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

EXPERT TEAM ON SATELLITE UTILIZATION AND PRODUCTS

JOINT THIRD SESSION

GENEVA, SWITZERLAND

3-7 SEPTEMBER 2007

FINAL REPORT

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 of 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 third sessions of ET-SAT and ET-SUP were held on 3 to 7 September 2007, as a joint session of the two expert teams. Primary objectives of the meeting were: to review the status of the space-based Global Observing system (GOS); to review the status of requirements from WMO programmes and the response to these requirements; to discuss the re-design of the GOS to 2025 and the strategy for transition of missions from R&D to operational status; to review the activities within the Integrated Global Data Dissemination Service (IGDDS) and the Regional ATOVS Retransmission System (RARS) projects; the expansion of the Virtual Laboratory; the concept of Regional/Specialized Satellite Centres for Climate Monitoring (R/SCC-CM), and; user information and questionnaire issues. The meeting was informed of the WMO Strategic Planning Process and noted the need for budgetary and staff resources to be in accordance with the strategic priorities. The meeting also reviewed the status of project proposals for the International Geostationary Laboratory (IGeoLab), the possibility of involving WMO in Space Weather issues, and the relations with the Committee on Earth Observation Satellites (CEOS).

In noting the outcome of the July 2007 Workshop on the Re-design and Optimization of the GOS the meeting reviewed an early draft Vision of the GOS to 2025. The joint meeting recommended that the Vision should be forward-looking and ambitious whilst emphasizing that the proposed GOS enhancements should be supported by a clear identification of the benefit to WMO Members. It may be necessary for some of the benefits to be clarified through Observing System Simulation Experiments (OSSEs). The session considered that by 2025 the increasing number of space-faring WMO Members and missions contributing to the space-based GOS should enable the GOS to satisfy a much wider range of requirements than at present. However to realize the new GOS Vision it would require an increased optimization of efforts amongst the space agencies through global planning of missions and ground segments to ensure data accessibility, quality and comparability for all WMO Members.

A major development under consideration is that of observing capabilities, currently provided by R&D missions without any long-term commitment, which would in the future be required on an operational basis. This requires a clear strategy for transition from R&D missions to operations. The session addressed in particular two situations: one which covers the transition of new technology from demonstration to pre-operational and then to operational status and another which covers the transition from a climate research objective to an operational objective. It also addressed the use of R&D data in support of operations. The session highlighted the role of WMO in this process and suggested that, on the basis of its discussions, a document on the strategy for transition from R&D missions to operations be submitted to CGMS and CM-8.

The meeting discussed the concept of Regional Specialized Satellite Centres (R/SSC) and in particular reviewed the Implementation Plan for the R/SSC for Climate Monitoring. Some adjustments to the parent organizations were suggested in terms of replacing GSICS with CGMS/GSICS, the session also recommended that the OPAG-IOS Chair request CGMS form a new International Working Group on Climate Monitoring and Calibration. The session also proposed that prior to extending the R/SSC concept to other areas such as Atmospheric Chemistry the R/SSC-CM outcomes should be reviewed after approximately two years to identify the benefits and costs of the concept.

Progress in the IGDDS and RARS activities were discussed and the meeting provided guidance for the further implementation of the projects with particular attention to the completion of the global RARS network and its possible expansion to other data types beyond ATOVS.

The session considered the outcome of the recent Virtual Laboratory Management Group meeting (VLMG3) and made a number of recommendations: it stressed the importance of Regional Focus Groups; reviewed the status and plans of other training activities; recommended aggressively pursuing the proposed VLMG activities and goals and; suggested that a full time support officer position be developed within the WMO Space Programme Office to cover training and utilization aspects. The ET-SUP session also recommended that Dr Luiz Augusto Toledo

Machado (Brazil) take over the CoE Co-chair role from the outgoing Co-chair, Mr Jeff Wilson (Australia); the nomination of the Beijing component of the Nanjing Regional Training Centre, the China Meteorological Agency Training Centre (CMATC), to become a CoE was supported; and ET-SUP suggested that the VLMG investigate options for creating a comprehensive learning environment for online satellite courses using software such as MOODLE.

The Expert Teams noted significant progress of the WMO Space Programme web pages and recommended priorities for further developing this information source, in particular training matters. The status of the draft technical document on the Status of WMO Members Use of Satellite Data and Products for the years 2004 and 2005 was reviewed and the meeting reaffirmed the benefit for WMO Members of publishing it. The ET-SUP session agreed that preparations begin on a new questionnaire and data gathering exercise covering the period 2006 and 2007, the subsequent analysis and Technical Document to be ready for discussion at CBS November 2008.

In view of the important developments regarding the space-based GOS and the forthcoming CBS meeting in November 2008, ET-SAT and ET-SUP considered appropriate to hold a fourth session by September 2008 at the latest (depending on budget), and to pursue activities in the inter-sessional period.

First row (left to right): Ms Anna Khokhlova, Dr Eva Oriol-Pibernat, Dr Vilma Castro

Second row (left to right): Mr Makoto Nakashiro, Mr Kazuyoshi Yoshimatsu, Dr Alexander Nerushev, Ms Alice Blunt, Mr Wolfgang Benesch, Mr Jeffrey Wilson, Dr Michael King, Dr Volker Gaertner, Dr James Purdom, Dr Paolo Pagano, Mr Lorenzo Sarlo

Back row (left to right): Mr James Gurka, Mr Sory Diallo, Mr A. S: Kiran Kumar, Mr Anthony Mostek, Mr Richard Francis, Mr Zhu Xiaoxiang, Mr Jun Yang, Mr Miroslav Ondras, Dr David Goodrich, Mr Jérôme Lafeuille, Dr Donald E. Hinsman

(Not in picture: Dr Luiz Toledo Machado, Dr Lothar Schueller)

1. ORGANIZATION OF THE SESSION (*agenda item 1)*

Opening of the session

1.1 The third sessions of the Expert Team on Satellite Systems and the Expert Team on Satellite Utilization and Products were held at the Headquarters of the World Meteorological Organization (WMO) in Geneva, Switzerland, from 3 to 7 September 2007.

1.2 The session was opened at 09h30 on Monday, 3 September 2007 by Professor Hong Yan, Deputy Secretary-General of WMO. In his opening remarks, Professor Yan recalled that during the Fifteenth WMO Congress several Members expressed their appreciation of WMO Space Programme achievements and noted that these achievements are only possible with the support of groups like ET-SAT and ET-SUP, particularly when there were very modest resources in the WMO Space Programme Office. It is the case that WMO Members are very appreciative when they see positive impacts and real tangible benefits for worldwide users that result from WMO initiatives. With that in mind Professor Yan urged that the groups focus on the outcome of their work and try to ensure that measurable user benefits are always at the heart of their actions and recommendations.

1.3 Professor Yan noted that the collocation of the two groups and the decision to come together in joint sessions for parts of the week were very logical given their respective roles and should provide ample opportunity to discuss items of common interest and also to reinforce the clear link between the provision of satellite observations and support for their effective exploitation – two core elements of the WMO Space Programme's responsibilities.

1.4 Professor Yan recognized with pleasure that many notable advances in satellite meteorology start as national or regional initiatives and, through the efforts of the WMO Space Programme, guided by Expert Teams, evolve and expand into systems and services of near-global proportions for the benefit of the whole WMO family of Members.

1.5 Finally Professor Yan thanked the ET-SAT and ET-SUP members for their invaluable contributions and wished them a very pleasant stay in Geneva.

Adoption of the agenda

1.6 The agenda for the session was adopted and is reproduced in Appendix II. Appendix I contains a list of participants for the session.

Working arrangements for the session

1.7 A tentative work plan, distributed as a meeting Information Document, was accepted as the basis for the working arrangements for the session. It was agreed that the work of the session would be conducted mainly in Plenary and working groups, as appropriate. The groups agreed that they would meet in joint sessions for agenda items 1 through 8, and would reconvene in a joint session for the presentation and discussion of the findings of the individual working groups. It was further agreed that a single joint final report would be prepared for the meetings. A summary for the OPAG-IOS Chair to use as input to other forums would be generated separately.

2. CHAIRMEN'S REPORTS (*agenda item 2*)

ET-SAT Chairman's Report

2.1 Dr Wenjian Zhang provided his Chairman's Report *in absentia*. He began his report by thanking the ET-SAT members for their dedication and hard work since the inception of ET-SAT, their organizations for their support of this Expert Team activity, and the WMO Space Programme Secretariat for its continued support.

2.2 Dr Zhang recalled from the Explanatory Memorandum that the meeting will address a number of issues that are important to the work of the Commission for Basic Systems (CBS) and the cross-cutting nature of the WMO Space Programme. He drew the attention of the ET-SAT members to items relevant to their work plan for 2007-2008 as detailed in Appendix VI.

2.3 Dr Zhang reminded the session of the achievements, issues and recommendations presented to CBS-Ext.(06) on behalf of ET-SAT and he was encouraged to note that these achievements, issues and recommendations received particular attention from the CBS. Dr Zhang went on to invite ET-SAT members to give special consideration, during the meeting, to the relevant decisions of CBS-Ext.(06) within the scope of OPAG-IOS and with respect to "satellite systems". These decisions are separately recorded under agenda item 9.

2.4 In concluding, Dr Zhang reiterated his thanks and wished the participants a most successful meeting.

ET-SUP Chairman's Report

2.5 Mr Jeff Wilson welcomed all ET-SUP and ET-SAT members to the joint meeting and encouraged both groups to exchange information and ideas to benefit WMO Members through the work of the OPAG-IOS in support of the WMO Space Programme.

2.6 Mr Wilson noted the positive impact of the current expanded staffing in the WMO Space Programme as reflected in the increased number and quality of the papers provided to the meeting by the Secretariat. He went on to congratulate Dr Donald Hinsman, on behalf of ET-SUP, on his new role as Acting Director of the World Weather Watch and thanked him for his tireless work as Director of the WMO Space Programme. Without Dr Hinsman's vision and ability to harness, coordinate and inspire the efforts of many others in expanding the use of satellite data by WMO Members we would not be where we are today. Our challenge, as members of National Hydrological and Meteorological Services (NHMSs) and/or of the ET-SAT/ET-SUP groups will be to build upon, and expand, the legacy Dr Hinsman has laid down for us.

2.7 Mr Wilson reminded the groups of the actions requested of the WMO Space Programme and CGMS Rapporteur at the last meeting of ET-SUP in 2006. These included:

- Take forward the application for a new Centre of Excellence in Brazil;
- Provide feedback to the IGDDS Implementation Group regarding their implementation plan;
- Update CBS and CGMS on the High Profile Training Event;
- Invite INPE to become a contributing member of the space-based component of the GOS;
- Update the ETs on relevant space activities via an occasional newsletter, and
- Identify additional data sources that could be incorporated into utilization statistics.

2.8 In his report Mr Wilson looked forward to the session being informed by the Secretariat on the outcome of these actions and in particular to the outcome of their consideration (as appropriate) by other bodies such as the OPAG-IOS Implementation/Coordination Team (ICT), the thirty-fourth CGMS meeting, the CBS Extraordinary session, the Consultative Meetings (CM-7) and finally through reports on many of the key items to the Fifteenth WMO Congress. Whilst on the subject of WMO Congress Mr Wilson recalled that new directions for WMO were requested by Congress and that the new result-based management / budgetary system will impact the Secretariat and all of the Constituent bodies. This result-based focus should be borne in mind when the ET groups set the goals and objectives for their work programme activities within the overall context of WMO Space Programme outcomes.

2.9 In concluding, Mr Wilson acknowledged and thanked the parent organizations of the participants of the joint session for their support to the two Expert Teams through allowing Expert

Team members to participate in these important tasks. He noted that the cost to each organization is high, but the potential rewards globally, organizationally and individually are also very high.

Report from Chairman of OPAG-IOS

2.10 Dr James Purdom thanked the ET Chairs and experts for their dedication to the work of their respective Expert Teams (ETs) and expressed the view that the activities undertaken by the groups are exceptionally valuable for the work of CBS.

2.11 Dr Purdom went on to recall the important meetings that have taken place since the 2006 ET sessions including CGMS, CBS Extraordinary session, WMO Congress and Executive Council in May 2007 and the CBS Management Group Meeting in June 2007. In addition there have been several associated meetings of importance, including 1) a meeting in January 2007 that developed the concept of a WMO Integrated Observing System (WIGOS) which has been deemed worthy of more serious development by both Congress and EC; 2) a meeting of the THORPEX ICSC which took place in April 2007 where plans for the various THORPEX experiments were put forth followed by a meeting of the THORPEX Observing Systems Working Group in May; 3) a Virtual Laboratory Management Group Meeting that took place in June; and, 4) an Optimization Workshop that investigated ways forward for the space-based sub-system of the GOS.

2.12 Dr Purdom then informed the session of some of the most salient points from each of the above-mentioned meetings, focusing on those that will impact the work of the groups. He noted that outcomes of CGMS, CBS Ext.(06) and WMO Congress are reported under separate agenda items so his presentations on these events were brief. However, Dr Purdom urged the session to pay particular attention to the decisions of the CBS Management Group including the following:

i) OPAG-IOS to participate and continue to support studies of observation targeting strategies based on the THORPEX, AMMA and IPY results;
ii) OPAG-IOS, through its ET-EGOS, ET-SUP, ET-SAT, ET-AWS and Rapporteurs, following the guidance given in the Implementation Plan (Framework) for Evolution of Space and Surface-based Sub-systems of the GOS (IP-EGOS), to pursue, especially in developing countries a wider use of observing systems (e.g., satellite, AMDAR) that were less dependent on infrastructure, expertise and funding;
iii) OPAG-IOS, through its ET-EGOS, ET-SUP, ET-SAT, ET-AWS and Rapporteurs, in coordination with WG PIW to promote implementation/evolution of the GOS in the Regions through sustainable functioning of RBSNs/RBCNs and keeping under continuous review related regional requirements.

2.13 Finally Dr Purdom advised the session that the next CBS meeting is planned for November 2008 and is likely to be held in Croatia.

3. ITEMS OF INTEREST FROM RELEVANT WMO MEETINGS INCLUDING COMMISSION FOR BASIC SYSTEMS, CONSULTATIVE MEETINGS, CONGRESS, AS WELL AS CGMS AND GEO MEETINGS *(agenda item 3)*

Items of interest from relevant meetings

3.1 The joint session was informed that since its last session, there had been several relevant activities including: the thirty-fourth session of the Coordination Group for Meteorological Satellites (CGMS-XXXIV) held in early November 2006; the Extraordinary Session of the Commission for Basic Systems 2006 (CBS-Ext.(06)) held in late November 2006; the seventh session of the WMO Consultative Meetings on High-level Policy on Satellite Matters (CM-7) held in January 2007; the Fifteenth WMO Congress (Cg-XV) held in May 2007; and activity within the Group on Earth Observations (GEO) and its associated Global Earth Observation System of Systems (GEOSS). The session reviewed major outcomes from each of the above meetings. The session also noted that many of the topics, including optimization of the LEO orbit, IGeoLab, R/SSC and the transition

from R&D to operational missions, were also agenda items for this meeting where more in-depth discussions would occur.

WMO Strategic Planning process

3.2 The session was informed of the new strategic planning process approved by the Fifteenth WMO Congress, held in May 2007. Three interlinked key components constituted the strategic guidance of WMO as follows: a WMO Strategic Plan that provides a high-level statement of the future direction and priorities of WMO in the form of three top-level objectives, five strategic thrusts and 11 Expected Results (ER) and their Key Performance Indicators (KPI); a WMO Operating Plan that converts strategic direction into specific, measurable outcomes by defining Programme activities and services and their corresponding Key Performance Targets (KPT); and a Result-based Budget (RBB) that connects outcomes, or end results, to resources identifying specific activities that need to be completed to achieve the established KPT and the required resources.

3.3 The session noted that the CBS Management Group had discussed the new WMO strategic planning process and decided to establish a small team comprised of the President, Vice-president and the OPAG Chairs that would work by correspondence and develop a CBS operational planning framework document for 2010-2011 that would be presented to CBS-XIV in November 2008.

3.4 The session queried how budgetary and staff resources were adjusted to the priorities set in the Strategic Plan. The Director of the WMO Space Programme indicated that the Strategic Plan would trigger some adjustment in the current structure of WMO Secretariat. Noting that the "Integration of WMO Observing Systems and the Development" and "Implementation of the new WMO Information System" were identified among the Expected Results at WMO level, the session thus anticipated adequate resources would need to be allocated to the WWW and the WMO Space Programme to meet these Expected Results.

4. STATUS OF THE USER REQUIREMENTS AND OBSERVING CAPABILITIES DATABASE *(agenda item 4)*

4.1 The joint meeting was informed that the "User Requirements" part of the database had been updated for most applications, taking into account the three-level characterization (threshold-breakthrough-goal) for each of the five qualifiers of each parameter.

4.2 As concerns the "Space-based Observing Capabilities" part of the database, ET-SAT members were invited to review and update it by mid-October 2007 with a goal to issue an updated version of the database by the end of 2007. Attention was drawn to the list of instruments that had been recently added in the database (based on ET-SAT-SUP-3 Doc. 5(2) information), for which there were no associated expected performances yet. ET-SAT members were invited to add appropriate expected performances for the relevant geophysical parameters from these instruments.

4.3 It was noted that the list of geophysical parameters (level 2) associated with the various instruments might have to be updated. The ET-SUP Chair underlined that this list of geophysical parameters served as a taxonomy of data usage in reference to the use of satellite data and products by WMO Members, and that if the list was modified such consistency should be maintained in future references.

4.4 The status and updating process of the User Requirements and Observing Capabilities database were discussed in more depth within the separate ET-SAT session. ET-SAT confirmed that the availability of such a database was an important asset provided that it was up-to-date. It was suggested that its updating cycle and process should be reviewed. ET-SAT noted that the database had two components: User Requirements and Observing Capabilities. The updating process was well established for the User Requirements part within WMO. As concerns the space-based Observing Capabilities part, it was felt important to streamline the updating process to the

extent possible in order to ensure that maintaining the database remains a sustainable task both for the administrator and for the space agencies that provide the input.

4.5 Dr Oriol-Pibernat informed the meeting that ESA was investigating new tools to collect and record information on satellite and instrument capabilities and was considering proposing an initiative within CEOS in this respect. The WMO Secretariat suggested cooperation among CEOS and WMO on this topic and ET-SAT encouraged ESA to further investigate this matter and report back on the findings.

4.6 For the short term, ET-SAT agreed that the database should be updated in its present form. WMO Space Programme provided ET-SAT members with a CD-ROM of the current version and indicated that the current version of the User Manual (Version 2.4) was available on line. It was clarified that, for historical purpose, past missions and instruments should not be removed from the database; however the relevant capabilities should be assigned a Confidence Level "4" to earmark them as: Not Available. The definition of the Confidence Levels is recalled below.

	Confidence Level	Definition
1	**Potential realized**	actual performance obtained in operational or routine practice approaches potential performance
2	**Potential expected**	actual performance is confidently expected to reach potential performance; performance evaluation based on strong heritage; production plans assured
3	**Potential projected**	potential performance estimated on the basis of instrument design; production not committed
4	*Experimental*	thought to be useful; performance values not provided; production not committed

4.7 The session pointed out that the definition of Confidence Level 4 was ambiguous with two different possible interpretations.

4.8 It was also clarified that the Observing Capabilities database should not be confused with a catalogue of the products that are actually available; the performance values (accuracy, resolution, timeliness, etc) of geophysical parameters associated with instruments should reflect the best possible characteristics of Level 2 products that can be generated from the instrument data.

4.9 ET-SAT noted that some geophysical parameters were derived from suites of instruments and that in such cases a performance value associated with one instrument may not be relevant to the suite of parameters.

ET-SAT agreed to the following actions:

Action ET-SAT-3.1 Secretariat to update the definition of confidence levels to reflect the case of data of instruments that are no longer active.

Action ET-SAT-3.2 WMO Space Programme to provide ET-SAT members with the Instruments spreadsheet including all instruments included in the database, and with the Missions spreadsheet including the information on mission launch and termination, for review and update. (30 September 2007)

Action ET-SAT-3.3 WMO Space Programme to clarify how to enter performance values for instruments that have to be used simultaneously to derive some parameters (30 September 2007)

Action ET-SAT-3.4 ET-SAT members to provide updates regarding missions and instruments under the responsibility of their respective agencies (15 October 2007)

Action ET-SAT-3.5 WMO Space Programme to prepare an update of the database User Manual (31 December 2007)

5. RE-DESIGN AND OPTIMIZATION OF THE SPACE-BASED COMPONENT OF THE GOS *(agenda item 5)*

Outcome of the OPT-2 workshop

5.1 The session was reminded that, following the outcome of ET-SAT-2 and its assessment of the GCOS Satellite Supplement, CBS Ext.(06) had requested "OPAG-IOS to commence an update of the baseline of the space-based GOS up to 2025 as a new horizon, and expand its scope beyond the World Weather Watch in order to include sustained observations of additional variables required for climate monitoring, and ultimately to address the needs of other WMO Programmes." For reference purpose, a summary of the current GOS baseline is included as Appendix VIII.

5.2 In response to the request from CBS-Ext.(06) the Secretariat developed a gap analysis (provided as ET-SAT/SUP-3/Doc. 5(2)) and organized the Workshop on the Re-design and Optimization of the Space-based GOS. The workshop was held on 21 and 22 June with participants from operational and R&D space agencies: CMA, CNSA, ESA, EUMETSAT, JAXA, JMA, NASA, NOAA, USGS, as well as representatives of GCOS, of the Committee on Earth Observation (CEOS), the Chairman of OPAG-IOS, the Chairman of ET-EGOS, and the WMO Space Programme. The workshop emphasized the importance of developing a new Vision of the GOS where observation of Essential Climate Variables (ECV) would be ensured through operational missions or otherwise long-term sustained missions rather than relying only on R&D missions with no plan for continuity.

5.3 The workshop recommended in particular including the following changes into the space-based GOS baseline to include:

- Core operational infrared and microwave sounding on at least three well separated sun-synchronous orbital planes (mid-morning, early afternoon and early morning);
- Constellation of small satellites for radio-occultation sounding;
- Ocean altimetry constellation including at least one high-precision reference altimeter mission and two additional altimetry systems flying on higher inclination orbits;
- Absolute continuity for at least one broadband Short-wave/Long-wave radiometer for Earth radiation monitoring and one Total Solar Irradiance sensor in Low Earth Orbit (LEO) with complementary measurements in geostationary and LEO orbits;
- At least two scatterometers and two full polarization microwave imagers for sea surface wind;
- Further refinement of an observation strategy for atmospheric composition.

5.4 The workshop also recalled that global optimization of satellite mission planning could only be efficiently achieved if satellite operators could ensure data quality and timely availability.

5.5 ET-EGOS had reviewed the outcome of the workshop and considered it an excellent basis to start developing a new Vision for the space-based GOS. ET-EGOS-3 provided a first draft of such a Vision, which was submitted to the joint third session of ET-SAT and ET-SUP for review, with the aim to ultimately develop a recommendation to CBS in November 2008. The new Vision, once endorsed, shall ultimately lead to a new description of the GOS in Part IV (Space-based sub-system) of the Manual on the GOS.

5.6 The OPAG-IOS Chair recalled the request of CBS to review and update the baseline of the space-based GOS, and underlined that this should not be limited to a simplified Vision but should be eventually complemented by an Implementation Plan, as was the case with the Vision to 2015, as well as a schedule. The session stressed that this important issue should be carefully reviewed in order to provide a Vision that is forward-looking while realistic and affordable. In this respect it

was acknowledged that a single WMO Member could only afford to contribute to part of the system, but that there was an increasing number of space-faring WMO Members contributing to the space-based GOS through operational or R&D missions. By 2025, in optimizing the efforts and enhancing cooperation among WMO Members' space agencies, it should be possible to satisfy a much wider range of requirements than at present. The session agreed to review the issue in more depth in a dedicated session with ET-SAT and ET-SUP members.

5.7 The session clarified that the Vision should translate requirements into observing capabilities; it should however remain a high-level description of those capabilities and avoid being too specific as concerns the architecture in order to allow optimization. The Vision shall not necessarily be based on the current plans or considerations of agencies, it should instead be developed on the basis of users needs anticipated for 2025 and should aim to describe the optimal achievable scenario for the next two decades.

5.8 It was also clarified that the primary request from CBS to expand the scope of the space-based GOS was to include the needs of climate monitoring, which are well formulated and seen as a priority, but that the needs of other programmes were also part of the CBS request and should be addressed to the extent possible. This would include e.g. hydrology or marine applications.

5.9 In comparison with the current Vision (to 2015), a major development in the draft Vision (to 2025) proposed by ET-EGOS is that capabilities currently provided by R&D missions with no long-term commitment would then be required on an operational basis. The implications of such a change of status are addressed from a general perspective as the strategy for transition from R&D missions to operations under item 8.

5.10 As concerns the level of capabilities listed in the draft Vision, the session felt that it could be more forward-looking and ambitious, noting that many of the proposed capabilities are already available or planned in the near-term. For instance, Doppler wind lidar, Geostationary microwave and Low-frequency microwave radiometry are listed as R&D and operational pathfinders but, by 2025, those capabilities might have completed their transition to a fully operational status. The session stressed however that the proposals should be supported by a clear identification of the purpose, for example, the advantage of adding missions in Highly Elliptical Orbit should be documented in order to better justify their inclusion as operational components.

5.11 The session appreciated that enhancing the space-based GOS would require increased resources for operational missions, which would require mobilizing and coordinating the efforts of WMO Members providing capabilities to the space-based GOS. In order to optimize data usability, attention was required to ensuring data quality, comparability (through calibration) and accessibility for all WMO Members. Partnerships should be encouraged among established and emerging agencies with a view to extend the operation of functional satellites to the maximum useful period.

5.12 The session highlighted that enhancing the GOS would require strong support from WMO Members. Therefore the new Vision should be supported by a description of the main expected outcomes that would result in benefits for WMO programmes. A preliminary identification of such benefits and relevant programmes was developed by the session and is attached as Appendix IX however it was suggested that ET-EGOS review and further develop this aspect. It was stressed that several proposals would need to be better quantified by the means of Observing System Simulation Experiments (OSSEs). The session underlined that the requirement for less than 60° longitude separation of geostationary locations was highlighting actual deficiencies of the current coverage over the Atlantic and the Pacific. Regarding LEO missions, it suggested minor additions including UV radiometers, SAR (possibly interferometric) imagery and VIS/IR imaging with special geometry.

Action ET-SAT-3.6 WMO Space Programme to forward to ET-EGOS Chair the outcome of the review of the draft "Vision to 2025" by ET-SAT/SUP-3 and to invite ET-EGOS to consider OSSEs in order to quantify the proposed elements, in particular the optimal number and orbital configuration of the Radio-

Occultation constellation complementing the IR/MW sounding mission. (30 September 2007)

Action ET-SAT-3.7 WMO Space Programme to provide CGMS-XXXV with an update on the draft Vision to 2025. (November 2007)

Gap analysis

5.13 The session was introduced to the gap analysis performed as an input to the Workshop on Re-design and Optimization of the Space-based GOS, based on current missions and available plans for the space-based GOS. This gap analysis was provided in ET-SAT/SUP/Doc. 5(2). With reference to a typology of 29 instruments/missions, the document recorded for each type:

- Definition of "nominal" instrument characteristics;
- Addressed geophysical parameters;
- Assumed/suggested observing strategy;
- Current and planned programmes until year 2020;
- Comments on the situation as projected beyond 2020;
- Recommendations.

5.14 A synoptic table of geophysical parameters (127) versus instrument/mission types (29) was provided in the Annex to the document, as well as tables describing the characteristics of each of the 157 instruments mentioned in the main text. The meeting was invited to take note and to consider the recommendations proposed for each of the 29 missions.

5.15 The joint session took note of the considerable amount of information gathered in this gap analysis and considered it as a very valuable reference document. It was suggested that the list of geophysical parameters addressed by each mission/instrument class should make a distinction between those parameters that are the primary output of a mission and the other parameters that are only by-products or for which the instrument is a secondary contributor.

5.16 ET-SAT members were invited to check the detailed description of missions and instruments under the responsibility of their agencies and report any update to the WMO Space Programme. JMA provided an update on MTSAT and MTSAT follow-on.

Action ET-SAT-3.8 All ET-SAT members to further review the gap analysis (ET-SAT/SUP-3/Doc. 5(2)), to check in the Appendix and its Annexes the descriptions of missions and instrument under the responsibility of their respective agencies and to report back to WMO Space Programme Secretariat any update needed (1 October 2007).

Review by ET-SUP

5.17 Colonel P. Pagano highlighted that among the GCOS ECV, the following were not currently identified in the GOS as operationally required observations:

- Atmospheric composition (ozone profile, distribution of GHG and aerosols);
- Sea ice concentration;
- Ocean colour and salinity;
- Wave height and sea state;
- Ice sheet elevation;
- Glaciers and ice caps;
- Albedo;
- Land cover;

- Fraction of Absorbed Photosynthetically Active Radiation (fAPAR) and Leaf Area Index (LAI).

To which he suggested to add the following further variables for inclusion in the GOS:

- Lightning detection;
- Air quality in the lower troposphere;
- Space weather (e.g., TEC and electron density profile).

5.18 The planned availability of future observations was categorized as "operational", "sustained" or "R&D". In light of current plans of Operational and R&D agencies, it was suggested that most parameters that meet the needs of GCOS could be made available in at least a "sustained" way, although not always with the resolution or accuracy required by GCOS.

5.19 The session noted the analysis presented by Colonel P. Pagano and considered it a useful input to confirm the relevance of a new Vision for 2025. It highlighted however the need to clarify the terms "operational" and "sustained" that were used by different entities with different understandings. The session noted that, in this context:

- Operational = provided on a routine basis with a commitment for continuity in the short-term (round the clock availability) and long-term (plans for follow-on missions);
- Sustained = provided with a commitment for long-term continuity (plans for follow-on missions) but without round the clock continuity of service.

6. REGIONAL / SPECIALIZED SATELLITE CENTRES *(agenda item 6)*

Background

6.1 At ET-SUP-2 in September 2006 the concept of Regional/Specialized Satellite Centres (R/SSC) was briefly considered in light of the discussions held at CM-6 and EC-LVIII. ET-SUP-2 noted the potential of realizing the concept for improving the quality and quantity of products available to WMO Members. They noted this to be particularly relevant to emerging areas such as climate monitoring. ET-SUP-2 agreed that the concept should be further developed.

6.2 Since ET-SUP-2 the initiative has progressed significantly under the guidance of CM-7 (January 2007) where the concept was approved and all participants strongly urged to work towards the development and approval of an Implementation Plan in time for the GEO Ministerial Summit in November 2007.

6.3 In line with the timetable agreed at CM-7, a workshop was held in March 2007 where the original concept was refined and actions agreed to proceed to an Implementation Plan. The meeting participants included CEOS, CMA, DWD, ESA, EUMETSAT, GCOS, JMA, NOAA-NESDIS, and WMO. Thereafter a first meeting of R/SSC-CM potential participants was convened by WMO on 16 May 2007 in Geneva, during the Fifteenth WMO Congress. That meeting focussed on the draft outline of an Implementation Plan and the schedule of activities culminating in an approved Implementation Plan by November 2007.

Next steps

6.4 A second R/SSC-CM potential participants meeting will be convened early November 2007 to finalize the Implementation Plan and assess the initial contributions of the respective partners. Immediately afterwards the R/SSC-CM initiative, as described in the approved first full release of the Implementation Plan, will be presented to the GEO Ministerial Summit in Cape Town on 30 November 2007.

6.5 Subject to finalization of the Implementation Plan, the R/SSC-CM network is expected to be progressively implemented from 2008 onwards and to deliver first products from 2010 onwards.

6.6 The original concept of R/SSC was described in generic terms and could be applied to many applications areas. Being the first to be defined, the global network of R/SSC-CM could be considered a "pilot" activity from which experiences can be gained that would feed into considerations for the establishment of further R/SSC addressing other application areas. It is recalled that, in its work programme as endorsed in 2006 by the Extraordinary session of the Commission for Basic Systems (CBS Ext.(06)), ET-SUP is expected to further the concept of Regional/Specialized Centres on Satellite Products".

Discussion

6.7 ET-SUP reviewed the evolution of the concept of the Regional/Specialized Satellite Centres (R/SSC) noting the progress of the Regional Specialized Satellite Centre for Climate Monitoring (R/SSC-CM) through its Implementation Plan.

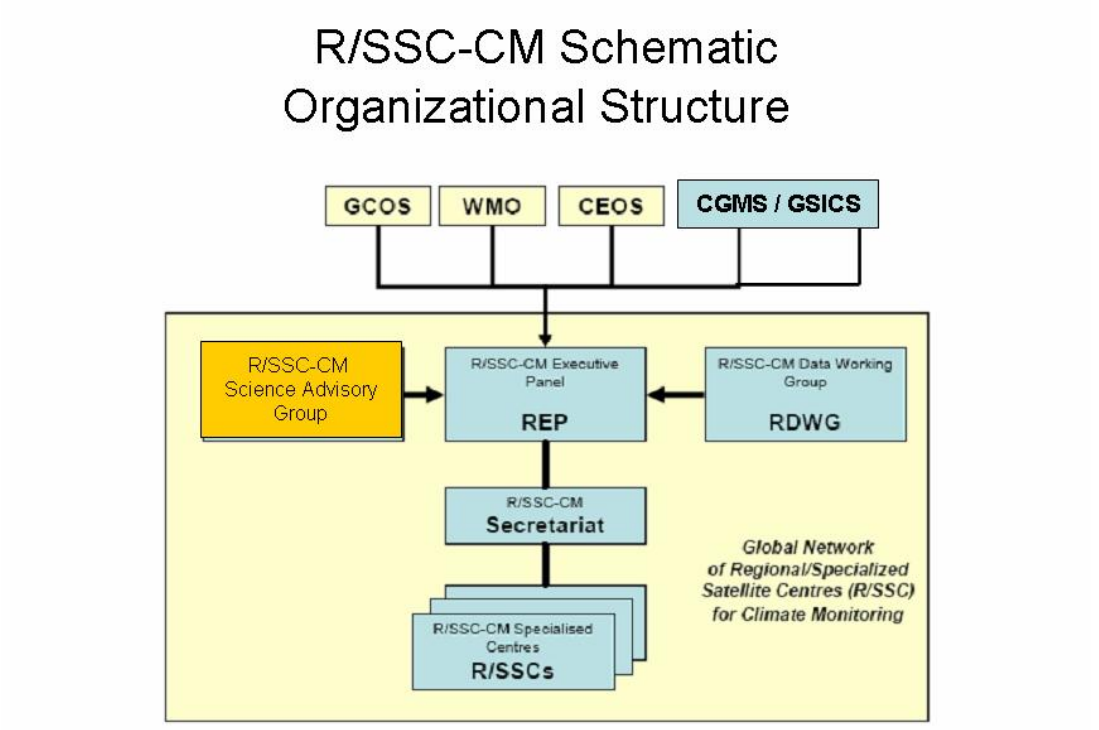
6.8 In reviewing the Implementation Plan the ET-SUP noted that the proposed structure was building on existing centres and expertise, and whilst there was a strong management and governance structure, it was noted that the overhead expenses of this structure would be covered by the existing centres.

6.9 ET-SUP considered it important that acronyms be used consistently; WMO is using RSSC-CM whilst the Implementation Plan uses R/SSC-CM, at the suggestion of the participating agencies.

6.10 In supporting the proposed Implementation Plan, the ET-SUP recommended two changes to the existing Schematic Organizational Structure of the R/SSC-CM network. These changes are:

- Replace GSICS with CGMS/GSICS to maintain the same level of representation with the other organizations;
- Rename the R/SSC-CM Research Group (RRWG) to the R/SSC-CM Science Advisory Group to better reflect their role.

These changes result in a revised organizational structure as illustrated in the following figure:



6.11 In addition to these changes, ET-SUP requested that the OPAG-IOS Chair request CGMS to form a new international science working group on the theme of climate monitoring and calibration to provide an open focus for collaboration and coordination on these important topics. The Terms of Reference for the new working group would be compatible with those from ITWG, IPWG and IWWW.

6.12 ET-SUP also recommends that point 8 of the Terms of Reference for the R/SSC-CM Executive Panel (Annex 1 of the R/SSC-CM IP) be reworded to read "Organize workshops on at least a biennial basis, and sessions at scientific meetings to advance the objectives of the R/SSC-CM and publicize the programme's achievements". It is expected that some of these meetings would occur in conjunction with the proposed CGMS climate monitoring and calibration working group.

6.13 Regarding the question of extending the R/SSC-CM concept to other application areas, the group felt that some time should be allowed to pass in order that lessons may be learned from the implementation of the R/SSC-CM. Consequently the OPAG-IOS Chair is also requested to propose to CBS that two years after the R/SSC-CM commences, as a pilot of the R/SSC concept, CBS review the outcomes and benefits of the concept prior to extending it to other areas such as Atmospheric Chemistry.

6.14 The following actions are identified from the discussions:

Action ET-SUP-3.1 WMO to forward to the R/SSC implementation meeting the proposals:

a) To replace GSICS with CGMS/GSICS in order to maintain the same level of representation with the other organizations. Additionally suggest that the CGMS representative on the R/SSC-CM Executive Panel be from GSICS;

b) To use consistent acronyms: either RSSC-CM or R/SSC-CM;

c) To rename the R/SSC-CM Research Group (RRWG) to the R/SSC-CM Science Advisory Group to better reflect their role;

d) Point 8 of the Terms of Reference for the R/SSC-CM Executive Panel (Annex 1 of the R/SSC-CM IP) to be reworded to "Organize workshops on at least a biennial basis, and sessions at scientific meetings to advance the objectives of the R/SSC-CM and publicize the programme's achievements".

Action ET-SUP-3.2 WMO SP to inform the GSICS Executive Panel, CGMS and R/SSC-CM potential participants, of these proposals (end October 2007)

Action ET-SUP-3.3 The OPAG-IOS Chair to invite CGMS to form a new international science working group on the theme of climate monitoring and calibration to provide an open focus for collaboration and coordination on these important topics. The Terms of Reference for the new working group would be compatible with those from ITWG, IPWG and IWWW.

Action ET-SUP-3.4 The OPAG-IOS Chair to propose to CBS that two years after the R/SSC-CM commences as a pilot of the R/SSC concept, CBS review the outcomes and benefits of the concept prior to extending it to other areas such as Atmospheric Chemistry.

7. RESPONSE TO NEW REQUIREMENTS BEYOND WWW: GCOS, DRR, CLIMATOLOGY, IPY, THORPEX, ATMOSPHERIC COMPOSITION *(agenda item 7)*

Response to requirements

7.1 The joint session noted that, as a cross-cutting programme, the WMO Space Programme had an objective to facilitate and expand the use of satellite data and products by WMO programmes and supported programmes. The Rolling Review of Requirements process was the main vehicle for interactions among the WMO Space Programme and these other programmes. Statements of Guidance (SOG) were available for ten application areas and most of them were in the process of being updated, under the responsibility of ET-EGOS. Focal points had been nominated by ET-EGOS for each of these application areas. ET-SAT and ET-SUP had reviewed the satellite aspects of the SOG at previous meetings and were expected to review the further updates when these updates will be finalized.

7.2 It was agreed that this review could be provided as an inter-sessional task by experts within ET-SAT and ET-SUP, or designated within their organizations by ET-SAT and ET-SUP members. The reviewers would liaise with the ET-EGOS focal points and assist them as appropriate in reviewing the draft updates of the various SOG. ET-SAT and ET-SUP designated the following experts to take care of the reviews:

- Global NWP, Regional NWP, Nowcasting and Aeronautical Meteorology: J. Gurka
- Seasonal and Interannual Forecasts: N/A
- Agricultural Meteorology: Kiran Kumar
- Hydrology: L. Sarlo
- Synoptic Meteorology (to be renamed General Forecasting): Chair ET-SUP
- JCOMM: Chair ET-SUP
- Climatology Activities other than GCOS: N/A
- Atmospheric Chemistry: N/A

7.3 The following actions were agreed:

Action ET-SAT-3.9 WMO Space Programme will inform ET-EGOS Chair that ET-SAT experts have been designated to assist the focal points to review the updates of the SOG (15 September 2007)

Action ET-SUP-3.5 WMO Space Programme will inform ET-EGOS Chair that ET-SUP experts have been designated to assist the focal points to review the updates of the SOG (15 September 2007)

Action ET-SAT-3.10 The ET-SAT experts (J. Gurka, K. Kumar, L. Sarlo) designated to support the updating of the SOG will provide a review of the draft updates to be received from the ET-EGOS focal points, for their respective SOG (when draft updates will be available)

Action ET-SUP-3.6 The ET-SUP experts (ET-SUP Chair) designated to support the updating of the SOG will provide a review of the draft updates to be received from the ET-EGOS focal points, for their respective SOG (when draft updates will be available)

7.4 The joint meeting noted and supported the comments made by CIMO and further noted that several activities and plans were contributing to respond to these comments (IGDDS, R/SSC, GSICS, GPM). The joint meeting noted emerging activities in the area of disaster risk reduction and climatology (other than GCOS), as well as the availability of a new GAW strategic plan. It was understood that these developments would eventually result in new requirements that ET-SAT and/or ET-SUP may be solicited in due time to review and respond to.

7.5 The joint meeting was informed of the actions and recommendations formulated by the first meeting of the Space Task Group (STG1) of the Sub-committee on observations of the WMO/ICSU Joint Committee of the International Polar Year (IPY). It was agreed that Recommendations STG1-R3, R4 and R5 should be brought to the attention of CGMS. As concerns Action STG1-A3 the session recommended that the Secretariat responds, with support of CGMS.

Comments from GCOS

7.6 It was noted that, in the case of GCOS, guidance was provided through the GCOS Implementation Plan and the Adequacy Reports. The session was informed on the recent update of GCOS observation requirements. Furthermore it noted a GCOS discussion paper on the cross-cutting value of observations for climate for the various GEO Societal Benefit Areas.

7.7 It was recalled that an extensive review of the GCOS IP and its Satellite Supplement had been performed at the second ET-SAT meeting with, among the outcomes, an identification of the relevant instruments and missions for the derivation of the GCOS required FCDRs. The GCOS Secretariat confirmed the value of this information, however expressed the need for additional information on the actual availability of present and historical datasets and was invited to detail its request.

7.8 It was noted that this need was addressed by the existing Global Change Master Directory on-line portal (www.gcmd.nasa.gov) that was implemented as a CEOS project some years ago. This database records satellite, surface (buoy) and other data sets available from multiple agencies around the world. The records contain data descriptions in terms of e.g. resolution, area, time period covered, availability and conditions of access, responsible entity, data formats and other features. In order to further facilitate data access for the purpose of GCOS, and in consultation with NASA/GSFC, M. King proposed that NASA/GSFC develops a dedicated interface to this portal that would provide direct access to the records of interest to GCOS.

Action ET-SAT-3.11 M. King to provide an interface, to be developed by NASA/GSFC, to the Global Change Master Directory portal in order to facilitate browsing and retrieval of instrument data that have been identified as relevant for FCDRs of GCOS Essential Climate Variables. (End November 2007)

Update on Disaster Risk Reduction

7.9 The session was briefed on current international developments regarding disaster risk reduction, as well as the International Charter on Space and Major Disasters, and on related specific satellite-based observation requirements for disaster risk reduction (i.e. risk identification, early warning systems, impact assessment, emergency preparedness, early recovery, risk transfer and sectoral planning). The session took note of the progress made within the DRR programme and the emerging activities to develop requirements for satellite data and products. It looked forward to review these requirements at a future session.

8. R&D TO OPERATIONS TRANSITION STRATEGY *(agenda item 8)*

8.1 The session discussed Document ET-SAT-SUP-3 Doc. 8 that consolidates the outcome of discussions held at previous meetings of the Executive Council, the Consultative Meetings on High-level Policy on Satellite Matters (CM) and Expert Team on Satellite Systems (ET-SAT) on the issue of the transition strategy from Research and Development (R&D) to Operations for relevant instruments and missions contributing to the space-based Global Observing System.

8.2 The paper recalled differences between R&D and operational missions and proposed criteria to evaluate the relevance of a transition from one to the other. It considered particular cases such as technological upgrade of existing operational missions, technology demonstration, preparatory missions, or the change from scientific research objectives to operational ones. Some guidelines were suggested regarding the role of R&D and operational agencies in managing the transition and

the steps that could be taken to ensure continuity of service for WMO Members. The paper also included a discussion of the early use of R&D data in an operational context.

8.3 The session agreed to first discuss the issue in parallel in ET-SAT and ET-SUP in order to address the space agencies' and the users' points of view respectively, and to share the findings of both groups in a joint session.

8.4 The joint session considered ET-SAT-SUP-3 Doc. 8 as a valuable basis for developing a document on the subject for submission to CM-8 and decided to review it in this perspective. A number of amendments were suggested in order to clearly focus on the main issues linked with the transition from R&D missions to operations, to illustrate the statements with examples, and to put a special emphasis on the potential role of WMO in this process.

8.5 Indeed, the role of WMO as a facilitator at many steps of this process was noted as being very important, and in particular:

- To advocate at the policy level a continuum of mandate between R&D and operational agencies in order to ensure that there is no gap in responsibilities when missions evolve from the R&D to the operational status;
- To keep under review a gap analysis highlighting the needs for improvements of the GOS;
- To encourage dialogue between R&D space agencies and operational entities in order to ensure that the needs for technological advances in operational observations are taken into account by R&D space agencies among their programme priorities;
- To identify opportunities raised by R&D missions and related applications;
- To promote awareness of these opportunities and capabilities, e.g. in organizing or sponsoring workshops;
- To contribute to the assessment of the need for transition of relevant missions;
- To acknowledge the required operational status of relevant mission categories in the high-level definition of the GOS, namely the "Vision for the GOS";
- To facilitate or organize the formulation of requirements;
- To encourage and support strong user involvement in the definition, development, validation and assessment of preparatory missions and new operational missions;
- To facilitate wide and open data access and encourage the early use of data from precursor instruments and new operational missions;
- To encourage R&D and operational agencies to support user training for the use of data from precursor and new operational instruments.

8.6 It was agreed that a revised version of the document would be prepared along these lines and circulated to the participants for comments.

Action ET-SAT-3.12 WMO Space Programme to prepare a draft document on the strategy for transition from R&D missions to operations along the lines discussed by ET-SAT/SUP and circulate it to the ET members for comments (15 September 2007)

Action ET-SAT-3.13 ET-SAT members to provide WSP with comments on the draft document on the strategy for transition from R&D missions to operations (1 October 2007)

Action ET-SUP-3.7 ET SUP members to provide WSP with comments on the draft document on the strategy for transition from R&D missions to operations (1 October 2007)

Action ET-SAT-3.14 WMO Space Programme to forward to CGMS-XXXV and CM-8 the document on the strategy for transition from R&D missions to operations.

9. STATUS OF OUTSTANDING ACTIONS FROM PREVIOUS ET-SAT MEETINGS *(agenda item 9)*

Action ET-SAT-2.1 WMO Space Programme Office to forward to the Chairman of ET-EGOS and to the ICT-IOS the proposed updates to the Implementation Plan for the Evolution of the GOS *(immediate);*

***Completed**. This was presented in September 2006 by the Space Programme Office at ICT-IOS-4, which is attended by the Expert Team Chairpersons. An update was also presented to ET-EGOS-3 in July 2007.*

Action ET-SAT-2.2 NASA (M. King) and CMA (W. Zhang) to investigate potential for inter-comparison of Terra/CERES and FY-3A/ERBU Earth Radiation Budget observations *(December 2006)*

***Open**. Initial contacts were established but no recent feedback is available.*

Action ET-SAT-2.3 WMO Secretariat to initiate an inventory of satellite data available in near-real time for global NWP, with indication of the means of data access and expected timeliness *(Next meeting)*

It is noted however that the WMO Information System (WIS) will allow, catalogue interoperability amongst Global Information Service Centres (GISCs) that should facilitate data discovery.
*The action was **closed** and the following new action was agreed:*

Action ET-SAT-3.15 A. Khokhlova will prepare an inventory of satellite data used, or available for use, in near-real time by NWP centres, with the aim to make this inventory available through the WMO Space Programme web page*. (End 2007)*

Action ET-SAT-2.4 ET-SAT members to update the review and identification of past, present and future instruments that have the potential to support the generation of GCOS required FCDRs *(Next meeting)*

***Closed**. See Agenda item 7.3.*

Action ET-SAT-2.5 WMO Space Programme Office to provide each agency represented in ET-SAT with relevant extracts of the latest version of the CEOS/WMO Database *(November 2006)*

***Completed**. This was done by e-mail on 16/08/2007.*

Action ET-SAT-2.6 ET-SAT members to assist in the process of updating the CEOS/WMO data base and provide the WMO Space Programme Office with updated information on relevant missions and instruments along the CEOS/WMO Database standards *(January 2007)*

***Closed** and replaced by a new action. See item 4.*

Action ET-SAT-2.7 The WMO Space Programme Office to update the database with input provided by ET-SAT members and their organizations *(February 2007)*

***Closed** and replaced by a new action. See item 4.*

Action ET-SAT-2.8 WMO Space Programme shall encourage GCOS Secretariat to refine the specifications of its observation requirements as appropriate and to inform the WMO Space Programme Office accordingly *(September 2006)*

***Completed**. GCOS was invited to refine its observation requirements for inclusion in the User Requirements Database, which was done as reported by GCOS in Document 7(2).*

Action ET-SAT-2.9 The WMO Space Programme Office to forward to GCOS, to CM and to CGMS the preliminary analysis of GCOS requirements performed by ET-SAT 2 *(October 2006 for GCOS and CGMS, and January 2007 for CM)*

***Completed**. The outcome of the ET-SAT review of GCOS Satellite Supplement was submitted to the Fourteenth GCOS Steering Committee on 10-12 October 2006, submitted to CGMS-XXXIV in November 2006 and subsequently adopted by CGMS as its preliminary response. This was reported in January 2007 to CM-7 who noted with pleasure the increased collaboration amongst the WMO Space Programme, the CGMS and the Committee on Earth Observation Satellites (CEOS) including a coordination of actions initiated by the three groups in response to the GCOS Implementation Plan. An update was formally forwarded to the GCOS Chairman on 16 February 2007 (Appendix).*

Action ET-SAT-2.10 WMO Space Programme to provide the R&D-to-operations transition discussion to the next WMO Consultative Meetings and identify in more detail the role WMO could assume in the transition from R&D to operations including high-level guidelines, pre-operational projects for data utilization by users and as part of the WMO-wide Operating Plan *(January 2007)*

***Closed** and replaced by a new action. See Item 8.*

10. UPDATE ON THE STATUS OF THE SPACE-BASED COMPONENT OF THE GOS *(agenda item 10)*

10.1 ET-SAT was informed on the status of replies received from space agencies regarding their proposed contributions to the space-based GOS. It was recalled that a satellite programme is contributing to the GOS as part of one of the three constellations (GEO, LEO, R&D) when the following conditions are fulfilled:

- It can satisfy requirements for space-based observations expressed by WMO programmes or WMO co-sponsored programmes;
- The responsible agency agrees to make the data available to WMO Members in a reliable manner;
- The responsible agency agrees to inform WMO Members on how to obtain the data;
- The responsible agency agrees to provide assistance to the WMO strategy for education and training in satellite meteorology;
- In the particular case of R&D satellites, the responsible agency agrees to follow the "Guidelines for requirements for observational data from operational and R&D satellite missions" adopted by the fifty-third session of the WMO Executive Council (EC-LIII).

10.2 J. Yang informed the session that CMA's contribution also included FY-2H and FY-4 O. Dr Michael King and Mr Kiran Kumar agreed to investigate the status of replies by ISRO. Dr King announced that NASA would provide an official response before the end of the day. Dr Eva Oriol-Pibernat clarified that the data from ESA instruments on ESA Earth-Explorer missions were accessible through an open process, subject to registration as a Principal Investigator (PI).

10.3 ET-SAT provided updates to the status of current and future GEO, LEO and R&D satellites, which were immediately incorporated into the WMO web pages.

10.4 ET-SAT briefly reviewed the latest update to the space section of the Implementation Plan for the Evolution of the space and surface-based sub-systems of the Global Observing System (IP-EGOS), resulting from ET-EGOS-3. Further minor updates were proposed to reflect the progress on implementation of recommendations S2, S3, S9, S16 and S17 in accordance with the latest plans for the launch dates of FY-3-A/B (2008/2009), GOES-R (2014), FY-4 O (2014), MTG/IRS (2017), and taking into account the termination of EP-TOMS and the availability of CALIPSO.

JMA status report

10.5 ET-SAT noted the update from JMA on the status of MTSAT-1R, and -2 and the plans for follow-on geostationary meteorological satellite of Japan.

10.6 ET-SAT noted in particular that MTSAT image data are now available via the Internet, that the HiRID and WEFAX services from MTSAT-1R will be discontinued on 12 March 2008, and only HRIT and LRIT will be continued thereafter. Details on this transition are available via the following web page http://www.jma.go.jp/jma/jma-eng/satellite/NEWS/discon2.html. The transition from MTSAT-1R to MTSAT-2 is planned in the middle of 2010. JMA plans to launch in 2014 the first satellite of the follow-on generation that will namely include advanced imaging capabilities.

11. DISCUSSION OF RELEVANT ITEMS FROM THE INITIAL JOINT SESSION *(agenda item 11)*

11.1 The report of ET-SAT discussions on items presented at the joint session is included in the relevant agenda item reports.

12. IGEOLAB *(agenda item 12)*

12.1 ET-SAT discussed the three current IGeoLab concept proposals:

a) Hyperspectral Infrared sensor
ET-SAT confirmed that there would be benefit from such a demonstration, namely as a precursor to a possible flight of a hyperspectral sounder in the GOES-R series. It looked forward to a solution of the current funding issue that would enable considering a flight opportunity for the prototype GIFTS instrument that is currently available as an engineering unit.

b) Geo microwave
Y. Jun confirmed that CMA and CNSA were considering a microwave mission on a dedicated FY-4 satellite (FY-4 M) as a complement to the planned FY-4 optical series (FY-4 O), and felt that WMO should have an important role to promote this challenging project.

ET-SAT recommended to advocate the requirements for such a GEO Microwave mission. It was proposed that WMO acts with the user community to clarify the priority to be allocated between precipitation detection, on one hand, and all-weather high-repetitivity temperature and humidity sounding on the other hand. ET-SAT felt it important that the Task Force on GEO MW provide CGMS with the elements of a comparison among the possible mission concepts, considering how the requirements were satisfied, as well as the schedule, cost and risk.

c) HEO
ET-SAT was interested to note the development of a new IGeoLab mission concept in HEO. While anticipating that such an initiative would be particularly useful to derive polar winds and to support short-range weather forecasting at high latitudes,

ET-SAT recommended to provide more visibility on the requirements underlying this initiative. ET-SAT also wished to have more information on the Arktika project itself.

Action ET-SAT-3.16 WMO Space Programme to circulate to ET-SAT members the Roshydromet presentation of Arktika given at CM-7

13. SPACE WEATHER *(agenda item 13)*

13.1 ET-SAT was informed on discussions held at the seventh session of Consultative Meetings on High-level Policy on Satellite Matters (CM-7) and at the Fifteenth WMO Congress (Cg-XV), on the possible scope of an involvement of WMO in the area of Space Weather and the potential role of the WMO Space Programme (WMO SP) in this respect.

13.2 Space Weather encompasses the conditions and processes occurring in space, including on the sun, in the magnetosphere, ionosphere and thermosphere, which have the potential to affect the near-Earth environment. Space Weather processes can include changes in the interplanetary magnetic field, solar wind, coronal mass ejections from the Sun, and disturbances in the Earth's magnetic field. It was recalled that Space Weather can affect the performance and reliability of space-borne and ground-based technological systems and can endanger human life or health.

13.3 ET-SAT noted that there are several aspects by which Space Weather can be relevant to WMO activities.

a) GOS satellites are directly affected by Space Weather events such as:
   - Differential charging and discharge, Single Event Upsets causing anomalies or damage to on-board computers and instrumentation;
   - Total Dose aging effect on electronic hardware and on solar panel efficiency;
   - Increased spacecraft drag requiring additional manoeuvres;
   - Magnetic disturbances on orientation systems;
   - Interference on communications.

b) Climate variables can be affected by Space Weather, and namely:
   - Total Solar Irradiance;
   - Stratospheric heating;
   - Ionization and ozone processes.

c) Although Space Weather events are not meteorological phenomena, they are combining with meteorological/climate factors to affect human activities, health and life, namely:
   - Aircraft navigation and safety is increasingly affected by Space Weather on polar routes;
   - Telecommunications reliability is affected by atmosphere and Space Weather;
   - Electric power distribution is affected by thunderstorms and geomagnetic storms;
   - Space Weather has an impact on health for astronauts and airline crew and passengers;
   - The possible impact of Space Weather on vegetation is being investigated.

d) Meteorological observations and Space Weather observations do share some infrastructure:
   - Space Weather information can be retrieved from Radio-Occultation sounders;
   - Dedicated Space Weather in-situ sensors are regularly carried on meteorological satellites.

e) Meteorological services can provide experience and support for Space Weather activities.

- Space Weather forecasting is still at a very early stage while atmospheric weather forecasting is a well established discipline; it has thus been suggested that Space Weather might benefit from the experience of atmospheric weather forecasting.
- Actually, in several WMO Members, including China, Denmark, Finland, Russian Federation, and the USA, Space Weather belongs to the mandate of the NMHS.

13.4 While Space Weather is not directly within the mandate of WMO, there might be a benefit for WMO Members if WMO could support some coordination in this area, building on the experience, infrastructure, services and cooperation practices that have been implemented for WMO programmes. Preliminary contacts with CMA, Roshydromet and NOAA were encouraging to investigate further this possibility. A recent letter from the International Space Environment Service (ISES) to the President and Secretary-General of WMO was also invited WMO to explore the issue.

13.5 ET-SAT acknowledged that the Space Weather phenomena had a considerable impact on spacecraft and discussed the relevance and feasibility of an involvement of WMO in that area. It was acknowledged that Space Weather issues were a very wide and complex area which, a priori, did not lie within the mandate of WMO, although for many WMO Members they were part of the mandate of the NMHS. Given the uncertainty about the level of resources available within WMO to support such activity, ET-SAT suggested that a potential involvement of WMO should be focused on particular aspects such as:

- Harmonizing the specifications of Space Weather instruments aboard GOS satellites
- Harmonizing and facilitating data exchange e.g. through the WIS
- Supporting exchange of experience between the NWP and the Space Weather communities.

14. RELATIONS WITH CEOS *(agenda item 14)*

14.1 ET-SAT noted that consideration had been given to closer cooperation with the Committee on Earth Observation Satellites (CEOS) for activities in response to GCOS. Such cooperation was strongly supported by CGMS-34, by the seventh session of Consultative Meetings on High-level Policy on Satellite Matters (CM-7), and encouraged by the WMO Congress.

14.2 ET-SAT was informed on interactions between WMO SP and CEOS in the past year, which led namely to a strong involvement of CEOS in the Re-design and Optimization workshop, and discussed proposed practical orientations to strengthen this cooperation in the future with the aim to optimize the effort of both organizations and of their members.

14.3 ET-SAT appreciated the developments that occurred in CEOS, CGMS and WMO within the past years and noted that some activities were converging, namely in the context of UNFCCC and GEO. It was thus appropriate to ensure that when space agencies were involved in activities within CEOS and WMO, these activities were not duplicating but efficiently and synergetically complementing each other. ET-SAT thus welcomed the proposal to strengthen the relationship with CEOS and to coordinate activities at a practical level such as:

- Hold annual consultation between WMO Space Programme and CEOS Chair or Executive Secretary on the planned activities involving space agencies;
- Keep each other informed on the date and scope of major events;
- Consider joint events as appropriate.

14.4 It was also recalled that collecting and maintaining a database on satellite missions, instruments and performances had started as a joint CEOS-WMO activity. The database has been maintained by WMO but, since we were at the crossroads where the updating process of the database has to be reviewed (See Item 4), this is a potential topic for a joint activity.

15. STATUS OF OUTSTANDING ACTIONS FROM PREVIOUS ET-SUP MEETINGS *(agenda item 15)*

15.1 The actions raised by ET-SUP at their second session were reviewed and their current status was agreed as follows:

Action ET-SUP-2.1 Review the draft revision of the Guide on the GOS, Part IV, Space-based sub-system (Doc. 8(2)) and provide comments back to the WMO Space Programme; (Due date (ET members): end of October 2006);

***Completed**. No comments were received. The document was agreed by CBS and published.*

Action ET-SUP-2.2 Work with the VLMG to increase the participation of WMO Members in the HPTE, distribute the lessons, and strongly encourage HPTE presenters and Regional Focus Groups to practice; (Due date (all ET members and WMO Space Programme staff members): 6 October 2006);

***Completed**.*

Action ET-SUP-2.3 OPAG-IOS Chair to take the application of PR Brazil to host a CoE in Brazil at CPTEC forward to CBS and CGMS following receipt by WMO Secretariat of the sponsorship letter from NESDIS; (Due date: November 2006);

***Completed**. New CoEs in Brazil and Argentina were endorsed by both CGMS (ref: Report of 34th Meeting of the CGMS, section G.1) and CBS (ref: Final Report of CBS-Ext.(6), section 6.1.3).*

Action ET-SUP-2.4 WMO Space Programme to inform the IGDDS Implementation Group of the ET-SUP suggestions and comments resulting from the review of the IGDDS draft Implementation Plan; (Due date: to be confirmed);

***Completed**. The suggestions and comments from ET-SUP-2 were communicated to the first IGDDS-IG meeting in July 2007 (under agenda item 2). The suggestions were agreed and the related discussion is recorded in section 3.7 of the IGDDS-IG-1 Final Report.*

Action ET-SUP-2.5 OPAG-IOS Chair to provide CGMS with details of the current status (and initial outcomes) of HPTE; (Due date: November 2006, CGMS-XXXIV meeting);

***Completed**. CGMS was informed of the HPTE and of the initial indicators of its remarkable success with participation exceeding expectations (ref: Report of 34th Meeting of the CGMS, section G.1).*

Action ET-SUP-2.6 WMO Space Programme to advise PR of Brazil of the outcome of the ET-SUP review of the CPTEC application to become a CoE; (Due date: end of October 2006);

***Completed**. The PR was informed and fully briefed during WMO Congress.*

Action ET-SUP-2.7 WMO Space Programme to invite INPE to become a contributing member to the space-based component of the GOS; (Due date: CM-7);

***Completed**. INPE were invited to describe its contribution to the space-based component of the GOS in advance of CM-7 (ref: letter dated 18 January 2007).*

Action ET-SUP-2.8 WMO Space Programme to provide newsletter along the lines of the ET-SUP newsletter as resources allow (Due date: to be confirmed);

***Completed**. ET-Space Newsletter #4 was distributed in February 2007.*

Action ET-SUP-2.9 The ET requested that the WMO Space Programme liaise with WWW to identify if any statistics exist, or could be collected, on the amount and type of satellite data being carried by the GTS as the beginning of collection of additional information for the 2007 TD on the Status of the WMO Space Programme Implementation Strategy to improve the Utilization of Satellite Data and Products; (Due date: ET-SUP-3);

***Ongoing**. Following consultation with WWW it emerged that no systematic statistics exist. However, relevant information may be available from major NWP centres (e.g. ECMWF). There have been insufficient resources within the WMO SP Secretariat to perform such an exercise to date. It is foreseen that such information may be considered for future editions of the TD. See also action ET-SUP-2.11 below.*

Action ET-SUP-2.10 The ET requested that the WMO Space Programme work with the IGDDS Implementation Group to identify if it will be possible to collect statistics on the number of users, type of data and products that are being moved by the ADMs and IGDDS as the start of collection of additional information for the 2007 TD on the Status of the WMO SP Implementation Strategy to improve the Utilization of Satellite Data and Products to be confirmed, at the fourth IGDDS RARS Workshop;

***Ongoing**. This action is related to the question of gathering the regional requirements for the various IGDDS components. Once these requirements are expressed, agreed and addressed the individual IGDDS service providers (ADM operators) will routinely monitor their services, including the numbers and characteristics of their users. At that point it would be appropriate to consider such monitoring information as a supplementary source of information for the Technical Document as suggested in the action. It is foreseen, therefore, that such information may be considered for future editions of the Technical Document (TD).*

Action ET-SUP-2.11 The WMO Space Programme requested to investigate whether it is practical to collect information from users such as NWP centres on the type and quantity of operational and R&D satellite data being used in operational assimilation systems as the start of collection of additional information for the 2007 TD on the Status of the WMO Space Programme Implementation Strategy to improve the Utilization of Satellite Data and Products; (Due date: ET-SUP-3);

***Ongoing**. This still appears to be a useful and practical way to proceed; however, there have been insufficient resources within the WMO SP Secretariat to perform such an exercise to date. It is foreseen that such information may be considered for future editions of the Technical Document.*

Action ET-SUP-2.12 WMO Space Programme to provide the R&D to operations transition discussion to the next WMO Consultative Meetings and identify in more detail the role WMO could assume in the transition from R&D to operations including high-level guidelines, pre-operational projects for data utilization by

users and as part of the WMO-wide Operational Plan; (Due date: ET-SUP-3);

***Completed**. This subject was presented to CM-7 in January 2007 where it was discussed at length. ET-SUP-3 agenda item 8 addresses the latest status of the subject and includes the outcome of the CM-7 discussions.*

Action ET-SUP-2.13 WMO Secretariat to update the draft Technical Document to include new components as described in paragraph 4.10 (and Annex V) as possible and if time permits; (Due date: end of September 2006);

***Completed**. The current Technical Document has been updated to the extent that the limited WMO SP resources allowed and will be presented as ET-SUP-3 agenda item 20.*

Action ET-SUP-2.14 Improve future editions of the Technical Document based on recommendations in Appendix V as appropriate and where possible; (Due date: ET-SUP-3);

***Ongoing**. This action is applicable to the Technical Document summarizing future editions of the questionnaire which will be considered under ET-SUP-3 agenda item 20.*

15.2 The session also reviewed an outstanding action from their first session as follows:

Action ET-SUP-1.14 WMO Space Programme to convene a workshop on RGB compositing.

***Completed**. The workshop was held in Boulder, U.S.A. on 5-6 June 2007. The workshop report was presented in document 15.2 and ET-SUP took note of the workshop report.*

15.3 The session went on to consider the status of actions raised by CBS Ext.(06) that were assigned to OPAG-IOS and were relevant to satellite utilization and products as follows:

(i) Requested OPAG-IOS to advise CBS of the additional factors that could influence the evolution of the baseline of the space-based component of the GOS in the 2015 to 2025 period through the inclusion of sustained R&D missions. Impacts on the GOS Plan and evolution to be investigated through collaboration between ET-EGOS, ET-SAT and ET-SUP;

This action is being addressed and is part of the motivation for ET-SAT/SUP-3 agenda items 5 and 8 where it will be considered in detail;

(ii) Endorsed the establishment of two new Virtual Laboratories for Education and Training in Satellite Meteorology Centres of Excellence in Brazil and Argentina;
This merely notes the CBS decision and is reported against action ET-SUP-2.3 above;

(iii) Encourage the growth of the Virtual Laboratory (VL) to ensure that all WMO Members have access to the training and materials that are available through VL Centres of Excellence and their sponsoring satellite operator(s);

… and …

(iv) Encourage Members, especially from developing countries, to participate more actively in the training and outreach programmes provided by their respective VL Centres of Excellence;

These two actions are completely in line with the direction of the VLMG and the VL partners. They underpinned the discussions at VLMG-3 which are included under ET-SAT/SUP-3 agenda item 18.

15.4 The session then took note of the OPAG-IOS ET-SUP work plan for 2007-2008 as agreed by CBS Ext.(06). This information is included in Appendix VI.

16. DISCUSSION OF RELEVANT ITEMS FROM THE INITIAL JOINT SESSION *(agenda item 16)*

16.1 In its plenary sessions ET-SUP discussed three items from the initial joint session, namely R/SSC-CM, the status of GOS re-design and optimization and the strategy for transition from R&D to operational missions. The outcomes of these discussions are combined with those of ET-SAT in the sections of the report dedicated to the three topics.

17. IGDDS AND RARS *(agenda item 17)*

17.1 The session reviewed the status of the IGDDS and RARS projects. It acknowledged that the two projects were closely linked by virtue of their respective objectives, participants and similar levels of maturity and that both projects have established Implementation Groups.

17.2 The session noted that both projects had been reviewed by CGMS at its 34th session and that CGMS had strongly supported the aims of the projects and had endorsed the Terms of Reference of the respective Implementation Groups. CGMS also specifically expressed its support to the planned RARS expansion and highlighted that IGDDS should guarantee a quality of service and traceability of the delivered products. CGMS felt it essential to clearly identify the requirements to be fulfilled by IGDDS when infrastructure components were shared by different (meteorological and non-meteorological) applications. It recommended that CGMS operators should support the objectives of the IGDDS Implementation Plan.

17.3 The session reviewed the outcomes of the first meetings of the RARS and IGDDS Implementation Groups (IG) that had taken place in Geneva on consecutive days in July 2007 and agreed the following:

- ET-SUP took note of, and welcomed, the progress of the RARS and IGDDS projects as stated in reports of the first meetings of the respective Implementation Groups;
- ET-SUP noted that these projects have been formulated with the needs of WMO Members as a key goal;
- ET-SUP noted the proposed changes to the IGDDS-IG Terms of Reference and to the IGDDS Implementation Plan and endorsed both changes;
- ET-SUP indicated that the use of the term “Data discovery” in section 4.3 a) of the Implementation Plan might not be widely understood and its meaning could be better defined.

17.4 The group noted the recommendation as stated in the RARS-IG report that all HRPT stations should also be capable of receiving Metop data (A-HRPT standard). They recognized that this comes with some cost to the station operator and wondered whether advice could be provided. The group noted that NOAA, EUMETSAT and WMO maintain a list of equipment manufacturers and that there may be benefit in providing some centralized support to users confronting this problem (e.g. through the RARS project web pages).

17.5 The group noted the current and planned RARS coverage maps and also took note of the actions raised by the IG to address the gaps in coverage. They were pleased that activities were in hand to evolve to quasi-global coverage but expressed some concerns that the foreseen coverage at “end of 2008” had not significantly evolved from the “end of 2007”. It was explained to the group that these maps showed only what was firmly planned and could be enhanced to show also what

was under consideration – which would indicate a much more complete coverage picture. The group requested that this aspect be made clear on the coverage maps.

17.6 ET-SUP considered the question of extending the RARS concept to include data from instruments other than ATOVS, noting that EUMETSAT have introduced a service for AVHRR and ASCAT. They felt that such an extension was an attractive and logical way forward in the medium term because it improved the timeliness in comparison with global orbit data, and because data from a limited number of direct readout stations could be shared across a whole region. They especially noted the potential value in considering hyperspectral sounding instruments in this context. This would have the potential to benefit two sectors of the user community:

- The collection, concentration and pre-processing of level 1 hyperspectral sounder data, in line with the RARS approach, followed by their dissemination via GTS or via satellite (similar to the current processing of ATOVS) would improve the timeliness of reception of these data for NWP centres;
- As concerns users in areas with poor upper air networks in particular in *Developing (Ds), Least Developed Countries (LDCs)* and ocean areas, there would be also a strong interest in level 2 products (e.g. atmospheric profiles) from these data, if some processing centres could make them available in a timely fashion.

17.7 ET-SUP identified a possible issue in the case where an IGDDS data provider was not able to transfer products to the regional service uplink site in a timely way due, for example, to technical or communication constraints. They suggested that the possibility of multiple uplink sites might provide a solution (e.g. the data provider uplinking their own products) but those ET members with experience of DVB-S systems advised that this would be an extremely unlikely scenario.

17.8 The group raised the issue of the NPOESS so-called ‘safety net’ network and whether, under a Joint Polar System agreement between EUMETSAT and NOAA it was foreseen that Metop data could be handled by such a system with the consequent improvements in timeliness. The group could not supply the answer from within their membership and hence raised an action for this to be clarified at CGMS.

Action ET-SUP-3.8 The OPAG-IOS Chair is requested to seek clarification through CGMS as to whether the provisions of a Joint Polar System would enable Metop to take advantage of the NPEOSS safety net in order to improve timeliness of global data delivery to users.

Identification of regional IGDDS requirements

17.9 The session considered a Standard Product Inventory that had been drafted by the Secretariat and reviewed by the IGDDS-IG to be used as a “first guess” for detailing user requirements for satellite data and products disseminated in each Region. The session further noted that the IGDDS-IG had advised that requirements be discussed within WMO Regional bodies bearing in mind the context of the footprints of the various DVB-S systems but not constrained by them.

17.10 ET-SUP considered the mechanism proposed to be appropriate for the purpose but noted that WG-PIW meetings are usually convened only every four years so their input would be restricted by this.

17.11 From their knowledge of general user requirements ET-SUP supported the inclusion of the element “GEO imagery over the region” in the generic requirement table and anticipated that this would be high priority information to be carried by DVB-S systems for all regions.

Impacts and benefits

17.12 ET-SUP was pleased to note that the successful implementation of the IGDDS and RARS projects would potentially contribute to nine out of the eleven Expected Results described earlier under the WMO Strategic Planning Process presentation.

18. VIRTUAL LABORATORY AND OTHER TRAINING ACTIVITIES *(agenda item 18)*

Current Status and Future Plans for the VL – VLMG Co-chairs assessment

18.1 The outgoing VLMG Co-chairs informed the session of the current status and future plans for the WMO/CGMS Virtual Laboratory for Training in Satellite Meteorology (VL). The information was based on the outcomes of the third Virtual Laboratory Management Group meeting (VLMG-3) in Boulder, USA in June 2007, and also covered the evaluation of the 2006 High Profile Training Event (HPTE). The Co-chairs expressed their pleasure and pride in reporting an active outward-looking VL and thanked the VLMG members for their support and encouragement over the last four years.

18.2 It is now very clear that the HPTE was a great success and the Co-chairs asked the Expert Teams to note the tremendous work undertaken by all VL members for the HPTE. In particular they highlighted the extraordinary efforts undertaken by INPE/CPTEC in September and October 2006 (even before CBS and CGMS approved their nomination as a CoE) to not only set up their own VL website, translate the core HPTE lectures into Portuguese and run a separate HPTE for Portuguese speaking countries but also to separately evaluate and report the training event in a very useful format. At ET-SUP-2 the expectation for the HPTE was of a target audience worldwide of approximately 150. In reality the numbers were very much higher than this with more than 2,000 participants from more than 125 WMO Members. HPTE lectures were delivered in English, Spanish and Portuguese. Some of the lectures in Africa used English slides but were presented in French. The participant evaluations were very positive, particularly those from Central and South America where they requested more sessions on a regular basis. At the Fifteenth WMO Congress in May 2007 Members requested that "… further initiatives along the lines of the HPTE be undertaken during the next inter-sessional period, subject to available resources".

18.3 The VLMG-3 extensively reviewed and evaluated the HPTE. In summary the HPTE met or exceeded most of its objectives and goals. The one area that wasn't fully met was the provision of all of the lectures in the six WMO languages. However, since the VLMG-3 meeting, work has begun on translating the HPTE lectures into Arabic, Russian and French. When these translations are completed the HPTE lectures will be available in all WMO languages, plus Portuguese. A DVD containing the HPTE resource material in English, Spanish and Portuguese is in the final stages of production and should be distributed in the near future. The lectures also include English and Portuguese audio. The WMO Space Programme Secretariat has recently distributed "Certificates of Participation" to all those people who returned the post course evaluation.

18.4 The Co-chairs reported that VLMG-3 had reviewed the five-year goals from the first VLMG meeting in May 2001. The broad assessment was that the VL has met or surpassed all of its important goals during the six-year period since VLMG-1. In addition, there have been outcomes that were not in the five-year goals set forth at Darmstadt which include the HPTE, the formation of Focus Groups, the use of electronic notebooks and hard drives and the full engagement of ET-SUP. In 2006 three new CoEs joined the VL and are contributing to its success. The full assessment of the VL by VLMG-3 is detailed in the VLMG-3 Final Report but a key recommendation made by the VLMG was the following:

> *Recommendation for ET-SUP and CGMS: The VL and its Management Group continue as put forth in the evaluation document. Furthermore the value of the activities within the VL, experience with the HPTE and the growing need for training and outreach as requested by Congress point to the need for the development of a position within the WMO SP whose sole role is to support satellite training and VL activities.*

18.5 Other important subjects for the future of the VL reviewed by the VLMG-3 (and recorded as appendices to the Final Report) were the Expectations for VL Partners, the Terms of Reference for the VLMG, the Objectives of the VLMG for the next five years and the Principles for Running VL Training Events. The Co-chairs requested ET-SUP to review and endorse these elements of the VLMG-3 Final Report for CGMS and CBS as the basis for the VLMG operations for the next five years and consider whether all current VL partners should be requested to re-affirm their commitment to VL by confirming their intentions to meet the revised expectations, Terms of Reference and principles statements.

18.6 The Co-chairs stressed that VLMG-3 noted the high success of the ongoing Regional Focus Group of the Americas in building a robust training and operational community of users of satellite data and products in Central and South America. They informed the session that Mr Tony Mostek (NWS) had agreed to take on the role of Global Coordinator for the Regional Focus Groups with the aim of encouraging and assisting the other Regional Focus Groups to become more active in assisting WMO Members in their Region.

18.7 The VLMG Co-chairs then reported the decisions taken at VLMG-3 regarding the selection of Co-chairs for the next session of the VLMG. Both of the current Co-chairs advised the VLMG that whilst they remained fully committed to the VL they wished to step aside to allow new Co-chairs to take their place and continue the expansion of the VL. The VLMG-3 recommended (and the two nominations agreed) that Dr Volker Gaertner from EUMETSAT take over the Satellite Operator Co-chair and Dr Luiz Augusto Toledo Machado from INPE/CPTEC take over the Centre of Excellence Co-chair. In accordance with the agreement on appointment of VLMG Co-chairs, ET-SUP members were invited to endorse the VLMG-3 recommendation for Dr Luiz Augusto Toledo Machado to take over the CoE Co-chair position. CGMS-35 will be invited to endorse the VLMG-3 recommendation for the appointment of Dr Volker Gaertner to the Satellite Operator Co-chair. The two outgoing Co-chairs have agreed to continue in an ex-officio role to assist the new Co-chairs in their role.

Discussions by ET-SUP

18.8 ET-SUP noted that the highly successful 2006 HPTE had been global in nature and was done with specific goals that included linking all CoEs and Sponsor Satellite Operators in a single Virtual Training event. It noted that future VL training events would encompass the successful paradigm set by the HPTE, but would be more regional in focus and thus the name for such regional training events should not be HPTE but rather a name designated by the responsible CoEs with respect to a particular event.

18.9 ET-SUP endorsed the report of the recent Virtual Laboratory Management Group (VLMG) meeting including the continuance of the Virtual Laboratory (VL), and its revised goals and objectives, Terms of Reference and expectations for the partners. Furthermore, ET-SUP recommended that the WMO Secretary-General send a letter to PRs of CoE's and CGMS Satellite Operator VL Sponsors thanking them for their active engagement and support of the VL, noting the great success of the HPTE, noting the recommendation of ET-SUP for continuation of the VL, noting the expanded role and responsibilities of the VL partners and requesting that they agree to continue in this role.

Action ET-SUP-3.9 WMO SP to send a letter to PRs of CoE's PR and CGMS Satellite Operator VL Sponsors thanking them for their active engagement and support of the VL, noting the great success of the HPTE, noting the recommendation of ET-SUP for continuation of the VL, noting the expanded role and responsibilities of the VL partners and requesting that they agree to continue in this role.

18.10 With regard to VL Regional Focus Groups (RFGs), ET-SUP noted the success of the Americas-Caribbean RFG and the importance of the development of similar RFGs across the VL. ET-SUP endorsed the recommendation from VLMG-3 that Mr A. Mostek take up the role of Global

VL RFG Coordinator. The ET-SUP suggested that each RFG should strive to hold routine RFG sessions on a monthly basis, at a minimum. ET-SUP recommended that, to assist with development of a RFG in Asia, CMA in coordination with other VL CoEs host a Focus Group planning meeting in 2008. The group noted that as the RFGs grow to serve all WMO Regions the RFG concept will evolve and become more dynamic as these groups build upon their varied experiences. The session recommended that each RFG should have a good support structure and a dedicated focal point.

Action ET-SUP-3.10 Mr A. Mostek to contact each RFG to identify dedicated focal points and to assist, where necessary, in the establishing of monthly RFG sessions in all regions. In particular Mr Mostek should liaise with CMA and other VL CoEs to facilitate the establishment of an RFG in Asia.

18.11 ET-SUP agreed that the VLMG Co-chairs should maintain regular contact with the other members of the VLMG and that it is their responsibility to coordinate inter-sessional activities. ET-SUP noted that the VLMG co-chairs are responsible for a written annual report of activity within the VL to WMO and CGMS via OPAG-IOS. The ET-SUP agreed that it was the responsibility of each CoE and Sponsoring Satellite Operator to provide the VL Co-Chairs with an annual VL summary/report at the end of August each year outlining their training activities for the past 12 months, anticipated training activities for the next twelve months, priority training needs for the region for the next 12 months, their ability to meet VL training needs, and other information relevant to the VL.

Action ET-SUP-3.11 The VLMG Co-chairs to maintain regular contact with the other members of the VLMG, to coordinate inter-sessional activities and to provide a written annual report of activity within the VL to WMO and CGMS via OPAG-IOS, based on input solicited from each CoE and Sponsoring Satellite Operator at the end of August each year.

18.12 ET-SUP reviewed and unanimously endorsed the VLMG recommendation that Dr Luiz Augusto Toledo Machado take over the CoE Co-chair position from the outgoing Co-chair, Mr Jeff Wilson. It suggested that the length of appointment of Co-Chair terms be four years, and that re-appointment is permitted. ET-SUP encouraged continuation of the practice of having the VL Co-Chairs from different partnerships.

18.13 ET-SUP strongly endorsed the concept presented in the VLMG-3 recommendation that a full-time VL training officer position in the WMO Space Programme Office is necessary to support the VL activities. ET-SUP indicated that a full time position should have scope beyond training and include other duties related to ensuring full utilization of satellite data in all WMO Regions. An outline of some of the duties such a position might undertake is presented in Appendix VII, with tasks listed in priority order.

18.14 ET-SUP noted the problems with security and firewall limitations being encountered by VL members with free audio over Internet service such as SKYPE and YAHOO. The ET-SUP noted efforts by the VISIT team and others to solve this problem and looked forward to hearing about and testing their solution.

18.15 ET-SUP recognized the synergy between topics addressed in VL training courses and eight of the nine GEO Societal Benefit Areas (Disasters, Health, Energy, Climate, Water, Weather, Ecosystems, Agriculture, (but not Biodiversity)). It was suggested that future training activities take this into account and that future courses' syllabus be designed to reflect this synergy.

18.16 ET-SUP addressed possible WMO sponsored training events during the period 2008-2012. Since the last such event had been in the Asia Pacific region and since EUMETSAT covers training requirements within Europe and Africa, ET-SUP recommended that the next WMO sponsored training event be held at one of the new CoEs in South America. It was agreed that such planning had its genesis in late 2006 and that circumstances and timeline considerations, in

order to have a timely event in a July/August 2008 timeframe, made the Brazil CoE most attractive as the host for this training event. Thus, in addition to the planned events described in the reports of status and plans for the various regions, the following events are suggested:

- July/August 2008 WMO VL multi-regional satellite training event that focuses on satellite remote sensing, use of the Virtual Lab and topical presentations focusing on GEO SBAs. Venue: Brazil CoE;
- August/September 2008 Virtual delivery using VISITView of selected Brazil lectures;
- EUMETSAT multi-regional satellite training event proposed for 2009 in Africa;
- Next WMO VL multi-regional satellite training event proposed for 2010 in CMATC, subject to available funding.

18.17 ET-SUP discussed future activities with regard to these planned training events. For the 2008 event, support arrangements between WMO and CoE Brazil need to be finalized. The question of inclusion of non-NHMS personnel in training events was discussed. It was agreed that inclusion of non NHMS as students is at their expense and after WMO quota for student numbers has been filled.

Action ET-SUP-3.12 WMO SP and VLMG to liaise with South American CoEs and other prospective partners to organize a multi-regional satellite training event in South America in 2008.

18.18 The question of evaluation of virtually presented training was brought forth. It was agreed that the evaluation presented by Brazil concerning their presentation of HPTE was a model that should be followed. Dr Luiz Toledo Machado provided a detailed discussion of the methodology used for their evaluation and this was discussed as follows:

- Each student was informed that there would be an evaluation after the training – this information was provided as part of email instructions regarding the training event. A separate email was sent to each participant – if there was no evaluation completed then there was a follow-up email informing them that this must be done to receive a certificate.
- Evaluation was done partially online. This was critical for ease of use by participants and for the technical staff that prepared the subsequent report with graphics and charts.

18.19 The need for post-training evaluation was discussed with a six-month timeframe agreed upon. The evaluation could be as simple as having each student that received a certificate provide a self assessment by answering a few simple questions such as: “has the training helped you in your utilization of satellite data/products?” or something as complicated as asking the student to re-evaluate what they provided in their first questionnaire.

Action ET-SUP-3.13 VLMG Co-chairs and WMO SP to develop guidelines for post-training evaluation based on the method used by Brazil for the 2006 HPTE and to encourage CoEs and satellite operators to adopt these guidelines in the evaluation of future training events.

18.20. A post-HPTE DVD of the core lectures was provided for review by EUMETSAT. The DVD is in Portuguese, Spanish and English. The Portuguese and Spanish reviews are completed and the English review is expected to be done by mid-September. Comments should be sent to Gordon.Bridge@eumetsat.int with copies to Jeff Wilson and Richard Francis.

Action ET-SUP-3.14 ET-SUP members to review the DVD of the core HPTE lectures and provide comments to EUMETSAT (Gordon Bridge) with copies to Jeff Wilson and Richard Francis (end-September 2007).

18.21 ET-SUP reviewed and confirmed the application of NSMC to have the CMATC which is the Beijing component of the Nanjing RTC become a CoE. This will be taken forward by OPAG-IOS to CGMS for final disposition.

Action ET-SUP-3.15 OPAG-IOS Chairman to take forward to CGMS the application of NSMC to have CMATC, the Beijing component of the Nanjing RTC, become the CoE for the region (November 2007)

18.22 ET-SUP reviewed the options for defining a basic satellite course along with the suggested resources to support the course. These courses will eventually be online as is already available at VISIT (SHyMet course) and at CMATC. The VLMG is requested to coordinate a process to share satellite course information among the training centres and CoEs. By doing this, the VLMG can ensure that these groups are integrated into the VL concept. In addition to the online library access, the VL also needs to ensure that there is a course structure to provide registration, evaluation, testing and certificates of completion. One possible tool to do this, already in use at come training centres, is MOODLE.

18.23 ET-SUP noted the active Regional Meteorological Training Centre in the Russian Federation and reviewed the options for a new CoE in the area, noting that RA VI currently has no CoE. In this respect, WMO would welcome receiving a letter from the PR of the Russian Federation in which he would inform CGMS that the Russian Federation is supporting a CoE in the WMO VL, which would be available to support satellite training in the Russian Federation and Europe. In addition the proposed Centre of Excellence would have to be sponsored by a space agency (e.g. Roscosmos). EUMETCAL and the Russian CoEs could consider sharing support for training activities in the region. WMO SP can provide a template of documentation of previous letters from Argentina and Brazil used last year to assist with preparation of these letter(s).

Action ET-SUP-3.16 WMO SP to provide copies of documentation related to the establishment of the CoEs in Argentina and/or Brazil to the Russian Federation to be used as indicative templates for similar correspondence for the establishment of a new Russian CoE (end-September 2007).

18.24 ET-SUP noted with interest the ongoing discussions between EUMETSAT and the South African Weather Service (SAWS) regarding the possibility of EUMETSAT sponsoring SAWS as a new CoE.

Status and plans for satellite training activities

18.25 The status and plans for satellite training activities in the Asia Pacific region, the Americas and the Europe/Africa region were reported to the group and are summarized in Appendices III, IV and V respectively.

18.26 ET-SUP noted the useful tabular layout of planned events in the report of status and plans for the Americas (Doc. 18.3) and agreed that this would be a good approach to maintaining a record of all planned VL related events.

Action ET-SUP-3.17 VLMG Co-chairs to create and maintain a table of VL related training events and publish this table as appropriate, including on VL web pages

19. USER INFORMATION *(agenda item 19)*

19.1 The session recalled the discussions on this subject at the 2006 meetings at which ET-SUP had recognized the central role played by the Internet and by the WMO Space Programme web pages in particular and had expressed a concern that published information must be up-to-date since outdated information was not only unhelpful but also might be a disincentive to revisit the pages in the future.

19.2 The session further recalled that it had suggested a number of principles that should be adhered to in the design of new web pages and made a number of recommendations for potential improvements to the web pages.

19.3 The current status of the Space Programme web pages was presented to the session via a guided tour of the live web site paying particular attention to the way in which the suggestions and recommendations made at ET-SUP-2 had been addressed.

19.4 The session expressed its appreciation for the extent to which the web pages have been improved and recognized that this had been done in line with their suggestions and recommendations. The session were of the opinion that the information available via the web site was now very comprehensive and would be of significant value to the varied audience who would consult the pages.

19.5 The session agreed that detailed information about available satellite products would be best addressed by taking advantage of initiatives that were underway or planned elsewhere, including the implementation of product catalogues and discovery / access portals. Hence, embarking on a comprehensive development specifically for the Space Programme would almost certainly represent duplication of effort. Instead it was proposed to take advantage of the related developments in the context of the WIS, of GEONETCast and other activities and to address this issue by considering ways of interfacing with these facilities.

19.6 The session recognized that two areas for which development was still ongoing concern the pages describing training activities (especially the Virtual Laboratory) and the CGMS. On the subject of training, the session agreed that this would be raised with the VLMG. On the subject of CGMS the session noted the ongoing dialogue between the Space Programme and EUMETSAT (the CGMS Secretariat) on the question of the division of responsibilities for CGMS web page content.

20. PROGRESS MONITORING AND USER FEEDBACK *(agenda item 20)*

Background

20.1 The session recalled the background to the subject, namely the strategic goal of the CBS OPAG-IOS to improve systematically the utilization of the space-based component of the Global Observing System's capabilities with emphasis on improving utilization of satellite data and services in developing countries. The session further recalled that one of the means to measure the extent to which this goal is being achieved is the distribution to WMO Members of a dedicated questionnaire addressing the availability and use of satellite data. It was agreed that this questionnaire and the analysis responses should form the basis of the discussions.

20.2 A preliminary evaluation of the latest questionnaire (covering the period 2004-2005) was performed by the group at their second session in 2006. At that session a preliminary and limited analysis of the questionnaire responses was available and presented in an early draft of the associated Technical Document (TD).

20.3 ET-SUP-2 had expressed the opinion that further work was necessary before the draft TD could be considered for publication and the session also stressed the need to significantly improve participation in future questionnaires, to streamline the questionnaire, and to have a mechanism to respond to questions and concerns raised by Members in their responses.

Inter-sessional work

20.4 The session noted that the manipulation and analysis of questionnaire results requires particular skills and is a particularly labour-intensive task. The initial work performed prior to ET-SUP-2, including the generation of the initial draft TD and the presentation to ET-SUP-2, was performed by a specially hired consultant. Following ET-SUP-2 the services of the consultant were

secured for a limited additional period. It had been necessary, therefore, to prioritize the outstanding work to take account of this limited resource. Based on the recommendations of ET-SUP-2 the initial draft Technical Document was updated. It had not been possible in the time available to incorporate late responses.

20.5 The session also noted that the draft TD anticipates that the graphs, tables and charts that have been generated to illustrate the analysis of responses will accompany the TD on a CD-ROM and that, for the purposes of the review by ET-SUP-3, these files, along with an explanatory note and glossary of terms and acronyms, had been stored on the WMO web server pages.

20.6 Before reviewing the TD the group was informed that the fourth session of the CBS Implementation/Coordination Team for the IOS (CBS/ICT/IOS-4) had met in September 2006, shortly after ET-SUP-2 and had:

- *Requested that ET-SUP use the outcomes of the questionnaire and associated Technical Document to work with the Regional Rapporteurs to provide a two-way flow of information for WMO Members on Improving the Utilization of Satellite Data and Products;*
- *Noted the low response to the questionnaire and made a similar finding when considering the questionnaire for the impact of new instruments on the GOS. The session recognized possible symptoms of "questionnaire fatigue" and commented that ET-SUP should work with other ETs and Rapporteurs to investigate if there is any value in combining questionnaires such that there is an overall IOS questionnaire that examines the top level information required by the IOS for planning and monitoring purposes.*

Current status

20.7 The group considered the suitability of the updated draft TD for publication bearing in mind that more than one and a half years had elapsed since the questionnaire was issued. They agreed that:

- It should indeed be published since it contains much useful information, users would be expecting it and a great deal of work had gone into it;
- It should be published very soon, ideally within 4-5 weeks, and hence any further proposed changes must fit into that timescale;
- The title page (and possibly also the Introduction) must make it completely clear what years the results are referring to and any reference to the year of publication should either be removed or reduced in visual significance;
- The report itself along with the accompanying spreadsheets and explanatory text should be recorded on CD-ROM and a copy of the CD-ROM should be sent to each PR;
- In addition the TD and accompanying information should be published on the Space Programme web pages;
- It should be published in its complete form but that, in the time available before publication, it would be necessary to thoroughly proof-read the document to ensure it is accurate and free from typographical errors (some problems were already noted);
- In addition it is desirable to:
  - Extract and highlight the key findings either through a dedicated section of the document or through the extraction and inclusion of a selection of the most informative charts;
  - Formulate brief responses to the hypotheses based solely on the analysis of the responses where possible (i.e. give an indication of whether what was hypothesized had been confirmed by the data).

20.8 The group formulated some ideas as to why responses may not have been received, although it noted that, in comparison with other WMO questionnaires, the level of response compares quite favourably. The ideas included:

- Translating the questionnaire as well as the cover letter into the WMO languages may have increased responses had this been possible;
- The original idea of sending reminders was not carried out due to lack of resources and this could have made a difference;
- It was thought that following up (or at least acknowledging) the cases where an NMHS has stated difficulties in receiving or exploiting satellite data would provide an incentive for the NMHS to complete the next questionnaire – the opposite effect may result if stated difficulties are perceived to be ignored.

The next edition of the Questionnaire

20.9 Following the approved CBS Ext.(06) work plan, ET-SUP reviewed plans to issue the next edition of the questionnaire and produce the next TD on the Status of the Utilization of Satellite Data and Products by WMO Members. ET-SUP recalled that these status reports were compiled on a two-yearly basis to match with CBS meetings. It was essential that the report to CBS was based on the most recent data which put strong time constraints on the data collection, analysis and report preparation.

20.10 Noting that the next CBS meeting is in November 2008 and that it was desirable to have information for CBS for the period 2006-2007, it was decided to minimize the changes to the current questionnaire which would be distributed to Members in the December 2007 time frame. In order to expedite reception and return of the questionnaire it was decided to investigate options for providing Members with a web based or electronic version. A preliminary work programme, timelines and risk assessment was carried out by the ET-SUP working group that will further this activity. The ET-SUP working group of Paolo Pagano, Wolfgang Benesch, Jeff Wilson and a Secretariat representative will refine the preliminary proposed work programme before the end of October 2007 and keep the OPAG-IOS Chair advised of progress with this activity. The working group noted that it would not be possible to meet the very tight deadlines to produce the report by November 2008 without strong ongoing support from the WMO Secretariat. Without this support it is questionable whether the status document will serve any purpose since it will be too far out of date to be useful for the CBS requirements.

20.11 The agreed preliminary work programme is as follows:

- Refine work plan and prepare a Project Plan on how to do the status report (October 2007);
- Identify and develop options for translation of questionnaire (October 2007);
- WMO SP to negotiate with EUMETSAT re-use of their online survey form (October 2007);
- Update the questions in the current questionnaire (November 2007);
- Refine the method of performing the analysis of the questionnaire data (early March 2008);
- Identify alternative sources of information (early March 2008);
- Refine old hypotheses and develop new ones for testing the data (early March 2008);
- Monitor progress against the plan and report to OPAG-IOS chair in January and March 2008;
- Develop an outline plan for the TD (March 2008);
- Assess tasks remaining and resources required to complete analysis of responses and to generate the TD (April 2008).

The following actions arise from the agreed approach.

Action ET-SUP-3.18 The ET-SUP working group on progress monitoring and user feedback to refine their preliminary work programme, timelines and risk assessment and

to draft the next edition of the questionnaire with the view of making the questionnaire available to Members by the beginning of January 2008.

Action ET-SUP-3.19 The ET-SUP working group on progress monitoring and user feedback to refine the method of performing the analysis of questionnaire responses, identify alternative sources of data to contribute to the analysis and develop an outline plan for the TD (March 2008);

Action ET-SUP-3.20 The ET-SUP working group on progress monitoring and user feedback to report progress against the plans for the next questionnaire to the OPAG-IOS chair, at least in January and March 2008;

Action ET-SUP-3.21 The ET-SUP working group on progress monitoring and user feedback to assess all tasks remaining and resources required to analyze responses and generate a TD (April 2008);

Action ET-SUP-3.22 WMO SP to meet with EUMETSAT in October 2007 to evaluate the possibility of using their web-based survey product;

Action ET-SUP-3.23 OPAG–IOS chair to advise the WMO Space Programme Office of the need for strong ongoing support for the activity on monitoring the progress on satellite data use.

21. ANY OTHER BUSINESS *(agenda item 21)*

The dates of the next meetings were discussed. It was agreed that:

- ET-SAT should meet in 2008, and a meeting in conjunction with ET-EGOS to be considered;
- A meeting of ET-SUP in 2008 is desirable as well, and should take place prior to CBS-08, but will be subject to available funding.

22. SUMMARY CONCLUSIONS *(agenda item 22)*

The two groups came together in joint session to present brief summaries of their respective conclusions on topics discussed while in separate sessions. This was to inform each other of actions and recommendations and to provide an initial view of what would be recorded in this joint final report.

Actions agreed at the meeting were reviewed and are listed in Appendices X and XI for ET-SAT and ET-SUP respectively.

23. CLOSURE OF THE MEETING *(agenda item 23)*

The Chairpersons thanked all participants and added a special thanks to the Secretariat for its support. The Secretariat thanked all experts and their organizations for their work that provided useful feedback and guidance for the Programme.

APPENDIX I

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APPENDIX II

AGENDA

Initial Joint Session

1. ORGANIZATION OF THE SESSION
- 1.1 Opening of the session
- 1.2 Adoption of the agenda
- 1.3 Working arrangements for the session

2. CHAIRMEN'S REPORTS
- 2.1 ET-SAT Chairman's report
- 2.2 ET-SUP Chairman's report
- 2.3 Report from Chairman of OPAG-IOS

3. ITEMS OF INTEREST FROM RELEVANT WMO MEETINGS INCLUDING COMMISSION FOR BASIC SYSTEMS, CONSULTATIVE MEETINGS, CONGRESS, AS WELL AS CGMS AND GEO MEETINGS

4. STATUS OF THE USER REQUIREMENTS AND OBSERVING CAPABILITIES DATABASE

5. RE-DESIGN AND OPTIMIZATION OF THE SPACE-BASED COMPONENT OF THE GOS

6. REGIONAL SPECIALIZED SATELLITE CENTRES

7. RESPONSE TO NEW REQUIREMENTS BEYOND WWW: GCOS, DRR, CLIMATOLOGY, IPY, THORPEX, ATMOSPHERIC COMPOSITION

8. R&D TO OPERATIONS TRANSITION STRATEGY

ET-SAT Session

9. STATUS OF OUTSTANDING ACTIONS FROM PREVIOUS ET-SAT MEETINGS

10. UPDATE ON THE STATUS OF THE SPACE-BASED COMPONENT OF THE GOS

11. DISCUSSION OF RELEVANT ITEMS FROM THE INITIAL JOINT SESSION

12. IGEOLAB

13. SPACE WEATHER

14. RELATIONS WITH CEOS

ET-SUP Session

15. STATUS OF OUTSTANDING ACTIONS FROM PREVIOUS ET-SUP MEETINGS

16. DISCUSSION OF RELEVANT ITEMS FROM THE INITIAL JOINT SESSION

17. IGDDS AND RARS

18. VIRTUAL LABORATORY AND OTHER TRAINING ACTIVITIES

19. USER INFORMATION

20. PROGRESS MONITORING AND USER FEEDBACK

Final Joint Session

21. ANY OTHER BUSINESS

22. SUMMARY CONCLUSIONS

22.1 ET-SAT FINDINGS
22.2 ET-SUP FINDINGS

23. CLOSURE OF THE MEETING

APPENDIX III

STATUS AND PLANS FOR SATELLITE TRAINING ACTIVITIES IN THE ASIA PACIFIC REGION

Mr Jeff Wilson, BMTC, informed the group of the status and plans for satellite training activities in the Asia Pacific region. The major elements of the report are summarized below.

The past year has been a very busy year for the Centre of Excellence (CoE) at the Bureau of Meteorology Training Centre (BMTC). The running of the Asia Pacific Satellite Applications Training Seminar (APSATS2006) and the High Profile Training Event (HPTE) were major tasks. In comparison 2007 and 2008 are expected to be much quieter, but will build upon the positive outcomes from the HPTE in particular.

The BMTC VISITview based weather discussion site has been in place since August 2006 and is modelled on the successful “hadar” site used by the weather discussion group of the Americas. In the months since the HPTE internal discussions and negotiations have been underway to identify an operational area to assist the Training Centre run a regular monthly weather discussion group for the Pacific RA V members. The Regional Special Meteorological Centre (RSMC) in Darwin has agreed to take on this role and several internal Bureau trials have been held to get the RSMC staff familiar with the technology. Mr Wilson reported difficulties opening the discussions up to RA V members to problems getting audio software that is compliant with Australian Public Service requirements.

In his role as VLMG Co-chair, Mr Wilson reported his discussions with the National Satellite Meteorological Service of CMA and the CMA Training Centre (CMATC) about the option of CMATC becoming another Centre of Excellence. If this does occur the BMTC will work closely with the CMATC on VL related matters under a separate working arrangement that is currently being prepared between the two Centres. This has already led to the exchange of various training resources, including the provision of the current Virtual Resource Library (VRL) and HPTE resources between the two Centres.

BMTC continues to maintain contact with JMA regarding VL matters, in particular SATAID related issues. This has lead to SATAID being selected for use in the new Jakarta Tropical Cyclone Warning Centre by the Indonesian Meteorological Service (BMG). JMA have recently assisted BMG with SATAID training through the provision of a lecturer for a course in BMG in August 2007. JMA, through an aid grant, is also assisting the Fiji Meteorological Service with a four week meteorology course for Pacific Island RA V members in September 2007 based in Fiji.

ET-SUP are asked to note that the Primary Contact for VL matters at the BMTC will shift from Mr Jeff Wilson to Dr Yuelong Miao (Y.Miao@bom.gov.au) and Mr Wilson will become the secondary contact but still retain a close interest in VL matters. Dr Miao was originally trained in China at the Nanjing Institute of Meteorology but has done further study in Canada and China. He has worked with the Bureau for nearly 10 years, the last four years in the training area where he has been responsible for the satellite interpretation units on a Graduate Diploma of Meteorology Course.

At this stage, there are no specific satellite based international classroom courses planned for BMTC in 2007 or 2008. In September 2007 WMO will be co-hosting one week Public Weather Service and Tropical Cyclone courses in BMTC. These courses will include some satellite related aspects and will use resources from the VRL.

APPENDIX IV

STATUS AND PLANS FOR SATELLITE TRAINING ACTIVITIES IN THE AMERICAS

Mr Tony Mostek, NOAA, informed the group of the status and plans for satellite training activities in the Americas. Mr Mostek drew the group's attention to the contribution of others to the report, especially his fellow ET-SUP colleagues Dr Vilma Castro and Dr Luiz Machado. The major elements of the report are summarized below.

The past year has been a very busy time for NOAA and the Centres of Excellence in Argentina, Barbados, Brazil and Costa Rica. The ongoing monthly VISITview weather briefings of the Focus Group of the Americas and Caribbean continued. The running of the High Profile Training Event (HPTE) in October was a major success and it was especially noteworthy to recall the late entry of the CoE in Brazil and the continuation of the HPTE in Portuguese in November. In comparison, 2007 and 2008 continue to be active for Regions III and IV, and will build upon the positive outcomes from the HPTE and Focus Group.

COMET and Virtual Institute for Satellite Integration Training (VISIT) programmes, which are supported and funded by NOAA, continue to develop a wide array of satellite-related training materials. These materials are available online at no cost to all users in all Regions with Internet access. The primary access to COMET satellite training is via the METED site at: http://www.meted.ucar.edu/topics_satellite.php and Mr Mostek informed the group that this site currently gives access to 36 online modules (of which three are available in Spanish and five in French) plus three modules on CD. Furthermore, COMET has begun work on the Environmental Satellite Resource Centre (ESRC). The ESRC website will provide a comprehensive set of links with information on satellite instruments, data, products and training that will be a valuable addition to the WMO VL Resource Library.

NOAA's VISIT programme provides a wide array of satellite-related training materials. The VISIT satellite training website is located at: http://rammb.cira.colostate.edu/visit/topic_sat.html. VISIT satellite site contains 40 sessions with most including recorded audio playback (the VISITview TV option). In 2006 the VISIT team, with help from COMET and WMO, developed a Website in English and Spanish to support the HPTE; see http://rammb.cira.colostate.edu/training/wmovl/. The VISIT HPTE site will be updated to support the GEOSS of Americas HPTE training scheduled for Spring/Summer 2008.

A collection of satellite training resources has been produced by COMET in support of NOAA's *Global Earth Observation System of Systems* (GEOSS) Americas partnership. This site includes select COMET satellite meteorology training modules and links to the VISIT Programme and the 2006 WMO High Profile Training Event. This collection is intended as background training material for participants in upcoming WMO and GEOSS Americas-sponsored satellite meteorology training events and workshops http://www.meted.ucar.edu/export/GEOSS_WMO_07/.

CIRA and VISIT in coordination with the NOAA/NWS International Desk supports the monthly briefings of the WMO Focus Group (FG) of the Caribbean and Americas. The weather briefings are done in English and Spanish with a second session led by CoE Costa Rica in Spanish. The Barbados CoE started the Caribbean FG that conducts a briefing almost every week. The VISITview server at CIRA used by these Focus Groups is located at http://hadar.cira.colostate.edu/vview/vmrmtcrso.html.

In 2006, VISIT team developed a basic course on satellite meteorology called Satellite Hydrology and Meteorology (SHyMet). The SHyMet course is composed of COMET and VISIT training materials. This course is open to anyone with an interest in satellite meteorology and takes about 16 hours to complete. The SHyMet Website is located at CIRA http://rammb.cira.colostate.edu/training/shymet/.

The VISIT team continued to support the VISITview programme. One major upgrade is the need for a reliable voice over Internet (VOI) option. The use of various VOI programmes in support of Focus Groups and HPTE is a concern both from reliability, performance and security

perspectives. Given the tremendous need for a cost effective (free) and secure VOI solution, the VISIT team is committed to work with the International training community to help solve this problem as soon as possible.

Since the formal establishment of the CoEs in Brazil (at CPTEC) and in Buenos Aires, Argentina after the ET-SUP meeting in September 2006, they have been very active. The group was informed of the planned training activities that are scheduled for the Americas for 2007-2008 and will be coordinated with CoEs Argentina, Barbados, Brazil and Costa Rica. Some are defined and confirmed, but others still need additional support from the sponsors. The CoE in Argentina anticipates becoming more actively involved in VL training in 2008 following the clarification of the restructuring of the Argentina Meteorological Service from the Military to Civilian during 2007.

APPENDIX V

STATUS AND PLANS FOR SATELLITE TRAINING ACTIVITIES IN THE EUROPE/AFRICA REGIONS

Dr Volker Gaertner, EUMETSAT, informed the group of the status and plans for satellite training activities in the Europe/Africa regions. The major elements of the report are summarized below.

EUMETSAT has supported the Virtual Laboratory from its beginning and utilizes the cooperation network to provide outreach training, especially for RA I. In recent months EUMETSAT has also started to align its activities for its own Member and Cooperating States in RA VI with the training methods foreseen at the Centres of Excellence.

EUMETSAT´s basic training approach is such that they concentrate primarily to train operational forecasters from Meteorological Services in Europe and Africa. In recent years the training has expanded slightly to also train personnel in the Middle East and occasionally in South America. The training in South America is provided to help use Meteosat data, which are disseminated through EUMETSAT's EUMETCast system into that geographical region.

EUMETSAT are now operating the polar orbiting Metop system (Metop-A) in addition to the geostationary Meteosat satellites and how this development has influenced graining needs. The variety of instruments on Metop provides valuable datasets which are beneficial beyond the classical meteorological application areas of Nowcasting, Numerical Weather Prediction and Climatology. Other application areas like Oceanography, Land Surface use, Hydrology and Environmental Monitoring / Air Quality are expected to make more and more use of the EUMETSAT data. Furthermore from 2008 onwards EUMETSAT will be an active operational partner in the ocean altimetry mission of Jason-2 and its follow-on programmes. As these new satellite systems are providing global datasets, it is evident that tools and methods have to be applied to train more user communities in larger areas with limited resources. Therefore the methods developed in the framework of the WMO Virtual Laboratory (VL) and also those made available in Europe through the training coordination of the EUMTCAL project are a vital contribution to achieve these goals.

The High Profile Training Event (HPTE) in October 2006 was strongly supported by EUMETSAT. During the event EUMETSAT organized four classroom events in Niamey, Nairobi, Muscat and Pretoria in parallel to allow the participants to take part in the HPTE. Lecture C was prepared by EUMETSAT. In total, EUMETSAT was involved in 19 HPTE lectures:

- 7 core lectures (1xA, 1xB, 3xC, 2xD);
- 6 regional lectures;
- 1 special topic from INPE (Brazil) on MSG data reception and processing;
- 5 weather briefings.

Participants in the EUMETSAT supported elements of the HPTE included:

- About 100 participants in five regional courses (Niamey, Nairobi, Oman, Lisbon, Pretoria);
- Participation from weather service in UAE (Adel + unknown number of participants);
- 150 participants in Maputo User Forum;
- About 60 participants from 15 counties in Europe, incl. Russia;
- About 80 participants from 20 countries in Central and South America (Lecture C in Spanish).

International training cooperation in Europe is being further progressed by EUMETSAT's active involvement in EUMETCAL, the European Virtual Organization for Meteorological Training – a project of EUMETNET. The group noted that EUMETCAL is aiming to facilitate distance learning by cooperation of national training centres of the Meteorological Services of EUMETNET. The assets of EUMETCAL are a centralized Web Site (www.eumetcal.org) and a resource library of training material (Intralibrary). EUMETCAL partners have started to organize regular VisitView weather briefings and helped to organize a first blended learning course on aviation meteorology

(hosted by Météo France). Further courses are in preparation. The course management is making use of a management system (Moodle). This is an essential development towards the establishment of the EUMETCAL Virtual College. Through EUMETSAT's involvement the resources and experience of EUMETCAL will be made available to the Virtual Laboratory to realize a European component of the VL.

EUMETSAT has started discussions with the South African Weather Service (SAWS) with the aim to formally integrate Pretoria (SAWS/University of Pretoria) as another Centre of Excellence into the VL network.

Some planned training events have been scheduled for Muscat, Nairobi, Niamey and Pretoria. These should pave the way for regular focus group discussions in the Centres of Excellence supported by EUMETSAT. In parallel courses will be running in Nairobi and Muscat to train the participants in creation of distance learning material and the delivery of live discussions (from/to Muscat/Nairobi). A similar parallel event between Niamey and Pretoria is planned for early 2008.

EUMETSAT further plans to enhance the distant learning by offering more and more blended learning courses in cooperation with the RTCs in its field of responsibility. To enhance the course delivery, it is intended to make more and more use of the course management system Moodle. Therefore it is anticipated to run a dedicated Moodle training event in spring 2008 at EUMETSAT where participants from all RTCs will be invited.

A planned major highlight in EUMETSAT's distant learning activities involving all RTCs will be a Regional VL Training Event in spring 2009 to which the afore-mentioned training courses will be a prerequisite.

EUMETSAT is occasionally participating in training events in South America to promote the use of Meteosat data in that continent, for example the training course which was recently held with EUMETSAT participation in Alagoas, Brazil (August 2007) and another one which will be supported in Cartagena, Columbia in October 2007.

APPENDIX VI

OPAG-IOS EXPERT TEAMS WORK PROGRAMME FOR 2007-2008
AS AGREED BY CBS Ext.(06)

ET-SUP Work Programme for 2007-2008

(a) In following the Rolling Review for the Strategy to Improve Satellite System Utilization, analyze the 2007 biennial questionnaire and other relevant information to prepare a new TD summarizing the current status of the Implementation Plan to Improve Satellite System Utilization;

(b) Interact with the IGDDS Implementation Group to check that the data requirements including inter-regional exchange, equipment, standards, content and timeliness are such that WMO Members can take full advantage of the ADMs and the inter-regional data dissemination systems;

(c) In conjunction with ET-SAT, review present and future R&D satellite data and products including their availability and applications towards better utilization by WMO Members;

(d) Represent WMO Member needs to the CGMS/WMO Virtual Laboratory for Satellite Data Utilization (VL) in relevant areas;

(e) In conjunction with WMO Space Programme Secretariat, further clarify the information needs of WMO Members regarding access to and utilization of satellite data and products and the associated capacity building, and the best way to meet these requirements;

(f) Further the concept of Regional/Specialized Centres on Satellite Products;

(g) Further expand the space-based component of the GOS baseline to include sustained observations of additional variables as required for climate monitoring working jointly with ET-SAT and ET-EGOS;

(h) Further develop “R&D to operations transition” concept and identify in more detail the role WMO could assume;

(i) Prepare documents to assist WMO Members, summarizing the results from the above activities.

ET-SAT Work Programme for 2007-2008

(a) Review both operational and R&D environmental satellites present capabilities and plans and provide input to relevant OPAG IOS, OPAG ISS Expert Teams and ICT meetings to assist in the integration of WMO-coordinated observing systems;

(b) Review CM recommendations for the relevant period and provide input to OPAG-IOS and ICT work programmes;

(c) Review SOGs and plans for GOS evolution and provide input to ET-EGOS towards improvement of system capabilities, particularly with respect to developing countries;

(d) Review the implications of expanding the space-based component of the GOS baseline to include namely sustained observations of additional variables as required for climate monitoring, in concert with ET-SUP and ET-EGOS, and report to CBS as appropriate;

(e) Provide input to other WMO sponsored expert group meetings, e.g., JCOMM, GCOS, WCRP and GAW with regard to satellite system capabilities and their requirements;

(f) Review progress on the Implementation Plan for Evolution of the Space and Surface-based Sub-systems of the GOS, initiate actions as appropriate and coordinate this activity with the ET-EGOS.

APPENDIX VII

RESPONSIBILITIES OF SUPPORT OFFICER

The support officer will be responsible for WMO matters related to the reception, processing and utilization of satellite data, product and services from the space-based component of the GOS focusing on education, utilization and training. Specific duties in priority order include:

(a) Coordinating education and training in the exploitation of satellite data and products throughout WMO programmes including;

- Implementing the education and training component of the WMO Space Programme Implementation Plan for:
  - The progressive adaptation of the contents of training events;
  - The enhancement of the training opportunities offered by “Centres of Excellence”;
  - The further development of the Virtual Laboratory and associated Virtual Resource Library (including the incorporation of basic tools for remote sensing applications);
- Reviewing and updating, as necessary, the WMO Space Programme web site pages and maintaining their consistency with the information contained within the Virtual Laboratory for Education and Training in Satellite Meteorology (VL);
- Maintenance and analysis of the questionnaire on availability and use of satellite data and products by WMO Members;

(b) Enhancing awareness of the availability and utilization of data, products and services, including those from R&D satellites;

(c) Fostering the definition and adoption of standard data formats for the exchange and storage of remote sensing;

(d) Increasing cooperation amongst WMO Members to develop common basic tools for utilization of research, development and operational remote sensing systems;

(e) Interacting with external satellite-related entities (including CGMS, IGOS, SFCG and the Virtual Laboratory Management and Focus Groups);

(f) Keeping abreast of international developments relating to environmental satellite applications (e.g., GEOSS);

(g) Keeping abreast of international developments by collecting, assembling and analyzing relevant documents on current satellite issues including data access and availability and the technical programmes of satellite operators;

(h) Preparing relevant scientific reports, studies and documents.

APPENDIX VIII

SUMMARIZED DESCRIPTION OF THE CURRENT GOS BASELINE (SPACE SEGMENT ONLY)

Satellites	Payload	Observations to be delivered
At least 6 operational GEO satellites Near-equally spaced	VIS and IR imagery IR sounding *Some hyperspectral IR sounders*	Fields of atmospheric temperature and humidity; Temperatures of sea and land surfaces; Wind fields at the surface and aloft; Cloud amount, cloud type, cloud top height and temperature, and cloud water content; Precipitation; Snow and ice cover; Total column ozone; Vegetation cover Radiation balance data
At least 4 operational LEO satellites sun-synchronous (2 am + 2 pm) *optimally spaced in time*	VIS, IR, MW imagery IR and MW sounding Other e.g. scatterometer, altimeter) *UV imagery* *Radio occultation* *At least 3 with hyper-spectral IR sounder* *At least 3 MW imager or scatterometer*	
2 LEO satellites (e.g. among the 4)	Altimeter	Ocean surface topography
R&D satellites (without guarantee of continuity or replacement policy)	VIS, IR MW imagery IR and/or MW sounding Other missions of relevance to WMO requirements *Radio-occultation* *Wind lidar* *Active and passive MW precipitation measurement* *Advanced hyperspectral capabilities* *Lightning detection (GEO)* *Possibly MW (GEO)*	(to the extent possible) Improved information on T,Q fields; Improved information on wind fields; Soil moisture distribution; Improved information on sea ice type and extent; Improved information on snow cover and water content; Wave heights, directions and spectra; Improved accuracy and frequency in rainfall monitoring; Three-dimensional cloud water/ice fields; Height of cloud base Improved monitoring of the Earth radiation budget; Sea-surface temperatures of improved accuracy; Distribution of particulate matter in the atmosphere, including volcanic ash; Ocean surface height; Ocean surface salinity; Ocean colour, related to marine pollution and biological properties; Sea and land ice topography; Improved information on ozone distribution; Improved information on land cover and vegetation mapping; Flood and forest fire monitoring; Information on fields of chemically-active atmospheric constituents; Information on carbon dioxide and other greenhouse gases; Lightning detection.

APPENDIX IX

DRAFT VISION TO 2025 AS REVISED BY ET-SAT/SUP-3

Observing capability	Expected outcome	WMO programmes
At least 6 operational geostationary satellites		
• With no more than 60° longitude difference between neighbouring locations	Optimize viewing angle with near-global coverage	WWW DRR WCP GCOS, WCRP
• All with IR/VIS multi-spectral imager	Weather and hazard monitoring (incl fires), SST, radiative fluxes	
• All with IR hyper-spectral sounder	Mesoscale permanent sounding, advanced AMV,contribution to chemistry	
Some with lightning detection	Severe warning lead time,	AMP/AEM, DRR, WWW
Operational polar-orbiting sun-synchronous satellites on 3 orbital planes (around 13:30, 17:30, 21:30 ECT with redundancy)		
• All with IR/VIS multi-spectral imager	Land and atmosphere and ocean observation (SST) demonstrated by MODIS, MERIS…	All major WMO programmes
• All with MW sounder	Temporal sampling of T,Q profiles for NWP and GCOS (average 4 hours	
• All with IR hyper-spectral sounder		
• Two with UV radiometer	O3	WWW, GCOS
Other satellites on appropriate orbits (not excluding the geostationary and polar orbits above) contributing to operational observations for weather & climate on a long-term basis		
• Two sun-synchronous satellites with scatterometer	At least 12-hourly ocean surface wind vector coverage (depending on swath and latitude) and soil moisture , ice type	WWW, GCOS, JCOMM
• Two sun-synchronous satellites with conical scanning full polarimetric MW imager	Complement surface wind coverage (+ benefit to many other parameters e.g. Sea ice, SST, precipitation)	WWW, JCOMM, GCOS
• At least two sun-synchronous satellites with narrow-band VIS/NIR imagers for ocean colour and vegetation	ocean colour and vegetation (fAPAR, LAI), surface albedo,burn scars, clouds and aerosols	JCOMM, GCOS, DRR, AREP, WCRP
• Constellation of high-resolution VIS/IR imagers for Land Surface Imaging	Land use, vegetation status (Landsat and SPOT type applications)	AMP/AgM, DRR, GCOS, HWRP
• Constellation of clusters of small satellites for radio occultation (RO)	T and moisture sounding in LS, space weather	WWW and GCOS
• A constellation for altimetry including two altimeters on sun-synchronous orbits and a high-precision reference altimeter system avoiding tidal aliasing	Sea level, sea state, ocean currents, ice shelf	WWW, JCOMM, GCOS

Observing capability	Expected outcome	WMO programmes
• Constellation of LEO satellites for precipitation measurements through combined use of active instrument in a low inclination orbit and passive microwave instruments on several high-inclination orbits	Temporal precipitation	GCOS, WWW, HWRP, DRR, WCRP
• Constellation of sensors for Earth Radiation Budget including at least one broad-band multi-angle viewing radiometer in LEO and a Total Irradiance sensor, together with auxiliary LEO measurements and geostationary sensors (TBD)	Earth Radiation Budget	GCOS, WCRP, WWW(SIA)
• Satellites in Highly Elliptical Orbit (HEO) ensuring Polar Regions coverage.	Polar AMV and cloud monitoring at high latitudes, sea ice (missions and justification vs polar satellites to be explained)	WWW
• A constellation of instruments/ missions to address atmospheric composition (TBD)	O3 and GHG profiles, aerosols, cloud properties	*GCOS, AREP, WWW*
SAR (possibly interferometric)	oil spills, floods, other hazards, earthquake and faults monitoring, sea ice leads, damage assessment, sea state, ice shelf and icebergs	WWW and DRR, JCOMM
One imager for special viewing (AATSR like)	High resolution SST, cloud properties, albedo	GCOS
Several R&D satellites and operational pathfinders including:		
• LEO with wind Doppler lidar (unless operational by then)	Wind & aerosols profiles	WWW, GCOS AMP/AeM,
• GEO microwave sub-mm	Precipitation high temporal sampling, cloud properties	WWW
• LEO Low-frequency microwave radiometer addressing salinity and soil moisture (unless operational by then)	salinity and soil moisture	
Cross-cutting aspects		
Improved availability and timeliness through operational cooperation among agencies.		
Expanded community of agencies contributing to the GOS		
Partnerships among agencies for extending the operation of functional R&D and other satellites to the maximum useful period		

APPENDIX X

SUMMARY OF ACTIONS FROM ET-SAT

Action ET-SAT-3.1 Secretariat to update the definition of confidence levels to reflect the case of data of instruments that are no longer active.

Action ET-SAT-3.2 WMO Space Programme to provide ET-SAT members with the Instruments spreadsheet including all instruments included in the database, and with the Missions spreadsheet including the information on mission launch and termination, for review and update. (30 September 2007)

Action ET-SAT-3.3 WMO Space Programme to clarify how to enter performance values for instruments that have to be used simultaneously to derive some parameters (30 September 2007)

Action ET-SAT-3.4 ET-SAT members to provide updates regarding missions and instruments under the responsibility of their respective agencies (15 October 2007)

Action ET-SAT-3.5 WMO Space Programme to prepare an update of the database User Manual (31 December 2007)

Action ET-SAT-3.6 WMO Space Programme to forward to ET-EGOS Chair the outcome of the review of the draft "Vision to 2025" by ET-SAT/SUP-3 and to invite ET-EGOS to consider OSSEs in order to quantify the proposed elements, in particular the optimal number and orbital configuration of the Radio-Occultation constellation complementing the IR/MW sounding mission. (30 September 2007)

Action ET-SAT-3.7 WMO Space Programme to provide CGMS XXXV with an update on the draft Vision to 2025. (November 2007)

Action ET-SAT-3.8 All ET-SAT members to further review the gap analysis (ET-SAT/SUP-3/Doc. 5(2)), to check in the Appendix and its Annexes the descriptions of missions and instrument under the responsibility of their respective agencies and to report back to WMO Space Programme Secretariat any update needed (1 October 2007).

Action ET-SAT-3.9 WMO Space Programme to inform ET-EGOS Chair when ET-SAT experts have been designated so that they can assist the focal points to review the updates of the SOG (15 September 2007)

Action ET-SAT-3.10 The ET-SAT experts (J. Gurka, K. Kumar, L. Sarlo.) designated to support the updating of the SOG will provide a review of the draft updates to be received from the ET-EGOS focal points, for their respective SOGs (when draft updates will be available)

Action ET-SAT-3.11 M. King to provide an interface, to be developed by NASA/GSFC, to the Global Change Master Directory portal in order to facilitate browsing and retrieval of instrument data that have been identified as relevant for FCDRs of GCOS Essential Climate Variables. (End November 2007)

Action ET-SAT-3.12 WMO Space Programme to prepare a draft document on the strategy for transition from R&D missions to operations along the lines discussed by ET-SAT/SUP and circulate it to the ET members for comments (15 September 2007)

Action ET-SAT-3.13 ET-SAT members to provide WSP with comments on the draft document on the strategy for transition from R&D missions to operations (1 October 2007)

Action ET-SAT-3.14 WMO Space Programme to forward to CGMS-XXXV and CM-8 the document on the strategy for transition from R&D missions to operations.

Action ET-SAT-3.15 A. Khokhlova will prepare an inventory of satellite data used, or available for use in near-real time by NWP centres, with the aim to make this inventory available through the WMO Space Programme web page. *(End 2007)*

Action ET-SAT-3.16 WMO Space Programme to circulate to ET-SAT members the Roshydromet presentation of Arktika given at CM-7

APPENDIX XI

SUMMARY OF ACTIONS FROM ET-SUP

Action ET-SUP-3.1 WMO to forward to the R/SSC implementation meeting the proposals:

a) To replace GSICS with CGMS/GSICS in order to maintain the same level of representation with the other organizations. Additionally suggest that the CGMS representative on the R/SSC-CM Executive Panel be from GSICS;

b) To use consistent acronyms: either RSSC-CM or R/SSC-CM;

c) To rename the R/SSC-CM Research Group (RRWG) to the R/SSC-CM Science Advisory Group to better reflect their role;

d) Point 8 of the Terms of Reference for the R/SSC-CM Executive Panel (Annex 1 of the R/SSC-CM IP) to be reworded to “Organize workshops on at least a biennial basis, and sessions at scientific meetings to advance the objectives of the R/SSC-CM and publicize the programme’s achievements”.

Action ET-SUP-3.2 WMOSP to inform GSICS Executive Panel, CGMS and the R/SSC-CM potential participants, of these proposals (end October 2007).

Action ET-SUP-3.3 The Chair of the OPAG-IOS to invite CGMS to form a new international science working group on the theme of climate monitoring and calibration to provide an open focus for collaboration and coordination on these important topics. The Terms of Reference for the new working group would be compatible with those from ITWG, IPWG and IWWW.

Action ET-SUP-3.4 The Chair of the OPAG-IOS to propose to CBS that two years after the R/SSC-CM commences as a pilot of the R/SSC concept CBS review the outcomes and benefits of the concept prior to extending it to other areas such as Atmospheric Chemistry.

Action ET-SUP-3.5 WMO Space Programme will inform ET-EGOS Chair that ET-SUP experts have been designated to assist the focal points to review the updates of the SOG (15 September 2007).

Action ET-SUP-3.6 The ET-SUP experts (ET-SUP Chair) designated to support the updating of the SOG will provide a review of the draft updates to be received from the ET-EGOS focal points, for their respective SOGs (when draft updates will be available).

Action ET-SUP-3.7 ET SUP members to provide WSP with comments on the draft document on the strategy for transition from R&D missions to operations (1 October 2007)

Action ET-SUP-3.8 The Chair of OPAG-IOS is requested to seek clarification through CGMS as to whether the provisions of a Joint Polar System would enable Metop to take advantage of the NPEOSS safety net in order to improve timeliness of global data delivery to users.

Action ET-SUP-3.9 WMO SP to send a letter to each CoE PR and each CGMS Satellite Operator VL sponsor thanking them for their active engagement and support of the VL, noting the great success of the HPTE, noting the recommendation of ET-SUP for continuation of the VL, noting the expanded role and responsibilities of the VL partners and requesting that they agree to continue in this role.

Action ET-SUP-3.10 Mr Anthony Mostek to contact each RFG to identify dedicated focal points and to assist, where necessary, in the establishing of monthly RFG sessions in all regions. In particular Mr Mostek should liaise with CMA and other VL CoEs to facilitate the establishment of an RFG in Asia.

Action ET-SUP-3.11 The VLMG Co-chairs to maintain regular contact with the other members of the VLMG, to coordinate inter-sessional activities and to provide a written annual report of activity within the VL to WMO and CGMS via OPAG-IOS, based on inputs solicited from each CoE and Sponsoring Satellite Operator at the end of August each year.

Action ET-SUP-3.12 WMO SP and VLMG to liaise with South American CoEs and other prospective partners to organize a multi-regional satellite training event in South America in 2008.

Action ET-SUP-3.13 VLMG Co-chairs and WMO SP to develop guidelines for post training evaluation based on the method used by Brazil for the 2006 HPTE and to encourage CoEs and satellite operators to adopt these guidelines in the evaluation of future training events.

Action ET-SUP-3.14 ET-SUP members to review the DVD of the core HPTE lectures and provide comments to EUMETSAT (Gordon Bridge) with copies to Jeff Wilson and Richard Francis (end-September 2007).

Action ET-SUP-3.15 OPAG-IOS Chairman to take forward to CGMS the application of NSMC to have CMATC, the Beijing component of the Nanjing RTC, become the CoE for the region (November 2007).

Action ET-SUP-3.16 WMO SP to provide copies of documentation related to the establishment of the CoEs in Argentina and/or Brazil to Russian Federation to be used as indicative templates for similar correspondence for the establishment of a new Russian CoE (end-September 2007).

Action ET-SUP-3.17 VLMG Co-chairs to create and maintain a table of VL related training events and publish this table as appropriate, including on VL web pages.

Action ET-SUP-3.18 The ET-SUP working group on progress monitoring and user feedback to refine their preliminary work programme, timelines and risk assessment and to draft the next edition of the questionnaire with the view of making the questionnaire available to members by the beginning of January 2008.

Action ET-SUP-3.19 The ET-SUP working group on progress monitoring and user feedback to refine the method of performing the analysis of questionnaire responses, identify alternative sources of data to contribute to the analysis and develop an outline plan for the TD (March 2008).

Action ET-SUP-3.20 The ET-SUP working group on progress monitoring and user feedback to report progress against the plans for the next questionnaire to the OPAG-IOS chair, at least in January and March 2008.

Action ET-SUP-3.21 The ET-SUP working group on progress monitoring and user feedback to assess all tasks remaining and resources required to analyse responses and generate a TD (April 2008).

Action ET-SUP-3.22 WMO SP to meet with EUMETSAT in October 2007 to evaluate the possibility of using their web-based survey product.

Action ET-SUP-3.23	OPAG–IOS Chair to advise the WMO Space Programme Office of the need for strong ongoing support for the activity on monitoring the progress on satellite data use.