W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N

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COMMISSION FOR BASIC SYSTEMS

OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS

EXPERT TEAM ON SATELLITE SYSTEMS

EIGHTH SESSION

GENEVA, SWITZERLAND

28-30 May 2013

FINAL REPORT

ET-SAT-8 participants
From left to right: Zhansheng Chen, Yasushi Izumikawa, Riko Oki, Jérôme Lafeuille, Guennadi Kroupnik, Jack Kaye, Lars Peter Riishojgaard, Albrecht von Bargen, Kenneth Holmlund, Wenjian Zhang.

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 Systems (ET-SAT-8) was held from 28 to 30 May 2013 in Geneva. Among its major outcomes, the session has:

- Reviewed the Vision for the GOS in 2025 and its proposed updates, and recommended to initiate efforts towards developing a new Vision for submission to the next regular session of the CBS, in order to take into account new technological opportunities, emerging national capabilities, and the outcome of the most recent impact studies.

- Reviewed the "Observing System Capabilities Analysis and Review Tool" (OSCAR). It confirmed the relevance of this tool to support the WIGOS Rolling Requirements Review (RRR) process, to facilitate coordination of the space-based observing system, and to inform satellite users. The meeting approved the plans for further development of this tool and the draft procedure to control the updating process. Noting some overlap between the contents of OSCAR and of the Committee on Earth Observation Satellites (CEOS) MIM database, it recommended to coordinate efforts with CEOS in order to take advantage of the complementary features of these tools while ensuring that agencies are not solicited twice to provide similar information

- Investigated the issues to be addressed for the development of the Architecture for Climate Monitoring from Space, in particular for the definition of the physical view of this architecture. It emphasized the requirement for continuity of climate observations, which entails not only avoiding gaps between consecutive measurement series but also ensuring compatibility between these series, which may be a challenge with the evolution of measurement technology. It recommended to extend the inventors of Essential Climate Variables to

- Initiated a review and update of the planned capabilities against the reference observation strategy, as defined in the updated Manual on the GOS, and agreed on a roadmap to complete this review. It noted the gaps and risks highlighted by the Resolution on Avoiding Gaps in Essential Space-based Observations adopted by the 65th Executive Council.

- Considered the proposed new volume of the Guide on Instrument and Methods of Observation (CIMO Guide) dedicated to satellite observation, and found that this document was a very substantial material of great relevance for satellite actual or potential users. It provided guidance on the points raised by the external and internal reviews of this document and recommended to submit this document to the CIMO editorial board once these points will be addressed.

FINAL REPORT

1. OPENING OF THE MEETING

1.1 Introduction

The eighth session of the Expert Team on Satellite Systems (ET-SAT-8) opened at 9h00 on Tuesday, 28 May 2013, in the WMO Headquarters in Geneva, Switzerland. The ET-SAT Chairman, J. Kaye, welcomed the participants (See Annex 1). The Director of the Observing and Information Systems department, W. Zhang, also welcomed the participants on behalf of the Secretary-General.

1.2 Adoption of the agenda

The Chairman introduced the agenda (Annex 2) and the main objectives of the session:

- To initiate actions regarding the physical definition and implementation of the architecture for climate monitoring from space;
- To provide updates on the satellite programmes and plans of the participating agencies and interact with the Expert Team on Satellite Utilization and Products (ET-SUP) on satellite utilization matters related to these programmes;
- To provide guidance on the development of the space-based capability component of the Observing System Capability Analysis and Review (OSCAR) tool;
- To analyze potential gaps in the space-based observing system as an input to forthcoming discussions of the Coordination Group for Meteorological Satellites (CGMS);
- To review and propose updates, if relevant, to space-based aspects of the Vision of WIGOS in 2025.

1.3 Chairman's statement

The Chairman welcomed the members of the team. He expressed his appreciation to serve as chair of ET-SAT and valued the opportunity of working with all its members and to learn more about the many valuable activities and programs of WMO, as well as WMO co-sponsored programs, and to hold a joint session with ET-SUP during the meeting time frame. As an introduction to the discussion, shared the following views:

a) We should all be pleased about how much we are accomplishing in terms of satellite observations of the Earth system, but we can't be complacent, especially as we look to the longer term, since the changes in the Earth require that collectively we be able to provide sustained observations that will enable the creation and evolution of the multi-instrument/multi-platform data sets so important to documenting Earth system evolution. We should assure users that, indeed, we are looking at Earth system evolution and NOT "observing system evolution";

b) Activities over the last year and those planned for the next year will continue to be helpful. The launch of Landsat Data Continuity Mission (LDCM) last February is a great step forward. Our Earth Observation community also recently welcomed the launches of Pléiades by CNES, HY-1C by China, SARAL by ISRO and CNES. The successful operation of the United States Suomi-NPP satellite, and the plans laid out by the U.S. for sustained land imaging and climate sensors help us look forward, although much remains to be worked out in terms of details;

c) While many issues are important and must be addressed, issues of data sharing and calibration/validation are critical to what we do. We should all continue to look to these

aspects of our respective programs and, to the maximum extent possible, enable integrated, international efforts in these areas to go forward;

d) We need to work to take advantage of the multiple entities that serve to coordinate among our respective programs in satellite observations and the utilization of data. We should be sure to establish and maintain clear goals for each so that there is no unintended duplication or confusion among our respective sponsors about these efforts;

e) In particular, I'd like to express my enthusiastic support for the activities of the WMO Polar Space Task Group. The ability of multiple entities to come together to try to facilitate the availability of satellite data is critical as we study this very important and rapidly changing part of the world for which space data are critical because of the limited availability of surface-based data;

f) Given the pressures that many of us are facing in terms of travel, we need to think hard about how we can best make entities such as ET-SAT work. We may find that the schedule of meetings and extent of participation that we've had in the past will no longer be viable. It's great that so many people are here for this meeting, and while I'm confident that we will all do what we can, we may well find that our need to rely on virtual meetings, technologically-provided solutions like WebEx, and other less-than-ideal arrangements will increase;

g) We all need to track the evolution of the international research programs in Earth system science – the creation of Future Earth from the previous Earth System Science Partnership (ESSP) programs (with the World Climate Research Programme (WCRP) maintaining its independence while interacting with Future Earth) provides a particular example of the dynamic external environment in which we all work;

h) We continue to emphasize the important role that WMO plays in environmental observations, and very much value the ability of ET-SAT to both provide guidance to and receive guidance from the WMO and its internal structure. In doing this, we also really appreciate the efforts of the WMO staff that serves to keep things running on a regular basis and makes meetings like this not only productive but worthwhile. In particular, we thank Jérôme Lafeuille for his many efforts on our behalf.

1.4 Terms of reference and preliminary work plan

J. Lafeuille briefed the participants on the role of ET-SAT within WMO and with respect to other satellite coordination groups such as the Coordination group for Meteorological Satellites (CGMS) and the Committee on Earth Observation satellites (CEOS). He introduced the Terms of Reference agreed by the Commission for Basic Systems (CBS) and the draft work plan for the 2013-2014 biennium defined by the CBS Management Group. This draft work plan was taken as a starting point and will be updated as appropriate after the meeting in the light of the deliberations of the team.

1.5 Guidance from OPAG IOS Chair

The chair of the CBS Open Programme Area Group on Integrated Observing Systems (OPAG-IOS) Lars Peter Riishojgaard, summarized the expectations of the CBS for the team, emphasizing in particular the contribution of space-based observation to the WMO Integrated Global Observing System (WIGOS), the Rolling Requirements Review (RRR) process materialized in OSCAR and the Vision of observing systems, which is evolving in the light of regular observation impact studies. The 5th Workshop on Impact of Observing Systems, held in Sedona, USA in May 2012, provided significant updates in this respect.

2. OUTCOME OF WMO AND OTHER MEETINGS OF RELEVANCE TO ET-SAT

J. Lafeuille summarized the outcome of major meetings of direct relevance to ET-SAT held over the past year:

- The seventh session of ET-SAT and the actions initiated by that session,
- The fifteenth session of CBS (CBS-15),
- The 40th meeting of CGMS,
- The 65th session of the WMO Executive Council (EC-65),
- The WMO Integrated Global Observing System (WIGOS) Inter-Commission Coordination Group (ICG) and task teams, including the Task Team on Regulatory Material (TT-RM) and the development of the WIGOS manual using the outcome of ET-SAT-7.

The team was pleased to note that all the conclusions of previous deliberations of ET-SAT had been followed up by the CBS and the EC and resulted in resolutions and recommendations adopted by WMO Members.

The Chair reported on the outcome of CEOS Strategic Implementation Team (SIT) and the evolution of CEOS constellations, and the team discussed the role of ET-SAT vis a vis CGMS and CEOS.
The meeting then reviewed the actions that were outstanding after the seventh meeting and noted that most of them had been successfully completed as indicated in the table in Annex 3. The team noted that the update of the satellite chapter of the "Manual on the Global Observing System " had been adopted by EC-65 but will be restructured to become part of the new "Manual on WIGOS". ET-SAT will be consulted by the WIGOS TT-RM before finalizing this new document. All previous actions were formally closed, some of them being pursued as a new action from ET-SAT 8 as indicated below:

Action ET-SAT 8.01: The Secretariat to invite all the R&D agencies contributing to the GOS to attend ET-SAT as observer if not member, and report on their plans, in particular as concerns near-real time data accessibility from their R&D missions of particular relevance for operational users.	ET-SAT-9
Action ET-SAT 8.02: The Secretariat to circulate to ET-SAT for review the draft satellite chapter of the future Manual on WIGOS, for review, once the structure of this Manual is stabilized.	31/01/2014 (subject to TT-RM outcome)

3. VISION OF SPACE-BASED OBSERVATION IN 2025

The Secretariat and the Chair OPAG-IOS recalled the Vision for WIGOS in 2025, adopted by the CBS in 2009. The meeting acknowledged that such a Vision, which is intended to be forward looking but achievable, provided a useful reference to guide the high-level planning of individual agencies.

ET-SAT emphasized the need to clarify the understanding of "operational" versus "R&D" systems. Operational implies a commitment to provide a service responding to the requirements of a user community; in the WMO context this implies continuity and data availability. However the detailed requirements for continuity and availability may depend on the applications and the products. For example, NWP is requiring timeliness and 24/7 continuity, while climate monitoring has more stringent requirements for long-term stability and traceability. R&D systems are increasingly used in support of operational applications, including e.g. in NWP, although without the same long-term commitment as "operational" systems. ET-SAT underlined that continuity is not only a feature of individual missions but results of the robustness of the overall system

The session noted the currently proposed updates to the space-based observation part of the Vision, and agreed that it should be kept under review. It recommended initiating efforts towards developing a new Vision for submission to the next regular session of the CBS, in order to take into account new technological opportunities, emerging national capabilities, the outcome of the most recent impact studies and to adopt a longer time horizon e.g. 2040.

Action ET-SAT 8.03: The WMO Secretariat to forward to IWWG the recommendation to investigate the impact of the longitude separation between adjacent geostationary satellites over the Pacific for wind field derivation, noting that with current plans the requirement for no more than 70 degrees separation cannot be satisfied over that area.	30/11/2013
Action ET-SAT 8.04: The OPAG IOS Chair to recommend to the CBS, at its Extraordinary Session 2014, that an update of the Vision is developed for submission to CBS-16, tentatively looking towards 2040.	31/01/2014 (to inform CBS Management Group)

4. OBSERVING SYSTEM CAPABILITY ANALYSIS AND REVIEW TOOL (OSCAR)

The session was introduced to the Observing System Capabilities Analysis and Review Tool "OSCAR" (www.wmo.int/oscar) and in particular its "Space-based capability" component, that was made openly available online as recommended by ET-SAT-7.

ET-SAT confirmed the relevance of this tool to support the WIGOS RRR process, to facilitate coordination of the space-based observing system, and to inform satellite users. The participants expressed support to the plans for further development of this tool. They confirmed the importance of managing the quality of this resource and therefore supported the proposed procedure to control the updating process (See ET-SAT-8/Doc 4).

ET-SAT noted some overlap between the contents of OSCAR and of the CEOS Missions, Instruments and Measurements (MIM) database, while recognizing that WMO needed to compile information and assessments of space-based and surface-based observation capabilities together with the observation requirements, to support the WIGOS RRR and evolution processes. It therefore recommended coordinating efforts with CEOS in order to ensure that agencies are not solicited twice to provide similar information.

Action ET-SAT 8.05: The Secretariat will investigate a mechanism or tool to facilitate provision of inputs and of feedback on the database contents, preferably coordinated with the call for updates from CEOS, while ensuring that agencies are not solicited twice to provide similar information,	31/12/2013
Action ET-SAT 8.06: The Chair will open the dialogue with CEOS System Engineering Office (SEO) to evaluate the potential for collaboration among OSCAR and CEOS MIM, with a view to minimize overall efforts and maximize the benefits of maintaining these complementary tools, and to report to WMO and to the CEOS plenary.	31/10/2013
Action ET-SAT 8.07: The Secretariat to implement the procedure for controlling the OSCAR updating process	31/10/2013
Action ET-SAT 8.08: Each ET-SAT member to check the information in OSCAR regarding the missions under responsibility of his/her respective agency : new missions, change of status (approval, launch, cancellation, termination), schedule, payload content, etc.	31/10/2013

5. ARCHITECTURE FOR CLIMATE MONITORING FROM SPACE

In May 2011, the WMO Congress adopted Resolution 19 (Cg-16) on the Architecture for Climate Monitoring from Space. The "Strategy Towards an Architecture for Climate Monitoring from Space" drafted in 2012 by an ad-hoc team of CEOS, CGMS and WMO Secretariat representatives has now been published by ESA. The possible organization of future efforts in this area were discussed at CGMS-40 (Nov 2012), at CEOS/SIT-28 (March 2013) and within WMO ICG-WIGOS (March 2013). The ET-SAT meeting was briefed on the outcome of discussions held during the Space and Climate Week (Geneva, 18-22 Feb 2013) within the Architecture ad-hoc team and the CEOS Working Group on Climate.

ET-SAT noted the progress of the conceptual definition of the Architecture and supported the proposal to combine: (i) the architecture development team, (ii) the WMO and CGMS activities in support of the architecture, and (iii) the CEOS Working Group on Climate.

The session investigated the issues to be addressed for the development of the Architecture, in particular for the definition of its physical view, and made the following points:

- The inventory of Essential Climate Variables (ECV) products is an important step, however it mainly addresses records from current or past missions, although the architecture is expected to be forward looking to provide guidance for actions, especially as concerns space segment design and planning that require a long lead time of 1 or 2 decades.

- The coordination function exerted by CGMS on satellite plans, e.g. through adopting and monitoring the implementation of the "baseline", is considered as a possibly important building block of a future architecture, like e.g. the CEOS Virtual constellations and working groups. The session therefore investigated how such mechanisms could be accounted for in the process to develop the physical view of the architecture.

- The mapping of missions to the CGMS baseline shows that most missions have a potential to support ECV product generation provided that all the steps identified in the logical architecture are addressed (e.g. calibration, dataset preservation, algorithm validation, etc)

- There is value in registering not only the ECV product datasets, i.e. Thematic Climate Data Records (TCDRs) but also the Fundamental Climate Data Records (FCDRs), which are in principle excluded from the ECV inventory. Indeed, some FCDRs can support several TCDRs (e.g. "Microwave radiances", etc). A minor extension of the ECV product inventory is thus suggested in this respect.

- It is clear, however, that the very broad definition of the mission categories in the CGMS baseline is not sufficient to characterize their ability to support ECV product generation. This requires a categorization based on more precise criteria as illustrated with the examples below.

CGMS Baseline categories	*Relevant sub-set*	*ECV*
Geostationary Advanced VIS/IR imagery (16 channels, etc)	*Split-window IR imager*	*SST*
	WV channel	*Water Vapour (UTH)*
LEO MW imagery, some polarimetric	*Low Frequency imager 5-10 GHz*	*Sea Surface Temperature*
	Full polarisation MW imagery	*Wind speed and direction (ocean surface wind)*

- Particular consideration should be given to long-term continuity. This is not only a matter of avoiding gaps between consecutive missions needed to support the ECVs, but also ensuring that the measurements (FCDRs) from these missions are comparable with each other to enable the generation of consistent TCDRs. The session recognized that a balance should be reached between continuity and progress: as technology evolves and progresses, we cannot aim at maintaining identical measurements, however effort should be made to achieve compatibility with earlier FCDR.

- ET-SAT therefore recommended that when designing a new mission that has the potential to support ECV generation, attention is paid in the design phase already to analyze compatibility with FCDRs provided by relevant heritage instruments.

Action ET-SAT 8.09: The Secretariat to report to the Architecture team and to the forthcoming CGMS-41 session the findings of ET-SAT-8 discussion on Architecture for Climate Monitoring from Space	31/07/2013

6. SATELLITE PROGRAMME UPDATES FROM PARTICIPATING AGENCIES

In a joint session with the Expert Team on Satellite Utilization and Products (ET-SUP), the members of ET-SAT presented an update on the status and plans of their respective agencies, focusing on highlights and milestones of recent programme development, new upcoming capabilities, and data access details. A summary of these presentations follows:

Zhansheng Chen (China National Space Administration / Shanghai Academy of Spaceflight Technology) outlined plans for China's polar orbiting and geostationary meteorological satellites. The presentation highlighted the planned 2015 launch of FY-4A which will feature an advanced imager, infrared sounder and lightning mapper. Plans for a FY-4 microwave mission, currently scheduled for 2020 were also outlined. Several application areas for geostationary imagery and derived products were demonstrated. Z. Chen also detailed the plans for the FY-3 series of polar orbiting satellites, the planned launch of FY-3C in October 2013 and future plans for a FY-3 rainfall monitoring mission in 2017, pending programme approval.

Guennadi Kroupnik (Canadian Space Agency) provided an overview of current and planned Canadian satellites, in particular the Radarsat Constellation mission and the Polar Communications and Weather (PCW) mission. The PCW mission has completed Phase A, with an accompanying business case and evaluation of socio-economic benefits. This evaluation, performed by EuroConsult, will be shared openly in the last quarter of 2013. The details of the payload for PCW have not yet been decided, but it will provide imagery with a refresh cycle of 15 minutes above 50°N. The RCM data policy is being negotiated with the industrial partner but should ensure global SAR data are available as much as possible. G.Kroupnik also provided details of the Chemistry and Aerosol Sounding Mission (CASS), which has been developed in direct response to GCOS/CEOS actions. The mission is seeking international partnerships.

Action ET-SAT 8.10: CSA (Guennadi Kroupnik) to share the evaluation of socio-economic benefits of the PCW mission.	30/11/2013

Kenneth Holmlund (EUMETSAT) provided an update on plans for the Meteosat and Metop series of satellites. It was noted that Indian Ocean Data Coverage is not guaranteed beyond 2016. Mr Holmlund also provided an update on the Antarctic Data Acquisition initiative for Metop and noted that average timeliness of the global data has been significantly reduced.

The continuation of the tandem Metop operations was discussed and highlighted benefits for NWP (dual sounders), ozone, and the generation of global Atmospheric Motion Vectors (AMVs.)

Action ET-SAT 8.11: EUMETSAT (Ken Holmlund) to provide an update on the Antarctic Data Acquisition initiative at the next session of ET-SUP regarding timeliness of data delivery and further development of the service. *(Noted by ET-SUP as Recommendation 7.11)*	30/04/2014

Yashushi Izumikawa (Japan Meteorological Agency) updated the meeting on plans for Himawari-8 and -9, with Himawari-8 scheduled for launch in 2014 and operations in 2015. Himawari-8 will feature an imager very similar to the GOES Advanced Baseline Imager. A 2-day training event on Regional readiness, to be held in conjunction with the 4th Asia/Oceania Meteorological Satellite Users' Conference (9-11 October 2013), was also discussed.

Albrecht von Bargen (Deutsches Zentrum für Luft- und Raumfahrt DLR) provided an update on the German space programme, including TerraSAR-X and TanDEM-X, and the planned EnMap and Merlin missions.

Jack Kaye (NASA) provided an update on NASA mission planning. Support for ground validation networks and airborne campaigns were also highlighted as critical activities. The Cyclone Global Navigation Satellite System (CYGNSS) constellation of 8 microsatellites will support tropical cyclone understanding and monitoring. The TEMPO geostationary atmospheric composition mission was outlined – it is awaiting an opportunity to be installed as a mission of opportunity on a commercial satellite.

Riko Oki (JAXA) described the Japan Space Basic Plan 2013-2017 which addresses the following priorities: national security and disaster management, development of industry and space science frontier. A key focus is ensuring autonomy in Earth observation data. Two major missions are being prepared for launch: ALOS-2, with a wide swath high resolution L-Band SAR, and the GPM core observatory, with the Ku/Ka Dual-frequency Precipitation Radar, which will be launched early 2014. Standard products and research products from JAXA spacecraft were described, and Ms Oki provided a number of data access weblinks. An example for application of satellite data in flood forecasting and warning was given. Access to GCOM-W1 data via EUMETCast will be progressed through a EUMETSAT/JAXA bilateral this Summer.

On behalf of Sid Boukabara (NOAA), Lars-Peter Riishojgaard presented an update on NOAA satellites status and plans. Slides on the significant impact of satellites on forecasting skill were shown. It was noted that operations for GOES-R are scheduled to commence in 2017. L.P. Riishojgaard noted that JPSS-1 is scheduled for a mid-2017 launch and that there could be a data gap if Suomi-NPP does not last beyond its design life of 5 years. It was also noted that the Defense equivalent of JPSS, DWSS, has been cancelled and current plans are to continue operations with DMSP until 2025. However, DMSP has no infrared sounder, and atmospheric sounding is not a core requirement for DMSP. The current plans for COSMIC-2 were also discussed, noting the agreement between the USA and Taiwan, China to implement this programme. Operations of the low-inclination orbit satellite fleet are scheduled to commence in 2016 and the high-inclination ones in 2018. Processing for COSMIC-2 will be handled by UCAR. The current COSMIC constellation is down to 3-4 operational satellites, from an original constellation of six.

On behalf of Dohyeong Kim (KMA), J. Lafeuille presented the satellite status and plans of KMA. COMS now takes an extended Northern Hemisphere observation every 15 minutes. Some research into integration of COMS data and ground observations for nowcasting (COMS and AWS, COMS and radar) was shown. KMA plan to operate Geo-KOMPSAT-2A

with an Advanced Meteorological Imager (AMI) similar to ABI and a space weather sensor, in 2017. The satellite design life time would be 10 years. Geo-KOMPSAT-2B with an Ocean and Environment sensor would be launched in 2019. KMA also has plans for a LEO satellite, aiming at a launch in 2020.

7. ATMOSPHERIC COMPOSITION REQUIREMENTS AND SPACE CAPABILITIES

In a joint session with ET-SUP, R. Eckman gave a briefing on the CEOS Atmospheric Composition Constellation (ACC), one of seven virtual constellations that assemble a set of space and ground segment capabilities operating together in a coordinated manner to meet a combined and common set of Earth observation requirements. The goal of the ACC is to collect and deliver data to develop and improve predictive capabilities for changes in the ozone layer, air quality, and climate forcing associated with changes in atmospheric composition.

ACC addresses the following elements:

(i) Develop a consensus for priorities based on emerging societal needs and established user requirements from both operational and research communities;
(ii) Determine if there are inconsistencies or deficiencies among the various requirements and reconcile differences if necessary;
(iii) Evaluate existing and upcoming missions, both operational and research, and compare with requirements;
(iv) Define enhancement in the area of calibration/validation, quality control, and data accessibility and interoperability;
(v) Establish how existing and approved missions could work synergistically to meet the international user community requirements and in particular the GEOSS societal benefit areas; and
(vi) Develop rationale and strategy for new mission(s) to meet existing requirements not being met and for possible new requirements.

Some of the known issues facing the atmospheric sciences applications communities for remotely sensed measurements include:

(i) Continuity of trace gas stratospheric measurements involved in ozone chemistry. These are needed to better understand trends and to quantify the effectiveness of the Montreal protocol;
(ii) Accurate and continued monitoring in the upper troposphere/lower stratosphere, with high vertical resolution, for climate research and applications;
(iii) Improved accuracy and coverage of radiatively active gases and aerosols in the boundary layer needed for surface flux assessment and aerosol/cloud formation. These remain the largest uncertainties in climate forcing;
(iv) Short- and long-term temporal and spatial variation measurements of radiatively and chemically active trace gases and aerosols to determine their impact on air quality for improved inventories, predictions, and assessments;
(v) Tracking trans-continental and trans-oceanic transport of tropospheric pollutants and their precursors; and
(vi) Interoperability of atmospheric composition data across existing and planned missions.

In 2008, ACC held a workshop to review atmospheric chemistry and climate model requirements, assess space-based measurement gaps, and deliver a set of prioritized recommendations for future atmospheric composition missions. After five years, many of its recommendations remain relevant and useful for consideration by the community. Subsequent meetings addressed the coordination of a future Air Quality constellation based on geostationary satellites planned and in development by Korea (GEMS), ESA (Sentinel-4), NASA (GEO-CAPE and TEMPO), and Japan (GMAP-Asia). The missions would be planned

to take advantage of their synergistic capabilities. Cost efficiencies might be achieved if there are common instrument requirements.
Coordinated algorithm development, data content and format, and calibration/validation were planned. A community-developed white paper was delivered to the CEOS SIT in 2010 (http://ceos.org/images/ACC/AC_Geo_Position_Paper_v4.pdf). The near-term recommendations of this paper are being implemented by ACC and the relevant mission science teams.

R. Eckman indicated he would welcome any involvement in an update of internationally-coordinated, community-based observation requirements for atmospheric composition, such as given by the 2005 IGACO report. He also confirmed that care must be applied in interpreting instrument gap analyses, noting the difference between specialized instruments (built for the purpose of measuring a particular variable) and secondary instruments (useable for measuring a particular variable, but not designed specifically for that purpose). J. Lafeuille recalled that the atmospheric composition segment of the WMO Vision for WIGOS in 2025 was still very preliminary, and the session agreed that it would be useful to elaborate it further based on updated requirements and expected technology.

Jack Kaye noted that the community should not lose focus on the value of in situ observations and highlighted the deployment of ozone sondes as an essential complement to satellite missions, and in some ways preferable to additional, lower-quality, satellite-based ozone sensors.

It was noted that within the Global Monitoring of Environment and Security (GMES, renamed Copernicus) programme of the European Union, EUMETSAT was leading the Partnership for User Requirements Evaluation (PURE) project. PURE is investigating the translation of service-driven requirements into data requirements, which is of potential interest to showing the linkage of GFCS to satellites and Architecture for Climate Monitoring from Space (Item 5).

8. SATELLITE UTILIZATION MATTERS

Preliminary outcome of ET-SUP discussions

In a joint ET-SAT/ET-SUP session, the ET-SUP Chair Anthony Rea provided an overview of ET-SUP. He recalled the mandate of ET-SUP and its work plan, and outlined its membership and coverage of a broad spectrum of application areas. He summarized the course of discussions held earlier in the week and outlined a number of issues that the ET-SUP members had wished to raise with agency representatives on ET-SUP.

The work of the break-out groups was described with preliminary results in the areas of SCOPE-Nowcasting, data format harmonization, and case study analysis in GFCS priority areas.

For SCOPE-Nowcasting, A. Rea went into some detail on the criteria that nowcasting products should fulfill, such as multi-satellite origin, sufficient documentation, adequate training, rapid delivery. The guidance of ET-SAT was sought on whether stringent requirements should be specified for the SCOPE-Nowcasting products. In response to a question on whether SCOPE-Nowcasting should take a more forward-looking view on the future of nowcasting products (such as their delivery in combination with model outputs, or as level 1 datasets, for example), A. Rea indicated that SCOPE-Nowcasting was focused on areas where the science was already mature. The broad categories for SCOPE–Nowcasting products were outlined and ET-SAT members suggested that a clear requirement for products needed to be established.

Regarding simplification of data formats, he reported on early ET-SUP considerations of criteria that data formats should meet.

W. Zhang mentioned the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) Task Team on the WIGOS Metadata, working on the development of common metadata for all WIGOS observations. Since this Task Team currently does not have a satellite community representative, focal points from ET-SUP (and ET-SAT) should follow its discussions.

CIMO Guide update

The Secretariat reported on the draft new volume of the Guide on Instrument and Methods of Observation (CIMO Guide) dedicated to satellite observation. He requested guidance on remaining open issues. ET-SAT found that this document was very substantial and of great relevance for actual or potential satellite users.

Regarding terminology, ET-SAT acknowledged that there was no precise, universally agreed definition of the "Field of View" and that, as far as possible, this concept should be further qualified in the text. It noted the points raised by the external and internal reviews of this document and recommended to submit this document to the CIMO Guide editorial board once these points will be resolved.

Action ET-SAT 8.12: The Secretariat to address, with the authors, the points raised by the reviewers with a view to submit a revised version to the CIMO Editorial Board by Fall 2013.	15/08/2013
Action ET-SAT 8.13: The Secretariat to inform CGMS of the preparation of the CIMO Guide on satellite observation, and invite feedback	31/07/2013
Action ET-SAT 8.14: ET-SAT members to inform their agencies of the upcoming opportunity to provide feedback, during the public review phase, on the draft CIMO Guide on satellite observation	30/11/2013

9. SHORT- AND LONG-TERM GAP ANALYSIS

A major task of ET-SAT is to advise the CBS on the status of space-based subsystem of WIGOS and the adequacy of implementation plans to fulfil the requirements of WMO programmes. Previous ET-SAT reviews have led to CBS Recommendation 4 (CBS-15) and to a draft resolution submitted to the forthcoming Executive Council (See EC-65 Doc. 4.4(4)). The outcome of previous ET-SAT meetings has also informed the CGMS Working Group on Operational Continuity and Contingency Planning.

The session initiated a review and update of the planned capabilities against the reference observation strategy (derived from the Vision for the GOS in 2025), and agreed on a roadmap to complete this review. Each ET-SAT member will review the "Evaluation" statements in the "Capability review" pages of the OSCAR database and provide feedback. (Note: missions aboard the ISS are not properly recorded. OSCAR will be modified to allow recording such missions, e.g. CATS, SAGE-III, OCO-3, Rapidscat, LIS) .

ET-SAT noted the space-related actions in the Implementation Plan for Evolution of Global Observing Systems (EGOS-IP). It noted the gaps and risks highlighted by Draft Resolution 4.4.3 of the 65th Executive Council and suggested mitigation actions for consideration by CGMS-41.

It was clarified that ET-SAT members were primarily expected to provide technical input and, for instance, should check the technical consistency of the actions identified in the IP and provide feedback based on their expertise and their understanding of technological trends. In

addition, ET-SAT members being fully aware of the programmatic status of the missions of their respective agencies, they are in a very good position to inform WMO on the progress achieved on actions these programmes contribute to.

Action ET-SAT 8.15: Each ET-SAT member to review the "evaluation" part of the "Capability review" in OSCAR for the climate/weather/water applications (i.e. ignoring Space Weather for the time being), in particular for the capabilities corresponding to his/her field of expertise. If necessary, communicate to the Secretariat (J. Lafeuille) missions that are either missing or not properly recorded	31/10/2013
Action ET-SAT 8.16: The Secretariat to update OSCAR data model in order to dissociate the availability of a payload and the in-orbit availability of the platform (e.g. for missions aboard ISS)	30/11/2013
Action ET-SAT 8.17: The Secretariat to circulate the EGOS-IP with draft comments on each action, for review by ET-SAT members	31/10/2013
Action ET-SAT 8.18: ET-SAT members to review the comments on space-related actions of the Implementation Plan for Evolution of Global Observing Systems (EGOS-IP).	30/11/2013

10. GLOBAL SPACE-BASED INTER-CALIBRATION SYSTEM (GSICS)

Tim Hewison, Chair of the GSICS Research Working Group (GRWG), gave (remotely) an update on the Global Space-based Inter-Calibration System (GSICS) and the outcome of its last Joint Working Group meeting held in March 2013.

Action ET-SAT 8.19: NASA (J.A. Kaye) to inform Tim Hewison (tim.hewison@eumetsat.int) of the Satellite Calibration Interconsistency Studies ROSES Element	Completed on 30 May 2013

11. REPORT ON SPACE WEATHER ACTIVITIES

J. Lafeuille introduced ET-SAT to the activities of the Inter-Programme Coordination Team on Space Weather (ICTSW). W. Zhang, emphasized that space weather was gaining in maturity, with several centres in the world reaching an operational status for space weather monitoring and warning delivery. Several branches of WMO are potentially impacted, including: the space-based observation system, the telecommunication system, the delivery of service to aviation and to the energy sector, and climate processes.

A Memorandum of Understanding is being prepared with the International Space Environment Service (ISES), which is affiliated to International Council for Science (ICSU), in order to formalize the strong collaboration between ISES and WMO. W. Zhang pointed out the rapid development and significant achievements of ICTSW supported by the Space Programme office but stressed that human resources needed to be seconded by WMO Members to the Secretariat in order to support this activity in a more sustainable way, and provide the Members with the full benefit of international coordination.

Action ET-SAT 8.20: ET-SAT Members to ensure that the relevant sections of their respective agencies are aware of ICTSW and consider participation, if interested.	31/10/2013

Action ET-SAT 8.21: ET-SAT Members to indicate to the Secretariat a point of contact for providing details on the Space Weather space-based missions (for OSCAR)	31/10/2013
Action ET-SAT 8.22: ET-SAT members to investigate the possibility of providing support to space weather coordination within the Secretariat.	15/11/2013

12. RADIO-FREQUENCY SPECTRUM MANAGEMENT ISSUES

David Thomas informed ET-SAT on the on-going activities of the WMO Steering Group on Radio-Frequency Coordination (SG-RFC) and the main issues of relevance to Earth Observation Satellites in the preparation for the next World Radio Conference (WRC-15).

Action ET-SAT 8.23: ET-SAT members to communicate the preliminary WMO position on WRC-15 to the appropriate persons of their agencies and provide feedback if appropriate	31/10/2013

13. ANY OTHER BUSINESS

No other business was raised.

14. DATE , PLACE AND AGENDA OF NEXT MEETING

The session agreed that future meeting dates shall be scheduled taking into account:
- Reasonable time separation from CGMS plenary meetings
- Outcome to be provided in advance of CBS Extraordinary session (Sept 2014)
- Desirable collocation with ET-SUP
- Recommended web meetings in the inter-session period to advance the actions.

Action ET-SAT 8.24: The Secretariat, in consultation with the Chair, to propose new meeting dates (tentatively early 2014).	31/10/2013

15. SUMMARY OF ACTIONS AND CONCLUSIONS

The outline of the report, including the agreed list of actions and other major conclusions was reviewed and adopted, subject to finalization after the meeting (See Annex 4). The main outcome of the meeting will be reported to the CBS by the OPAG IOS Chair.

The meeting was closed at 16h30 on Thursday 30 May 2013.

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AGENDA

1. OPENING OF THE MEETING

- Welcome and introduction of participants
- Approval of agenda and working arrangements
- Chairman's statement
- ET-SAT Terms of Reference and preliminary work plan
- Guidance from OPAG IOS Chair

2. OUTCOME OF WMO AND OTHER MEETINGS OF RELEVANCE TO ET-SAT

- ET-SAT-7
- CBS-15
- CGMS-40
- WIGOS ICG and Task Teams (including Task Team on Regulatory Material)

3. VISION OF SPACE-BASED OBSERVATION IN 2025

- Status of the Vision for WIGOS in 2025
- Review of proposed updates

4. OBSERVING SYSTEM CAPABILITY ANALYSIS AND REVIEW TOOL (OSCAR)

- Introduction to OSCAR, updating procedure and future developments
- Guidance from ET-SAT-8

5. ARCHITECTURE FOR CLIMATE MONITORING FROM SPACE

- Outcome of the "Space and Climate Week"
- Contribution to the physical view of the architecture

6. SATELLITE PROGRAMME UPDATES FROM PARTICIPATING AGENCIES

7. ATMOSPHERIC COMPOSITION REQUIREMENTS AND SPACE CAPABILITIES

8. SATELLITE UTILIZATION MATTERS

- Observation Requirements Database
- ET-SUP report (including: 2012 WMO Survey on Satellite Data Use, data access issues, Product Access Guide)
- Draft CIMO Guide on Satellite Observation

9. SHORT- AND LONG-TERM GAP ANALYSIS

- Continuity of core operational missions
- Other essential missions for weather and climate
- Discussion on gaps, risks and mitigation actions

10. GLOBAL SPACE-BASED INTER-CALIBRATION SYSTEM (GSICS)

11. REPORT ON SPACE WEATHER ACTIVITIES

12. RADIO-FREQUENCY SPECTRUM MANAGEMENT ISSUES

13. ANY OTHER BUSINESS

14. DATE , PLACE AND AGENDA OF NEXT MEETING

15. SUMMARY OF ACTIONS AND CONCLUSIONS

ACTIONS FROM ET-SAT-7 CLOSED AT ET-SAT-8

Action	Due Date	Status
Action ET-SAT 7.01: WMO Secretariat to send a letter to the European Commission expressing the interest of the WMO community for GMES missions and the wish that GMES data (in particular from Sentinel 3, 4, 5) will be openly and freely accessible in order to maximize the benefit from these missions that are important European contributions to climate monitoring and applications.	30 June 2012	Action closed. There are strong expectations that the Copernicus (GMES) data policy will be open, as already supported by ESA
Action ET-SAT 7.02: Members to review and update the list of web links to data access information and pre-processing software package which is contained in ET-SAT/Inf.4 and provide feedback to the WMO Secretariat (Stephan Bojinski: SBojinski@wmo.int)	30 June 2012	COMPLETED. Information is on line (data access and tools)
Action ET-SAT 7.03: WMO Secretariat to send a letter to R&D space agencies not represented at ET-SAT-7 in order to express the interest of WMO for R&D missions of particular relevance for operational users, and to seek update on the plans for near-real time data accessibility.	30 June 2012	Action closed, noting the broader representation of R&D agencies in ET-SAT. It is furthermore agreed that all the agencies contributing to the GOS be invited to attend ET-SAT (See new Action ET-SAT 8.01).
Action ET-SAT 7.04: WMO Secretariat to forward to IWWG the recommendation to investigate the impact of the longitude separation between adjacent geostationary satellites over the Pacific for wind field derivation, noting that with current plans the requirement for no more than 70 degrees separation cannot be satisfied over that area.	30 June 2012	This action should be pursued. It is defined by ET-SAT-8 as a new Action ET-SAT 8.02
Action ET-SAT 7.05: The Secretariat will develop a procedure for the management of the SOCRAT updating process, in order to ensure that the process is efficient and that satellite programme data are consistent with authorized information from agencies.	30 September 2012	COMPLETED. See ET-SAT-8/Doc.4
Action ET-SAT 7.06: The Secretariat will investigate a mechanism or tool to facilitate provision of inputs and of feedback on the database contents.	End 2012	To be further investigated with the aim to minimize duplication in the provision of inputs to OSCAR and to CEOS MIME. See new actions ET-SAT 8.03 and 8.04
Action ET-SAT 7.07: The Secretariat will investigate a mechanism for sharing SOCRAT data with e.g. the CEOS MIM.	April 2013	COMPLETED. See ET-SAT-8/Doc.4
Action ET-SAT 7.08: The Secretariat to complete the development of the SOCRAT tool, to simplify the granularity of instrument classes, to review the description of instrument “ranking” with reference to “missions”, and to implement updates and corrections mentioned at ET-SAT-7.	15 June 2012	COMPLETED. See ET-SAT-8/Doc.4
Action ET-SAT 7.09: Secretariat to consider including a quantitative estimation of instrument performance based on a performance estimator as contained in Volumes 4 and 5 of the Dossier.	May 2013	COMPLETED, is considered as a future development, to be discussed by ET-SAT-8 under item 4 See ET-SAT-8/Doc.4

Action ET-SAT 7.10: Secretariat to investigate the possibility to base performance assessments on actual instruments instead of theoretical instruments.	May 2013	COMPLETED, is considered as a future development, to be discussed by ET-SAT-8 under item 4. (ET-SAT-8/Doc.4)
Action ET-SAT 7.11: Secretariat to submit SOCRAT to ET-SAT, ET-SUP, and ET-EGOS Members for beta-testing, with password, and subsequently make it openly available on a pre-operational, then operational basis.	15 June 2012	COMPLETED. See ET-SAT-8/Doc.4
Action ET-SAT 7.12: ET-SAT Chair to forward to OPAG-IOS the conclusions of the revised Gap Analysis, raising the attention on anticipated gaps related to early morning orbit imagery and sounding, geostationary sounding, global precipitation measurement, Earth radiation budget, and limb sounding for stratospheric greenhouse gas monitoring, and to recommend urging Members to take initiatives to fill such gaps.	1 June 2012	COMPLETED. Was addressed by CBS-15 and EC-65. See ET-SAT-8/Doc.2.1, and Doc.9
Action ET-SAT 7.13: ET-SAT Chair to forward to OPAG-IOS the suggestions for updating the Vision of the GOS in 2025.	1 June 2012	COMPLETED. See ET-SAT-8/Doc.3
Action ET-SAT 7.14: The Secretariat will circulate the survey to ET-SAT Members, once finalized by the writing team, to enable ET-SAT Members to liaise within their organization and ensure full consistency between the survey process and ET-SAT activities on Gap Analysis.	1 June 2012 (depending on writing team)	COMPLETED. See ET-SAT-8/Doc.5.1 and 5.2
Action ET-SAT 7.15: ET-SAT Chair to submit the proposed update of the Manual on the GOS to the ICT-IOS with a view of its submission to the CBS Rapporteur on Regulatory Material.	1 June 2012	COMPLETED. See ET-SAT-8/Doc.2.1 and 2.1 ADD 1
Action ET-SAT 7.16: ET-SAT Chair to forward to ET-EGOS the proposed revision to the satellite-related parts (including Chapter 6) of the EGOS-IP.	30 April 2012 for ET-EGOS-7	COMPLETED. Approved by CBS and EC. See ET-SAT-8/Doc.2.1
Action ET-SAT 7.17: Secretariat to implement the corrections agreed to the draft contribution to the CIMO Guide, ensure an editorial revision, and submit the revised text to the CIMO editorial board.	July 2012	COMPLETED. See ET-SAT-8/Doc.8.3 Rev.1
Action ET-SAT 5.11: Space Programme Office to circulate a draft of instrument guidelines based on the representative characteristics of selected instruments, for review by ET-SAT members. (1 month before ET-SAT 6)	to be rescheduled in the future ET-SAT work plan.	CLOSED. To be re-considered after completion of the draft contribution to the CIMO Guide.
Action ET-SAT 5.12: CMA (Yang Jun) and ISRO (A.S. Kiran Kumar) to work towards consolidating an initial list of requirements for AWS sensors to contribute to the validation and ground truth of space-based observation (with reference to ET-SAT/SUP-4/DOC.18.1, Annex), by December 2010 in consultation with ET-SAT and ET-SUP members. Reference: http://www.wmo.int/pages/prog/www/OSY/Meetings/ET-AWS6-2010/Doc6.doc	New due date: 1 September 2012	No progress, action closed
Action ET-SAT 5.15: CMA (Jun Yang) and ISRO (Kiran Kumar), to consider possible further contribution to SCOPE-CM and communicate their interest to WMO Space Programme (CMA, ISRO are encouraged to contact the SCOPE-CM Secretariat (Lothar Schueller, EUMETSAT) to submit a proposal for one or several products, preferably in the terrestrial domain.)	.	Action closed. CMA, ISRO are still encouraged to propose products to SCOPE-CM.

Action ET-SAT 6.01: ET-SAT members to review the draft strategy for ensuring user readiness for future operational missions, to be initiated by the ET-SUP and VLab, with a view to submit a proposal to CGMS. (When available from ET-SUP and VLab, in advance of CGMS-39)	Waiting for input from ET-SUP.	COMPLETED. CBS-15 has adopted guidelines for user readiness (See ET-SAT-8/Doc. 2.1)

ET-SAT-7 Recommendations

Nr.	Recommendation	Comment
1	Proxy data sets should be systematically made available to the user community through data servers and broadcasting systems in advance of the launch of a new generation satellite in order to help users to plan for ingesting such new data and preparing their utilization.	Now included in the CBS-15 Guidelines for user readiness
2	Multi-purpose DVB-S broadcast systems should be used when available for the dissemination of proxy datasets for new generation satellites in order to provide data in advance of the availability of direct readout services	Now included in the CBS-15 Guidelines for user readiness Note that it should apply to any multi-purpose receiving system, not specifically DVB-S
3	Sufficient resources should be allocated to support the work of the Steering Group on Radio Frequency Coordination (SG-RFC) and an adequate level of representation of WMO in key international frequency coordination meetings.	This was reinforced by a CBS-15 and EC-65 recommendation.
4	ET-SAT members should keep the Steering Group on Radio Frequency Coordination (SG-RFC) informed of relevant issues from the space community, maintain links with the SG-RFC and the WMO Secretariat on frequency matters, to ensure effective WMO representation of Earth observation satellite providers and users in ITU frequency management processes.	Noted.
5	Given the pivotal role of the capabilities database in the RRR process and in support of global coordination of satellite planning, and the need to ensure its sustainability and reliability, it is recommended to assign resources with high priority within the Secretariat for technical maintenance, first level contents updating, and - through consultancy - for technical level updating and quality control.	This was reinforced by a CBS-15 and EC-65 recommendation.
6	Satellite operators, including ET-SAT and CGMS Members, and expert groups, should support the database updating process through submitting inputs and providing reviews and feedback.	This was reinforced by a CBS-15 and EC-65 recommendation.

NEW ACTIONS FROM ET-SAT-8

Action	Due Date
Action ET-SAT 8.01: The Secretariat to invite all the R&D agencies contributing to the GOS to attend ET-SAT as observer if not member, and report on their plans, in particular as concerns near-real time data accessibility from their R&D missions of particular relevance for operational users.	ET-SAT-9
Action ET-SAT 8.02: The Secretariat to circulate to ET-SAT for review the draft satellite chapter of the future Manual on WIGOS, for review, once the structure of this Manual is stabilized.	31/01/2014 (subject to TT-RM outcome)
Action ET-SAT 8.03: WMO Secretariat to forward to IWWG the recommendation to investigate the impact of the longitude separation between adjacent geostationary satellites over the Pacific for wind field derivation, noting that with current plans the requirement for no more than 70 degrees separation cannot be satisfied over that area.	30/11/2013
Action ET-SAT 8.04: The OPAG IOS Chair to recommend to the CBS, at its Extraordinary Session 2014, that an update of the Vision is developed for submission to CBS-16, tentatively looking towards 2040.	31/01/2014 (to inform CBS Management Group)
Action ET-SAT 8.05: The Secretariat will investigate a mechanism or tool to facilitate provision of inputs and of feedback on the database contents, preferably coordinated with the call for updates from CEOS, while ensuring that agencies are not solicited twice to provide similar information,	31/12/2013
Action ET-SAT 8.06: The Chair will open the dialogue with CEOS System Engineering Office (SEO) to evaluate the potential for collaboration among OSCAR and CEOS MIM, with a view to minimize overall efforts and maximize the benefits of maintaining these complementary tools, and report to WMO and to the CEOS plenary.	31/10/2013
Action ET-SAT 8.07: The Secretariat to implement the procedure for controlling the OSCAR updating process	31/10/2013
Action ET-SAT 8.08: Each ET-SAT member to check the information in OSCAR regarding the missions under responsibility of his/her respective agency : new missions, change of status (approval, launch, cancellation, termination), schedule, payload content, etc.	31/10/2013
Action ET-SAT 8.09: The Secretariat to report to the Architecture team and to the forthcoming CGMS-41 session the findings of ET-SAT-8 discussion on Architecture for Climate Monitoring from Space	31/07/2013
Action ET-SAT 8.10: CSA (Guennadi Kroupnik) to share the evaluation of socio-economic benefits of the PCW mission.	30/11/2013
Action ET-SAT 8.11: EUMETSAT (Ken Holmlund) to provide an update on the Antarctic Data Acquisition initiative at the next session of ET-SUP regarding timeliness of data delivery and further development of the service. *(Noted by ET-SUP as Recommendation 7.11)*	30/04/2014

Action ET-SAT 8.12: The Secretariat to address, with the authors, the points raised by the reviewers with a view to submit a revised version to the CIMO Editorial Board by Fall 2013.	15/08/2013
Action ET-SAT 8.13: The Secretariat to inform CGMS of the preparation of the CIMO Guide on satellite observation, and invite feedback	31/07/2013
Action ET-SAT 8.14: ET-SAT members to inform their agencies of the upcoming opportunity to provide feedback, during the public review phase, on the draft CIMO Guide on satellite observation	30/11/2013
Action ET-SAT 8.15: Each ET-SAT member to review the "evaluation" part of the "Capability review" in OSCAR for the climate/weather/water applications (i.e. ignoring Space Weather for the time being), in particular for the capabilities corresponding to his/her field of expertise. If necessary, communicate to the Secretariat (J. Lafeuille) missions that are either missing or not properly recorded	31/10/2013
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