table of responsibilities is provided by IPET-OSDE. Observing system impact studies presented to IPET-OSDE were also discussed, along with the need for ET-SUP involvement in the development of WMO regulatory material related to satellites.

A number of outcomes of the Eighth Session of ICT-IOS, relevant to ET-SUP, were also described. These included:

- (i) the need to review the ET-SUP work programme;
- (ii) the report of the 5<sup>th</sup> WMO Data Impact Workshop; and
- (iii) the requirement that, for a space-based observing system to be a contributor to WIGOS, it is essential that its data are made available to the WMO community in a timely manner.

#### **4. OUTCOME OF RELEVANT MEETINGS**

The Secretariat provided a briefing on results of meetings relevant to the session, such as: the 65<sup>th</sup> session of Executive Council; the 41<sup>st</sup> session of CGMS; the first session of the Intergovernmental Board on Climate Services; the 3<sup>rd</sup> session of the Inter-Commission Coordination Group on the WIGOS.

The WMO Executive Council endorsed an amendment to the Manual on the Global Observing System (WMO-No. 544, 2010 edition, updated in 2013) including a new section (Part IV) on the space-based sub-system and modified sections on the satellite users' perspective, based on proposals developed by ET-SUP in 2012: general ground segment provisions, data dissemination, data stewardship, education and training (VLab); user preparation to new systems) and the connection between users and providers on a regional basis.

Through Resolution 12, the Council endorsed the development of Regional Requirements for Satellite Data Access and Exchange, invited "all regional associations to establish standing mechanisms for documenting and maintaining their requirements for satellite data access and exchange, in line with guidance provided by CBS at its 15th session", and invited "the CGMS and its members to support these mechanisms".

At CGMS-41, ET-SUP matters received significant attention at CGMS-41 in the areas of

- Ensuring the preparedness of users to the new generation of satellites
- User needs and evolution of regional data dissemination requirements
- SCOPE-Nowcasting: Concept, objectives and pilot activities.

Representatives of the WMO Commission for Climatology (CCI) presented plans for the 16th session of the Commission in July 2014. A priority for CCI in the future is increasing the use of satellite and other remotely-sensed data for climate operations. The proposed CCI structure for 2014-18 includes a proposal for a Task Team on using remotely-sensed data in climate monitoring applications. This Task Team would work under one of the Commission's Open Panels of CCI Experts (OPACE 2). The 2012 annual WMO Statement on the State of the Global Climate made reference to remotely-sensed soil moisture data for the first time.

ET-SUP is invited to discuss the proposal to create a new task team on using satellite data for climate monitoring under the WMO CCI.

**RECOMMENDATION 8.1: The management of CCI should consult with ET-SUP and WMO SP Office on the terms of reference of the proposed Task Team, and on its membership.**

**RECOMMENDATION 8.2: The proposed CCI Task Team on satellites should provide a report to the next session of ET-SUP.**

**RECOMMENDATION 8.3: In order to fully address the requirements of all WMO application areas for satellite datasets and products based on the WIGOS, the Team recommends that CBS consider making ET-SUP an Inter-Programme expert team.**

The ICG-WIGOS session in February 2014 inter alia discussed the latest draft WIGOS metadata standard. An ET-SUP-facilitated task team (Guillaume Aubert (EUMETSAT), Leon Majewski (BOM), Nigel Atkinson (UKMO)) had provided feedback to an earlier version of this draft standard. Some comments by the team were accepted in the latest draft, but some features of the



proposed standard are still not compatible with satellite data (e.g., category 2 , id 2-02 "Network affiliation" is mandatory; however, a satellite does not have such an affiliation). [N.B.: The Secretariat re-iterated the ET-SUP comments with the responsible Task Team on WIGOS Metadata in a teleconference on 11 March 2014].

R. Eckman suggested that CEOS WGISS, through Andy Mitchell, could provide expertise and input to the Task Team on WIGOS Metadata. The Chair agreed that appropriate linkages should be made.

W. Zhang stressed that the Architecture for Climate Monitoring from Space provides an opportunity to drive the development of climate-related satellites, as has done the World Weather Watch over the past 50 years for weather satellites.

## **5. DATA EXCHANGE: GLOBAL AND REGIONAL ASPECTS**

Under this item, the session discussed reports on global and regional efforts to determine user requirements for access to satellite data and products, including existing coordination mechanisms. This involved the North America-Europe Data Exchange (NAEDEX) and Asia-Pacific Satellite Data Exchange and Utilisation (APSDEU) mechanisms, as well as WMO Region-based coordination initiatives in Region I, II, III/IV, and V. In addition, participants were encouraged to raise specific issues or problems of data exchange, especially concerning near-real time access to data from R&D satellites.

### **5.1. Regional mechanisms for satellite data access and exchange**

#### **5.1.1 RA I**

S. Wannop recalled the role of RAIDEG and reported on results of the 4<sup>th</sup> RAIDEG meeting in June 2013. Updates to the EUMETCast baseline agreed at the session included the UKMO forecast model, additional levels in the ECMWF model, additional time steps in UKMO model, SAWS products, ocean current and significant wave height, SARAL and ASCAT datasets, and microwave data (SSMIS, TRMM) to support precipitation monitoring. The meeting also discussed results of the 2012 WMO Survey, AMESD/MESA updates, and links between RAIDEG and a wide range of WMO application communities.

She also presented an outline of the agenda for the upcoming fifth meeting of RAIDEG in September 2014. Engagement of oceanographers and agricultural application experts is envisaged. AMESD systems will receive a last update of software this year before the overall transition to MESA. RAIDEG should also have a role in the preparation for MTG, since this new satellite provides a good opportunity to invest in receiving and application infrastructure.

As for recognition of RAIDEG within the RA I WIGOS structure, W. Zhang informed that the RA I session will be organized in November 2014 and that endorsement of RAIDEG in the working structure of the Association will be sought. More efforts should be spent on application development in Africa specific to the economic sub-regions.

I. Gitonga reported that satellite products have improved services within KMD, such as in the area of agriculture.

It was noted that RAIDEG membership was representative of African economic sub-regions and consisted of knowledgeable experts from key services, selected in coordination with the WMO Regional Programme.

**RECOMMENDATION 8.4: ET-SUP recommended that RAIDEG be formally recognized within the working structure of RA I.**

### 5.1.2 RA II

H. Murata informed on activities in the RA II WIGOS Project on Develop Support for NMHSs in Satellite Data, Products and Training. He reported on the regular issuance of newsletters on satellite matters to all members of the Project. There has been participation by JMA in the 4<sup>th</sup> AOMSUC, informing on Himawari-8 planning. The 4<sup>th</sup> AOMSUC was co-sponsored by the China Meteorological Administration (CMA), the Japan Meteorological Agency (JMA), the Korean Meteorological Administration (KMA), and the World Meteorological Organization (WMO).

The session suggested that the RA II WIGOS Project should develop a baseline of satellite data and products based on user requirements throughout RA II, starting with members of the Project Coordination Group. Using the Group as a mechanism for satellite operators to interact with users would also help identifying the main issues of users in RA II (data acquisition, product utilization, training...).

H. Murata suggested that the third meeting of the Coordinating Group of the RA II WIGOS Project will be held in 2015 on the occasion of the sixth AOMSUC in Japan. A training event using new satellite data will be also planned by JMA on the occasion of the Conference.

The session strongly encouraged CMA, JMA, KMA and IMD to organize a training event in association with the 5<sup>th</sup> AOMSUC, with focus on the new generation of satellites (Himawari-8, FY-4A, GEO-KOMPSAT-2A). X. Fang and H. Murata should explore whether such a training event could be organized.

It was also suggested that tropical cyclone monitoring should be a session topic at the AOMSUC.

**ACTION 8.1: X. Fang and H. Murata to facilitate the organization of a satellite user training event in association with the 5<sup>th</sup> AOMSUC, including a focus on the new generation of satellites (Himawari-8, FY-4A, GEO-KOMPSAT-2A). The CMA and KMA VLab CoEs should be involved. This is consistent with Recommendation 7.3 (ET-SUP-7). By Oct 2014.**

**RECOMMENDATION 8.5: Co-leads of the RA II WIGOS Project to organize a meeting of the Project Coordination Group in 2014, in conjunction with the 5<sup>th</sup> AOMSUC.**

**ACTION 8.2: The session recommended that the AOMSUC International Conference Steering Committee discuss the possibility that India could host a future AOMSUC, and that WMO raise this item at the next session of the Committee. The Committee should also consider including a session on tropical cyclone monitoring in the next AOMSUC programme. By Oct 2014.**

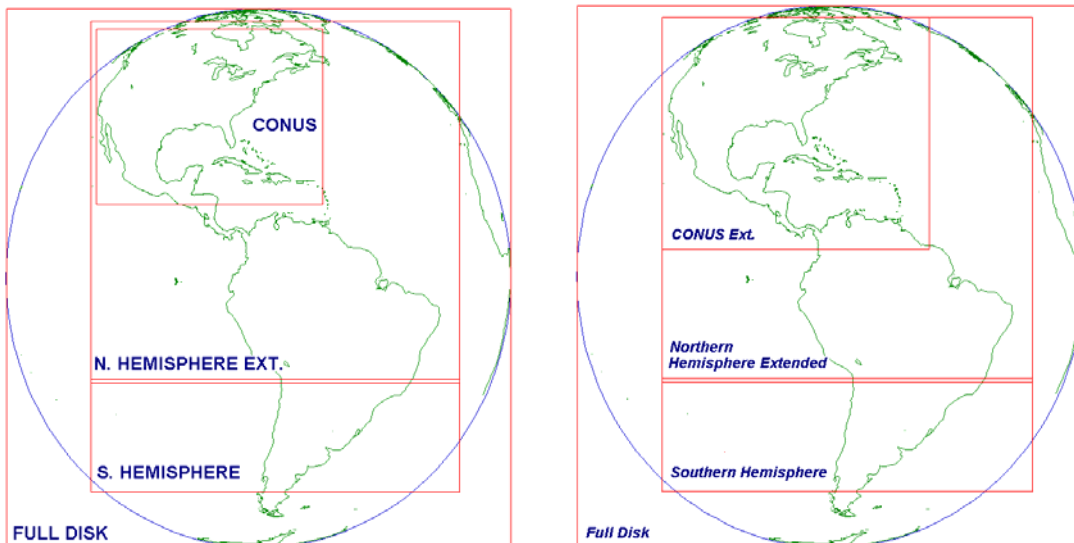
### 5.1.3 RA III/IV

L. Machado presented results from the work of the Coordination Group on Satellite Data Requirements in Region III and Region IV. He reported on progress in interaction with NOAA for an optimized scanning schedule of the GOES-E imager, yielding better imager coverage for South and Central America, and the Caribbean (see Figures below).

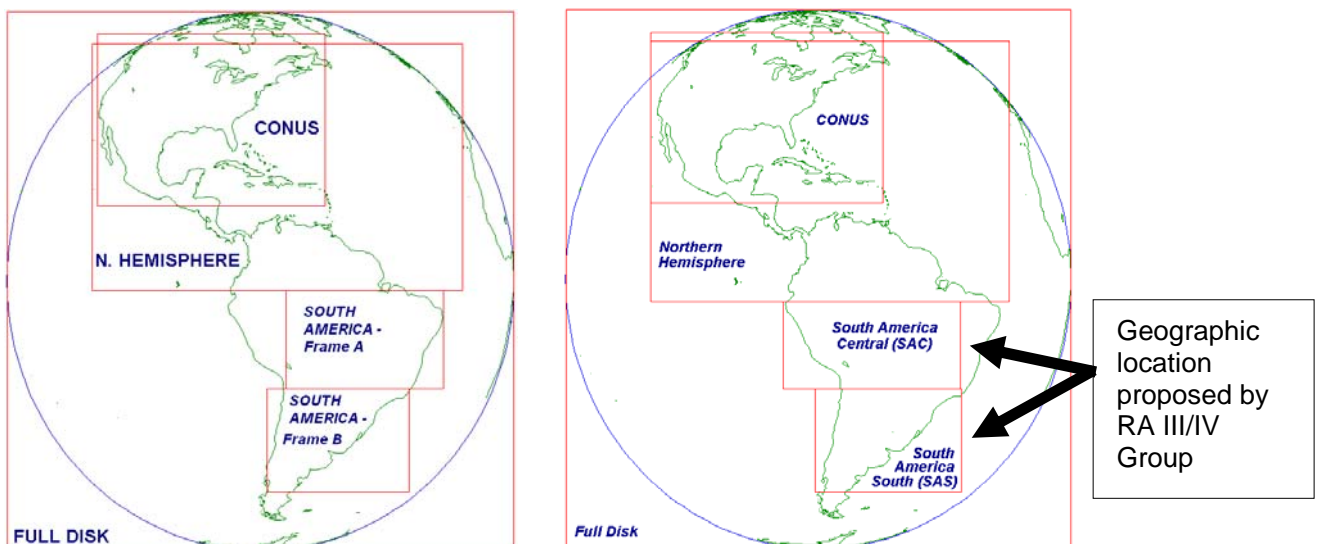
He further presented initial results from a regional user survey, intended to further elaborate on early work on regional user requirements for data access and exchange. All Members in Region III and IV (except for the United States) were contacted related to satellite data access and utilization. 46 questionnaires were answered by institutions from 12 countries (Argentina , Aruba , Barbados , Brazil , Canada , Chile , Colombia , Costa Rica , Ecuador , Peru , Trinidad and Tobago and Uruguay), 7 from Region III and 5 from Region IV, with substantial participation from institutions in Brazil and Argentina (69% of total).

Currently, half of the users receive data using the internet, 21% use the DVB-S standard, 21% use direct readout stations and 4% use GTS. For the future, those interested in receiving data via DVB-S almost doubles (37%), and 24% of the community still does not know the GEONETCast-Americas system. This, along with the difficulties in the acquisition of direct readout stations, enables new strategies and investments in the GEONETCast-Americas System broadcast.

The vast majority of respondents (80 %) are interested in distributing data and products to Region III and IV (e.g., using the GEONETCast-Americas System). The data range comprises meteorological products in general, lightning products, biomass maps, Data Collecting Platforms files, Oceanographic data, rainfall, NDVI, fog, among others. A considerable part of the community (46%) would consider contributing to a Region III/IV-wide data distribution system by allocating financial and technical resources.



**Fig. 1:** Routine scan frame operations of GOES-East imager: current routine (left panel) and planned optimized schedule (right panel). Scan frequency is generally highest in the CONUS frame which will be enlarged in the optimized schedule (CONUS Ext.), leading to better coverage of the Caribbean and northern South America areas. Northern Hemisphere extended and Southern Hemisphere panels overlap.



**Fig. 2:** Rapid scan frame operations of GOES-East imager: current routine (left panel) and planned optimized schedule (right panel). Geographic location of the South America Central (SAC) and South America South (SAS) frames (right panel) has been defined as a result of discussions in the Coordination Group on Satellite Data Requirements for Region III and Region IV.

Within the Group, all satellite data providers are yet to validate the initial set of data user requirements. Once this has been achieved, a Region-specific data dissemination plan for these datasets should be developed, taking into account the various capabilities for data reception, data utilization and connectivity in the Region. The regional survey results will inform such planning, and should be publicized widely, ie. as a WMO report, as information to NOAA (represented on the Coordination Group by Paul Seymour and Kelly Sponberg) and at the 2015 NOAA Satellite Conference.

The Coordination Group also needs formal endorsement by the upcoming session of Regional Association III.

The Chair commended the Group for having reached tangible results on the changed NOAA GOES scanning schedule.

**ACTION 8.3: The Coordination Group, with assistance by the Secretariat, to publicize the results of the regional survey, as a WMO publication (by 15 Jul 2014) and by communication to the 2015 NOAA Satellite Conference.**

**RECOMMENDATION 8.6: The session recommended that the Coordination Group be formally endorsed by the upcoming session of Regional Association III, following the endorsement by RA IV in 2013.**

#### **5.1.4 RA V**

A. Rea reported on recent progress with TT-SUR and training events for the Region held in association with the 4<sup>th</sup> AOMSUC in Melbourne, Australia. Through workshops, TT-SUR identified an initial set of user requirements for data access and exchange, and this work will continue. The events also helped raise awareness of Himawari-8.

A. Rea also reported on the status of RARS stations in RA V.

The 16<sup>th</sup> session of RA V in May 2014 is invited to confirm the function of the TT-SUR in the new RA working structure, through a document on the WMO Space Programme.

#### **RA VI**

The Secretariat raised the question to S. Wannop whether all countries in RA VI were receiving satellite data user support. S. Wannop responded that beyond EUMETSAT member states, EUMETSAT were undertaking significant efforts to provide technical assistance in satellite data reception (through the DAWBEE programme and its successors). EUMETSAT also organize information days for users in Eastern Europe and Central Asia, to inform them about utilization of satellite data such as for nowcasting.

The Group recommended that efforts to provide satellite utilization support to all RA VI countries should continue, through EUMETSAT. These efforts should include WMO where appropriate.

**RECOMMENDATION 8.7: EUMETSAT should consider the needs of non-EUMETSAT member states of Region VI in its efforts to provide satellite utilization support. These efforts should include WMO where appropriate.**

## 5.2 NAEDEX-APSDEU

S. English and A. Rea informed on the status of NAEDEX-APSDEU as a forum for global NWP centre data requirements, from satellites and other sources. The two mechanisms (NAEDEX, APSDEU) are increasingly integrated, as shown in the format of their joint meeting. For example, the meetings discuss ways how users in Europe access data from US and Chinese sources, how users in the US access data from European and Chinese sources etc. Participation by WMO as an observer in the sessions of NAEDEX-APSDEU has been very welcome, and should continue. The 25<sup>th</sup> NAEDEX meeting will be held on 26-28 May 2014 in Guangzhou, China, jointly with the 13<sup>th</sup> APSDEU meeting.

## 5.3 Specific data exchange issues

No issues were raised.

H. Murata informed on JMA plans to disseminate Himawari-8 data (i) via internet, requiring high-speed internet connectivity to access the full dataset, (ii) via a telecommunication satellite, which allows for dissemination of a subset of data (limited number of channels, coarser resolution). Details were discussed under agenda item 6.5.

## 6 DATA DISSEMINATION AND ACCESS

This agenda item addressed both strategic and technical aspects of data dissemination, and mechanisms for data access (with focus on near-real time). A proposal for an updated vision for the Integrated Global Data Dissemination Strategy (IGDDS) was provided, the status of satellite datasets registered in the WMO Information System (WIS) discussed, and Regional ATOVS Retransmission Service (RARS) issues elaborated.

Participants were also briefed on the availability of the various DVB-S/S2-based dissemination services, in GEONETCast and beyond. Also, under this item, the Secretariat presented an overview of the online resources available on the WMO website to facilitate access to satellite information and data (OSCAR; Product Access Guide; Data Access pages).

### 6.1 Updated IGDDS Strategy

M. Rattenborg presented a proposal on an updated Integrated Global Data Dissemination Strategy (IGDDS). This presentation covered: IGDDS background and expected benefits to WMO members, challenges and opportunities, the status of IGDDS discussions in ET-SUP and WMO bodies, IGDDS reformulation, status and proposed actions and IGDDS oversight.

The presentation outlined some of the user issues that IGDDS aims to address, and detailed the expected benefits. The history of the IGDDS was also outlined for background information. M. Rattenborg proposed that the IGDDS should now be reformulated as a broader strategy, including:

- (i) a vision;
- (ii) strategic targets realizing the vision;
- (iii) strategic activity threads for the realisation; and
- (iv) a concept for overseeing the strategy implementation.

It was stressed that there is a strong need for IGDDS mechanisms to address the large increases in satellite data volumes already experienced, and expected over the next decade. Existing data exchange mechanisms will be largely unable to cope with these volumes.

A number of actions were proposed in the presentation. These were considered by the team in Breakout Group 6. Based on the outcome of the presentation and the breakout group, the session recommended that the revised Vision for IGDDS be presented to CGMS-42 in May 2014.

**ACTION 8.4: WMO to present a revised vision for the IGDDS to CGMS-42. By May 2014.**

## **6.2 Satellite data in the WMO Information System**

P. Shi (Secretariat) gave an overview of the aims of WIS. The overall concept, covering data discovery, access and retrieval was described. A number of issues were discussed, including the challenges of exchanging satellite data over the GTS. It was noted in discussion that the creation of metadata is responsibility of data providers, and WIS is the vehicle for users to discover data using these metadata.

It was noted that two expert teams address data representation and discovery in WMO: IPET-MDRD (Metadata and Data Representation) and IPET-DRMM (Data Representation, Monitoring and Maintenance).

The eighth session was invited to nominate a lead person with responsibility for identifying the data representation requirements of ET-SUP together with existing internationally agreed data representations that are used to fully or partly meet these requirements. This is with the intention of submitting these to IPET-DRMM (for inclusion in existing WWW data representations) and/or IPET-MDRD (for consideration when creating new data representations or standardizing WMO use of external data representations).

These issues were also considered by the team in Breakout Group 6.

See section 7.1 for relevant Actions and Recommendations.

## **6.3 Regional ATOVS Retransmission System**

### **6.3.1 General update and coding issues**

J. Lafeuille described the concept of Regional ATOVS Retransmission Services (RARS) and provided an update on the status of the overall RARS network. The current RARS procedures were noted – including, for example, the coding convention. Several ongoing developments were also described, including:

- (i) integration of several new RARS stations into the RARS/ATOVS network;
- (ii) evolution of RARS to a new project named DRARS (Direct Readout Acquisition and Relay of Satellite Data), with the inclusion of advanced sounder data products from CrIS and IASI and possibly other products;
- (iii) plans to replace the RARS Operators Standards by a Guide to the DRARS System, as part of the WMO Information System (WIS) documentation; and
- (iv) convergence with the NOAA Direct Broadcast Real Time Network (DBRTN) for NPP and JPSS.

The eighth session was invited to note the information presented in the document and to provide feedback regarding the planned evolution of RARS including:

- (i) replacing RARS by the “Direct Readout Acquisition and Relay of Satellite Data (DRARS)”;
- (ii) developing a Guide to the DRARS System as part of the WIS documentation; and
- (iii) striving to achieve interoperability and data sharing among the DRARS and the NOAA DBRTN initiative for NPP and JPSS.

The team discussed the RARS coverage indicators, suggesting that in future, one index could be produced for NOAA POES, another for MetOp, and so on. This would better reflect the state of the system and its future robustness. The team also noted the extension of RARS coverage through the addition of sites in Tahiti (France), Chennai, New Delhi (both India) and Easter Island (Chile).

Whilst the baseline RARS ATOVS network is stable, a major ongoing development is to extend the RARS to the collection and retransmission of additional sensor data, in particular advanced hyperspectral infrared sounders. Since data volumes are orders of magnitude higher than for traditional sounders the network operation must be optimized by selecting stations with minimum overlap with each other, and by sampling the data through channel selection, data reduction and compression.

The Team endorsed the new roadmap for RARS, defined at the RARS meetings held in 2012 (ITSC-18/RARS Technical Subgroup, Toulouse, March 2012 and RARS ad-hoc meeting, Exeter, UK, 25-26 October 2012). It also endorsed the convergence of RARS with the NOAA DBRTN project discussed in 2014 (ITSC-19/RARS Technical Subgroup, Jeju, Republic of Korea, March 2014).

**ACTION 8.5: The RARS Implementation Group be convened to manage the transition of RARS to DRARS. By Mar 2015.**

**ACTION 8.6: Secretariat (J. Lafeuille, P. Shi) to submit a draft outline for a DRARS Guide to the upcoming CBS Ext. session in Sep 2014. By Sep 2014.**

### **6.3.2 EUMETSAT Plans for RARS extension in Africa**

S. Wannop presented a plan to extend the RARS network into Africa through an European Development Fund project (through African Development Bank) through upgrading up to four direct readout stations. The project recognizes that there are few (<5) users of near-real time level 1 polar satellite data in Africa. Extending the RARS could also address a significant gap in the global RARS network in the South Atlantic and South-West Africa.

S. Wannop outlined that EUMETSAT will provide technical assistance to the project, partially building on existing infrastructure. The potential station locations are in South Africa, Kenya and Gabon. The project would also encompass capacity building and training of users. She indicated that sample data has been exchanged, and provision of test data to RA I is being considered prior to installation of stations. Installation of stations is expected to start in early 2015, with the project to run for four years.

The team discussed this initiative, and whilst welcoming this expanded capability and coverage, expressed some views regarding the supportability of the stations and the level to which user needs had been addressed.

**RECOMMENDATION 8.8: African partners and EUMETSAT to evaluate the possibility of funding ongoing technical and maintenance support for the four proposed African RARS stations over the lifetime of the infrastructure.**

**RECOMMENDATION 8.9: African partners with support by EUMETSAT to ensure that the new stations produce a suite of derived products that address user requirements expressed through RAIDEG.**

## **6.4 GEONETCast Components**

### **6.4.1 EUMETCast**

S. Wannop provided an overview of EUMETSAT's plans for EUMETCast, including:

- (i) the EUMETCast Europe DVB-S2 migration;
- (ii) the future of EUMETCast Americas; and
- (iii) the EUMETSAT Data Subnet on CMACast.

She noted that DVB-S would not be able to cope with data rates from new generation of satellites, and that therefore the switch to DVB-S2 is required. The DVB-S2 service will provide a basic service, and a high volume service, primarily to deliver Copernicus Sentinel-3. Users will need to replace their receiver and also re-point their antenna in many instances.

The team noted that the transition process for migration of EUMETCast Europe to DVB-S2 will occur during 2014-2015, and that user information is provided on the EUMETSAT website.

S. Wannop advised the group that EUMETCast Americas is planned to run until the end of 2015. Potential alternatives to EUMETSAT's continuation of the service were discussed, including harmonization with GEONETCast-Americas. Some dissemination tests of MSG via GEONETCast-Americas have been performed and funding for this initiative through alternative external sources is also being explored.

She noted that EUMETCast and CMACast have now established joint user management (ie. EUMETSAT managing users of their data received via CMACast and vice versa).

### **6.4.2 GEONETCast-Americas and RapidCast**

A. Mostek gave a presentation on behalf of NOAA colleagues Paul Seymour and Kelly Sponberg. He outlined the status of GEONETCast-Americas: currently there are 29 receiving stations in eight countries. NOAA is taking steps towards transferring many of the products from the US National Weather Service "International Services and Communication Systems" (ISCS) to GEONETCast-Americas. It is possible to convert the old ISCS receive stations to GEONETCast Americas stations at a relatively low cost.

He noted that NOAA is in discussions with the Brazilian space research institute (INPE) on a possible contribution by INPE to increase the bandwidth of the GEONETCast Americas broadcast.

A. Mostek described how communication throughout the Pacific is a chronic challenge caused by sparse populations separated by long distances. RAPIDCast was developed to address this issue by utilizing a commercial satellite provider with coverage of the Pacific Islands first and with edge coverage over the US mainland and big islands. RAPIDCast also uses Ku band, which while vulnerable to some rain fade, is able to use smaller dish solutions that often more suitable for remote deployment.

At 128kbps, the DVB-S-based RAPIDCast broadcast focuses on delivering Pacific relevant information from the EMWIN stream, as well as Pacific imagery and products, such as might be carried on LRIT. The broadcast became operational in 2013, and an initial station deployment of 15-20 sites will continue through 2014.

The team questioned whether RapidCast is connected to TT-SUR and also if the capacity of RapidCast could be expanded.



**RECOMMENDATION 8.10: RapidCast managers including NOAA to continue to work with TT-SUR in RA-V to document and respond to user requirements for data to be delivered by RapidCast.**

#### **6.4.3 CMACast**

X. Fang presented on the status of CMACast, as a major component of GEONETCast. He outlined that there are 2600 user stations in China, and 25 overseas users in Asia-Pacific region. He described the structure of the CMACast reception system and noted that user support is available (<http://wisportal.cma.gov.cn>). CMA plan to better understand the requirements of overseas users by use of a questionnaire.

**RECOMMENDATION 8.11: The RA II WIGOS Project Coordination Group and RA V TT-SUR should be used as a mechanism to gather user requirements for CMACast.**

#### **6.5 Himawari-8/9**

H. Murata provided an update on Himawari-8, which will not carry direct dissemination equipment of imagery. All imagery will be distributed via an internet cloud service, and a reduced service will be provided via a telecommunications satellite (HRIT, SATAID formats). This *HimawariCast* service is planned to start operations in early 2015: HRIT (5 bands as on MTSAT)/LRIT (3 bands) compatible with MTSAT-2, and coarser spatial resolution than H-8 standard data. The exact bandwidth and footprint of HimawariCast are not yet known. The Team considered whether an expansion of the HimawariCast bandwidth and content was an option for the future, to adjust to evolving user needs.

For full-resolution data it was noted that registered users can access data via a cloud service, but that this would be limited to 1 agency per country.

The Team noted that this distribution strategy may pose challenges to some Members, especially those with overseas territories.

**RECOMMENDATION 8.12: JMA to provide information on HimawariCast to the RA V meeting to be held in Jakarta on 2-8 May 2014.**

#### **6.6 Product Access Guide and other WMO online resources**

S. Bojinski presented on the status and recent development of online resources hosted by the Space Programme Office, namely:

- (i) the Product Access Guide (PAG);
- (ii) the Data access and tools webpage; and
- (iii) the OSCAR Space-based Capabilities database (OSCAR/Space)

The eighth session was invited to:

- (i) comment on the current PAG status, and on steps to improve its content;
- (ii) advise on a mechanism to oversee PAG content, for example by setting up a PAG content management task team; it is suggested that team members represent users of products;
- (iii) provide guidance on maintaining the “Data access and tools” website; and
- (iv) comment on the status of OSCAR/Space.

These issues were considered under Breakout Group 5.

## 7 DATA FORMATS AND VISUALIZATION

The team noted that satellite data come in a wide range of representations and formats which sometimes pose challenges to their utility and access by satellite data users, especially those in less developed countries. Recognizing the WMO standard data formats (BUFR, GRIB, CREX), this session discussed ideas for consistent, interoperable and potentially simpler satellite data formats. Availability of processing and visualization tools for satellite data is an aspect of their usability and shall be discussed using regional examples.

In the discussion, the Team recommended that the requirements of users for particular data formats should be considered by the data providers in the Regional requirements dialogue.

### 7.1 Data formats task group

S. Keogh presented (via webex) a report of the Data Formats Task Group. This document is proposed actions and recommendations to address the concerns of satellite data users related to the perceived difficulty in utilizing data in various WMO standard formats. This work was initiated by ET-SUP in response to the results of the WMO 2012 User Survey which indicated that users find data formats to be challenging to use, particularly if they are not working for a National Meteorological or Hydrological Service (NHMS).

The team noted that the high level use cases outlined in the paper provide a very helpful conceptualisation overview and would assist in classifying users into basic and specialized users.

The eTeam discussed these matters and, together with the discussion in break-out group 6, concluded on the following actions and recommendations:

**ACTION 8.7: S. Keogh and the ET-SUP Data Formats Task Group should further develop and expand on the high level cases presented in document ET-SUP-8/Doc.7.1. By Sep 2014.**

**ACTION 8.8: Secretariat, ET-SUP nominees (Daniele Biron, Mikael Rattenborg) and other experts as needed to engage in CGMS-WMO Task Force on Metadata Standards, by Jun 2014; and report results from this Task Force to WMO Expert Teams under the ICT-ISS (ET-MDRD, ET-DRMM), as appropriate.**

**RECOMMENDATION 8.13: ECMWF should propose a plan (including resources required) for running a community based development of their software to provide unified access to data in several formats. In addition ECMWF should fully publicise its “ecCodes” tools, documentation and training via the WMO web site along with a short-medium term roadmap of how these tools will evolve.**

**RECOMMENDATION 8.14: ET-SUP members to explore in their institutions possible support for the community-based development of these ECMWF software tools.**

### 7.2. Use of visualization tools

#### 7.2.1 Example from RA I

I. Gitonga described the range of satellite and model output products that KMD receive, and visualize using the SYNERGIE system. These have proven beneficial to improving services. Satellite products are particularly important for nowcasting. Other products such as NDVI are useful for evaluating the impact of weather events, and climate applications. KMD currently have a good level of required satellite datasets, however addition of NDVI anomaly data would be useful.

The group noted advice that a special version of the visualization software McIDAS-V to run on a USB stick (for Windows, Linux, Mac) had been developed by CIMSS and distributed by EUMETSAT along with data. This software was identified as a potential solution for countries with little visualisation capability.

**ACTION 8.9: Secretariat to update the WMO Website on satellite tools to reflect the availability of the special version of McIDAS-V. By Jul 2014.**

### 7.2.2 Example from RA II

S. Goyal reported on the use of visualization tools in IMD. This covered the internally-developed (ISRO) MIAS software for visualizing data and products from Indian satellites, including INSAT-3D and Kalpana-1, together with other data sources. The SYNERGIE system is also used within IMD. Both systems are used within the IMD forecasting centre. A new version of MIAS can also visualize scatterometry. MIAS is in principle available openly, but would need assistance by IMD Satellite Application Centre to be used internationally.

### 7.2.3 Example from RA V

A. Rea reported on the use of VisualWeather by the Bureau of Meteorology. The Bureau of Meteorology is implementing Visual Weather as an enterprise-wide solution to data visualisation for forecasters. The system is proprietary, and can handle a range of model, satellite and surface data. As much as possible, the system is being adapted to read standard WMO and international formats.

He reported that SATAID is the Satellite Animation and Interactive Diagnosis tool developed by the JMA Meteorological Satellite Centre. A number of NMHSs in RA V use SATAID in an operational context.

For smaller NMHSs in RA V, A. Rea reported that web browsers are a useful means of obtaining data from multiple sources. The US Naval Research Laboratory (NRL) Tropical Cyclone Page is a good example which is used by many NMHSs in RA V.

The team agreed that for nowcasting applications for some services, the dissemination of simple imagery (GEOTIFF, etc.) would be sufficient to meet user needs.

## 8 SCOPE MECHANISMS

This item presented two WMO-led initiatives aiming at sustained, coordinated processing of environmental satellite data, with (8.1) targeting the use of satellite products in nowcasting applications, and (8.2) focussing on the generation of climate data records and elevating the scientific and technical maturity of such records. The plans for Pilot Project 2 of SCOPE-Nowcasting on consistent generation of volcanic ash products and necessary algorithm intercomparisons were discussed in detail.

### 8.1 SCOPE-Nowcasting Overview

In a brief report, A. Rea noted good progress since the first meeting of the ad-hoc steering group for SCOPE-Nowcasting on 19-22 November 2013. Some concerns were raised on institutional commitment to SCOPE-Nowcasting action plans ([http://www.wmo.int/pages/prog/sat/documents/SCOPE-NWC-1\\_FinalReport.pdf](http://www.wmo.int/pages/prog/sat/documents/SCOPE-NWC-1_FinalReport.pdf)). Lessons from SCOPE-CM can help shape the initiative further.

### **8.1.1 SCOPE-Nowcasting Pilot Project 2 – Volcanic Ash Intercomparison**

As the NOAA representative on SCOPE-Nowcasting, M. Pavlonis described the necessity of detecting and quantifying volcanic ash and challenges associated with satellite retrievals. Some of the challenges are:

- No single sensor is ideally suited for detecting and characterizing all types of volcanic clouds in a timely manner
- Basic cloud retrieval challenges: multiple cloud layers (results in artifacts) with the same and/or different compositions, uncertainty in microphysical parameters (particle shape, index of refraction, etc...)
- Mitigating measurement errors and artifacts (calibration, noise, stray light, sensor degradation, striping, navigation errors, etc...)
- Interaction with operational users - developing product displays, communicating product uncertainty and caveats

Different retrieval techniques currently provide different answers, and a multi-sensor approach appears most warranted.

In the framework of this Pilot Project, an intercomparison activity on satellite-based volcanic cloud retrieval algorithms is planned. Case studies for this activity are close to being defined, and an organizing committee is being formed. A WMO-sponsored workshop will be held in week of 20 Oct 2014 in Madison WI, USA. It is planned to involve scientists active in this area, as well as current and envisaged users in workshop, such as VAACs.

It was suggested that representatives from the ground-based and aircraft communities should be involved in this activity, to provide independent comparison and validation of satellite-derived products.

**RECOMMENDATION 8.15: The organizing committee for the SCOPE-Nowcasting Pilot Project 2 should involve one expert from the lidar and aircraft communities, respectively, in the proposed activities.**

The volcanic ash inter-comparison effort is expected to benefit significantly from the example set by other intercomparison activities in the meteorological community, such as by the cloud remote sensing community through the CREW workshops.

In terms of material for capacity building, one of the deliverables of the intercomparison activity is a best practices guide which should assist Members.

### **8.1.2 SCOPE-Nowcasting Pilot Project 2 – JMA Volcanic Ash Testbed**

H. Murata presented the development of a volcanic ash retrieval algorithm testbed by JMA, in response to a CGMS action (41.26). JMA has been developing volcanic ash products for use in aviation services. Algorithms by JMA, EUMETSAT and NOAA NESDIS have been installed in the testbed, and preliminary intercomparisons have been carried out, for example in retrieving ash top height using the NOAA NESDIS and EUMETSAT algorithms.

## **8.2 SCOPE-CM**

J. Schulz provided a status report on SCOPE-CM, which entered Phase 2 in 2014. Activities are project-based, 10 project currently registered with SCOPE-CM, and the partnerships over phase 1 have proven very useful. Additionally, Phase 2 projects also show a good participation of research institutions and product users allowing for innovation throughout the duration of the projects. The main aim within these projects is to elevate the generation capability, documentation and utility of climate data records to a higher level measured by the maturity index.

The data records include both Fundamental Climate Data Records (level 1) and geophysical products (level 2). In generating FCDRs, SCOPE-CM is increasingly making use of methods for calibration provided by GSICS.

Some large ambitious projects are recognized in the initiative, such as GEO Surface Albedo, AVHRR Radiances, Radio Occultation products and AMV reprocessing. These projects have direct impacts on global NWP-model based reanalyses and climate model evaluation. The continuation of ISCCP shows stronger engagement by research community in SCOPE-CM.

J. Schulz stressed that maturing takes time, using two cloud product examples from the ESA CCI and the CM-SAF. The interconnections between projects will be exploited, ie. the FCDR projects (AVHRR, GEO) provide a common basis for generating various ECV products, which increases the consistency among these products. to using similar FCDRs or by providing input datasets, such as from reprocessing of GEO imagery.

A new website has been set up: <http://www.scope-cm.org>

The session suggested whether, in line with the objective to “Deliver data for climate services”, SCOPE-CM should more strongly engage with the operational climate monitoring community as a user of “interim Climate Data Records”.

**RECOMMENDATION 8.16: SCOPE-CM Executive Panel at its next session to discuss linkages and specific needs of operational users for interim climate data records internationally coordinated by SCOPE-CM, through extending an invitation to such users.**

**RECOMMENDATION 8.17: SCOPE-CM Secretariat to identify a successor for the chair of the SCOPE-CM Executive Panel, given the resignation of the previous chair in March 2014, if possible by July 2014.**

## 9 SATELLITE APPLICATIONS

### 9.1.1 ECMWF

S. English highlighted recent changes in the ECMWF system: the number of vertical levels in the model increased from 91 to 137 ; some aspects of the model physics were improved, e.g., the diurnal phase in precipitation was now better parameterized. The ensemble data assimilation system in 4D-VAR with 25 members allows for flow-dependent background error covariances.

He described data impact assessments, using as an example hurricane Sandy where the ECMWF forecast predicated the left turn of the storm nine days in advance. The studies showed that LEO data was critical, and coverage in Pacific was essential due to the teleconnections between the oceans. Removing the polar orbiting satellite data reduced the skill significantly. The Team noted this example as a good illustration of the critical importance of satellite data in NWP.

The Team also noted that the example showed that the quality of modern data assimilation systems is also critical.

He also described a second experiment looking at the combined impact of MetOp-A and – B, which showed that the second MetOp adds half of the impact of the first MetOp; hence there is significant additional skill improvement through adding the second MetOp.

S. English described using principal components (PCs) in data assimilation and outlined that, in cloud-free scenes, it has been demonstrated that PCs yield the same results as radiance assimilation.

### 9.1.2 Data impact assessments for NWP and climate – UKMO utilization of satellites

S. Keogh provided (via WebEx) a short presentation on changes to the UKMO NWP forecasts system since the last ET-SUP. In addition, he presented on plans for the future utilization of geostationary satellite data in both forecasting and NWP. These plans would require global cooperation between both providers and distributors of these data in order to leverage the benefits from these forthcoming missions.

A number of issues were addressed in his presentation including: the optimal thinning of IASI data, calibration issues with SSMIS, high-resolution AMV derivation using NWC-SAF software, and the use of merged satellite-radar rainfall products.

He also noted that UKMO were receiving and processing Fengyun-3B data using CMA-supplied pre-processing software. He also noted that the UKMO Space Weather Operations Centre has just commenced operation.

### 9.2 Ocean application and JCOMM matters

J-L. Fellous provided an overview of the value of satellites for oceanographic applications. He explained the international collaboration occurring within the CEOS Virtual Constellation for SST, and the GHRSSST which maintains an operational service. The ocean modelling community is a key user of GHRSSST products.

He described a number of initiatives aiming at generating SST datasets (ESA CCI\_SST, NOAA CLASS, JAXA GCOM-C1 AMSR-2). A CEOS SST cal/val campaign is also planned, with funding by ESA, including a SST comparison campaign, and SST operational validation.

He noted the failure of OSCAT on 3 April 2014, and current efforts to use the HY-2A scatterometer operated by China. He also described advances in coastal altimetry through reprocessing of echos, the status of ocean colour missions, investigation of links between SST and ocean colour, and the application of ocean colour datasets.

The group noted the key difference between the oceanographic and meteorological communities in that, for oceanography, there is no single defined agency per country with responsibility for the oceans. Additionally, many ongoing observations are carried out by research agencies.

J-L. Fellous noted that there had been no substantial progress with TT-SAT in JCOMM and requested advice from ET-SUP on what JCOMM should be doing in this area.

**ACTION 8.10: ET-SUP chair to communicate with the JCOMM TT-SAT Chair (Joel Dorandeu, MyOcean) to understand better how the two Teams can work together for mutual benefit. This could potentially lead to a joint session with TT-SAT or some other collaborative activity. By 30 Jun 2014.**

### 9.3 Disaster response: the International Charter “Space and Major Disasters”

S. Wannop provided a presentation on the International Charter “Space and Major Disasters”, an International agreement among participating Space Agencies and service providers to deliver space-based data and information in support of relief efforts during emergencies caused by major disasters. EUMETSAT joined the Charter in mid-2012. The Charter executes priority tasking of different EO instruments in case of natural and man-made disasters and can be activated by an authorized user.

Through the Universal Access resolution, any national disaster management authority (not NMS) can submit requests for emergency response support to the Charter. Affected countries do not have to be members of the Charter.

ICT-IO8-8 asked ET-SUP to consider the development of a mechanism and associated standards and procedures that will allow Members to be able to seek high temporal resolution satellite information from the satellite operators, leading up to and in the event of emergency situations such as Typhoon Haiyan. This action was considered, in the context of the Charter, by Breakout Group 2.

#### **9.4 Atmospheric composition: Update of observation requirements**

D. Terblanche reported on the progress in forming the GAW Task Team on Observational Requirements and Satellite Needs. The Task Team (TT) will assess the needs in GAW for satellite measurements. The communities that will need this information are those working with atmospheric chemistry and climate, air pollution and human and ecosystem health, air quality forecasting, and inclusion of atmospheric composition data in meteorological models. The information gathered by the TT should also serve as input to the ongoing Rolling Review of Requirements (RRR) process in WMO.

He indicated that the TT should consist of about 10 members including representatives from the GAW user community and representatives of relevant WMO Programmes, with two co-chairs leading the work. He noted that GAW is framed as an end-to-end system, and the importance of formulating observing requirements.

The team noted the information provided. R. Eckman as co-chair of the CEOS Atmospheric Composition Constellation supported this activity and will ensure linkage between ET-SUP and the GAW Task Team. W. Zhang also noted that ICG-WIGOS had supported the activity.

#### **9.5 Use of satellites in forecasting storm Phailin in the Indian Ocean**

S. Goyal reported on IMD activities to forecast tropical cyclone Phailin in November 2013, the most intense cyclone to cross the Indian coast since 1999. She gave an account of the impact of the storm which highlighted the very good monitoring and forecasting by IMD and others. A comprehensive list of satellite instruments used was provided.

The cyclogenesis methodology is based on scatterometry. Wind shear products (based on Meteosat-7) indicated intensification of system. MW imagery and scatterometer assisted in identifying storm centre.

S. Goyal noted that the first WMO International Workshop on Satellite Analysis of Tropical Cyclones (IWSATC) was organized by the WMO Tropical Cyclone Programme (TCP) in collaboration with the WMO World Weather Research Programme (WWRP), and held in 2011 in Honolulu (co-chairs: Chris Velden and Andrew Burton), and was seen to be very beneficial. However there has been no successor to this workshop.

**RECOMMENDATION 8.18: WMO TCP and WWRP consider holding a second International Workshop on Satellite Analysis of Tropical Cyclones.**

#### **9.6 Application of satellite data in Kenya**

I. Gitonga described the purpose of KMD and the use of satellite data in the service. He provided an overview of observing systems hosted and used by KMD, including one upper-air

sounding station. He noted that satellite observed or generated data goes a long way in assisting many RA I Members to meet their environmental and weather related goals and needs.

He also noted the use of SYNERGIE for integrated use of satellite and in situ products. He advised that satellite data from MSG had been used in support of the Severe Weather Forecasting Demonstration Project.

## **10 PREPARING USERS TO NEW SATELLITES**

A major focus of the session was how to support users in preparing for the upcoming new generation of satellites that will be launched before the end of this decade, with an initial focus on meteorological, geostationary satellites. Representatives from satellite operators were invited to provide an update on their programmes (Himawari-8, GOES-R, FY-4A, MTG, INSAT-3D), with primary interest in user preparation programmes. The Secretariat presented the online Satellite User Readiness Navigator portal (SATURN) and a user perspective on upcoming non-geostationary satellites of major importance to WMO Programmes.

### **10.1 Preparation for Himawari-8**

H. Murata showed the status of preparation for the new JMA geostationary satellite Himawari-8; he gave an overview on scan areas and other technical details of the AHI instrument, on the data dissemination strategy, including the various formats used for data dissemination, sample data, and planned products (AMVs, volcanic ash, dust, aerosol). As for products, H. Murata explained the change in AMV software used with Himawari-8, expected to lead to an increased density of retrieved wind vectors.

JMA are providing this information at <http://mscweb.kishou.go.jp/himawari89> . AHI data are processed into a Himawari Standard Format which is described in a users' guide [http://mscweb.kishou.go.jp/himawari89/space\\_segment/hsd\\_sample/HS\\_D\\_users\\_guide\\_en.pdf](http://mscweb.kishou.go.jp/himawari89/space_segment/hsd_sample/HS_D_users_guide_en.pdf)

JMA have not yet decided on the details of the RGB generation. It will be based on user feedback, also in support of SCOPE-Nowcasting. The Team recommended that the WMO standard for RGB should be followed.

**ACTION 8.11: JMA to consider using the WMO RGB standards ([http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012\\_FinalReport.pdf](http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf)) in the H-8 product suite, and to report on progress at the next session of the Team. By Mar 2015.**

### **10.2 GOES-R Proving Ground**

A. Mostek provided a report on the current status of GOES-R Proving Ground (PG) program, a summary of recent reports and plans for the next year. The GOES-R PG was established in 2008, with dedicated funding to support a small team of scientists working with product development, training and evaluation programs. The PG was established to realize the benefits of the GOES-R system as soon as the satellites are launched and operational. More information on GOES-R Proving Ground can be found at: <http://www.goes-r.gov/users/proving-ground.html>. From this small beginning, the GOES-R PG grew quickly to encompass many NOAA product development and operational offices across the United States.

The Proving Ground is a collaborative effort between the GOES-R Program Office, NOAA Cooperative Institutes, a NASA center, NWS Weather Forecast Offices, NCEP National Centers, and NOAA Test Beds. The Proving Ground is a project in which simulated GOES-R products are tested and evaluated before the GOES-R satellite is launched. The simulated GOES-R products are generated using combinations of currently available GOES data, along with higher resolution



data provided by instruments on polar-orbiting satellites such as MODIS on NASA's Aqua and Terra satellites, NOAA SNPP, and numerical model synthetic satellite data.

In a number of operational testbeds, the baseline and additional products planned for GOES-R are evaluated, such as on fog/low status.

The session took note of the rapid progress of NOAA GOES-R Proving Ground and the many activities regarding user readiness and product evaluation in preparation for launch late in 2015 or early 2016.

Other agencies are asked to consider developing plans to establish Proving Grounds in preparation for other satellites (see item 10.7).

In view of the needs of prospective users of GOES-R outside the US, the need for a transition plan from GOES to GOES-R was strongly emphasized by the Team. Within such a plan, data dissemination using GEONETCast-Americas should help in smooth transition of user operations. GEONETCast-Americas could serve as a risk reduction measure in this situation, noting the different capabilities of specialized and general users. Specification of exact schedules in the transition is important.

The handling of the full datasets to be expected from GOES-R remains a challenge to be resolved.

The Team noted uncertainty around the GOES-R positioning (East, West) and entering into operations, re-emphasizing the need for timely planning of parallel operations and transition to the new system, as appropriate. Introduction of an extended check-out period was suggested.

The Team recommended that NOAA should use all mechanisms to make users and managers in all of Region III and IV aware of GOES-R development, including details on product suite, ground segment, and transition plans. Efforts to raise awareness should include the VLab (through a GOES-R event week), the Region III/IV Coordination User Group, the 2015 NOAA Satellite Conference, and the upcoming RA III session in Sep 2014.

**RECOMMENDATION 8.19: NOAA NESDIS to consider using an extended check-out period to make GOES-R data available on a pre-operational basis.**

**RECOMMENDATION 8.20: NOAA NESDIS and NWS participate in the RA III session in Sep 2014 (Asuncion, Paraguay), in particular to inform on the plans for GOES-R and GEONETCast-Americas.**

**RECOMMENDATION 8.21: NOAA NESDIS, in collaboration with international partners, to develop a GOES-R preparation project for users in RA III and RA IV (outside the US).**

**RECOMMENDATION 8.22: T. Mostek and CIRA to facilitate organization of GOES-R related events through the VLab and dedicated user conferences, such as the 2015 NOAA Satellite Conference.**

**ACTION 8.12: NOAA NESDIS to consider using the WMO RGB standards ([http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012\\_FinalReport.pdf](http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf)) in the GOES-R product suite, and to report on progress at the next session of the Team. By Mar 2015.**

### 10.3 Preparation for FY-4A

X. Fang reported on plans for the new-generation geostationary FY-4A satellite. Instrument capabilities, ground segment concept, testing schedule, product algorithm development plans. Proxy datasets are being produced (aerosol, lightning) based partly on MODIS. User preparedness and data dissemination plans. FY-4A and 4B are considered as R&D satellites since first time that CMA operate a three-axis stabilized geostationary satellite. The commissioning may take longer, and the satellite may not enter operations until 2017. There will be a long period of parallel operations with FY-2.

Dissemination of GIIRS potentially through CMACast and direct readout; it remains open how to handle large data volumes. GIIRS will not scan the full disk.

It was noted that given similar capabilities of the imagers on the new generation of geostationary satellites, product generation from these imager should be better coordinated and harmonized where possible. The Team recognized the role of CGMS in this regard.

**ACTION 8.13: CMA to consider using the WMO RGB standards ([http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012\\_FinalReport.pdf](http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf)) in the FY-4A product suite, and to report on progress at the next session of the Team. By Mar 2015.**

### 10.4 Preparation for MTG

S. Wannop reported on the Meteosat Third Generation (MTG) programme should guarantee access to space-acquired meteorological data until at least the late 2030s.

The Meteosat Third Generation series will comprise six satellites, with the first spacecraft likely to be ready for launch from 2018. The in orbit configuration will consist of two parallel positioned satellites, the MTG-I imager (a 3-tonne satellite with 16 nominal channels) and the MTG-S sounder. The sounder will be one of the key innovations in the new programme, allowing Meteosat satellites, for the first time, to not just image weather systems but to analyse the atmosphere layer-by-layer and perform far more detailed chemical composition studies.

The aim of the preparations is to ensure that MTG satellite data are used by the EUMETSAT Member State NMHS within one year from the successful launch of the first MTG Imaging satellite and to have identified applications areas for the Sounder (IRS) prior to launch of the first MTG-S.

To ensure the smooth transition of the user community from Meteosat Second Generation (MSG) operational services to MTG services the EUMETSAT Secretariat will establish a User Preparation Project. It is assumed that the future project will have 3 distinct phases:

- Phase I - Clarification of user preparation requirements and preparation process definition
- Phase II - Main user preparation phase prior to launch
- Phase III - Evolution and transition to routine operations; with distinction between RA I and RA VI

In advance of the formal project EUMETSAT has developed a draft Pre-Project Concept document.

S. Wannop presented assumptions regarding: the prospective user community of MTG-I (assumed similar to MSG), test data and support tools, data usage, data discovery, delivery and access, user requirements for information, partnerships (which include WMO ET-SUP and the SATURN project).

EUMETSAT is committed to establishing a MTG user preparation project.

**RECOMMENDATION 8.23: EUMETSAT and CMA to closely coordinate the exploitation plans for MTG IRS and FY-4A GIIRS, given the particular challenges associated with these instruments.**

**RECOMMENDATION 8.24: CGMS WG II should discuss common approaches to the exploitation of instruments on the new generation of geostationary satellites where these instruments have similar characteristics.**

**ACTION 8.14: WMO Secretariat to make available the report of the July 2013 IRS EUMETSAT workshop to ET-SUP members. By Jul 2014.**

### **10.5 First data from INSAT-3D**

S. Goyal reported on first data and products derived from the imager and sounder on INSAT-3D. For example, total precipitable water used to monitor and predict cyclones Lehar and Madi (which weakened due to dry air intrusion, hence no disaster response was needed on mainland India). She showed the website through which images and products are available. (<http://www.imd.gov.in/section/satmet/dynamic/insat.htm> ).

The Team suggested that IMD consider participation in the 5<sup>th</sup> AOMSUC.

### **10.6 Other upcoming satellites 2014-2015**

The Secretariat gave summarized information on satellite products and data access mechanisms for non-geostationary satellites planned for launch in 2014-2015 that are relevant to WMO Programmes (except for space weather). Details for the upcoming generation of geostationary satellites were provided through individual providers (items 10.1 through 10.5) and the SATURN portal (item 10.7).

### **10.7 Satellite User Readiness Navigator portal (SATURN)**

M. Rattenborg, for the Secretariat, presented the concept for the SATURN (SATellite User Readiness Navigator for the next generation of geostationary satellites) online portal, together with the approach for populating the portal. Satellites operators are responsible for the content pertaining to their satellites.

An important element of the portal is the forward-looking planning for user readiness activities, and an outline is presented for a Reference User Readiness Project, including a Reference Timeline for activities and deliveries from the satellite system development.

The portal allows for several views on the information (“postings”) provided, such as by satellite, by topic (data access and use), by FAQ. The first online version of SATURN is planned to be made public after CGMS-42 in June 2014.

It is planned to add INSAT-3D and future LEO satellites (FY-3E, JPSS, EPS SG) in a next iteration. It was suggested to also include the plans for a Highly-Elliptical Orbit mission (PCW) in the portal.

As for multilingual support of the portal, no details have as yet been developed. It is planned to translate high-level content, and include non-English content from providers (such as GOES-R material in Spanish). A timestamp should be added to each of the posting.

The Team expressed strong support to this development and encouraged all operators to provide timely and relevant information. It also expressed appreciation to EUMETSAT for providing voluntary contributions to the WMO Space Programme Trust Fund.

**RECOMMENDATION 8.25:** The Team recommended that all satellite operators provide timely and relevant information to SATURN.

**ACTION 8.15:** Secretariat to communicate SATURN to all potential users, including at WMO Executive Council, through all Regional Requirements groups, to all WMO Members via a letter, and through appropriate publications. By Nov 2014.

**RECOMMENDATION 8.26:** Secretariat to add a timestamp to each posting in SATURN.

**ACTION 8.16:** A. Rea, S. English to provide an initial review of SATURN, through a dedicated user account. By Jun 2014.

## **11 INTERNATIONAL SCIENTIFIC WORKING GROUPS (UPDATE)**

This item provided reports from the 3<sup>rd</sup> workshop of the International Radio Occultation Working Group (IROWG) held in September 2013, and the 19<sup>th</sup> International TOVS Study Conference (ITSC; 26 March – 1 April 2014).

### **11.1 Radio Occultation (IROWG)**

A. von Engel reported on recent developments identified by the International Radio Occultation Working Group (IROWG). Main recommendations from the 3<sup>rd</sup> IROWG workshop included

- Develop a GNSS-RO Continuity Plan, moving operational constellation providing more than 10 000 occultations per day
- Ensure continuity of RO measurements especially after COSMIC-1
- Ensure timely update of receiver firmware
- Avoid observation gap at mid- and high latitudes

Other remarks regarding RO capabilities included that Jason CS is set to carry a secondary RO instrument. A RO-CLIM project was recognized in the SCOPE-CM context, aiming at the generation of two climate datasets.

He noted recent developments, such as potential involvement of commercial RO data providers, and the potential full loss of RO capability on Oceansat-2, in particular of the near-real time data provision since the scatterometer on that satellite has stopped working. He also noted that the RO instrument on Oceansat-2 has so far failed to provide useful data, primarily because the instrument onboard software was not updated. When presenting the current RO constellation, he pointed out the difficulty of getting hold of RO data from research satellites. This also led IROWG to recommend focussing to build up an operational satellite constellation for RO; nevertheless, delayed-mode RO data is still useful for climate assessments. Agencies could be approached through CEOS on this issue, for example through EUMETSAT as the current Chair of CEOS.

Related to data exchange, the Team entered into a discussion on which data are considered “essential” in the sense of WMO Resolution 40. Private operators entering the field and operating observing systems on a commercial basis would not necessarily be violating Resolution 40, however in conjunction with privatization of data generation, Members could decide to re-designate data as “essential” and “additional”, possibly resulting in less wide or more expensive access to data. The various business models of private operators were touched upon.

A. von Engel explained the potential utility of a central facility for GNSS orbits and clocks, since all near-real time RO processing centres require this kind of information for RO data.

**RECOMMENDATION 8.27: ET-SUP should consider developing a guideline on what minimum set of satellite data should be considered essential, and add this as an item for the next session of the Team.**

## **11.2 Sounding**

S. English presented on behalf of the ITWG co-chairs highlights from the ITSC-19 Conference held in Jeju Island, Republic of Korea, 26 March – 1 April 2014. In the area of data available in particular:

- there was a strong acknowledgment of the value of CMA's approach to early access and characterization of FY-3 data;
- recognition of the rapid progress by KMA in utilizing soundings in NWP
- for future high volume datasets from satellites, a two-stream data dissemination strategy may be a viable concept (ie. one lossy compressed stream at high availability, good timeliness, but high cost; one lossless stream, but less reliable, worse timeliness, but cheaper);
- operational data dissemination systems should be tested with simulated data for new missions a few months before launch.
- good support to SATURN as a mechanism to ensure user preparedness
- when designing new or modified BUFR formats, drafts should be circulated to the NWP community via the NWP Working Group for feedback, prior to submission to WMO.
- Use of Principal Component for reduced-volume dissemination of sounder data is being investigated as a future approach to exploit large volumes of satellite data; If PC compression is used to disseminate hyperspectral IR observations, a conservative approach should be taken in order to mitigate information loss (e.g., by retaining as many principal components as possible
- ITWG to provide list of most relevant events affecting the quality of data, e.g. calibration changes, sensor anomaly, change of operation mode, and indication of the magnitude of the event justifying a notification.
- Harmonization of the various software packages for generating level 2 products; better guidance for users of preprocessing packages used for VIIRS, CrIS, and AIRS

It was noted that CGMS is discussing a common approach to documenting calibration events. Input by ITWG to this discussion would be useful to define what users perceive as relevant events.

Further points highlighted by S. English include:

- The unknown uncertainty in line-by-line RT modelling (e.g. of spectroscopy libraries) should be addressed
- SI-traceable calibration of instruments is not only needed for climate, but also for NWP, and missions such as CLARREO should be supported
- ROSHYDROMET to make available preprocessing software for L0/L1 Meteor-M data
- Support to RARS implementation group re-vitalization
- Resources spent on ground and user segment should sufficiently match the expenses on spacecraft development

## **12 ARCHITECTURE FOR CLIMATE MONITORING FROM SPACE: USER CASE STUDIES**

The session discussed progress with developing user case studies for the priority areas of the Global Framework for Climate Services (GFCS). These studies are intended to investigate the

climate service requirements of users (for example those recognized in the publication *Climate ExChange*) and then trace back the impact of satellite data (ECV products, FCDRs, sensors) to these services. These user case studies will be essential to demonstrate the link between the Architecture for Climate Monitoring from Space and the GFCS. Work undertaken in the CGMS Tiger Team on Socio-Economic Benefits of Satellites will also be considered in this context.

### **12.1 GFCS User Case Studies**

R. Eckman reported on initial work on developing GFCS-related user case studies, intended to demonstrate the validity of the Architecture for Climate Monitoring from Space, and to highlight potential gaps in satellite sensors, datasets and products. A set of case studies explained in Climate Exchange has been identified; more detailed analysis is required to develop these case studies. It was noted that the Joint CEOS/CGMS Working Group, through Mark Dowell (EC/JRC) has interest in this activity.

Break-out group 4 further elaborated on this topic.

### **12.2 CGMS Tiger Team on Socio-Economic Benefits of Satellites**

R. Eckman reported on the CGMS Tiger Team on Socio-Economic Benefits of Satellites (SETT), to develop a credible methodology and common terminology for articulating the socio-economic benefit of satellite observing systems and to explore the most effective ways to communicate this information to desired stakeholders.

The Chair noted that assessing value to space-based observations should be done through developing cases where the benefit of satellite data has shown value to applications. For the Team, such assessments cover all GEO societal benefit areas, not only climate.

In developing countries, the social impact of disasters is often higher than the economic value. The upcoming SETT workshop should also include presentations on developing country cases.

**RECOMMENDATION 8.28: The Team recommended participation by its Members and the Secretariat in the CGMS SETT.**

## **13 TRAINING AND EDUCATIO**

The session reviewed the overall progress made in training and education on satellite applications: status of the Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) over the past year, in particular the range of global and regional training events (partly in cooperation with the Committee on Space Research (COSPAR)), preparation for the 7th meeting of the Virtual Lab Management Group. ET-SUP was invited to consider the proposal for a new co-chair for the VLab, aimed to replace a current co-chair who is stepping down. Selected training activities by CMA, ROSHYDROMET and COMET were also discussed.

### 13.1 VLab Status and Plans

V. Gärtner updated the session on activities in the VLab over the intersessional period, including: the virtual roundtable on competencies of aeronautical meteorological personnel, held in six languages; the GEONETCast event week; a week on latest meteorological science; development of conceptual models for the Southern Hemisphere; satellite direct readout events (EUMETSAT, NOAA).; the world wide weather briefing with 450 participants worldwide.

It was noted that other satellite operators should organize similar direct readout training events. He also announced a plan to organize a virtual roundtable on climate. Coordination with partner programmes occurred through the WMO Train the trainer online seminar for WMO RA I.

**RECOMMENDATION 8.29: Taking note of the successful completion of the first phase of the project 'Conceptual Models for the Southern Hemisphere', the Team encouraged the conduction of a second phase (starting in autumn 2014)."**

**ACTION 8.17: Secretariat to circulate report on first phase of the project on developing 'Conceptual Models for the Southern Hemisphere' to ET-SUP Members. By Jul 2014.**

Volker Gärtner, who has been co-chairing the VLab together with Kathy-Ann Caesar (CIMH), announced his intention to step down from this function in 2014. In a letter to WMO, ROSHYDROMET proposed as new co-chair Prof. Grigory Chichasov, Director of the WMO Regional Training Centre in the Russian Federation, and Mr Eduard Podgaiskiy from the Russian State Hydrometeorological University as his assistant. Prof. Chichasov and Mr Podgaiskiy are the nominated main points of contact for the VLab Centre of Excellence in the Russian Federation, and hosts of the upcoming 7th meeting of the VLab Management Group.

The Chair thanked V. Gärtner for his long-standing support for the VLab and for the significant progress the VLab has made under his co-chairmanship.

**RECOMMENDATION 8.30: The Team recommended that the proposal by ROSHYDROMET to nominate as new VLab co-chair Prof. Grigory Chichasov, Director of the WMO Regional Training Centre in the Russian Federation, and Mr Eduard Podgaiskiy from the Russian State Hydrometeorological University as his assistant be favourably considered by CGMS.**

ET-SUP emphasized the critical importance of strong VLab leadership and looks forward to working with the incoming co-chairs, and their participation at future sessions of ET-SUP.

Break-out group 3 elaborated on topics for future COSPAR/VLab training events.

### 13.2 Training on the FY-3 product suite

X. Fang briefed the session on sensing capabilities of the FY-3 series, derived products, and classroom training. The FY-3 sounder has proven useful to NWP; global imagery mosaic from MERSI. Several data delivery services are available, a preprocessing package for direct readout users is available.

Training plan includes enhanced courses, both classroom and remotely. A training event involving CMA, JMA and KMA should be held in conjunction with the 5<sup>th</sup> Asia-Oceania Meteorological Satellites User Conference. International version of SMART is under development.

**ACTION 8.18: X. Fang to contact the Beijing CoE on how to organize a distant lecture on the FY-3 data and products, as per open Action 7.19, to be held in conjunction with the 5<sup>th</sup> AOMSUC. By Sep 2014.**

**RECOMMENDATION 8.31: The Team encouraged CMA to work with the VLab to make recordings of classroom lectures available online.**

### **13.3 Training on Meteor-M product suite**

Not discussed (S. Uspensky unable to attend).

### **13.4 COMET Update**

This report given by A. Mostek (taken from COMET's Semi-Annual report dated March 2014) provided a review of the current status of UCAR COMET program with a summary of recent satellite related training and plans for the next year (2014 into 2015). A key message was that COMET is recovering quickly from significant budget cuts in 2012 and 2013 that led to some staff layoffs and reduction in training development and delivery. The summary of recent COMET training delivery and the increase in training development is a major success and COMET management and their sponsors (in the U.S. and around the world) need to be commended for their tremendous support. A reason for COMET's turnaround is due in part to sustained support received from satellite programs in the U.S. (GOES-R and JPSS) and from other programs including Canada, EUMETSAT and others.

More specifically, COMET activities encompassed:

- Work continued on the module on the GOES-R GLM (Geostationary Lightning Mapper).
  - Efforts to update the content in the 2008 module, "Microwave Remote Sensing: Land and Ocean Surface Applications" was completed. The update addresses changes and developments that have taken place over the last several years in space-based microwave instruments, their capabilities and derived products.
  - Planning was completed for the EUMETSAT/NESDIS module on using altimeter and scatterometer data in marine forecasting, with scriptwriting expected to begin shortly.
  - Work continued on the outline and design of the COSMIC 2 module, with scriptwriting expected to begin in April.
  - The script for the much anticipated module, "How Satellite Observations Impact NWP", was finished in January and the module development was primarily completed in February. The module was published in March.
  - The module Satellite Feature Identification: Conveyor Belts, funded primarily by the Meteorological Service of Canada was scripted and development was completed in February.
  - Several remote sensing resources from EUMeTrain were added to the MetEd Website
- Several EUMETSAT-funded modules were published

Several satellite training events are planned targeting at user preparedness to GOES-R (launch in late 2015 or early 2016), such as the GOES-R Operations Warning (GROW) courses. These include building satellite liaison personnel, bridging between the satellite provider and the operational user. On-site satellite focal points are planned to be installed in all NWS forecasting offices across the US.

The contribution of the JCSDA to training on satellite data assimilation in NWP was recognized.

The session was pleased to learn and expressed its acknowledgment to NOAA and its partners about the rapid improvement in the financial situation of the COMET programme, given its importance to ET-SUP objectives. It noted the significant changes in NOAA Satellite Training Plans in preparation for GOES-R launch (late in 2015) with specific focus on operational forecasters.



### 13.5 COSPAR Matters

J.-L. Fellous provided a short report on the COSPAR capacity building workshops and associated fellowship programme, with particular focus on the collaboration established with the WMO Space Programme, the Virtual Lab, and related bodies.

COSPAR Capacity-Building Workshops are held at a rate of about 3 workshops in each two-year period. These have as a main objective the encouragement of the scientific use of space data by scientists in developing countries. In particular, in view of the large number of extensive archives of data from past and current space missions and the ready access to these and the associated analysis software which is afforded by the internet, the typical workshop aims to provide a highly practical training in the use of one or more of these, based on current missions. However, any training activity which is related to science covered by one of the eight COSPAR commissions is eligible for support.

The main limitation in organizing training events is less on financial resources, but on identifying manpower helping to organize events. The next capacity building workshop involving collaboration between the WMO/Virtual Laboratory and COSPAR is planned to take place on 21 July - 1 August 2014. The workshop will be hosted by the Tver State University (Russian Federation), and will cover a variety of topics under the title "Satellite Remote Sensing, Water Cycle and Climate Change"(see <http://event.tversu.ru/>). This event will take place in the two weeks before the 40th COSPAR Scientific Assembly to be held in Moscow from 2 to 10 August 2014 (see <http://cospar2014moscow.com/>).

Break-out group 3 developed priorities of future COSPAR/VLab training events.

**ACTION 8.19: S. Keogh to explore the possibility of UKMO taking the lead in the organization of a COSPAR/VLab training event on space weather; such an event should be hosted in a developing country. By Sep 2014.**

### 13.6 ECMWF Course on Satellite Data Assimilation

The training officer at ECMWF gave a short briefing on the subject matters of training courses offered by ECMWF:

- Input into NWP systems (incl satellite data)
- Use of NWP products
- Data assimilation
- Satellite data assimilation, with support from the NWP SAF (open to world)

Attendance is mainly from NWP centres, 20% from universities, and 15% from training centres. Participants come from all over the world, including Asia and Oceania. ECMWF scientists provide the lectures, and presentations are available and open to the general public.

The one-week annual seminar on satellite data in September 2014 covers a state-of-the-art of current issues; it is open to all participants.

## 14 NEXT WMO SATELLITE USER SURVEY

Not discussed.

**ACTION 8.20: Participants are to provide comments on scope, approach, format, and timing of a next WMO survey on the use of satellite data, taking into account previous ET-SUP guidance and regional user surveys. By Jul 2014.**

## **15 ET-SUP COMMUNICATION PLAN**

Not discussed.

**ACTION 8.21: A. Rea to prepare and circulate a draft communication plan to Team members. By 31 Dec 2014.**

## **16 UPDATE ON FORTHCOMING EVENTS**

The session obtained brief reports on:

- The 2014 NOAA GOES-R User Readiness Conference
- The 5<sup>th</sup> Asia-Oceania Meteorological Satellite Users Conference in China, and associated events (October 2014)
- The 2014 EUMETSAT Meteorological Satellite Conference in Geneva, Switzerland
- The Climate Research and Earth Observations Symposium 2014

The group was informed of the plans for the 42<sup>nd</sup> session of the Coordination Group for Meteorological Satellites, held in Guangzhou, China, 19-23 May 2014, and related WMO input to the session.

### **16.1 NOAA GOES-R User Readiness Conference**

A. Mostek informed about the planned Conference to be held 2-6 June 2014 in Kansas City MO, USA. He noted strong support by the Director of the National Weather Service to the satellite programme. Training activities will be led at the director level. The next full-fledged NOAA Satellite Conference is planned for spring 2015 in Maryland, USA.

### **16.2 5<sup>th</sup> Asia-Oceania Meteorological Satellites User Conference**

X. Fang briefed on early planning for the 5<sup>th</sup> Asia-Oceania Meteorological Satellites User Conference. A training event which would address the upcoming generation of satellite capabilities is planned, involving CMA, JMA and KMA.

### **16.3 2014 EUMETSAT Meteorological Satellites Conference**

S. Wannop briefed the Team on the upcoming EUMETSAT Meteorological Satellite Conference 22-26 September 2014 in Geneva, Switzerland, with sessions covering the range of WMO application areas.

Other events of interest to EUMETSAT are:

- METEOREX exhibition in St. Petersburg 7-9 Jul 2014
- 11<sup>th</sup> User Forum for Africa, Johannesburg, 8-13 Sep 2014
- World Met Technical expo Brussels, 21-23 Oct 2014
- EUMETCast Workshop in 2015

### **16.4 Climate Research and Earth Observations from Space (“Climate Symposium”)**

The Climate Symposium 13-17 Oct 2014 in Darmstadt, Germany brings together international experts in climate observations, research, analysis and modelling. Abstract submission deadline is 20 April 2014. Themes cover satellite observations for climate system monitoring, modelling, and prediction.

## 16.5 **CGMS-42**

The Secretariat briefed the Team on the agenda of the forthcoming 42<sup>nd</sup> session of CGMS, held in Guangzhou, China, 19-23 May 2014.

## **REPORTS FROM BREAK-OUT GROUPS**

Breakout Groups were formed along the following topics

1. Regional issues
2. Disaster Charter response
3. COSPAR training priorities
4. Climate Case Studies
5. Product Access Guide Content management
6. IGDDS Vision and Metadata Issues

### **BREAK-OUT GROUP 1: Regional issues**

Participants: L. Machado, I. Gitonga, S. Goyal, D. Biron, M. Rattenborg

The break-out group reiterated the importance of the Regional Requirements Groups on satellite data access and exchange, through the need for:

- 1) Formal recognition of the regional group by WMO constituent bodies and RAs
- 2) The generic Terms of reference (ToR) for the groups should be amended by each RA, as considered appropriate by the Association. They should be complemented by descriptions of the roles and responsibilities of the focal points, the data providers and the chairman.
- 3) The tabular template prepared in Region I and III/IV can be used as a common template for gathering user requirements.

This corresponds to Action 7.4 which is still open.

- 4) Regional user surveys are a good mechanism to understand the users' needs and priorities.

This is consistent with Recommendation 7.2.

**ACTION 8.22: A. Rea to facilitate a region-based user survey in RA V through the TT-SUR (and its possible successor). The survey should reference the recent regional survey done in RA III/IV and should specifically target data distribution and visualization issues. By end of 2014.**

- 5) Besides the nominated members, the Groups should invite, on an ad-hoc basis, specialists covering all WMO application areas.

### **BREAK-OUT GROUP 2: Disaster charter response**

Participants: S. Wannop, H. Murata, S. English, J. Lafeuille

The ET-SUP breakout group recognised the importance of making full use of available satellite data during any emergency situation. This is an area where satellite data have a direct societal impact. It is equally important that a well thought-out working set of procedures is in place to ensure the flow of information and support within the region during a severe weather event. It was

recognised that an organization is in place for some severe weather/disaster events, e.g. RMSCs for regional tropical cyclones and VAACs for volcanic ash hazards to aviation, and that any enhancement should build upon existing infrastructure. It should be ensured that satellite capabilities are fully utilized by the existing structures (RMSCs, VAACs,...) SDS-WAS. Furthermore, it was noted that other events, e.g. wildfires, dust storms are not operationally coordinated at the regional level.

Noting the activities of the International Charter 'Space and Major Disasters', the group briefly discussed the potential value in tasking meteorological satellite operators to provide additional data (e.g. rapid scan, or tailored products) during severe weather events. Whilst additional data may be useful, the availability of ad-hoc products may not give forecasters the time to familiarise themselves and incorporate these data into routine forecasting procedures. Likewise, operational user systems may not be easily configured to receive additional products that would be transmitted in dedicated broadcast channels.

The group therefore felt that when a regional structure is in place, a priority should be to provide additional data on a routine basis to the Regional Specialized Meteorological Centres, or to offer additional training, in order to support and help improve the valuable service they already provide in monitoring severe weather events.

In addition, the group suggested that making additional products available on a server for consultation would be a way to enhance the information with little impact on operational procedures. Frequent imagery is particularly useful when nearing the tropical cyclone landfall. It was recognised that new imaging sensors will offer the flexibility of more frequent data over a given region and will thus make such a special tasking more relevant in future and easier to accommodate in operational procedures. Advantage might also be taken of some R&D satellite data or e.g. novel products derived from altimetry, which are not yet integrated in operational practices.

It was also noted that the WMO-ESCAP Panel on Tropical Cyclones had expressed concern about the long-term coverage of the Indian Ocean. The group recognised that CGMS should ensure continued coverage and availability of satellite data through the geostationary ring.

The following was recommended:

**RECOMMENDATION 8.32: WMO TCP to consider a review of the list of satellite data used in regional tropical cyclone centres to evaluate and identify any missing sources of useful data and, where needed, train centre staff in the use of new sensor data.**

**RECOMMENDATION 8.33: WMO TCP to consider a review of the notification procedures between regional tropical cyclone centres and the effected NMHSs to identify potential enhancements, including the possibility to request additional information.**

**RECOMMENDATION 8.34: ET-SUP could follow the activities of groups like International Charter and the new CEOS Working Group on Disasters to identify potential best practice which could be applied within the meteorological community (users and satellite operators).**

The Team further recommended, through WMO WDS and CGMS, increased cooperation between regional NMHSs during severe weather events and supported the sharing of information/data on the monitoring of such events where they cross national boundaries. In particular, establishing FTP servers was encouraged where additional data or products (third-party R&D satellite data, prototype products) could be uploaded to enhance the information available in emergency situations.

Noting the recent impact of super typhoon Haiyan, ET-SUP recognized the need for a full complement of satellites within the geostationary ring and it encourages satellite operators to

continue to work together to fill any gaps arising in future, e.g. coverage over the Indian Ocean after the re-orbiting of Meteosat-7.

### **BREAK-OUT GROUP 3: Training priorities**

Participants: J.-L. Fellous, X. Fang, R. Eckman, T. Mostek, S. Bojinski

The group developed propositions for future events, noting the benefits of bottom-up (COSPAR) and top-down (VLab) approaches. Stimulation top-down of training event and topics was considered useful in some cases. Training topics should carry a research flavour.

### **RECOMMENDATION 8.35: VLab to support recording and archiving of workshop material from COSPAR/VLab events.**

The group suggested the following topics, recognizing the VLab strategy, topics identified in the 2012 WMO Survey, upcoming satellite missions, and their relevance to EO research:

- 2015: Soil moisture in Africa (considering SMOS, GPM, SMAP, ASCAT, AMSR-2); open questions: Could this event include Asia/ Middle East participants? Could it be hosted by Morocco?
- 2015: Space weather
- 2016: Ocean dynamics (considering SMOS, Jason, Sentinel-3, Aquarius)
- 2017: Atmospheric chemistry (considering SAGE III, OCO-2, GOSAT-2, Sentinel 5P)

For each event, it is necessary to identify a champion and a host country. A one year effort is required for the organization. New-generation geostationary satellite capabilities should also be considered.

### **ACTION 8.23: Secretariat to present these topics and timeline to VLMG-7 for discussion. By Jul 2014.**

### **BREAK-OUT GROUP 4: Climate case studies**

Participants: R. Eckman, W. Zhang, I. Gitonga, S. Goyal, J.-L. Fellous, S. English

The group noted that user case studies should focus on the right-hand columns of the Architecture for Climate Monitoring from Space (dataset exploitation and decision-making). Since group members were familiar with cases relevant to the GFCS as follows:

- Disaster Monitoring in India – S. Goyal
- East African Drought Monitoring – I. Gitonga
- Disaster Monitoring in Brazil – S. English
- European Flood Awareness System – S. English
- Great Barrier Reef – A. Rea
- Solar Energy Resource Assessment in US – R. Eckman
- Drought Monitoring and Assessment in China – X. Fang and Yiping Zhang

It was decided to identify information resources and contact persons related to each of these cases, in order to develop them in full.

Related to *Climate ExChange*, the group decided to carry out a short survey with all authors of case studies in this publication, consisting of three questions:

- Which satellite observations are used in your application, if any?
- If not, are you aware of the existence of satellite products in your area?

- How important do you rate the importance of satellites for model analyses? (Not important to very important)

The survey information should be used in the final case study report as lead-in and background information, as a possible guidance for additional case studies.

The structure of case studies should be along the lines of:

- Project, specific application, service, end user, intermediary users, linkages and information flow
- Note satellite observation
- Model used
- Relevant CDRs
- What agency produces records
- Sustainability of service vs demonstration service?

**ACTION 8.24: Team to develop template for case studies, and scope out the case studies to be carried out, in collaboration with Secretariat and Mark Dowell (JRC and member of JWGC). By 31 May 2014.**

**ACTION 8.25: Team to agree on questions, and carry out survey with authors of ClimateExchange. By 31 May 2014.**

**ACTION 8.26: Develop and document 10-12 case studies showing the relevance of satellites for climate services; draft by mid-Nov 2014, final version by Jan 2015.**

#### **BREAK-OUT GROUP 5: PAG management**

The break-out group agreed on a ET-SUP PAG management task team :  
S. Wannop, D. Biron, T. Mostek, X. Fang, H. Murata

The group advised that:

- CGMS members should be identified, in the first instance, as product providers
- Confirm user demand through soliciting feedback from Regional requirements groups, publicizing at EC, and monitoring online traffic
- Incentives should be created for providers to follow the Concept requirements

It was recommended that Secretariat continue work on preparing a working demonstration of PAG in time for Exec Council meeting in June. This demonstration version should include some selected products that clearly show benefit to users of PAG. Subsequently, satellite operators should be encouraged to provide the stable web-based design structure needed for the PAG. For demonstration to be a success - must be focused and show benefit to the Satellite Operators and for the key users, which include less-experienced satellite data users, in particular from developing countries.

Links to training material should be included comprehensively, by referring to content in the ESRC portal.

**RECOMMENDATION 8.36: WMO SP to prepare a working demonstration of PAG in time for the WMO Executive Council meeting in June 2014.**

**ACTION 8.27: The PAG management task team to provide feedback to this demonstration version before WMO EC 2014. By 31 May 2014.**

**RECOMMENDATION 8.37: CGMS operators to set up stable URLs of their satellite product collections as per the Product Access Guide concept.**

## **BREAK-OUT GROUP 6: IGDDS Vision and Metadata**

Participants: L. Machado, P. Shi, M. Rattenborg, J. Lafeuille

This break-out group reviewed the proposed outline of a new Integrated Global Data Dissemination Strategy (IGDDS) (item 6.1) with emphasis on the following points. It also discussed metadata matters (item 7.1)

### **Relationship between IGDDS and WIS**

There is a need to ensure that IGDDS, as a global strategy for satellite data dissemination, is fully integrated in the WMO Information System (WIS). WIS is understood here as both a concept for data management and exchange and an infrastructure implementing this concept. Integration within WIS bears in particular on satellite data/metadata registration in GISCs, formats definition, metadata definition, recognizing the satellite data requirements and the dissemination infrastructure in the WIS planning process.

### **Data registration in WIS**

Satellite data should be more systematically registered in the WIS. Each satellite operator should liaise with a GISC and develop the required metadata. The satellite operators' catalogues are normally harvested by the GISCs, which should be able to generate list of satellite products. It is the case for CMACast products in the Beijing GISC, and probably for EUMETCast products in the Offenbach GISC. Similarly, other satellite operators should ensure their products are registered in a GISC with proper metadata in order to be discoverable.

### **Requirements gathering**

The requirements gathering process should be pursued through two mechanisms:

1. regional mechanism
2. global, thematic mechanism (NWP/NAEDEX-APSDEU, JCOMM, PSTG)

The outcome of satellite data/product requirements gathering should be reported to the relevant OPAG-ISS expert team, i.e. the ET-CTS (Expert Team on Telecommunication Infrastructure), as an input for WIS infrastructure evolution.

### **DVB-S integration**

The range of DVB-S systems is growing, which is a positive development that offers opportunities. It provides additional access possibilities, with helpful flexibility in satellite transition periods.

There is however a concern that the different current and planned systems are not integrated as foreseen in the initial IGDDS vision and implementation plan. Integration was efficiently achieved in Europe (with FAX-E and RETIM integrated into EUMETCast) and in China (CMACast merged with FYCast). Options for integration are being discussed in RA III/IV (GNC-A, EUMETCast-A). This is not yet the case in the Asia-Pacific region.

Whilst recognizing the wish of some WMO Members to maintain independent access and dissemination capacity, the group stressed the need to at least ensure interoperability of the different DVB-S broadcast systems, for instance enabling users to receive different data streams available in a given region on a single receiver system with dual Low Noise Block (LNB) and antennas.

### **Way forward**

The group expressed general support to the proposed strategy and recommended that a consolidated version, taking into account the comments made, be presented to CGMS.

**RECOMMENDATION 8.38: Dissemination service operators should explore ways that one operator could disseminate regionally-relevant WMO-related products in a Region, such as in support of SCOPE-Nowcasting in RA II, on behalf of other operators.**



## **17 ANY OTHER BUSINESS**

None raised.

The Chair encouraged feedback from the Team on format and conduct of the session, as guidance for future sessions. Comments included the following:

- Some members agreed to keep a four-day agenda, whereas others favoured five days
- The crowded agenda was noted, giving little time to the break-out sessions
- More attention should be paid to standardization aspects of WIGOS
- On the point of closer cooperation between ET-SUP and ET-SAT, it was noted that the two groups should in principle be kept separate, given the clear focus of ET-SUP
- Time could be saved by being more Action-focused, rather than present many documents for information only, for example by having a panel at the beginning, giving everyone a chance to shortly introduce non-controversial documents, and then enter the topics that require in-depth discussion.
- Should the Team discuss institutional strategies to realize satellite application facilities in RAs (using the EUMETSAT SAF concept as a model); a 1998 paper to ET-SUP discussing NOAA Satellite Application Partners in RA III/IV was noted.

## **18 REVIEW AND ADOPTION OF THE DRAFT REPORT**

The Secretariat provided a draft report of the session, for initial feedback by participants.

## **19 DATE AND PLACE OF NEXT MEETING**

The meeting agreed on two options for holding the date of its next session: 9-13 March 2015 (preferred) or 16-20 March 2015 (back-up).

Team members should get back to the Secretariat to indicate their availability.

## **CLOSURE OF THE MEETING**

The session was closed at 13.30 on Thursday, 17 April 2014.

APPENDIX I

**WORK PLAN FOR THE ET-SUP FOR THE PERIOD 2012-2014 (FROM ICT-IOS-7 DOC. 6.6) (LAST UPDATE: 19 DEC 2012)**

No.	Task	Deliverable/Activity	Due	Responsible	Status	Comment
1	Monitor the progress of satellite data availability and use by WMO Members, related issues and expectations, with the aim to publish findings and recommendations in a WMO document	Biennial survey Analysis of responses Findings and recommendations Advice to Regional Associations on follow-up actions WMO document for publication Next survey	2012/2 2012/4 2012/4 2012/4  2013/1 2015	WMO SP Secretariat and ET-SUP	2012 Survey completed;	
2	Provide advice and support to the development and implementation of WIGOS, from a satellite user's perspective and coordinate with ET-SAT and ET-EGOS on the evolution of the space-based component of Global Observing Systems;	Contribute to the evolving EGOS IP, the Manual on the GOS, the Vision for the GOS 2025, and the WIGOS IP  Support WMO Programmes (both operational and research) in their satellite data and product-related needs	2012/2 and as required  Continuous	ET - SUP and WMO SP Secretariat	Revision to EGOS-IP approved at ET-EGOS in May 2012	
3	Initiate and promote activities to improve the availability of operational and R&D satellite data according to user needs, monitor these activities in close coordination with the relevant CGMS working group(s) and with WIS activities;	Promote the development and maintenance of Regional Satellite Data Requirements in all Regions, as appropriate  Provide feedback on the progress of IGDDS and RARS  Guide and assist new Regional Satellite Requirements Coordination Groups	2013 onwards	ET - SUP and WMO SP Secretariat, with assistance from Int'l WGs  IGDDS and RARS implementation groups	Interaction with ITWG, IWWG, IPWG, IROWG, Nowcasting and other expert groups strengthened  Partnership with SWFDP reinforced	
4	Review present and future R&D satellite data and products including their availability and potential applications, and provide advice with a view of increased utilization by WMO Members;	Review of relevance and availability of R&D satellite data, based on global/regional requirements;  Strengthen interaction with R&D agencies in the area of altimetry, soil moisture, precipitation, and climate  Make recommendations for improved availability, information and training, especially for developing countries	Ongoing	ET - SUP and WMO SP Secretariat	Participation in relevant fora (CHy, Altimetry Symposium); International Soil Moisture Workshop planned for Jul 2013, ESA Living Planet Symposium 2013)	

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5	Review and assist in addressing the needs of WMO Members for information regarding access to and utilization of satellite data and products;	Maintain a list of satellite data access points, processing and analysis software tools on WMO webpage  Include updated list of VLab-relevant tools	2012/3 (continued yearly)	ET - SUP and WMO SP Secretariat	Collection of information initiated	
6	Promote development and harmonization of satellite data and products responding to WMO Members' needs	Continue to provide guidance to phase 2 of Sustained Co-ordinated Processing of Environmental Satellite Data (SCOPE) for Climate Monitoring as a key contribution to the architecture for climate monitoring from space.  Assess and further the concept of SCOPE for Nowcasting, through pilot projects  Develop Product Access Guide, in coordination with satellite operators	2013/1 (call for proposals)  2013 (prototype developed)  2013 (updated version published)	ET - SUP and WMO SP Secretariat and responsible for the SCOPE-NWC projects	Pilots Projects defined and agreed  First version on WMO SP website	
7	Keep under review the needs of WMO Members for training in satellite meteorology and related fields, and engage with the Management Group of the Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) to address these needs, towards full utilization of satellite data from operational and R&D satellites, in accordance with the 2009-2013 Virtual Laboratory Training Strategy;	Regular reviews of the VLab status, activities and plans (training resources, courses, meetings, newsletters);  Support existing VLab CoEs and the establishment of new ones;  Provide guidance to meet users' needs, especially from less developed Members and for the next generation of satellites;  Explore training partnerships  Contribution to training resource development	2012/3 (continued yearly)  2013/1  2013/1 and continuing  2013-2014  Continuous activity	VLMG, WMO SP Office and ET-SUP	VLMG meeting in October 2012 held; virtual meetings every 3 months  Candidature of CoE Morocco agreed; launch event  CBS Guidance developed; follow-up to be defined based on Members' needs WMO-COSPAR MoU signed; joint activities in 2013 in planning stage.	

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APPENDIX III

**AGENDA AND WORK SCHEDULE**

WORLD METEOROLOGICAL ORGANIZATION

ET-SUP-7/Doc. 1.2(1) REV.2  
(8.IV.2014)

COMMISSION FOR BASIC SYSTEMS  
OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS

EXPERT TEAM ON SATELLITE UTILIZATION AND PRODUCTS

EIGHTH SESSION

GENEVA, SWITZERLAND, 14-17 APRIL 2014

Original: ENGLISH

**PROVISIONAL AGENDA**

**MONDAY, 14 APRIL 2014**

	<i>Approx. Time incl. Discussion</i>
8:30 Registration (Salle 7 LAKE)	
9:00 <b>1. ORGANIZATION OF THE SESSION</b>	20'
1.1 Opening of the session (Chair); Welcoming Remarks (WMO)	
1.2 Adoption of the agenda	
1.3 Working arrangements for the session	
9:20 <b>2. CHAIRMAN'S REPORT</b> (Rea)	10'
9:30 <b>3. GUIDANCE FROM THE CHAIRPERSON OF OPAG IOS</b> (Dibbern)	10'
9:40 <b>4. OUTCOME OF RELEVANT MEETINGS</b> (Secretariat)	10'
10:10 <b>5. DATA EXCHANGE: GLOBAL AND REGIONAL ASPECTS</b>	
5.1 Regional mechanisms for satellite data access and exchange	
5.1.1 RA I (Wannop)	20'
5.1.2 RA II (Murata)	20'
10:50 <i>Break</i>	20'
11:10 5.1.3 RA III/IV (Machado)	20'
5.1.4 RA V (Rea)	20'
5.2 NAEDEX-APSDEU (English)	15'
5.3 Specific data exchange issues (All)	15'
12:20 <i>Lunch Break</i>	70'
13:30 <b>6. DATA DISSEMINATION AND ACCESS</b>	
6.1 Updated IGDDS strategy (Secretariat)	20'
6.2 Satellite data in the WMO Information System (Secretariat)	20'
6.3 Regional ATOVS Retransmission Services (RARS)	
6.3.1 General update and coding issues (Lafeuille)	30'
6.3.2 EUMETSAT Plans for RARS extension in Africa (Wannop)	5'
6.4 GEONETCast Components	
6.4.1 EUMETCast (Wannop)	5'
6.4.2 GEONETCast-Americas and RapidCast (Mostek)	10'
6.4.3 CMACast (Fang)	5'
6.5 Himawari-8/9 data distribution / dissemination plan (Murata)	15'
15:20 <i>Break</i>	15'



## APPENDIX III

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15:35	6.6 Product Access Guide and other WMO Online Resources (Secretariat)	15'
15:50	<b>7. DATA FORMATS AND VISUALIZATION</b>	
	7.1 Data format task group (Keogh)	20'
	7.2 Use of visualization tools: Example cases	
	7.2.1 RA I - KMD (Gitonga)	10'
	7.2.2 RA II - IMD (Goyal)	10'
	7.2.3 RA V (Rea)	10'
16:40	<b>8. SCOPE MECHANISMS</b>	
	8.1 Nowcasting (Rea)	20'
	8.1.1 Nowcasting PP2 – Volcanic ash retrieval intercomparison (Pavlonis – <i>by webex</i> )	10'
	8.1.2 Nowcasting PP2 – JMA volcanic ash testbed (Murata)	10'
	8.2 Climate Monitoring (Doutriaux-Boucher, Schulz – <i>by webex</i> )	20'
17:40	<i>Adjourn for Day 1</i>	
<b>TUESDAY, 15 APRIL 2014</b>		
		<i>Approx. Time incl. Discussion</i>
9:00	<b>9. SATELLITE APPLICATIONS</b>	
	9.1 Data impact assessments for NWP and climate	
	9.1.1 ECMWF (English)	20'
	9.1.2 UKMO (Keogh)	20'
	9.2 Ocean applications and JCOMM matters (Fellous)	20'
	9.3 Disaster response: the International Charter (Wannop)	10'
	9.4 Atmospheric composition: update of observation requirements (Secretariat (AREP/GAW))	10'
	9.5 Use of satellites in forecasting storm Phailin in Indian Ocean (Goyal)	20'
	9.6 Application of satellite data in Kenya (Gitonga)	10'
10:50	<i>Break</i>	20'
11:10	<b>10. PREPARING USERS TO NEW SATELLITES</b>	
	10.1 Preparation for Himawari-8 (Murata)	10'
	10.2 GOES-R Proving Ground (Mostek)	10'
	10.3 Preparation for FY-4A (Fang)	10'
	10.4 Preparation for MTG (Wannop)	10'
	10.5 First data from INSAT-3D (Goyal)	10'
	10.6 Other upcoming satellites 2014-2015 (Secretariat)	10'
	10.7 Satellite User Readiness Navigator portal (SATURN) (Rattenborg)	20'
12:30	<b>11. INTERNATIONAL SCIENTIFIC WORKING GROUPS (UPDATE)</b>	
	11.1 Radio Occultation (IROWG) (von Engeln; Ector; Secretariat)	15'
	11.2 Sounding (ITWG) (Bormann; Goldberg; presented by English)	15'
13:00	<i>Lunch Break</i>	60'
14:00	<b>12. ARCHITECTURE FOR CLIMATE MONITORING FROM SPACE: USER CASE STUDIES</b>	
	12.1 GFCS User Case Studies (Eckman; Gitonga)	20'
	12.2 CGMS Tiger Team on Socio-Economic Benefits of Satellites (Eckman; Secretariat)	15'
14:35	<b>13. TRAINING AND EDUCATION</b>	
	13.1 VLab Status and Plans (Gärtner)	20'
	13.2 Training on FY-3 product suite (Fang)	15'

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	13.3 Training on Meteor-M product suite (Uspensky) ( <i>unable to attend</i> )	15'
	13.4 COMET Update (Mostek)	15'
	13.5 COSPAR (Fellous)	15'
	13.6 ECMWF Course on Satellite Data Assimilation (English)	5'
16:00	<b>14. NEXT WMO SATELLITE USER SURVEY</b> (Rea)	15'
16:15	<i>Break</i>	20'
16:35	<b>15. ET-SUP COMMUNICATION PLAN</b> (Rea)	20'
16:55	<b>16. UPDATE ON FORTHCOMING EVENTS</b>	
	16.1 NOAA GOES-R User Readiness Conference (Mostek)	5'
	16.2 5 <sup>th</sup> Asia-Oceania Meteorological Satellites Users Conference (Fang)	5'
	16.3 2014 EUMETSAT Meteorological Satellite Conference (Wannop)	5'
	16.4 Climate Research and Earth Observations Symposium 2014 (Wannop)	5'
	16.5 CGMS-42 (Secretariat)	10'
	16.6 Other events (All)	10'
17:35	<b>FORMATION AND BRIEFING OF BREAK-OUT GROUPS</b>	
17:45	<i>Adjourn for Day 2</i>	
19:15	<i>Group Dinner <a href="#">Auberge de Savièse</a></i>	

**WEDNESDAY, 16 APRIL 2014**

		<i>Approx. Time incl. Discussion</i>
9:00	<b>ALL DAY : WORK IN BREAK-OUT GROUPS (7 JURA, 7 LAKE, 8 JURA)</b>	
11:45	<b>INTERIM REPORTS TO PLENARY</b>	45'
12:30	<i>Lunch Break</i>	70'
13:40	<b>ALL DAY : WORK IN BREAK-OUT GROUPS (7 JURA, 7 LAKE, 8 JURA)</b>	25'
16:30	<b>INTERIM REPORTS AND DISCUSSION IN PLENARY</b>	90'
18:00	<i>Adjourn for Day 3</i>	

**THURSDAY, 17 APRIL 2014**

9:00	<b>REPORTS OF BREAK-OUT GROUPS (Group leads)</b>	90'
10:30	<i>Break</i>	20'
10:50	<b>17. ANY OTHER BUSINESS</b>	10'
11:00	<b>18. REVIEW AND ADOPTION OF THE DRAFT REPORT</b>	90'
12:30	<i>Lunch Break</i>	60'
13:30	<b>18. REVIEW AND ADOPTION OF THE DRAFT REPORT (cont'd)</b>	60'
14:30	<b>19. DATE AND PLACE OF NEXT MEETING</b>	10'
14:40	<i>Adjourn Session</i>	

APPENDIX IV

**ACTIONS FROM ET-SUP-8 AND PREVIOUS ET-SUP MEETINGS**

ACTION	DEADLINE
Action 7.4: S. Wannop, L. Machado, A. Rea, H. Kunimatsu and X. Fang to agree on a common template for gathering requirements for data access and exchange, based on their respective practices. Deadline: 1 Dec 2013.	30 Jun 2014
Action 7.19: CMA VLab CoE to arrange for a distance lecture on the FY-3 product suite for the benefit of all Regions.	Oct-14
ACTION 8.1: X. Fang and H. Murata to facilitate the organization of a satellite user training event in association with the 5th AOMSUC, including a focus on the new generation of satellites (Himawari-8, FY-4A, GEO-KOMPSAT-2A). The CMA and KMA VLab CoEs should be involved. This is consistent with Recommendation 7.3 (ET-SUP-7).	Oct-14
ACTION 8.2: The session recommended that the AOMSUC International Conference Steering Committee discuss the possibility that India could host a future AOMSUC, and that WMO raise this item at the next session of the Committee. The Committee should also consider including a session on tropical cyclone monitoring in the next AOMSUC programme.	Oct-14
ACTION 8.3: The Coordination Group, with assistance by the Secretariat, to publicize the results of the regional survey, as a WMO publication (by 15 Jul 2014) and by communication to the 2015 NOAA Satellite Conference.	Jul-14
ACTION 8.4: WMO to present a revised vision for the IGDDS to CGMS-42.	May-14
ACTION 8.5: The RARS Implementation Group be convened to manage the transition of RARS to DRARS.	Mar-15
ACTION 8.6: Secretariat (J. Lafeuille, P. Shi) to submit a draft outline for a DRARS Guide to the upcoming CBS Ext. session in Sep 2014.	Sep-14
ACTION 8.7: S. Keogh and the ET-SUP Data Formats Task Group should further develop and expand on the high level cases presented in document ET-SUP-8/Doc.7.1.	Sep-14
ACTION 8.8: Secretariat, ET-SUP nominees (Daniele Biron, Mikael Rattenborg) and other experts as needed to engage in CGMS-WMO Task Force on Metadata Standards, by Jun 2014; and report results from this Task Force to WMO Expert Teams under the ICT-ISS (ET-MDRD, ET-DRMM), as appropriate.	Jun-14
ACTION 8.9: Secretariat to update the WMO Website on satellite tools to reflect the availability of the special version of McIDAS-V.	Jul-14
ACTION 8.10: ET-SUP chair to communicate with the JCOMM TT-SAT Chair (Joel Dorandeu, MyOcean) to understand better how the two Teams can work together for mutual benefit. This could potentially lead to a joint session with TT-SAT or some other collaborative activity.	30-Jun-14
ACTION 8.11: JMA to consider using the WMO RGB standards ( <a href="http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf">http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf</a> ) in the H-8 product suite, and to report on progress at the next session of the Team.	Mar-15
ACTION 8.12: NOAA NESDIS to consider using the WMO RGB standards ( <a href="http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf">http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf</a> ) in the GOES-R product suite, and to report on progress at the next session of the Team.	Mar-15
ACTION 8.13: CMA to consider using the WMO RGB standards ( <a href="http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf">http://www.wmo.int/pages/prog/sat/documents/RGB-WS-2012_FinalReport.pdf</a> ) in the FY-4A product suite, and to report on progress at the next session of the Team.	Mar-15
ACTION 8.14: WMO Secretariat to make available the report of the July 2013 IRS EUMETSAT workshop to ET-SUP members.	Jul-14
ACTION 8.15: Secretariat to communicate SATURN to all potential users, including at WMO Executive Council, through all Regional Requirements groups, to all WMO Members via a letter, and through appropriate publications.	Nov-14
ACTION 8.16: A. Rea, S. English to provide an initial review of SATURN, through a dedicated user account.	Jun-14
ACTION 8.17: Secretariat to circulate report on first phase of the project on developing 'Conceptual Models for the Southern Hemisphere' to ET-SUP Members.	Jul-14
ACTION 8.18: X. Fang to contact the Beijing CoE on how to organize a distant lecture on the FY-3 data and products, as per open Action 7.19, to be held in conjunction with the 5th AOMSUC.	Sep-14
ACTION 8.19: S. Keogh to explore the possibility of UKMO taking the lead in the organization of a COSPAR/VLab training event on space weather; such an event should be hosted in a developing country.	Sep-14
ACTION 8.20: Participants are to provide comments on scope, approach, format, and timing of a next WMO survey on the use of satellite data, taking into account previous ET-SUP guidance and regional user surveys.	Jul-14

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ACTION 8.21: A. Rea to prepare and circulate a draft communication plan to Team members.	31-Dec-14
ACTION 8.22: A. Rea to facilitate a region-based user survey in RA V through the TT-SUR (and its possible successor). The survey should reference the recent regional survey done in RA III/IV and should specifically target data distribution and visualization issues.	31-Dec-14
ACTION 8.23: Secretariat to present these topics and timeline to VLMG-7 for discussion.	Jul-14
ACTION 8.24: Team to develop template for case studies, and scope out the case studies to be carried out, in collaboration with Secretariat and Mark Dowell (JRC and member of JWGC).	31-May-14
ACTION 8.26: Develop and document 10-12 case studies showing the relevance of satellites for climate services	draft by mid-Nov 2014, final version by Jan 2015
ACTION 8.27: The PAG management task team to provide feedback to this demonstration version before WMO EC 2014.	31-May-14
<b>RECOMMENDATION</b>	
RECOMMENDATION 8.1: The management of CCI should consult with ET-SUP and WMO SP Office on the terms of reference of the proposed Task Team, and on its membership.	
RECOMMENDATION 8.2: The proposed CCI Task Team on satellites should provide a report to the next session of ET-SUP.	
RECOMMENDATION 8.3: In order to fully address the requirements of all WMO application areas for satellite datasets and products based on the WIGOS, the Team recommends that CBS consider making ET-SUP an Inter-Programme expert team.	
RECOMMENDATION 8.4: ET-SUP recommended that RAIDEG be formally recognized within the working structure of RA I.	
RECOMMENDATION 8.5: Co-leads of the RA II WIGOS Project to organize a meeting of the Project Coordination Group in 2014, in conjunction with the 5th AOMSUC.	
RECOMMENDATION 8.6: The session recommended that the Coordination Group be formally endorsed by the upcoming session of Regional Association III, following the endorsement by RA IV in 2013.	
RECOMMENDATION 8.7: EUMETSAT should consider the needs of non-EUMETSAT member states of Region VI in its efforts to provide satellite utilization support. These efforts should include WMO where appropriate.	
RECOMMENDATION 8.8: African partners and EUMETSAT to evaluate the possibility of funding ongoing technical and maintenance support for the four proposed African RARS stations over the lifetime of the infrastructure.	
RECOMMENDATION 8.9: African partners with support by EUMETSAT to ensure that the new stations produce a suite of derived products that address user requirements expressed through RAIDEG.	
RECOMMENDATION 8.10: RapidCast managers including NOAA to continue to work with TT-SUR in RA-V to document and respond to user requirements for data to be delivered by RapidCast.	
RECOMMENDATION 8.11: The RA II WIGOS Project Coordination Group and RA V TT-SUR should be used as a mechanism to gather user requirements for CMACast.	
RECOMMENDATION 8.12: JMA to provide information on HimawariCast to the RA V meeting to be held in Jakarta on 2-8 May 2014.	
RECOMMENDATION 8.13: ECMWF should propose a plan (including resources required) for running a community based development of their software to provide unified access to data in several formats. In addition ECMWF should fully publicise its "ecCodes" tools, documentation and training via the WMO web site along with a short-medium term roadmap of how these tools will evolve.	
RECOMMENDATION 8.14: ET-SUP members to explore in their institutions possible support for the community-based development of these ECMWF software tools.	
RECOMMENDATION 8.15: The organizing committee for the SCOPE-Nowcasting Pilot Project 2 should involve one expert from the lidar and aircraft communities, respectively, in the proposed activities.	
RECOMMENDATION 8.16: SCOPE-CM Executive Panel at its next session to discuss linkages and specific needs of operational users for interim climate data records internationally coordinated by SCOPE-CM, through extending an invitation to such users.	
RECOMMENDATION 8.17: SCOPE-CM Secretariat to identify a successor for the chair of the SCOPE-CM Executive Panel, given the resignation of the previous chair in March 2014, if possible by July 2014.	
RECOMMENDATION 8.18: WMO TCP and WWRP consider holding a second International Workshop on Satellite Analysis of Tropical Cyclones.	
RECOMMENDATION 8.19: NOAA NESDIS to consider using an extended check-out period to make GOES-R data available on a pre-	

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operational basis.	
RECOMMENDATION 8.20: NOAA NESDIS and NWS participate in the RA III session in Sep 2014 (Asuncion, Paraguay), in particular to inform on the plans for GOES-R and GEONETCast-Americas.	
RECOMMENDATION 8.21: NOAA NESDIS, in collaboration with international partners, to develop a GOES-R preparation project for users in RA III and RA IV (outside the US).	
RECOMMENDATION 8.22: T. Mostek and CIRA to facilitate organization of GOES-R related events through the VLab and dedicated user conferences, such as the 2015 NOAA Satellite Conference.	
RECOMMENDATION 8.23: EUMETSAT and CMA to closely coordinate the exploitation plans for MTG IRS and FY-4A GIIRS, given the particular challenges associated with these instruments.	
RECOMMENDATION 8.24: CGMS WG II should discuss common approaches to the exploitation of instruments on the new generation of geostationary satellites where these instruments have similar characteristics.	
RECOMMENDATION 8.25: The Team recommended that all satellite operators provide timely and relevant information to SATURN.	
RECOMMENDATION 8.26: Secretariat to add a timestamp to each posting in SATURN.	
RECOMMENDATION 8.27: ET-SUP should consider developing a guideline on what minimum set of satellite data should be considered essential, and add this as an item for the next session of the Team.	
RECOMMENDATION 8.28: The Team recommended participation by its Members and the Secretariat in the CGMS SETT.	
RECOMMENDATION 8.29: Taking note of the successful completion of the first phase of the project 'Conceptual Models for the Southern Hemisphere', the Team encouraged the conduction of a second phase (starting in autumn 2014)."	
RECOMMENDATION 8.30: The Team recommended that the proposal by ROSHYDROMET to nominate as new VLab co-chair Prof. Grigory Chichasov, Director of the WMO Regional Training Centre in the Russian Federation, and Mr Eduard Podgaiskiy from the Russian State Hydrometeorological University as his assistant be favourably considered by CGMS.	
RECOMMENDATION 8.31: The Team encouraged CMA to work with the VLab to make recordings of classroom lectures available online.	
RECOMMENDATION 8.32: WMO TCP to consider a review of the list of satellite data used in regional tropical cyclone centres to evaluate and identify any missing sources of useful data and, where needed, train centre staff in the use of new sensor data.	
RECOMMENDATION 8.33: WMO TCP to consider a review of the notification procedures between regional tropical cyclone centres and the effected NMHSs to identify potential enhancements, including the possibility to request additional information.	
RECOMMENDATION 8.34: ET-SUP could follow the activities of groups like International Charter and the new CEOS Working Group on Disasters to identify potential best practice which could be applied within the meteorological community (users and satellite operators).	
RECOMMENDATION 8.35: VLab to support recording and archiving of workshop material from COSPAR/VLab events.	
RECOMMENDATION 8.36: WMO SP to prepare a working demonstration of PAG in time for the WMO Executive Council meeting in June 2014.	
RECOMMENDATION 8.37: CGMS operators to set up stable URLs of their satellite product collections as per the Product Access Guide concept.	
RECOMMENDATION 8.38: Dissemination service operators should explore ways that one operator could disseminate regionally-relevant WMO-related products in a Region, such as in support of SCOPE-Nowcasting in RA II, on behalf of other operators.	