

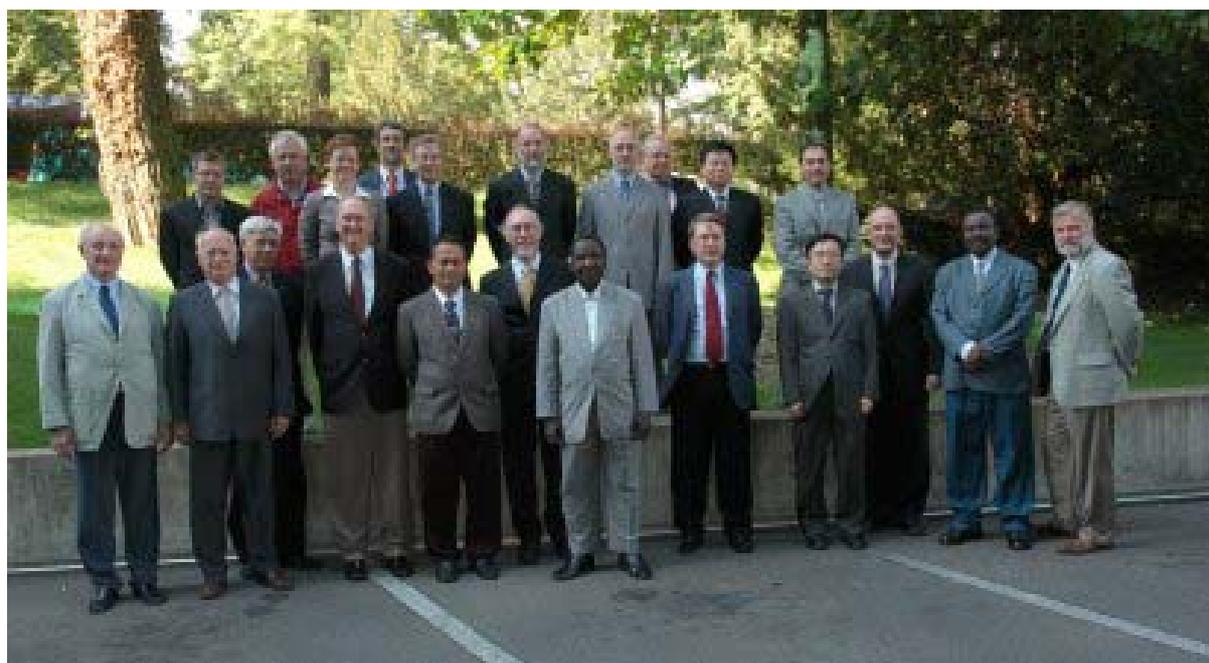
WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS

OPAG ON INTEGRATED OBSERVING SYSTEMS

IMPLEMENTATION/COORDINATION TEAM FOR INTEGRATED OBSERVING SYSTEMS FOURTH SESSION

GENEVA, SWITZERLAND, 11 – 15 SEPTEMBER 2006



FINAL REPORT

WMO General Regulations 42 and 43

Regulation 42

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

Regulation 43

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

EXECUTIVE SUMMARY

The fourth session of the CBS Implementation and Coordination Team for Integrated Observing Systems convened on Monday, 11 September 2006 at WMO Headquarters, Geneva, Switzerland. Dr J. Lengoasa welcomed the members on behalf of the Secretary-General of WMO. He stressed the importance of the present meeting in shaping the future of the observations systems within WMO.

The Chairman presented his report. He noted that the ICT has several tasks that are addressed through the OPAG expert teams and Rapporteurs. The Chairman also reported on several changes that have occurred within the OPAG since the third session. He also provided a summary of the many activities since the third session of the ICT-IOS.

The Rapporteurs of each Regional Association presented reports on the performance and status of the GOS in their respective Regions.

The ICT-IOS received a report on Monitoring Statistics during 2005. The results showed relatively stable levels of receipt of SYNOP and TEMP reports over the last four years, although some variation was noted. SHIP reports also remained fairly stable during the same period, however BUOY and AIREP/AMDAR reports showed an increase.

The ICT-IOS was presented with several recommendations dealing with Automatic Weather Station issues, including the standardizing of AWS code formats and the adoption of a standard reference system for locating AWS's.

There has been much progress on the Implementation Plan for the Evolution of the Global Observing Systems (EGOS-IP). A record of progress in the form of a revised draft of the Implementation Plan was presented to the session.

The ICT-IOS noted that the space-based requirements for the GCOS Implementation Plan and the review of planned satellite missions both indicate a need for optimizing several aspects of future satellite missions and payloads to meet the GOS baseline. The session also agreed there was a need to pursue updating the GOS vision and baseline in its future work.

The ICT-IOS noted the increased availability of satellite data and products due to improvements in Advanced Dissemination Systems (extension of EUMETCAST to South America) and commencement of the Asia-Pacific RARS network. The ICT-IOS were pleased to note the improvements in capacity building by the addition of new Centres of Excellence and the global High Profile Training Event.

ICT-IOS reviewed the GOS performance in the Regions and in particular monitoring results regarding frequency, accuracy and geographic coverage provided by RBSN and RBCN and GCOS networks.

It also discussed major issues relating to the further improvement of coordination between OPAG-IOS and Rapporteurs/Coordinators on Regional Aspects of the GOS, and proposed specific actions to enhance working links with the regions, especially in implementing the IP-EGOS at regional level.

The Manual on the GOS passed through all drafting and revision processes, and has been sent to the printers for publication. The Guide on the GOS is ready for submission to CBS-Ext.(06) for approval.

The ICT-IOS was advised on development of the revised Volume A. The ICT recommended obtaining the assistance of a WMO Member who has experience in this type of application to provide support and assistance in further development.

The ICT-IOS noted that further steps had been taken to integrate AMDAR into WWW operations. The news that evaluation trials for humidity/water vapour sensors had started was welcomed by the session.

The ICT-IOS developed proposals for the Rapporteurs/Coordinators on GOS matters for improving the fulfillment of their responsibilities and dissemination of information on IOS matters within the regions.

The Meeting adjourned on 15 September 2006 at 12.00 noon.

1. ORGANIZATION OF THE SESSION

1.1 Opening of the meeting

The fourth session of the CBS Implementation and Coordination Team for Integrated Observing Systems was convened by OPAG Chairman, Dr James Purdom at 09:30 a.m. on Monday, 11 September 2006 at the WMO Headquarters, Geneva, Switzerland.

Dr J. Lengoasa welcomed the members on behalf of the Secretary-General of WMO. He advised of the concept of the WMO Integrated Observing System that was introduced at EC-LXVIII, and how the EGOS Implementation Plan will be an important component in the development of this concept. He also advised the meeting to be aware of other observing systems, including THORPEX and GEOSS. Dr Lengoasa advised that the objective of this meeting was for the members to pull together, in a comprehensive manner, all of the available observing system and information system information into recommendations for evaluation by CBS Ext.(06) and also to for the assistance of planning for Congress in May 2007. He also noted that the ICT consisted of distinguished experts who would assure a constructive outcome. He wished the participants well with their busy work schedule during the week.

1.2 Adoption of the agenda

The ICT adopted the agenda as contained in Annex I.

1.3 Working arrangements

The meeting agreed on working arrangements and adopted a tentative work plan for consideration of the various agenda items (See Annex II). The Chairman announced that he intended to adhere rigidly to the work plan, starting each session precisely on time and ending on time. He further stated that it was his intention to leave a substantial time for drafting the final report of the meeting and the document for CBS-Ext.(06), which would be the definitive result of the meeting.

2. REPORTS

2.1 Report of the Chairman

The OPAG Chair expressed his appreciation to the Chairs of the expert teams and Rapporteurs for their hard work during the period that had resulted in a number of important accomplishments. He particularly noted the substantial progress with regard to their respective terms of reference. He commented on changes that have occurred within CBS and the OPAG IOS since CBS-XIII in 2005. Within the OPAG IOS, the ET-ODRRGOS was reconstituted as ET-EGOS (Evolution of the GOS). Dr Paul Menzel resigned as Chair of ET-EGOS and Dr John Eyre has taken over as acting Chair of that Expert Team. The ET-SSUP was reformulated to be ET-SUP (Satellite Utilization and Products) and a new Expert Team, ET-SAT (Satellites) was added to the OPAG with Dr Wenjian Zhang as its Chair. Mr Jerome Lafeuille resigned as Chair of ET-SUP and Mr Jeff Wilson has taken over as acting Chair of that Expert Team. ET-AWS remains unchanged. In addition Co-Rapporteurs on Impacts of New Instruments on the GOS (Mr William Nyakwada and Mr Alan Douglas) have been added to the OPAG and there is no longer a Rapporteur for Changes to Volume A. The OPAG Chair expressed his thanks to the departing ET Chairs, Dr Menzel and Mr Lafeuille, for their hard work and inspiring leadership.

The chairman reported on results from CBS-XIII in 2005, CBS MG Meetings in 2005 and 2006, CGMS XXXIII and EC-LVII and EC-LVIII. At CBS-XIII in St. Petersburg in 2005, Dr Sue Barrell was confirmed as Co-Chair of OPAG and a new Expert Team on Satellite Systems (ET-SAT) was added to OPAG IOS. Additionally the Implementation Plan for the Evolution of the GOS was endorsed by CBS.

At the CBS-Management Group Meeting in Geneva in 2005, the MG reviewed all OPAG Implementation Coordination Teams and Expert Teams and their Terms of Reference and finalized the two-year work programs of the teams. The MG also designated Dr Sue Barrell, Co-Chair of OPAG-IOS, as the Coordinator with the Disaster Prevention and Mitigation Program.

At EC-LVIII the concept of the integration of the WMO Observing Systems was introduced. The Executive Council established an EC Task Team to work on this issue. The OPAG Chair advised that this concept could have far reaching implications on the work of the OPAG and on the work of the WMO in general.

The OPAG Chair discussed the potential impact of THORPEX on all CBS OPAG activities and reported that CBS is working in close coordination with CAS on THORPEX. He informed the ICT that he is Co-Chair of the THORPEX Observing Systems Working Group and that Terms of Reference for the various THORPEX working groups had been developed. The OPAG Chair advised that at CGMS-XXXIII he had been named as their Rapporteur to the THORPEX International Core Steering Committee (ICSC).

3. REVIEW OF THE STATUS OF THE SURFACE-BASED COMPONENT OF THE GOS

3.1 RBSN Performance Monitoring Results and Implementation Trends

The session discussed the WWW monitoring results. It was noted that the percentage of SYNOP reports available at MTN centres in comparison with the number of reports required from RBSN stations was about 76 per cent during the period 2003-2006, with a slight oscillation of one per cent over the period. There were still deficiencies in the availability of SYNOP reports from areas in Region I (54 per cent in April 2006), in Region III (59 per cent) and in Region V (69 per cent).

The percentage of TEMP reports available at MTN centres increased from 63 per cent in 2003 to 69 percent in 2006. The availability of TEMP reports was relatively satisfactory for the northern and eastern parts of Region II, the northern part of Region IV, some countries in Region V and the western part of Region VI. The availability of TEMP reports was generally insufficient for most of the other parts of the world.

There was no major change in the availability of SHIP and TEMP SHIP reports during the period 2003-2006. The number of BUOY reports has increased from 11000 to 34000 during the period 2003-2006. The number of AIREP reports oscillated between 3400 and 5200. The number of AMDAR reports increased from 15000 to 42000 during the period 2003-2006. The number of aircraft reports from BUFR aircraft reports increased from 112000 to 150000 during the period 2004-2006. Except for AIREP and BUOY reports, a large part of the reports from mobile stations were issued from the Northern Hemisphere.

4. REVIEW OF THE STATUS OF THE SPACE-BASED COMPONENT OF THE GOS

The session was advised that there are three constellations in the space-based component of the Global Observing System: Polar-Orbiting, Geostationary and Research & Development. The current polar-orbiting meteorological satellite systems include the Chinese FY-1 series of satellites, NOAA satellites, including the most recent NOAA-18 which became operational in August 2005 and the Russian Meteor series of satellites.

The current geostationary meteorological satellite systems include the Meteosat satellites operated by EUMETSAT, the Indian INSAT and the KALPANA-I (Metsat) satellites, the MTSAT series of satellites operated by JMA and the geo-synchronous meteorological satellites operated by NOAA, which include the current primary satellites, GOES-East and GOES-West stationed over 75 West and 135 West respectively. The dissemination of hourly imagery from the Indian geostationary meteorological satellites is now available via its web site and it expected that half hourly imagery would be available within one to two years. EUMETSAT has an agreement with

Meteo France and NOAA that allows it to rebroadcast Indian satellite data through the EUMETCast system.

Research and development satellite systems include the European Space Agency's (ESA) ERS satellites and Envisat; the Russian Earth observation spacecraft "Monitor-E" developed by the Khrunichev Space Research and Production Center; as well as R&D satellites from NASA, JAXA and CNES.

The session was also informed about future satellite systems, including the EUMETSAT Polar System (EPS), which is planned to operate for an initial period of 14 years. China is developing the FY-3 series of polar orbiting meteorological satellites, of which there are 8 satellites starting with FY-3A and ending with FY-3H, to cover the period of 2007-2020. The Russian Space Agency (Roscosmos) is planning to create a new generation of hydro-meteorological polar-orbiting satellite series, Meteor-M, in the framework of the Federal Space Program of Russia. Meteor-M is expected to be launched at the end of 2006 for a service period of at least five years.

NOAA has plans for future polar-orbiting meteorological satellite systems, including a planned launch for NOAA-N' in December 2007. EUMETSAT is preparing for MSG-3 and MSG-4. India is planning a future series of INSAT satellites with meteorological applications. INSAT-3D is scheduled for launch early 2007. JMA is planning the Multifunctional Transport follow-on series. Roscosmos is developing its new geostationary meteorological satellite GOMS No. 2/Electro-L. The satellite is planned to be launched in 2007. NOAA is continuing its GOES series of satellites. Many new research and development satellite systems are under development, and the meeting was informed of the different planned satellite developments of the various space agencies.

Tables of current and future satellites within the Global Observing System are regularly updated and available on the WMO Space Programme pages of the WMO website (<http://www.wmo.int/web/sat/GOSstatus.html>) under "Global Observing System (GOS) status report".

5. STATUS OF SURFACE-BASED AND SPACE-BASED SUB-SYSTEMS OF THE GOS IN THE WMO REGIONS

The Rapporteurs/Coordinators on Regional Aspects of the GOS informed the meeting on the implementation of observing programmes in their respective regions.

5.1 Report on the GOS in Region I

The appropriate recommendations relevant to the evolution of the GOS in Africa address mainly the aspects of the production of the conventional data of the surface based subsystem network (RBSN) and in situ observing systems. In fact, in the preparation of the plan, it was noted that in many areas of Africa the current GOS provide no sustainable observations, whereas in other areas observation should be improved. The issues of the evolution of the GOS in Africa fall into 3 categories:

- a) lack of public infrastructure, interest and support from decision makers;
- b) lack of expertise from people to do the job, training etc. and
- c) lack of funding for equipments, consumables, spare parts, manpower etc.

The evolution of the GOS in Africa must therefore take into account upgrading, restoring, substitution and capacity building. Two aspects need to be considered: the use and the production of the data.

Possible approaches towards the redesign consist of identifying observing systems that are less dependent on infrastructure, expertise, and funding. These are satellite, AMDAR, and AWSs. However, a minimum set of reliable RAOBs would be required as a backbone to the upper air network, but also to validate the satellite observations with enough height and accuracy.

One of the major observing components of the RBSN in Western and Central Africa and in the Indian Ocean (Madagascar, Comores) is operated by the Agency for Air Navigation Safety in Africa and Madagascar (ASECNA) in its 17 Member States. ASECNA Member Countries had 200 synoptic stations, among which around 130 were operated by the Agency. It also had 22 radiosonde stations, 17 of which were fully operational.

Opportunities for the evolution of the GOS in Africa comprise: a) the identified AMDAR programme in Southern Africa which is now fully operational and the establishment of a substantial targeted programme (E-AMDAR) for the ASECNA area; b) the AMMA Project through its radiosonde group (ARG) whose general goal is to assist and organise the development and maintenance of a co-ordinated network of radiosonde, Pilot balloon, VHF/UHF and GPS Total Columnar Water Vapour (TCWV) stations during the AMMA Extended Observation Period (EOP) scheduled from late 2005 to early 2007 and beyond; c) the implementation of the GCOS revitalisation activities that had started in many African countries, specially in the SADC region where some of these activities have been completed. This should in turn lead to a significant increase in the availability of Climate and Climate TEMP Reports from Africa.

Achievements:

- Increase in the number of operational stations in many African countries especially in countries recovering from war,
- Many upper air stations have been upgraded especially in ASECNA members countries where 17 out of 22 RAOB stations operated Digicora II equipments using RS92 radiosondes;
- The AMDAR regional programme in Southern Africa is now fully operational;
- ASECNA countries will very soon be provided with a very simple PC-based data display system to visualize AMDAR data; this action comes prior to the development of a sub-regional AMDAR programme in the ASECNA region;
- An AMDAR technical training workshop is planned for early November 2006 in Nairobi for 12 countries in eastern and southern Africa;
- The GCOS Technical Support Project in the SADC region has carried out a number of activities to revitalize the GUAN and GSN. Numerous stations have received assistance ranging from complete renovation (Dar-es-Salam, Windoeck) to the supply of radiosonde consumables and hydrogen generators (Mauritius, Douala, Abidjan, Madagascar); other generators have programmed for next year for Dakar and Luanda; the impact is the reduction of silent stations and the leading toward the increase of the availability of CLIMAT TEMP;
- Many GUAN stations have received certificate of recognition;
- The GOS in west and central Africa has been improved especially the upper air component by the AMMA Project;
- Many upper air stations that have been silent or obsolete for many years have been restored or upgraded, 16 stations are now operating refurbished Digicora 2 using digital RS92 radiosondes with balloons filled with helium;
- Four new upper air stations are now fully operational;
- During the AMMA Extended Observing Period (July-August 2006) many other observing systems have been used (TCWV, VHF/UHF profilers, dropsonde from balloons etc.);
- The Meteorological Transition in Africa (MTAP, also known as PUMA) -MSG ground receiving stations have been installed in almost all African countries providing access to more information and capacity to utilize satellite and products;
- The Volume II, Regional Aspects, Region I-Africa has been reviewed and updated
- The identification of the relevant recommendations of the EGOS-IP that address the special issues and the major considerations
- Three RDF operational interoperable upper air systems implemented;
- The terms of reference of the Regional Rapporteur have been updated in taking account the EGOS-IP.
- The new RBSN is being developed in the light of the EGOS-IP.

Issues (also appear in section 10):

- In many areas of Africa the current GOS simply does not exist because of many major deficiencies;
- Many stations proposed to be within the RBSN especially for the upper-air component are not implemented;
- Failures to catch up with rapid technological developments;
- Poor economic environment and difficulties to establish stations in uninhabited areas;
- Inadequate or lack of telecommunication facilities, lack of capacities for the operation and maintenance and calibration of equipment;
- High cost of consumables especially for upper air stations;
- Lack of qualified personnel; the meteorological technician training is decreasing;
- Lack of public infrastructure and expertise being the result of the lack of funding and lack of involvement, support, attention and awareness in the matters of meteorological services (climate, weather) by the public officials (governments and regional economic groupings);
- Lack of efficient synergy and working arrangements between OPAG-IOS, the Rapporteur, the Regional Association Decision Making Bodies (President, Regional Directors) in solving the issues addressing the evolution of the GOS in the region;
- Lack of Regional Observing programmes such as EUCOS in Region VI that deals with all the issues and problems and that defines the strategies to improve the evolution of the GOS in the region; rather than to let a single country run its own national observation programme (if it exists);

Recommendations:

- The evolution of the GOS in Africa, and in developing countries in general, must take into account upgrading, restoring, substitution and capacity building, especially in the use of new technologies of observing systems that are less dependent on local infrastructure. In some circumstances those include satellite, AMDAR, dropsondes and AWSs. Nonetheless, a minimum set of reliable RAOBs is required as a backbone to the GUAN and RBCN; these are also used to validate satellite observations.
- Migration toward the table driven codes (BUFR and CREX) as a reliable representation of the data is required,
- The production of vertical profiles by AMDAR in many data sparse areas is worthy of testing.
- It is desirable to conduct OSEs to study the impact of additional observations (e.g AMDAR) in areas of sparse conventional observations (e.g RAOB) and discuss possible observing system experiments to explore enhancing the observations in these areas. This is in fact a requirement to study the impact of all AMDAR data in Central and Southern Africa on the global NWP. The AMMA Programme provides an opportunity for impact studies and subsequent network design.
- The type of PUMA Project should be expanded to include other data types for routine applications (synoptic, aviation and nowcasting).
- Developments through the AMMA Project offer a proposed route forward in some parts of West Africa, and special attention should be paid to maintaining the selected parts of the network (particularly the RAOBs in ASECNA countries, Ghana and Nigeria) after the AMMA Project is concluded.
- The highest priority for each RA 1 Member should go to a) maintaining and upgrading its national surface component of the RBSN and RBCN, with emphasis on the implementation of the best practices of the GSN and b) to rehabilitate observing sites in critical locations through the deployment of AWSs (viable and cost effective compared to manned stations). Therefore, it is essential that Sub-regional Economic Groupings (NEPAD, ECOWAS, SADC, IGAD, CEMAC etc.) be sensitised on the role of observational networks of surface data (meteorological, environmental, climatological) in achieving sustainable development of other countries through the prevention of natural disasters and catastrophes associated with severe weather, climate and water.

- High priority should be given by the Region and the WMO Secretariat to include operational stations in Volume A to be part of the RBSN/RBCN and to maintain a minimum RAOB network with acceptable performance within data sparse areas for example (Central Africa, countries recovering from war, desert areas, permanent silent stations, etc.).
- Make full use of AMDAR ascent/descent data at major airports. Thus high priority should be given by the Region, the WMO Secretariat and the AMDAR Panel to help ASECNA achieve by the end of 2007 the implementation of a full operational AMDAR programme in West and Central Africa.
- High priority should be given by CBS, the Regions, CAS and ASECNA to sustaining the operational AMMA network after the completion of the project.

5.2 Report on the GOS in Region II

The Regional rapporteur reported that there were some positive trends in the implementation of GOS in RA II in the past two years. The session was advised that current RBSN list includes 1312 surface stations, 281 radiosonde stations and 32 rawin stations (as of April 2006) in Region II.

The October 2005 annual monitoring results showed that the availability of RBSN in RA II was 88% for SYNOP reports and 77% for TEMP reports. It is thus evident that the availability of SYNOP reports from the Region II is generally satisfactory whilst the availability of TEMP reports is not satisfactory from northern, south eastern and western parts of the Region. The October 2005 annual monitoring results also showed that among the implemented RBSN stations, 66 SYNOP stations and 21 TEMP (part A) stations were "silent".

The current RBCN implementation in RA-III, as of March 2006, includes 658 CLIMAT stations and 181 CLIMAT TEMP stations, of which 263 are GSN stations and 32 are GUAN stations respectively.

Regarding Marine Systems the meeting was advised that considerable effort has been given to further develop marine-observing networks. Several members had established their own ARGO programme, including Japan, the Republic of Korea and China.

The overall the availability of AMDAR reports in Region II continues to be low. In some countries, difficulties exist in communicating AMDAR data to the Meteorological Services. Several RA II Members are deploying new meteorological radars to help mitigate natural disasters. Japan, Hong Kong, China, Vietnam and China are deploying Doppler radar systems.

30 out of 34 members of RA II are equipped with low-resolution LEO receivers (APT) but only 14 members are equipped with high-resolution LEO receivers (HRPT). 32 out of 34 members are equipped with at least one LEO receiver, 30 have low-resolution WEFAX receivers while only 12 have high-resolution (HR) receivers. In total 32 out of 34 members have at least one geostationary receiver.

Achievements:

- The surface observing stations of RBSN in RA II have been increased from 1234 in 2004 to 1315 in 2006.
- The availability of the TEMP report from RBSN in RA II is increasing stably, from 62% in April 2004 to 79% in April 2006.
- The number of ARGO station from RA II members has increased, Japan has deployed 367 ARGO stations the Republic of Korea deployed 84 and China deployed 14.
- Middle East Project is going well. AMDAR programmes have become operational in Saudi Arabia and Hong Kong. China with a small volume of data being exchanged on the GTS. Hong Kong, China is routinely producing data from one aircraft but the number will also increase in time. Initial valuation shows data quality is good.

- The regional AMDAR program has been established in RA II.
- China has deployed about 101 new generation weather radar systems and about 158 Doppler radars will be established in the country in accordance with the “China new generation weather Radar monitoring network distribution plan”, which has been approved by the Chinese Meteorological Administration (CMA).

Issues:

- The October 2005 annual monitoring results showed that among the implemented RBSN stations, 66 SYNOP stations and 21 TEMP (part A) stations were “silent”.
- The availability of SYNOP reports from the Region II is generally satisfactory whilst the availability of TEMP reports is not satisfactory from northern, south eastern and western parts of the Region.
- The overall the availability of AMDAR reports in Region II continues to be low. In some countries, difficulties exist in communicating AMDAR data to the Meteorological Services.

Recommendations:

- More workshops should be organized in RA II to train experts and discuss how to participate the AMDAR program.
- Those Members, whose TEMP report availability rate is not satisfactory should make more efforts to improve their upper-air data availability and provide more TEMP reports to the GTS.
- Further measures should be taken to make RA II Members aware of the importance of the RBCN for the climate prediction and research, and every Member should also make every effort to provide CLIMAT and CLIMAT/TEMP reports from RBCN stations to GTS.

5.3 Report on the GOS in Region III

The contribution of RA-III to the global RBCN (Regional Basic Climate Network) is consists of 325 stations (12.5% of the total) providing CLIMAT reports and 49 stations (9.5% of the total) providing CLIMAT TEMP reports.

There has been an increase of the availability of CLIMAT and CLIMAT TEMP messages in the RBCN from RA-III, which reached 70% and 65%, respectively, in December.2005.

Regarding the RBSN (Regional Basic Synoptic Network), there are 435 stations, but only 40% of the stations carry out 8 observations daily. On average, the availability of SYNOP reports is 64%. However at 06:00 UTC the availability of reports is only 30%.

There has been a decrease in the GSN (Global Surface Network) in Region III from 113 stations in 2002 to 102 stations in 2005. This corresponds to 27% of the number of stations of the RBCN. The GUAN (Global Upper-air Network) has remained constant, with 58 stations in the last years. Reports from some GUAN stations of RA-III are not regularly received at the GCOS (Global Climate Observing System) Monitoring Centers.

The 13 country members have the capacity to receive information of orbiting and geostationary satellites. Eight countries have receivers of high-resolution (HRPT) polar satellite. Twelve members have the capacity of low resolution reception, whereas seven have the capacity of high resolution reception (HR

Achievements:

- Some countries have made an effort with the automation of surface stations, through data collection platforms (DCPs),
- Increase of the availability of CLIMAT AND CLIMAT TEMP messages.

Issues:

- Inadequate capacity of functioning and maintenance and calibration of meteorological instruments.
- Limited availability of public infrastructure and lack in training of the personnel
- Some countries of the Region mainly are recipients of information rather than generators of information for international exchange.
- The amount of AMDAR from RA-III, it is practically zero, due to technical limitations with reception and transmission of the data.
- Decrease in the number of observations during the night hours.

Recommendations:

- Maintenance of weather stations should be in accordance with WMO recommendations, which will require additional government assistance;
- Training of personnel for transmission and processing of the meteorological information
- In some instances, financial support for maintenance and acquisition of meteorological instruments.

5.4 Report on the GOS in Region IV

The session was advised that the number of RBSN reporting stations in RA-IV has increased since 2004 from 512 to 541 (a net increase of 29 stations). There are 39 silent SYNOP stations and 4 silent TEMP stations.

Regarding the Regional Basic Climatological Network (RBCN), the number of CLIMAT reporting stations in RA-IV has increased from 242 in 2002 to 298 in 2004 (a net increase of 56 stations), but in July 2005 the network decreased to 267 stations (a net decrease of 31 stations). And the number of CLIMAT TEMP reporting stations in RA-IV has decreased from 72 in 2002 to 58 in 2004, a net decreased of 14 stations. The last available report of July 2005 also showed 58 reporting CLIMAT TEMP stations.

The session was advised that USA is particularly interested in developing targeted AMDAR programs for regions in the Caribbean, Central and South America. Canada is extending operations equipped flights into arctic Canada. The session was informed of the programme to construct and install four new digital weather radars in the Caribbean to replace the aging radar network installed by the Caribbean Meteorological Organization. In addition there is a project to install a radar at each country of Central America in next years. Honduras and Guatemala could have a Doppler radar in the near future.

Achievements:

- The number of RBSN and RBCN reporting stations have showed a sustainable increase in the last two years
- The dissemination of global and regional satellite products in the Region has been sustainable, particularly in Central America and Caribbean Countries

Issues:

- The WAFS-METLAB system is not properly working in some countries of the area;
- The CLIMAT TEMP or CLIMAT transmission via Internet to RTH (Washington) has problems to reach the monitoring centre
- The countries have problems to buy radiosondes in detriment of the upper air networks, especially in Central America
- The Region has a lot of silent stations that are officially implemented but are not operationally

Recommendations:

- The Members of RA-IV have to review and update their entries in the RBSN and RBCN listings and identify the silent stations to investigate why those stations have problems

- In order to increase the availability of climatological data is very important that the Members should be made to ensure that their operational observing stations compiled and transmitted the CLIMAT/CLIMAT TEMP messages according to existing regulations
- To find financial support from the international community to continue and expand the activities in improving the quantity and quality of the meteorological observations
- The data of the Caribbean Countries that have Automatic Weather Systems deployed could be part of the GOS
- Canada has sub-regional observations that could be included in GOS
- Guatemala are transmitting via GTS 5 new synoptic stations that were acquired during the last months and plans buy 31 automatic surface stations and one radar in 2007; all those data could be transmitted via GTS and be part of GOS
- The countries of the RA IV are transmitting synoptic reports that could be transmitting both principal and intermediates reports.
- The Countries of Central America send a lot of data to Wallops from all the Post-Mitch Automatic Meteorological Stations; this information could be integrated to GOS.

5.5 Report on the GOS in Region V

Availability of SYNOP reports has been around 69 per cent during the period 2003-2005. The availability of TEMP reports has decreased over the past two years from around 65 per cent to 58 per cent. The major difficulties experienced especially by developing countries were due to the high cost of consumables and in telecommunications. Natural disasters that struck several countries in the Region had a detrimental impact on observational networks.

The availability of CLIMAT reports from the Regional Basic Climatological Network (RBCN) has decreased to 74 per cent in the 2005 monitoring but the availability of CLIMAT TEMP reports increased from 83 to 91 per cent over the past two years. Data receipt from the GSN decreased slightly over the past two years but continued above 70 per cent in 2005. RA V continues to have one of the most reliable reporting rates for daily TEMP messages from the GUAN although the reporting rate for CLIMAT TEMP messages remains at about 80 per cent.

While fully acknowledging the importance of CLIMAT bulletins, RA V questions the need for CLIMAT TEMP, since TEMP bulletins are exchanged on the GTS from all upper-air stations and provide more complete information.

The Association appreciated the steps that were taken to avoid a prolonged loss of upper-air data from the need to replace certain radiosonde systems.

The Association noted with appreciation and gratitude the efforts made by meteorological satellite agencies for the recent major improvement in the implementation of meteorological satellites covering the Region, including the cooperation between JMA and NOAA in ensuring the continuous coverage of geostationary satellite imagery until the launch of MTSAT-1R. The maintenance of Meteosat-5 at 63 degrees East has been a valuable enhancement of the coverage over the Indian Ocean region. The commitment by India/China/Russia to support a permanent geostationary imaging capability over the Indian Ocean is valuable for the western areas of RA V.

Most small countries in the east of the region have lost direct reception of GOES imagery with the demise of WEFAX transmissions. Generous assistance has recently been committed by USA to fund the transition to LRIT reception.

376 ships from six countries of the region participated successfully in the VOS programme in June 2005. The number of ship reports remains fairly constant but buoy reports continue to increase. An issue of concern for ship observations is the potential threat to ship security by the increasing widespread availability of ship's observations in real-time on web sites unconnected to NMHS and the WWW.

In Region V, there is potential for future expansion on some flying routes, especially for New Caledonia and French Polynesia. Access to data and easy display of AMDAR data, especially in small NMHS, is a critical element to demonstrate the value for AMDAR data for operational use.

The number of weather radars is increasing. The established networks are being enhanced, and new radars are being installed in Indonesia, New Caledonia and Fiji. Low cost lightning detection systems would provide information of significant benefit for NMHS, especially those that are not equipped with weather radars.

The recent meeting of Regional Association V reviewed and endorsed proposed amendments to the *Manual on the GOS Volume II, Regional Aspects, Region V – South-West Pacific*.

Further work is required in translating the concepts for the evolution of the GOS into specific actions for the region.

A Southern Hemisphere Science Plan for THORPEX was prepared in early 2006 with contributions from Australia, New Zealand, South America, South Africa and Pacific Islands. The Association has appointed a Rapporteur on WWRP-THORPEX.

RA V appointed a GEOSS Rapporteur for facilitating the coordination of GEOSS development within the Region, and also agreed of a GEOSS rapporteur within the WG-PIW.

Of growing importance is the role and responsibility of the World Weather Watch and NMHSs to support Early Warning Systems (EWS), and, in particular, Tsunami Warning Systems (TWS) in the Pacific and Indian Ocean, and, more generally, to the WMO Natural Disaster Prevention and Mitigation Programme. Observations are an important part of Early Warning Systems and there are opportunities for improving the observing system itself, and the communications systems for the distribution of information.

Another issue for the region is the Migration to Table Driven Code Forms. The session stressed that appropriate mechanisms must be put in place in the region to ensure all activities are integrated, impacts are minimized, problems are identified and progress monitored.

Relevant non-NMHS agencies/users of the region (including appropriate regional organizations outside WMO) need to be engaged as stakeholders in the development and implementation of WIS if it is to achieve its objectives.

The *Strategic Development Plan for Meteorology in the Pacific (2000-2009)* has been a useful guide for development of meteorology in the Pacific including for the observing system in the region. The Regional Association decided to revalidate and update this plan as a Strategic Plan for the whole Region. There is still a need for resources mobilization for the implementation of the projects.

Achievements:

- Maintenance of the number of reports from RBSN surface observations and increase in CLIMAT TEMP reporting
- Continued provision of CLIMAT and upper air reports although with some decrease
- Continued good performance of the GSN and GUAN
- The coordinated steps from WMO Secretariat and donors to avoid a prolonged loss of upper-air data from the need to replace certain radiosonde systems
- The major contribution from meteorological satellite agencies in USA, Japan, China, Europe, Russia and India to the GOS in the region. A notable achievement was the cooperation between JMA and NOAA in ensuring the continuous coverage of geostationary satellite imagery until the launch of MTSAT-1R
- Developing use of satellite data in NMHS operations, including from research satellites

- Maintenance of the number of ship reports and the increase in the number of buoy reports
- Continued development of the AMDAR program and plans for extension to new routes
- The number of weather radars is increasing
- Amendments to the Manual on the GOS Volume II, Regional Aspects, Region V – South-West Pacific

Issues:

- Decrease in the number of upper air observations
- Slight decrease in number of CLIMAT reports
- Communications problems affecting the transmission of observations in some isolated areas
- Need to complete the LRIT transition project generously funded by USA to remedy the loss of direct reception of GOES imagery in the east of the region
- Need for low cost lightning detection for countries that do not have weather radar
- Further work is required in translating the concepts for the evolution of the GOS into specific actions for the region
- Means of developing regional involvement in THORPEX and GEOSS
- Ensuring GOS supports Early Warning Systems (EWS), and, in particular, Tsunami Warning Systems (TWS) in the Pacific and Indian Ocean, and, more generally, the WMO Natural Disaster Prevention and Mitigation Programme
- Successful Migration to Table Driven Code Forms to obtain benefits but ensuring that there is no negative impact
- Ensuring that the GOS is fully covered in the development of the RA V Strategic Plan
- Need to mobilize resources for enhancement of the GOS in the region.

Recommendations:

- While fully acknowledging the importance of CLIMAT bulletins, RA V questions the need for CLIMAT TEMP, since TEMP bulletins are exchanged on the GTS from all upper-air stations and provide more complete information
- Closer involvement of THORPEX and World Weather Watch activities
- Relevant non-NMHS agencies/users of the region (including appropriate regional organizations outside WMO) need to be engaged as stakeholders in the development and implementation of WIS if it is to achieve its objectives
- Continuation of efforts to mobilise resources to maintain the surface-based networks in the region
- Identify more specifically the actions required by Members for the evolution of the GOS and commence monitoring of the implementation of the plan
- Continued assistance from the AMDAR Panel and Technical Coordinator to develop a regional AMDAR.

5.6 Report on the GOS in Region VI

The meeting was advised that the current RBSN list include 895 fixed stations, 1 weather ship and 7 moored buoys. Most of the stations reported regularly and few stations were totally “silent” for a longer period during the monitoring period March to July 2006. Data quality is in general good.

It is noted that a trend in RA VI, especially in the western part of the region, is a move to automatic solutions. In some countries the whole synoptic network has been made automatic while in other counties all RBSN stations are still manual.

The deadline for insertion of List 1 RBSN stations onto GTS is 3 minutes past the synoptic hour. Monitoring statistics shows that only 21 Member countries manage to get at least 90% of their RBSN data available with 15 minutes after the synoptic hour at Exeter. At 45 minutes after the hour 90% of all RBSN stations from all countries in RA VI were available at Exeter.

Use of hourly observations in NWP has shown a positive impact, in particular in data sparse areas. Monitoring at Exeter shows that 11 countries in RA VI insert hourly data onto GTS. A number of other countries in RA VI have hourly data from their stations but for some reason do not exchange the data.

RA VI countries operate 129 radiosonde stations but the number has decreased during the last years for financial reasons. Out of the 129 stations, 20 stations make only one sounding per day, only 10 stations make more than 2 observations per day and only one station makes observations at 06 and 18 UTC.

Based on monitoring statistics during and summer of 2006 the following have been noted:

- Testing of sounding before the launch may not be standard procedure at all stations.
- Temp part C and D are missing regularly from some stations.
- Data from many stations appear very late on GTS.

Monitoring also shows that many countries within the region do not split up the TEMP message into two transmissions onto the GTS.

The announced termination of the NELS Agreement (Loran C in the North West Europe and North Atlantic) to be effective as from 1, January 2006 was cancelled since Denmark and Norway informed that their 5 Loran C stations would continue at least until the end of 2006. It appears now quite likely that the 5 Loran C stations will continue to operate at least until the end of 2009. A decision will be made during autumn 2007.

E-ASAP (The EUMETNET Automatic Shipboard Aerological Programme) was developed to optimize the European ASAP operations. 17 E-ASAP systems were in operation in 2005 and near 5000 profiles from the North Atlantic and Mediterranean Sea were taken. A similar amount of profiles are planned for in 2006 with 16 systems in use.

E-AMDAR (The EUMETNET–Aircraft Meteorological Data Relay Programme) was developed to maximize AMDAR systems at commercial aircrafts to get upper-air data measurements of wind and temperature. During 2005 the E-AMDAR programme delivered around 11.2 million AMDAR observations from a daily average 307 aircrafts. The goal is to have 3 hourly profiles from as many airports as possible within the EUCOS area. It is still an uneven distribution of AMDAR data geographically within RA VI. The lack of night observations is a problem. Humidity sensors are on trial and test flights with Lufthansa flights during 2006 are planned, with also humidity included in an AMDAR profile.

E-SURMAR is an optional programme to coordinate EUMETNET Members activities for surface observations from voluntary Observing ships (VOS) and from Data Buoys. The programme operates more than 50 drifting buoys in the North Atlantic and measurements of pressure and sea surface temperatures are available hourly.

VOS recruited by Members of EUMETNET transmitted around 300 000 observations within the EUCOS area of interest. It is also interesting to note that more than 50% of these observations come from AWS aboard recruited ships. It is also interesting to note that numbers of ship report hourly. Cheap data communication over sea areas is a key for more data.

WINPROF also a EUMETNET programme to support the operation of wind profiler radar systems over Europe and provide their data for operational use through the Cost Wind initiative for a Network Demonstration in Europe (CWINDE). The number of sites reporting to CWINDE was early 2006 28 wind profilers and 75 Doppler weather radars.

OPERA programme is EUMETNET programme to improve the quality and exchange of weather radar data. The OPERA network covers 25 European countries. Its members operate close to 150 weather radars and exchange data on a bilateral basis or within several regional weather radar

networks. Data from more than 110 radars are collected in near real time to a central hub in the Opera program for evaluation and calibrations. Plans exist to make a European composite.

High density precipitation networks are available in many countries, but data are normally not available in near real time. Stations are normally manually operated, but in some countries part of the network has been built up with automatic stations. Many of the stations are privately operated, and data cannot be used freely. Quality of much of the data is questionable. A survey among the Members could be conducted to see if there is a will to make this type of data available.

Achievements:

- The meeting was advised that the RBSN in RA VI consists of 895 surface, 7 moored buoys, one weather ship and 129 radiosonde stations as of 1 September 2006. Situation of RBSN is good in Ra VI. The network has no big holes. 11 countries submit hourly synoptic on to GTS.
- Under the umbrella of EUCOS, the 21 members of EUCOS operate 16 ASAP systems providing near to 5000 profiles per year. AMDAR produced 11.2 million observations in 2006. In the drifting buoy programme in the North Atlantic, more than 60 buoys are operated at any time.
- Wind profiles from wind profilers and doppler weather radars are collected from more than 100 systems on a central hub and used for experiments and NWP purposes.

Recommendation:

- Monitoring of quality and timeliness of RBSN data on GTS should be improved, and requirements of information on GTS and telecommunication practice should be harmonized.

6. REVIEW OF OTHER IN-SITU SYSTEMS (AIRCRAFT, MARINE, etc.) AND IMPACT OF NEW INSTRUMENTATION AND OBSERVING SYSTEM STUDIES ON THE GOS

6.1 Aircraft Systems, including AMDAR

The ICT noted the report of the Rapporteur on AMDAR activities. The Rapporteur should report on activities related to the integration of AMDAR into WWW operations and study the required training activities relevant to AMDAR.

In his report, the Rapporteur recalled that the averaged number of observations exchanged daily on the GTS has exceeded 200,000. Although a large portion of these data were obtained over Europe, North America and Australia, the data coverage in data sparse regions has improved by targeted observation delivered for regions in Africa, Eastern Europe, part of Russia, the Middle East, South and East Asia and South America. It was noted that Japan, China and Canada had continued their operational programmes delivering a significant amount of data on the GTS and that Finland will become part of the E-AMDAR programme towards the end of 2006. Of interest were a series of newly planned programmes and a large number of countries are considering starting national programmes.

The ICT noted that further steps have been taken to provide targeted observations from data sparse areas and was pleased to note that these data were delivered by existing programmes as part of the contributions to the WMO WWW programme. It was also informed that evaluation trials for alternative AMDAR system installed on smaller regional aircraft have been conducted.

The ICT was informed that evaluation trials for humidity/water vapour sensors had started.

The ICT noted that further steps had been taken to integrate AMDAR into WWW operations and was pleased to note that the AMDAR Panel Training Sub-Group had developed a questionnaire on AMDAR training requirements. It further noted that the result of the survey compiled by the Secretariat showed that 79% of the replies to the questionnaire indicated that there was a need for training on the use of AMDAR data for operational applications.

The ICT was pleased to note that the AMDAR Panel had performed a technical training workshop in Hungary and was planning additional technical training on request of the Russian Federation, Morocco, Brazil and Kenya. It noted that the AMDAR Panel was prepared to participate in a CAeM/CBS task team for the development of a training concept on the use of AMDAR data. It also noted that the AMDAR Panel was planning to install appropriate training material on AMDAR on the CAeM Web site www.caem.wmo.int.

Achievements:

- The averaged number of AMDAR observations exchanged daily on the GTS has exceeded 200,000;
- Existing programmes have improved the coverage in data sparse areas by targeted observations;
- Newly planned programmes will further improve the world wide data coverage;
- Evaluation trials for alternative AMDAR systems (TAMDAR, AFIRS) had been conducted;
- The evaluation trials for humidity/water vapour sensors had started;
- A questionnaire on AMDAR training requirements was distributed and the result was reviewed;
- A technical training workshop was held in Hungary;
- Further steps had been taken to integrate AMDAR into WWW.

Issues:

- Progress on establishing a CAeM/CBS Task Team and on the development of a training concept has not sufficiently advanced;
- The integration of the AMDAR Panel into WWW programme has to be completed.

Recommendations:

- ICT should encourage the establishment of the CAeM/CBS Task Team;
- ICT and the Secretariat to propose further steps to integrate the AMDAR Panel into the WWW programme.

6.2 Marine Systems

Mr Etienne Charpentier presented as status of marine observing systems. The WMO Marine Meteorology and Oceanography Programme (MMOP) provides support for the coordination of technical regulations, and for the implementation of these through the Observations Programme Area (OPA) of JCOMM, the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology. OPA includes three implementation panels - the Data Buoy Cooperation Panel (DBCP), Ship Observations Team (SOT), and Global Sea Level Observing System Group of Experts (GLOSS GE). The OPA maintains linkage with other international implementation panels which also provide important contributions to the global ocean observing system even though they are not officially part of JCOMM, i.e. (i) the Argo Steering Team (profiling floats), (ii) the OceanSITES Steering Team (long-term, deepwater reference stations), and the International Ocean Carbon Coordination Project (IOCCP). Three observing system issues are common across all elements of the OPA, and its Observations Coordination Group (OCG) has chosen to give priority attention to (i) achieving global coverage by the in situ networks, (ii) system-wide monitoring and performance reporting, and (iii) funding to meet implementation targets.

JCOMM is also contributing to the CBS Expert Team on the Evolution of the Global Observing System (ET-EGOS). In this context, JCOMM developed its Statement of Guidance (SoG) relating to marine user requirements. It is being updated and will be published as a JCOMM technical report. There are four major application areas relevant to JCOMM (i) Numerical Weather Prediction (NWP), (ii) Seasonal to Inter-annual Forecast (SIA), (iii) Ocean Mesoscale Forecast (OMF), and (iv) Coastal Marine Services. Statements of Guidance for NWP and SIA are not under the responsibility of JCOMM. Ocean Mesoscale Forecast is now designed and implemented by a GOOS/GCOS OOPC pilot project, Global Ocean Data Assimilation Experiment (GODAE).

Integrating existing and near future ocean observation systems, near-operational ocean mesoscale forecast is or will be conducted in the GODAE project. Demonstration phase of GODAE started in 2003. Coastal Marine Services include the traditional tasks of the JCOMM community. However, the social needs have increased and become diversified, which forces JCOMM community to redesign the observing systems including backbone GOSs (e.g., GOOS/Coastal Ocean Observing Panel).

A summary of essential in situ observing programme implementation status and the challenges remaining to achieve global coverage was presented. Implementation targets have been defined and agreed upon for all of the components except for the VOS fleet and the ASAP programmes. ASAP (34 ships, 400 profiles per month), is regarded as complementary to the AMDAR programme as it can potentially provide for in situ atmospheric soundings from data sparse area where aircrafts are not flying or not providing ascents or descents. The meeting agreed that cooperation between JCOMM and CBS was required in this regard. ICT-IOS is inviting Member Countries to participate in the ASAP for providing in situ aerological profiles from ocean data sparse areas (recommendation). It is estimated that about 56% of the observing system under JCOMM is now completed. Drifting buoy component reached completion by the end of 2005 but efforts remain to be made to add barometers on all of the instruments (recommendation). Argo profiling float programme is now 83% completed. Tropical moored buoy component is 72% completed. 60% of the VOSclim target has been achieved with now about 120 VOSclim ships reporting through the system. However, efforts remain to be made in order to collect all required data sets, including delayed mode data and metadata, from the fleet (recommendation). About 4700 VOS ships reporting as many as 250000 observations per months are reporting on the GTS. However, the VOS fleet has been declining in recent years and availability of VOS ships' position on public web sites is a matter of concern to ship owners and masters. At its fifty-eighth session, Geneva, Switzerland, June 2006, the WMO Executive Council adopted resolution 3.4.4/2 (EC-LVIII) – Ship owners and masters' concerns with regard to VOS data exchange. Resolution authorized in particular for a trial period of one year Members to mask the ship's call signs from FM-13 SHIP reports provided that they provide access to a secured database with ship's identification. The meeting stressed that unique ship's identification remains essential for quality monitoring activities as well as for global climate studies and that any technical solution proposed for ship masking should eventually provide for this for such activities (recommendation). Other components of the marine observing system include XBT high density and frequently repeated lines (82% completed, target 51 lines), GCOS real-time sea level reference stations (40%/170 stations), reference time-series stations (21%/58 stations), global reference mooring network (48%/29), and the repeat hydrography and carbon inventory (43%/full ocean over 10 years). It was noted that requirements for real time distribution of in situ sea level data for Tsunami Monitoring purposes had not been clearly expressed to CBS by the users. JCOMM is invited to help in collecting precise requirements in this regard in order to eventually define appropriate CREX template (recommendation).

Regarding satellite observations, Sea Surface Temperature, Sea surface Height, Surface vector winds, ocean colour, and sea ice are considered essential variables by JCOMM. The value of space-based altimeter measurements of sea surface height has now been clearly demonstrated by the TOPEX/Poseidon and Jason missions. Changes in sea level during major El Nino events can now be discerned at high resolution and provide realistic model initializations for seasonal climate forecasting. The same data, when calibrated with island tide gauge observations, are also able to monitor the rate of global sea level change with an accuracy of 1 mm per year. The planned NPOESS altimeter will be adequate for shorter term forecasting, but the NPOESS altimeter will not fly in the same orbit as TOPEX/Poseidon and Jason; and for monitoring long-term sea level change, continuation of precision altimeter missions in the TOPEX/Poseidon/Jason orbit is necessary. Jason follow-on altimeter missions (Ocean Surface Topography Mission, OSTM) are necessary to continue the long-term sea level record (recommendation).

There is presently significant international momentum for implementation of a composite global observing system consisting of: 1) the in situ networks; 2) continuous satellite missions; 3) data and assimilation subsystems; and 4) system management and product delivery. The JCOMM

OPA implementation plan is largely based on the GCOS Implementation Plan for the Global Observing System for Climate in support of the UNFCCC (GCOS-92). The ocean chapter of the plan has been endorsed as the ocean backbone of the Global Earth Observation System of Systems (GEOSS). Although the backbone system specified by GCOS-92 is designed to meet climate requirements, marine services in general will be improved greatly by implementation of the global coverage called for by this design. The system will support global weather prediction, global and coastal ocean prediction, marine related multi-hazard warning systems, marine environmental monitoring, and many other non-climate users. The OPA accepts the GCOS Climate Monitoring Principles as best practice. Opportunities for JCOMM OPA support to the marine related international multi-hazard warning systems include real-time reporting from GLOSS tide gauge stations, coordinated deployment of ocean buoys, and the use of common platforms and logistics infrastructure for multiple observational purposes. This will also be a main requirement driver for the OPA work plan over the next four years.

While JCOMM is participating in ET-EGOS and its Rolling Review of Requirements process, it is also now providing its own performance metrics for evaluating the effectiveness of the observing system. These activities help in efforts to convince governments to provide the funding needed to meet global implementation targets. Variables initially monitored include sea surface temperature, sea surface salinity, temperature profiles, salinity profiles, and near-surface current. The OPA is working to incorporate reports for other ocean variables that have been specified by GOOS and GCOS. Details can be found at http://www.jcommops.org/network_status. ICT-IOS is inviting JCOMM to add new variables in its performance metrics, especially regarding sea level pressure, surface wind, and surface air temperature (recommendation).

Following an OPA proposal, JCOMM-II established a common fund for consumables to finance expansion of the ocean system. This should eventually help in having more countries to contribute to the international observing system. The initial thrust of this idea is to support the Ship Of Opportunity Programme (SOOP) of the SOT through the purchase of XBT probes but other expendables could be added in time. ICT-IOS is inviting Member Countries to make commitments to the JCOMM trust fund (recommendation).

Achievements:

- Much progress in the last few years with regard to the development and implementation of the marine observing systems. The global system is now 56% complete.
- In particular, the drifting buoy component is now fully completed with 1250 drifting buoys maintained worldwide.
- Argo is now 84% completed with more than 2500 profiling floats operational.
- Progress was made with regard to extending the tropical moored buoy array in the Atlantic and Indian oceans.
- 60% of the proposed 200 VOSclim ships are now participating in the fleet
- Performance metrics have been defined and are now routinely being produced on a quarterly basis. Monthly monitoring products are also provided by JCOMMOPS on a monthly basis.
- JCOMM trust fund for ship consumables has been established.

Issues:

- Three observing system issues are common across all elements of the JCOMM Observations Programme Area, and its Observations Coordination Group (OCG) has chosen to give priority attention to (i) achieving global coverage by the in situ networks, (ii) system-wide monitoring and performance reporting, and (iii) funding to meet implementation targets.

In addition, the following issues have been raised by the fourth ICT-IOS meeting:

- Very few ships do participate in the ASAP and most of them report from the North Atlantic Ocean only.

- Because of ship owners and masters' concerns with regard to VOS data exchange, availability of ship positions on public web sites is threatening the VOS programme in a context where the VOS fleet was already declining.
- Many ships participating in the VOSclim fleet do not meet the requirements in terms of delayed mode data and metadata delivery.
- While it is appreciated that the drifting buoys network is now completed, only a small portion of them are equipped with barometer. Recommendations have been made by the DBCP data users and technology workshop, Reading, UK, 27-28 March 2006, that all buoys should eventually be equipped with barometers.
- Requirements for real time distribution of in situ sea level data have not been clearly expressed to CBS by the users.
- ICT-IOC welcomes the development of JCOMM performance metrics. It noted that such metrics are only provided for a limited number of variables.
- While the planned NPOESS altimeter will be adequate for shorter term forecasting, Jason follow-on altimeter missions (Ocean Surface Topography Mission, OSTM) are necessary to continue the long-term sea level record.

Recommendations:

- Member Countries are invited to make commitments to the JCOMM Trust fund for Ship consumables (Rec. 3, JCOMM-II)
- ASAP ships provide for useful Aerological profile data and should be regarded as complementing AMDAR data. ICT-IOS is inviting Member Countries to participate in the ASAP for providing in situ aerological profiles from ocean data sparse areas.
- While ship's call sign masking within FM-13 SHIP reports has been authorized for a trial period of one year by the fifty-eighth WMO EC, ICT-IOS stresses that unique ship's identification is absolutely required for quality monitoring activities as well as for global climate studies.
- Efforts should be made to add pressure sensors to drifting buoys.

6.3 Impact of New Instrumentation on the GOS

On behalf of the Co-Rapporteurs, Mr Alan Douglas presented the ICT-IOS with the results to date (those responses received by WMO before the end of August 2006) following the issue of the questionnaire to Permanent Representatives by WMO at the start of 2006. The ICT-IOS was reminded of the background to the creation of the two Co-Rapporteurs; that there was an opinion within CBS that enforced changes of technology (by suppliers) were causing financial problems which could only be resolved by cutting back on the existing GOS structure. The ICT was also informed that the opportunity to gather additional, but related, information had been exercised. The ICT-IOS noted that there had been a poor response to the questionnaire (47 Members or about 25% of Members), despite the importance attached to this by CBS. This makes the findings of the survey only to be indicative and not definitive, given lack of harmony with some other sources of information available to the ICT. Overall, only 6 LDCs (4 from Africa, 1 from Asia and 1 from the Pacific) and 4 Low Income Country (LIC) Members (2 from Africa, 1 from Asia and 1 from Europe/Asia) responded. Therefore, though the returns themselves were relatively consistent across the different WMO regions, care will need to be taken in applying the results universally. There were some broad differences in the priorities for equipment between the "established" and "developing" regions. In the "established" regions (primarily Europe) new radiosonde and radar systems took priority whilst in the "developing regions" Automatic Weather Stations and satellite reception units had the priority.

Despite the low response, the ICT-IOS welcomed the results presented; both as the start of a good baseline for future decisions and for the evidence that some Members were finding alternative ways to secure the necessary funding to retain and, indeed, continue to develop the network. In the case of securing funding, regional variations were noted; and also the lack of preparedness to operate the systems in some regions was less than in others, again due mainly to funding constraints. In respect of the concern about the low response, it also noted that there

appeared some inconsistency between the responses received and the reports of the Regional Rapporteurs and other Working Group / Expert Team findings. It was thus proposed that such inconsistencies should be resolved by involving the Regional Rapporteurs and Centres of Excellence, as part of an exercise to secure additional returns, and the baseline then re-set accordingly.

The ICT-IOS noted the additional information, which had been obtained from those Members responding to other sections of the questionnaire to provide additional information on changes (historic and planned) to the GOS and the responses to other OPAG activities – once the baseline was verified this would ensure that future decisions were taken on the basis of real evidence. The ICT-IOS agreed that it should consider whether a better effort could be made to rationalise some of the questionnaires issued to help avoid potential questionnaire fatigue.

Looking to the future, it was agreed that the Chair would incorporate the outcome in his report to the forthcoming Extraordinary meeting of CBS; drawing attention to the poor and incomplete responses and that a proposal be prepared by the Secretariat for adoption at Extraordinary CBS to adopt slightly revised TORs and secure agreement to gain additional information (those who had already responded would only have to confirm updates to their responses) and report to the next full meeting of CBS. This further initiative would involve the Regional Rapporteurs / Co-ordinators and Centres of Excellence.

Achievements:

- Questionnaire created and issued,
- The returns received, analysed and reported to the ICT,
- Results were good in helping to define the progress being made in developing the GOS, and providing a good baseline for future decisions.

Issues:

- Low number and incomplete returns (limited the accuracy and validity of the findings),
- Some apparent inconsistencies with the results from other information available,
- Not sufficient involvement of the Regional Rapporteurs / Centres of Excellence to secure extra / confirm data,
- Process of getting questionnaire through WMO (and need for translation?)

Recommendations:

- OPAG Chair to present at Extraordinary CBS – making it clear the poor response, given CBS concern on the matter,
- Revise the TORs, as considered appropriate, and seek the approval of the Extraordinary CBS meeting for these changes,
- Propose (to CBS) that responses from ALL Members are sought (inviting those who had responded to confirm their information / add any missing details) and that Co-Rapporteurs be asked to prepare a full report for the next ICT / Full CBS meetings,
- Seek pro-active involvement of the Regional Rapporteurs/Coordinators (for in situ and ground based remote sensing) and the Regional Centres of Excellence (for space matters) in seeking to extend the number of responses.

6.4 Status of OSEs and OSSEs

Dr J. Pailleux presented a status report on OSEs and OSSEs which highlighted some results obtained in the Numerical Weather Prediction (NWP) community since the last workshop (Alpbach, March 2004) where a comprehensive review of impact studies was performed. This status report is the same one as what was presented to the ET-EGOS-2 meeting (July) except some modifications accounting for the discussions in the ET-EGOS, as well as some recent email exchanges, especially with some NWP centres not represented in the ET-EGOS. Several conclusions of the Alpbach workshop are confirmed by the recent results, and none is contradicted. Among those, the importance of microwave sounders on polar orbiting satellites and

of the AMDAR system for the GOS is stressed again. Rapid progress is noted on the use of advanced infrared sounders. The studies on the targeting techniques and the impact of targeted observations should not be given up: they currently produce mixed results. It was also noted that a new OSSE initiative has been launched, mainly by the US, and should be supported.

Some specific results, not available in Alpbach (2004) show the importance for the future GOS of GPS radio-occultation systems, of GPS ground-based networks, and of wind observations over the polar caps provided by satellite imagers such as MODIS. For the future, it is recommended to use, as much as possible, campaigns (e.g.: the THORPEX campaigns) to test the impact of new technologies and new observations (including those deployed in a targeted mode). The idea is also to get as much as possible some "operational legacy" from the campaigns in terms of observing systems.

Mr K. Koizumi presented a status report on regional OSEs. He advised the meeting that ground-based GPS and Doppler radar wind data showed promising results and have started to be used operationally in some NWP centers. However, with the exception of some GPS data exchange in Europe, the international exchange of this data has not yet happened. Some additional work is required to ensure full global exchange of GPS and Doppler radar wind data.

Achievements:

- The main global results of OSE have been confirmed by new experiments, for example, the central role of microwave sounders for global NWP.
- An OSSE initiative has started in collaboration between Europe and North America;
- The impact of some new or recent observing systems has been demonstrated: e.g.: surface-based GPS and GPS radio-occultation.
- The first steps have been taken to organise a new workshop in 2008 (i.e. 4 years after Alpbach).

Issues:

- The central role of microwave sounders for NWP has to be consolidated.
- There is a need to understand more the observation requirements inside the tropics, which could be treated by designing and running appropriate impact studies on AMDAR data, in relation with other systems observing wind and temperature (and perhaps humidity).
- It is important to exploit through impact studies the specific observation sets coming out from campaigns (AMMA, THORPEX).
- Concerning surface GPS observing systems, the exchange of short interval and/or high resolution observation data needs to be encouraged and organized and the potential to use networks which are not established primarily for meteorological applications needs to be investigated continuously.

Recommendation (to CBS):

- To encourage Members to make sure the microwave frequency protection mechanism in order to guarantee the central role to the GOS of the microwave sounders.

Recommendations (not to CBS):

- To keep stimulating the studies of observation targeting strategies in coordination with the THORPEX ad hoc groups.
- To keep a strong link with THORPEX for designing impact studies related to the observation campaigns, especially when campaign observations can potentially be used for improving the GOS.

7. REPORTS OF THE OPAG-IOS EXPERT TEAMS

7.1 Report of ET-AWS

The ET-AWS dealt with the issues related to (a) Development of the guidelines for AWS QC procedures, (b) Development of standards for variables to be reported by AWS, (c) Development of AWS metadata standards, (d) Development of procedures to access the information on AWS algorithms, and (e) Review of the BUFR/CREX descriptors and templates for AWS data.

Through the effort of the ET-AWS and in collaboration with the OPAG ISS ET on Data Representation and Codes (ET-DR&C), BUFR/CREX descriptors were updated to allow for reporting both instrument and nominal values of AWS.

The ET-AWS developed Guidelines on QC procedures for data from AWS and were included in the revised Guide on the GOS (WMO-No. 488).

The ICT-IOS agreed that that it would be beneficial to apply universal rules or standards of observation to all AWS-based platforms to avoid unnecessary confusion and achieve data compatibility. It also agreed that a standard AWS should provide observational data based on a standard and optional set of variables. The ICT-IOS requested the ET-AWS, in collaboration with the relevant technical commissions, to develop further a set of standard and optional variables for AWS.

The ICT-IOS noted that no standard reference system had been endorsed by the WMO to be used as the reference for both horizontal position of a station and vertical position of a station and agreed on the Recommendation x.x "Adoption of a World Geodetic System and a Global Geoid Model as references for positioning" for consideration by CBS-Ext. (2006).

The ICT-IOS appreciated that the ET-AWS developed a standard set of metadata for AWS with respect to real-, near-real, and non-real-time and that this standard set was included in the revised Guide on the GOS (WMO-No. 488).

The ICT-IOS, taking into account the latest development of the WMO Core Profile of Metadata Standards, agreed with the proposal of the ET-AWS that four catalogues be developed with regard to: (a) Variables measured by a standard AWS; (b) Instruments used for variables measured by standard AWS; (c) Data processing procedures used by AWS; and (d) Data quality control procedures used for AWS data.

The ICT-IOS agreed that the AWS metadata should be transmitted together with measured data. In this regard, the OPAG-ISS will be requested to update the Table-driven Code Forms to allow for a transmission of AWS data and metadata within a single BUFR AWS template.

The ICT-IOS noted with the appreciation the work done by ET-AWS and ET-DR&C on blending the BUFR template for AWS BUFR and SYNOP BUFR template to avoid a necessity of transmitting two messages from one AWS station from those locations designated as both a synoptic and a non-synoptic station. The new proposal was already tested and was made available in the WMO web server.

The ICT-IOS was concerned with the limitations of the current numbering convention expressed by the WMO block number and a WMO station number that allows for no more than 999 stations to be reported under one WMO block number, especially that the same limitation is valid for BUFR/CREX codes. For a given WMO block number, more than 999 observing stations (mainly AWS) sometimes exist and the number of AWS is ever increasing. Therefore, it is not always possible to allocate a WMO station number to all AWSs and those cannot be reported in the current WMO BUFR templates and exchanged through the GTS. The OPAG-ISS will be requested to address the problem of the WMO station number limitations in current and future BUFR templates.

The ICT-IOS recalled that the fifty-seventh session of the Executive Council requested technical commissions to review technical regulations relevant to observation generation, with a

view to rectifying deficiencies, inconsistencies and errors. In this regard, the ICT-IOS will propose to CBS-Ext. (2006) that all CBS OPAGs and their respective ETs would review BUFR descriptors

Achievements:

- BUFR updated to allow for reporting both instrument and nominal values of AWS;
- The Guidelines on QC procedures for AWS developed and included in the revised Guide on the GOS (WMO No. 488);
- A first version of a set of the standard and optional variables for AWS developed;
- Identification of the World Geodetic System 84 (WGS 84) as the reference datum system for horizontal positioning of a weather station and the Earth Geodetic Model 96 (EGM-96) as reference for its vertical positioning;
- The standard set of metadata for AWS with respect to real-, near-real, and non-real-time developed and included in the revised Guide on the GOS (WMO No. 488);
- The new AWS-SYNOP template developed that allows for a single message to be transmitted from AWS locations designated as both synoptic and non-synoptic station.

Issues:

- The role AWS in the GEOSS system of systems and the evolving role of AWS through the evolution of the GOS;
- Crosscutting nature of the ET-AWS activities;
- Development of acceptable standards for a standardized AWS platform including a set of standard and optional variables for AWS;
- Approval of a standard reference system to be used as the reference for both horizontal position and vertical position of a station.
- Development, under the WMO Core Profile of Metadata Standards, of four catalogues with regard to: (a) Variables measured by a standard AWS; (b) Instruments used for variables measured by standard AWS; (c) Data processing procedures used by AWS; and (d) Data quality control procedures used for AWS data;
- Metadata issues as they relate to QC processes carried out at data processing centres.
- Update of BUFR to allow for metadata transmission together with measured data;
- Limitations related to WMO block number and a WMO station number convention under the BUFR;
- Traceability of BUFR descriptor to the International Meteorological Vocabulary, WMO-No. 182 and WMO Technical Regulations, WMO-No. 49;
- The role of AWSs in the Evolution of the GOS.

Recommendation:

- The World Geodetic System 1984 (WGS 84) be used as the primary reference for horizontal positioning,
- The Earth Geodetic Model - EGM-96 be used as the fixed reference level for MSL determination, and
- The WMO Technical Regulations, WMO-No. 49, and the appropriate WMO Manuals and Guides are updated accordingly.

7.2 Report of ET-EGOS

The Chairman of ET-EGOS, Dr John Eyre, summarised the work of the ET, which had met twice: ET-EGOS-1, 7-9 December 2005, and ET-EGOS-2, 10-14 July 2006. Reports at: www.wmo.int/web/www/CBS-Reports/IOS-index.html.

ET-EGOS-2 had considered reports from various activities related to its work including: THORPEX, International Polar Year, AMDAR Panel, EUCOS, Commission for Climatology and GCOS. The ET had discussed these reports and revised its own work plan and actions list accordingly. Concerning IPY, the ET had supported the exchange of additional observations in near real-time, to the extent possible, and suggested that OPAG-ISS be informed of this requirement. Concerning the proposal for a GCOS Reference Upper Air Network (GRUAN), the ET expressed

concern that the upgrading of a few stations to GRUAN standards could take resources from other parts of the GUAN network, but had been assured by GCOS representatives that this issue was receiving attention.

In furthering the CBS Rolling Review of Requirements (RRR) process, the ET had reviewed the status of the WMO/CEOS database of user requirements for observations and of observing system capabilities. It stressed the importance of regularly updating the database and recommended that sufficient resources be made available among WMO Members to provide input and among the WMO Secretariat to implement and maintain the database. It also endorsed the proposal to introduce a new "break-through" level into all statements of user requirement. The ET had then reviewed the Statements of Guidance (SOGs) in 11 application areas. In each case, it had either endorsed the proposed new version or agreed actions needed to prepare an updated version. For climate monitoring, the ET had agreed that it was no longer necessary to develop a SOG through the CBS RRR process, as the necessary guidance was already available through the GCOS Adequacy Reports and Implementation Plan.

The ET had reviewed progress on studies through which real and hypothetical changes to the GOS are assessed for their impact on NWP performance (see paragraph 6.4 of this report). The ET had also reviewed and endorsed plans to organize the next impact studies workshop in early 2008. It had agreed to keep the workshop format similar to the first three workshops (Geneva 1997, Toulouse 2000 and Alpbach 2004). As the THORPEX programme is also deeply involved in the observation impact studies, close contacts would be maintained with the relevant working groups of THORPEX for organising this workshop.

The ET had reviewed the Implementation Plan for Evolution of surface- and space-based sub-systems of the Global Observing System (EGOS-IP) and recorded progress in the form of a revised draft of the Plan. This review took note of comments from other bodies, including ET-SAT and ET-AWS. The ET had also considered reports on the evolution of the GOS in some WMO Regions. It perceived that there are currently problems in communicating the EGOS-IP and its action items to WMO Members. To address this, the ET had prepared an outline of a "Supplementary Note" of expanded information on how specific items from the IP could be implemented in the Regions. The ET also conducted a check to ensure that, where the GCOS Implementation Plan calls for action by CBS, appropriate actions have been identified in EGOS-IP. The results of this check are recorded in the report of ET-EGOS-2.

The current EGOS-IP represents considerable progress and is already serving a useful purpose. However, it falls short of being a comprehensive document and complete planning tool, comparable with (for example) the GCOS Implementation Plan. This difference reflects largely the differences in resources devoted to the two activities. The ET had suggested that the next phase of work should aim towards a more comprehensive IP and associated activity, noting the resource implications of such a decision. ICT/IOS discussed this proposal but recommended that the EGOS-IP should retain its current form. It also suggested that regular updates of the EGOS-IP document were useful as a record of progress, but should not be presented to Members as a revised Plan, the original Plan being adequate as a guide to implementation action by Members.

The ET had noted recent proposals towards enhanced integration between WMO observing systems. The ET had stressed the need to ensure continued focus, during such integration, on the importance of the basic programmes for which CBS is currently responsible. The ET had noted the creation of an EC Task Team on this topic, provided some comments on its Terms of Reference, and offered some advice on the role that the ET-EGOS might play in work towards integrated WMO observing systems.

In addition to development of items in the original Work Plan, the new proposed Work Plan contains additional items in the following areas: interactions between ET-EGOS and IPY, brochure on EGOS, EC Task Team on Integrated WMO Observing Systems, GCOS issues, interaction between GOS performance statistics and EGOS-IP. In addition to this, it is important to note that EGOS-IP represents a major Work Plan in its own right, with substantial actions and implied

activities involving ET-EGOS, WWW Dept, WMO Space Programme, WMO Members and Regions, and other bodies.

Achievements:

- Updated the database of observing system capabilities for space-based systems
- Updated the Statements of Guidance in several application areas
- Adopted the GCOS Adequacy Reports and Implementation Plan to serve as a “Statement of Guidance” for climate monitoring
- Recorded progress on the Implementation Plan for the Evolution of the GOS (EGOS-IP) in the form of an updated draft
- Identified actions in the GCOS IP that need to be more fully represented in EGOS-IP
- Secured strong engagement with EGOS-IP in RA-I: key issues identified and proposals made for developing an implementation strategy
- Established strong links between ET-EGOS and related THORPEX activities

Issues:

- Plan to enhance the database of user requirements for observations to include “break-through levels” in addition to “maximum” and “minimum” requirements
- Need to re-invigorate the network of “points of contact”, representing expertise on user requirements in each application area, in order to improve the effectiveness of the Rolling Review of Requirements process
- Need to improve engagement with EGOS-IP in most WMO RAs
- Need to update the “Vision for the GOS”
- Need to improve engagement with IPY observational issues, including steps to ensure dissemination of many new IPY observations in near real-time
- Concern expressed on the potential impact of the proposed GRUAN on the GUAN and the RBSN
- Need to improve interaction between GOS performance statistics and EGOS activities

Recommendations:

- To re-invigorate the network of “points of contact”, representing expertise on user requirements in each application area – action by ET-EGOS
- To endorse the continued updating of EGOS-IP as a means of monitoring progress against the published version of the Plan – ICT/IOS
- To request all Members to supply a point of contact responsible for reporting progress and plans in their country related to EGOS-IP – **to CBS**
- To request the Secretariat to gather information from Members on progress and plans in their country related to EGOS-IP, with a focus on those activities not covered through established mechanisms, e.g. WMO Space Programme, AMDAR Panel, JCOMM – **to CBS**
- To request Secretariat to advise on appropriate mechanisms for issue of reports on progress and plans of Members related to EGOS-IP – **to CBS**
- To request ET-EGOS to analyse information on progress and plans supplied by Members related to EGOS-IP, and to summarise progress – **to CBS**
- To consider the development of a strategy to sustain key components of the AMMA observational network beyond the end of the AMMA experiment – **to CBS**
- To note proposals for the next CBS Workshop on NWP Impact Studies (OSEs and OSSEs) in early 2008
- ET-EGOS coordinate activities with other OPAG IOS ETs

7.3 Report of ET-SAT

Dr Sue Barrell, Co-Chair OPAG-IOS, reported on behalf of the Chair of the Expert Team on Satellite Systems, Dr Wenjian Zhang, on the activities of the ET-SAT, which had held two meetings in Geneva during the last working period.

The session noted that the ET had provided an analysis and a preliminary response to GCOS Requirements for Space-based Climate Products. The ET provided a list of the past, present and future instruments that could be used to generate each of the 35 Essential Climate Variables (ECVs) identified in the GCOS Requirements. Analysing space agency plans for future missions, the ET had highlighted that there was a risk of gap, or lack of long-term planning, or actual performances that may not exactly meet GCOS requirements for some of the required variables. The ICT agreed to the ET recommendations that WMO should encourage its Members to implement the nine cross-cutting recommendations of the space-based component of the GCOS Implementation Plan and that the scope of the GOS be expanded to address all specified climate observations and to highlight the distinction between “sustained” and “operational availability”.

The ICT noted that the ET’s review of the outcome of the CGMS “Optimization Workshop” held 28-29 August 2006 had compared the planned observation capabilities of satellite missions in both GEO and LEO orbits for the next two decades against the CBS-approved baseline for the GOS, reflecting the same concerns raised in the discussion on GCOS. It was stressed that optimization among partners could only be fully achieved if data availability and quality were satisfied. The session noted that the Integrated Global Data Dissemination Service (IGDDS) and the operational Global Space-based Inter-calibration System (GSICS) would help to satisfy these conditions.

In discussing the evolution of the GOS baseline, the ET had highlighted the need for integration of all WMO observing systems and noted the refinements suggested by the optimization workshop. The session recommended a joint task for ET-SAT, ET-SUP and ET-EGOS to undertake a task to address the GOS baseline evolution.

Consideration of the transition strategy for R&D satellite missions to operations highlighted that early involvement of users was essential and offered opportunity for benefits to all stakeholders. The ET had underlined that “preparatory” missions were needed to bridge the gap between demonstration and operational follow-on.

Achievements:

- Space-based component of the GOS expanded including new CNSA missions;
- GCOS Implementation Plan reviewed, present GOS satellite systems identified for both compliance and need for expanded GOS baseline;
- GSICS Implementation Plan agreed with goal for operational status in 2007;
- IGDDS quasi-operational with near global coverage, full operation and coverage expected in 2007;
- GEO and LEO orbit plans reviewed taking into consideration contingency planning.

Issues:

- Need for a greater optimization of the LEO and GEO missions to support the space-based component of the GOS and its overall configuration;
- Need to update the Vision for the space-based GOS and the GOS baseline.

Recommendations:

- Ensure greater optimization of LEO and GEO mission planning to meet the GOS baseline, through cooperation and coordination with satellite agencies.;
- Increase data availability in an open and timely manner and ensure data quality meets agreed standards in terms of characterization and calibration, the latter through the GSICS worldwide inter-calibration initiative;
- Approve implementation of the 9 cross-cutting recommendations formulated by GCOS in the Satellite Supplement to the GCOS Implementation Plan;
- ET-EGOS, ET-SAT and ET-SUP to commence an update of the GOS baseline of the space-based GOS with 2025 as a new horizon, and expand its scope beyond WWW in

order to include sustained observations of additional variables required for climate monitoring, and ultimately to address the needs of other WMO programmes as well.

7.4 Report of ET-SUP

The meeting noted that the ET-SUP work plan is focused on three areas of the WMO Space Programme Implementation Plan: Access to satellite data and products; Utilization of satellite data and products; and, Increasing the capacity of WMO Members to access and utilise satellite data and products. These broad work areas were addressed by ET-SUP-2 in the week 4-8 September under the following tasks.

The ICT was informed that ET-SUP-2 reviewed a preliminary draft of a new Technical Document on the *Analysis of the 2005 Biennial Questionnaire on the Utilization of Satellite Data and Products by WMO Members*. The ET-SUP-2 recommended that future Technical Documents (ie from 2008 onwards) change to become Status reports of the WMO Space Programme Strategy to Improve the Utilization of Satellite Data and Products. The broadening of the scope of the Technical Document should significantly improve the quality and quantity of the data available for monitoring and planning purposes for WMO Members in this area. The WMO Secretariat has been assigned a number of actions to complete the analysis of the 2004/2005 data and publish the associated Technical Document as well as begin to identify and set in place status data collection mechanisms for the next TD.

The ICT 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.

The ICT noted that ET-SUP-2 reviewed the status of global RARS activities, appreciating the increase of products on the European ATOVS Retransmission Service, the commencement of the RARS in the Asia - Pacific and firming up of plans for the South American RARS. The IGDDS Implementation Plan was also reviewed at ET SUP 2 with some changes suggested prior to the IP being presented at CGMS in China in November 2006.

The ICT was informed the Joint ET-SUP-2 and ET-SAT-2 session noted that beside the ongoing evolution of the GOS, as outlined in the EGOS-IP, several additional factors should be considered in discussions of the EGOS vision and may trigger a further evolution of the GOS. The factors include:

- WMO decision to integrate all WMO Global Observing Systems, noting that the space based component of the WWW GOS is already addressing more than just the WWW needs;
- The meeting of requirements for the Global Climate Observing System which rely heavily on space-based observation will have far reaching implications on the GOS;
- The need to optimise the space-based observation effort at global scale, recognised by CGMS and discussed at the CGMS-WMO Optimisation Workshop 28-29 August 2006. This optimisation not only affects the current GOS baseline but also covers future needs such as Radio-Occultation Sounding, distribution of sun-synchronous orbital planes and the relative emphasis to be given to GEO and LEO observing capability;
- The current vision for GOS to 2015 was developed in 2001 and the tremendous development in space capabilities make it appropriate to initiate the development of an updated vision of the space-based component of the GOS to 2025;
- The emergence of the Global Space-based Inter-Calibration System (GSICS) in the near future will add another component to the GOS, in addition to the current GOS operational GEO and LEO and the R&D components.

The session was informed of the joint activities between ET-SUP-2 and the WMO Space Programme to improve the content, accuracy/currency of information on the WMO Space Programme website as well as its ease of use. The ICT requested ET-SUP to work with the WMO SP to provide WMO Members ready access to information on how and where they can access key

satellite data and products. This information needs to be made available to the Regional Rapporteurs to assist them in their activities on the EGOS.

The ICT noted the High Profile Training Event (HPTE) status report from ET-SUP-2. The ICT expressed its thanks for the support of EUMETSAT, NOAA, Japan, China, Brazil, Portugal, Costa Rica and Australia to the HPTE but stressed that the distribution of the training material, practicing of the Regional Focus Groups and increased publicity will need to be carefully handled to meet the required deadlines. The Co-Chairs requested that the ET-SUP Chair urgently engage VLMG to interact with the NMHSs in their Region to determine which Members were going to participate in the HPTE and through which VL Centres.

The ICT were also informed the WMO Secretariat had received another two nominations for Centres of Excellence, the first, in October 2005, from the Permanent Representative of Argentina to establish a CoE in Buenos Aires for training in Satellite Meteorology in Spanish. NOAA/NESDIS agreed to co-sponsor this CoE, the second nomination, in September 2006, from the Permanent Representative of Brazil who proposed the Centre for Weather Forecast and Climate Studies of Brazil (CPTEC) as a new WMO Centre of Excellence for training activities in Satellite Meteorology in Portuguese. Once the sponsorship letter from NESDIS (as sponsoring satellite operator for Brazil) was received all necessary conditions to become a Centre of Excellence would have been met for both Centres and the ICT requested that the Chair of OPAG IOS take the proposals to CBS for approval.

Achievements:

- Preparation of draft Technical Document on Utilization of Satellite Data based on Biennial Questionnaire
- Further refinement of the RARS and IGDDS concept with the Asia-Pacific RARS now injecting ATOVS retrievals into the GTS
- Further refinement of options to evolve the Space Based Component of the GOS
- Extension of the Virtual Lab activities through increase in the number of CoE's and preparation of the HPTE

Issues:

- The current vision associated with the EGOS does not fully take into account recent developments in system capability, new user demands and structural change in the Space Based Component of the GOS and should be updated.
- The ICT noted its concern that VL Centres of Excellence did not seem to be engaging with the NMHSs in their Region to the degree required
- The participation rate in the Biennial Questionnaire should be improved and 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

Action (for CBS):

- OPAG IOS to advise CBS Ext 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
- OPAG IOS Co-Chairs to take recommendations for new CoE's in Brazil and Argentina to CBS Ext for endorsement

Action (for ICT):

- CoE's to become substantially involved with the Regional Rapporteurs to increase the Utilization of satellite data and products in the Regions
- The ICT 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.

- The Co-Chairs requested that the ET-SUP Chair urgently involve VLMG to interact with the NMHSs in their Region to determine which Members were going to participate in the HPTE and through which VL Centres.

8. CLIMATOLOGICAL OBSERVATIONS AND GCOS

8.1 Status of GCOS Networks - GSN and GUAN

The ICT acknowledged the report of the Rapporteur on GCOS matters. The rapporteur noted that the *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*, released in 2004, has now become the reference document for international and national action plans and activities in support of global climate observations. The document, *Systematic Observation Requirements for Satellite-based Products for Climate (GCOS-107)*, has also recently been completed, which provides information on requirements for space-based observations and climate products that is supplementary to the GCOS implementation plan. In addition, it was acknowledged that GCOS is continuing its interaction with the UNFCCC through the submission of regular progress reports on systematic observations of the climate system. A summary report of the GCOS regional workshops as well as updated guidelines for Parties to the convention on reporting their activities on systematic observations will be provided for COP 12 in November 2006.

The ICT also noted the release by the GCOS Secretariat of the *Analysis of data exchange problems in global atmospheric and hydrological networks*, which summarized the circumstances impeding the exchange of data relevant to climate. Many of the problems related to the GSN and GUAN were addressed at the Second Session of the CBS/GCOS Expert Meeting on Coordination of the GSN and GUAN. Based on the recommendations resulting from the Expert Meeting, a coordinated CBS Lead Centre training session was held, which included representatives from the CBS Lead Centres for GCOS in Japan, USA, Iran, Morocco and Australia. These Lead Centre representatives have produced a working document that describes the steps to be taken to remedy the absence or misreporting of CLIMAT messages. Since the time of this Lead Centre training, Chile has officially accepted to take on the role of Lead Centre for much of Region III and the British Antarctic Survey has agreed to serve as Lead Centre for Antarctica. Negotiations are also in progress to establish Lead Centres in southern Africa and in Western Europe.

GCOS Technical Support Projects (TSPs) have carried out a number of activities in support of the revitalization of the GUAN and GSN. TSPs have been established in the Pacific and Caribbean regions as well as in the SADC region of Africa. Numerous GUAN stations have received assistance ranging from complete renovation to the supply of hydrogen generators and radiosonde consumables, the impact of which has been to reduce the number of silent stations. Additional activities have focused on the renovation of GSN stations. While very few GSN stations do not transmit anything over the GTS, over 140 do not transmit CLIMAT reports and fewer than half transmit CLIMAT messages every month. The CBS Lead Centres are working to improve CLIMAT report receipt from the GSN stations in their regions.

The GCOS Lead Centre/Archive Centre at NOAA/NCDC continues to request historical daily temperature data from GSN stations as well as historical metadata concerning instrument and location changes at GUAN stations. Since 2004, approximately 30 countries have provided GSN daily climate data and approximately 25 have provided GUAN metadata histories. Requests for the digitization of historic data continue to be welcomed by the NOAA/NCDC GCOS Lead Centre.

The meeting wished to know if it was possible to completely create CLIMAT TEMP reports from daily TEMP messages, and requested the Rapporteur on GCOS Matters to investigate and report back on this issue.

Achievements:

- Completion of the document *Systematic Observation Requirements for Satellite-based Products for Climate (GCOS-107)*, which provides requirements for space-based

observations and climate products that are supplementary to the GCOS implementation plan.

- GCOS Technical Support Projects (TSPs) have carried out a number of activities in support of the revitalization of the GUAN and GSN in the Pacific and Caribbean regions as well as in the SADC region of Africa
- New CBS Lead Centres for GCOS have been established at the NMSs of Iran, Morocco, and Australia.
- Training workshops on the provision of CLIMAT and CLIMAT TEMP, jointly sponsored by GCOS/WWW/WCP, have been provided in Russia and Morocco.
- Historical GUAN station metadata has been updated with information supplied by Members and is available from the CBS Lead Centre at NOAA/NCDC.

Issues:

- Errors continue to be made in the preparation CLIMAT messages.
- Requests for historical data and metadata are frequently unanswered.

Recommendations:

- Encourage members to communicate historical data and metadata from their GCOS network stations to the CBS Lead Centres for GCOS.

8.2 Availability of CLIMAT and CLIMAT TEMP Reports at MTN Centres

The Annual Global Monitoring (AGM) of the WWW is a monitoring exercise carried out by about 90 centres, including 15 MTN centres, once a year from 1 to 15 October. Information on the AGM is available on the WMO server under <http://www.wmo.ch/web/www/ois/monitor/monitor-home.htm>.

The MTN centres received in total:

- 67 per cent of the CLIMAT reports expected from the RBCNs in October 2005; the availability was higher than in 2003 (62 per cent) and in 2004 (65 per cent);
- 65 per cent of the CLIMAT TEMP reports expected from the RBCNs in October 2005; the availability was slightly lower than in 2003 (67 per cent) and in 2004 (68 per cent).

The analysis of the AGM results shows that the availability of CLIMAT and CLIMAT TEMP reports is not satisfactory. The density of reports received is particularly low in Region I for CLIMAT (29%) and CLIMAT TEMP reports (29%), and in Region II for CLIMAT TEMP reports (52%). Detailed information on the analysis of the AGM exercises is available in the WMO server under:

ftp://www.wmo.int/GTS_monitoring/AGM/From_WMO/200410/AGM_global2.htm

ftp://www.wmo.int/GTS_monitoring/AGM/From_WMO/200510/AGM_global2.htm

The meeting noted that, although CLIMAT reports for the GSN stations should be distributed globally, reports are sometimes received at one GSN Monitoring Centre only, which results in differences in the CLIMAT reception rate at the JMA and DWD Centres. The meeting recommended that the centres concerned monitor the reception of the GTS bulletins, in which the report are compiled, and compare their results to the results of the SMM exercises (see ftp://www.wmo.int/GTS_monitoring/SMM/SMM1.htm). This would make it possible to identify possible deficiencies in the exchange of the GTS bulletins

9. UPDATES OF THE GOS-RELATED REGULATORY MATERIAL

Report on the Guide on the GOS and the Manual on the GOS

The meeting was advised that the activities in updating of the GOS-related regulatory material had been concentrated on reviewing and updating the Guide on the Global Observing

System (WMO-No. 488) with the aim to harmonize available material on the conventional and satellite components of the GOS and updating the Manual on Global Observing System (WMO-No. 544).

The preliminary draft of the Guide was prepared by the Consultant, Dr I. Zahumensky and was reviewed by the second session of the CBS OPAG-IOS Task Team on Regulatory Material which took place in Geneva from 20 to 22 February 2006 chaired by Dr A. A. Vasiliev, the Rapporteur on Regulatory Material. The Task Team discussed the text of the Guide in detail and proposed number of changes. Considerable effort was made to ensure consistency in terminology between the Guide and the Manual. The group drafted a new section on end-used applications. It was suggested to replace Part II of the Guide with the newly updated material. In Part IV- The Space-based Subsystem, several diagrams were amended so as to make them more understandable to wider users of the Guide. The team also decided to add an additional part to the Guide entitled "Quality Management" which would describe general goals of quality management in relation to the observing systems.

In accordance with the agreed action plan, all amendments and updates were incorporated in the text and electronic version was posted on the WMO website; Members were invited to review and send comments by the end of August 2006. 16 Members responded and some of them made suggestions. Members input was incorporated in the text and the draft of the Guide on the GOS now is ready for submission the CBS-Ext.(06) for approval.

The Task Team also discussed amendments and adjustments to the Manual on the GOS and the majority of them were accepted. There was a discussion on classification of scales for meteorological phenomena, resulting from the fact that scales in CIMO publications differ from the definition used in the Manual on the GOS. It was decided to adopt the classification of scales published in the CIMO Guide after consultation with the president of CAS.

Since the proposals for updates to the Manual were of an editorial nature, the president of CBS agreed to the procedure of inviting WMO Members' comments on the proposed updates to be approved for publishing by EC-LVIII. According to this decision, the comments and amendments received were collected into a supplement to the Manual and were adopted by Resolution of EC-LVIII.

In respect to Volume II of the GOS Manual, the parts concerning RA VI and RA V were revised and approved by corresponding Regional Associations. The revised RA I and RA II chapters are awaiting submission to the respective Working Groups of the Region. As to the revision of Parts III and IV, it was proposed to invite the presidents of RA III and RA IV to initiate the necessary action for preparation of the revised text for approval by the Regional Association.

The meeting expressed its appreciation to the Consultant, Dr Igor Zahumensky, and to the Rapporteur for their outstanding work on updating these publications.

Update on the revised WMO Pub No. 9, Volume A

The session was advised that due to the recent decision of WMO to only run and support Oracle applications, development of the Access-based revised Volume A ceased in early 2005, pending a decision as to how to proceed to an Oracle environment. Two options were investigated, one to obtain support and assistance from a WMO member running a similar Oracle application, with other to develop the application within WMO. After a detailed investigation it was decided to hire a consultant to develop the revised Volume A as an Oracle application. This proved to be considerably more difficult than originally envisioned. The outcome of the consultants work was an Oracle version of the new Volume A as a design, but with no Oracle database tables.

To finalised development of the new Volume A it will be necessary to hire an Oracle consultant with meteorological experience to develop the required database tables, migrate the data to the new application and finalize the application. The meeting decided to request

assistance for further development of this application from a WMO Member who is running an Oracle station dictionary.

Activities:

- CBS 13th session (2005) initiated review on Guide on the GOS
- Consultant, Mr Igor Zahumensky (Member of GOS Team) entrusted with work to prepare preliminary draft
- Draft was reviewed during the 2nd session of the CBS OPAG-IOS Task Team on GOS-related regulatory material in February this year and number of changes were proposed
- Action plan prepared to finalize and submit revised Guide to the upcoming CBS-Ext.(06) session
- Per action plan, WMO Members were invited to review and send comments by end of last month
- 16+ Members have responded so far with a couple of them making suggestions. Responses are yet filtering in
- Minor updates to the Manual on GOS, Volume I – Global Aspects was also reviewed by the Task Team.
- As with the Guide, WMO Members were invited to comment on these changes
- Work on revision of Volume II – Regional Aspects of the GOS Manual continues
- Amendments and some editorial changes done by the Task Team to RA VI and RA V input.

Achievements

- Draft text of the Guide on the GOS is ready for submission to CBS-Ext.(06) for approval.
- Resolution with updates to the Manual on the GOS, submitted to recently concluded EC session and adopted.
- Secretariat is currently in the process of publishing the update to the Manual as a regular Supplement for distribution
- RA VI and RA V revised regional aspects of Volume II of the GOS Manual is currently being published.
- RA I and RA II revised regional aspects of Volume II of the GOS Manual awaiting submission by respective Working Group of the Region.
- Revised Volume A specification completed.
- All historical data required to be entered into revised Volume A has been collected and ready for input as soon as application is available.

Recommendations:

- To approve the revised Guide on the Global Observing System.
- To invite Presidents of RA-III and RA-IV to make arrangements for revision and approval of the relevant parts of Volume II of the manual on the Global Observing System.
- To request assistance from WMO Members in further development of the revised Vol. A .

10. FUTURE COMPOSITE GOS AND ITS IMPACT ON DEVELOPING COUNTRIES

The EGOS IP recommendations which address relevant aspects of the issues affecting the evolution of the GOS in developing countries were identified. These relevant recommendations include G1: data distribution, G2 documentation of observations, G3 timeliness and completeness of observations, G6 ozone sondes observations exchange, G4 Baseline System for provision of comprehensive and uniform data coverage, G9 AMDAR technology for more ascent/descent profiles with improved vertical resolution, G13 Ground-based GPS measurements for total water vapour, G20 More profiles in the tropics.

Steps in the framework of the implementation plan include: 1) the identification of relevant recommendations of the plan addressing the major issues; 2) the translation of these relevant recommendations into general outlines and specific recommendations and action, and 3) the

formulation of a proposal of a strategic plan for the evolution of the GOS, which will enable Members to realise the changes.

Furthermore, with regard to the conventional basic data to be exchanged internationally, the regional strategic plan with the support of WMO Secretariat, WMO Region Economic Groupings will address:

- The feasibility of the creation of a regional or sub-regional programme managing the evolution of the GOS as EUCOS in Europe, NAOS in America and COSNA in the North Atlantic.
- The organisation and funding of major programmes of specific observations over data sparse regions in developing countries as the example of the International Polar Year (IPY).

The full involvement of the Regions in the THORPEX Programme through the establishment of an African Regional THORPEX Committee (both operational and research components) and in the planned GEOSS activities, in cooperation with WMO Programmes and Projects in order to enable the Region to have a full cross-benefit with the WWW Programme.

Achievements:

- The identification of the IP recommendations that address relevant aspects of the issues affecting the evolution of the GOS in developing countries;

Issues:

- In many areas in developing countries the current GOS simply does not exist because of many major deficiencies;
- There is a need to establish funding mechanisms or programmes to sustain the production and the achievement of high level performance of the exchange of good quality conventional meteorological, climatological and environmental data;
- Many stations proposed to be within the RBSN especially for the upper-air component are not implemented;
- Failures to catch up with rapid technological developments;
- Poor economic environment and difficulties to establish stations in uninhabited areas;
- Inadequate or lack of telecommunication facilities, lack of capacities for the operation and maintenance of equipment;
- High cost of consumables especially for upper air stations;
- Lack of qualified personnel; the Class IV training is less and less provided;
- Lack of public infrastructure and expertise being the result of the lack of funding and lack of involvement, support, attention and awareness in the matters of meteorological services (climate, weather) by the public officials (governments and regional economic groupings);
- Lack of efficient synergy and working arrangements between OPAG-IOS, the Rapporteur, the Regional Association Decision Making Bodies (President, Regional Directors) in solving the issues addressing the evolution of the GOS in the region;
- Lack of Regional Observing programmes such as EUCOS in Region VI that will deal with all the issues and problems and will define the strategies to improve the evolution of the GOS in the region; rather than to let a single countries run its own national observation programme (if it exists);

Recommendations:

- The evolution must take into account upgrading, restoring, substitution and capacity building (especially in the use of new technologies), taking into account both the use of the data and the production of the data. It is possible that some countries do not and will not be able to produce the data and will therefore only be users of data. To help countries produce data for international exchange, due consideration must be given to the three issues previously identified, i.e. public infrastructure, expertise and funding.

- Possible approaches towards the evolution of the GOS were identified by the EGOS IP, which recommended for developing countries observing systems that were less dependent on infrastructure, expertise, and funding, such as satellite, AMDAR, and AWSs. However, a minimum set of reliable RAOBs would be required both as a backbone to the upper air network, and also to validate the satellite observations with enough height and accuracy. Migration toward the BUFR code (as a reliable representation of the data) is required.
- If resources are available, the highest priority should go to (a) maintaining the RBSN and RBCN, noting that GUAN stations are part of the RBSN, and (b) rehabilitating observing sites in critical locations.
- Members are urged to distribute, as quick as possible, certain type of observations made routinely in near real-time but not distributed worldwide. These information are of interest for use in other meteorological applications
- Observations made by Pilot sounding – In the tropics, the wind profile information is considered to be of particular importance.
- Observations made with high temporal frequency should be distributed globally at least hourly. Examples include regular aviation observations (METAR, SPECI, high resolution Radar observations, AWSs, Buoys Hourly SYNOP, precipitation and wind from local or regional mesonet, soil moisture and temperature.
- The need for good metadata exchange in support of observational data sometimes in real-time is essential.

11. IOS INPUT TO THE GEOSS WORK PLAN

The session reviewed the status of WMO's overall participation in the GEO 2006 Work Plan in which WMO was involved either as a Lead or Participating Organization. The session noted for the 9 Tasks for which WMO was the Lead Point-of-Contact (POC) that seven (7) out of 9 status reports had been submitted for the June 2006 quarter. However, for the 56 tasks that WMO participated in, only 24 status reports had been submitted for the June 2006 quarter. The session noted that some of the non-reports were for tasks within WWW's area of interest. Thus the session strongly encouraged all relevant task participants to seek to submit 100% of the required status reports for the September 2006 quarter.

With regard to the GEO 2007-2009 Work Plan, the session noted that WMO had submitted a proposed new task for the WMO Information System. However, the proposed Task for WIS under "*WE-07-P1: WMO Information System contribution to the GEO Information System of Systems*" was not included in Version 2 of the draft GEO 2007-2009 Work Plan. The session urged the Secretariat to inform WMO representatives on GEO Member delegations of this omission and suggest that it be reinstated. Additionally, WMO as a GEO Participating Organization should also stress the need to include the WIS task.

12. PREPARATION OF CBS-Ext.(06), INCLUDING OPAG/IOS INPUT

The ICT considered the layout and substance of the document on OPAG-IOS activities to be submitted to CBS-Ext.(06). It requested the ICT members to provide comments on the draft document in order that the ICT Chair, in coordination with the Secretariat, can provide the final draft of the document by 23 September 2006.

13. ANY OTHER BUSINESS

Future Work Plans

In addition to a review of the Work Plans for 2005-2006 as endorsed by CBS-XIII, the meeting approved the addition of some items to each of the Expert Team Work Plans for the period 2007-2008. The proposed Work Plans for 2007-2008 for ET-EGOS, ET-SAT, ET-SUP and ET-AWS are given in Annex IV.

Regional Rapporteur/Coordinator activities

Following a request of the Chairman, the ICT was given a short presentation of the attempt to implement the concept of a Co-ordinator of Regional Rapporteurs/Coordinators following the previous meeting of the ICT. The subsequent discussion among the Regional Rapporteurs considered how they could best carry out their responsibilities, and enhance links between the OPAG on IOS and their regions. The Regional Rapporteurs noted that the lack of face-to-face contact with related NMHS staff was a limitation in performing an effective liaison role.

The Regional Rapporteurs/Coordinators agreed that it was desirable to exchange information and reports among themselves and the Chair of the OPAG, but decided that a Co-ordinator of Regional Rapporteurs / Co-ordinators was not necessary.

The meeting of the Regional Rapporteurs reviewed the guidelines prepared at the previous ICT meeting and made some minor amendments. They requested that these guidelines and other basic information (such as the procedures for defining and amending the RBSN and RBCN) be consolidated on the WMO web site as an introduction package for Rapporteurs, especially to assist newly appointed Rapporteurs. See Annex VII.

The Regional Rapporteurs/Coordinators also requested that they be copied all correspondence and questionnaires relating to the GOS. In addition, to assist the Regional Rapporteurs/Coordinators with establishing contacts in the regions, the meeting requested that the list of RBSN Focal Points and other Regional Rapporteurs be revised regularly and be provided to the Regional Rapporteurs.

The meeting also prepared a standard format for the Regional Rapporteurs/Coordinator to report to their Working Group on PI-WWW and to the OPAG on IOS. A copy is provided in the Annex V.

The Regional Rapporteurs also commended the Rapporteur from Region 1 on his work in applying the Implementation Plan for the Evolution of the GOS to Region 1 and extracting priority tasks for action. The Regional Rapporteurs agreed to prepare a similar implementation plan for their regions, with a target time of March 2007.

Recommendation:

- That the Regional Rapporteurs prepare an implementation plan for the evolution of the GOS in their regions based on the document prepared for Region 1 by March 2007. This document is intended to be passed to the President of each Regional Association, through the WG on PIWWW, for endorsement and subsequent consideration by Members of the region.

Performance Measures on the Surface-based component of the GOS

The meeting noted that the annual status reports on the implementation of WWW contain many useful statistics. It is recognized that there are various requirements of the statistics, but in the context of the evolution of the GOS a missing element is an overall summary measure of progress towards meeting the requirements specified in the RRR.

Specifically for the RBSN the meeting recognized that there are perhaps 3 different purposes:

1. Is the commitment of Members to provide a certain number of observations being met?
2. Is the Regional commitment as specified in the RBSN being met?
3. Are the requirements for observations (as defined in the Rolling Review of Requirements) being met?

The most common statistics in the monitoring reports address purpose 2 and are based on availability of RBSN in percentages. As the RBSN changes in time this measure does not show

the overall measure of the evolution of the GOS. Measures of quality are available from the Lead Centres. Timeliness is also another criterion and some statistics are included in the Annual Report, and even more in the monitoring statistics.

Purpose 1 is also addressed in the Annual reports where the performance against “expected” is also reported. The “expected” measures performance against the observation program listed for each station in Vol. A (which may be less than the RBSN standard – such as only one upper measurement per day). This measure is only as reliable as the information in Vol. A provided by Members.

In some reports there are also statistics on “implemented” stations. This seems to add an extra level of complexity and perhaps could be dropped, leaving the focus on the number of reports received.

Issue:

- The Annual Report includes some assessment of spatial density of observations relative to the RBSN standard, and time series of changes in the RBSN itself. However, purpose 3 is the main element missing and an area that needs developing. In particular, it would be desirable to specify some summary metrics that measure the progress of the evolution of the GOS. The meeting noted the broad summary measures presented for marine monitoring by the JCOMM representative, and the GCOS measures.

The metrics need to be broad summary measures that indicate the level of meeting requirements, and have the potential to trigger action. Possibilities are:

- overall measure or maps of observation density
- proportion of area with requirements being met

In the context of the composite observing system the statistics should focus on the information required for the application, not necessarily the observation platform (e.g. a combination of sonde and AMDAR may meet some requirements over a given area). The criterion for meeting requirements may also include elements of timeliness or quality, rather than quantity alone.

In the RRR there are many application areas. For the RBSN global NWP seems a suitable application to choose as a starting point for which to develop a metric.

Recommendations:

- That the ET-EGOS considers the development of suitable summary metrics that can be used to assess the state of the IOS.
- That reports on the state of the IOS (including the Annual Report Red Book) provide additional information on changes in the IOS beyond the RBSN. Some statistics are already included on numbers of AWS and number of hourly reports. It is recommended that these elements be enhanced and others included (e.g. numbers of high resolution upper air soundings, ...) to provide indications of the evolution of the IOS.

Issue:

- The ICT noted that ET-SUP was also investigating metrics for the Space-based component of the GOS.

Recommendation:

- That ET-SUP coordinate with ET-EGOS on metrics for the Integrated GOS.

Requirements for Actions

The meeting identified many items that will require additional follow-up. These requirements for action are collected together in Annex VI

13. CLOSURE OF THE SESSION

There being no further business to come before the ICT, the chairman closed the session at 3.00pm Friday, 15 September 2006.

AGENDA

1. ORGANIZATION OF THE SESSION

- 1.1 Opening of the meeting
- 1.2 Adoption of the agenda
- 1.3 Working arrangements

2. REPORTS

- 2.1 Report of the Chairman

3. REVIEW OF THE STATUS OF THE SURFACE BASED COMPONENT OF THE GOS

- 3.1 RBSN Performance Monitoring Results
- 3.2 Trends in the Implementation of RBSNs

4. REVIEW OF THE STATUS OF THE SPACE-BASED COMPONENT OF THE GOS

5. STATUS OF SURFACE-BASED AND SPACE-BASED SUB-SYSTEMS OF THE GOS IN THE REGIONS

6. REVIEW OF OTHER IN-SITU SYSTEMS (MARINE, AIRCRAFT, etc.) AND IMPACT OF NEW INSTRUMENTATION AND OBSERVING SYSTEM STUDIES ON THE GOS

7. REPORTS OF THE OPAG-IOS EXPERT TEAMS

- 7.1 Report of ET-AWS
- 7.2 Report of ET-EGOS
- 7.3 Report of ET-SAT
- 7.4 Report of ET-SUP

8. CLIMATOLOGICAL OBSERVATIONS AND GCOS NETWORKS

9. UPDATES OF THE GOS-RELATED REGULATORY MATERIAL

10. FUTURE COMPOSITE GOS AND ITS IMPACT ON DEVELOPING COUNTRIES

11. IOS INPUT TO THE GEOSS WORK PLAN

12. PREPARATION OF OPAG/IOS INPUT FOR CBS-Ext.(06)

13. ANY OTHER BUSINESS

14. CLOSURE OF THE SESSION

WORK PLAN**(CBS Implementation- Coordination Team on Integrated Observing System, Fourth Session, Geneva, 11-15 September 2006)**

	Monday 6	Tuesday 7	Wednesday 8	Thursday 9	Friday 10
09h00 – 9h30 9h30 – 10h30	Registration	Agenda Item 6	Agenda Item 8	Drafting groups	Drafting groups
10h30 – 10h45	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
10h45 – 12h30	Agenda Items 2, 3, 4	Agenda item 6 (cont'd)	Agenda Item 9	Drafting groups	Approve Draft Final Report
12h30 – 14h00	Lunch	Lunch	Lunch	Lunch	Close
14h00 – 15h30	Agenda Item 5	Agenda item 7	Agenda Items 10 & 11	Drafting groups	
15h30 – 15h45	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
15h45 – 17h30	Agenda Item 5 (cont'd)	Agenda item 7 (cont'd)	Agenda Items 12 & 13	Drafting groups	

PROVISIONAL AGENDA

1. ORGANIZATION OF THE SESSION
 - 1.1 Opening of the meeting
 - 1.2 Adoption of the agenda
 - 1.3 Working arrangements
2. REPORTS
 - 2.1 Report of the Chairman
3. REVIEW OF THE RBSNs
 - 3.1 RBSN Performance Monitoring Results
 - 3.2 Trends in the Implementation of RBSNs
4. REVIEW OF THE STATUS OF THE SPACE-BASED COMPONENTS OF THE GOS
5. STATUS OF SURFACE-BASED AND SPACE-BASED SUB-SYSTEM OF THE GOS IN THE REGIONS
6. REVIEW OF OTHER IN-SITU SYSTEMS & NEW INSTRUMENTATION
7. REPORTS OF THE OPAG-IOS EXPERT TEAMS
8. CLIMATOLOGICAL OBSERVATIONS AND GCOS NETWORKS
9. UPDATES OF GOS-RELATED REGULATORY MATERIAL
10. FUTURE COMPOSITE GOS AND ITS IMPACT ON DEVELOPING COUNTRIES
11. IOS INPUT TO THE GEOSS WORK PLAN
12. PREPARATION OF OPAG/IOS INPUT TO CBS.EXT.(06)
13. ANY OTHER BUSINESS
14. CLOSURE OF THE SESSION

LIST OF PARTICIPANTS

Dr James F.W. Purdom Chair	Cooperative Institute for Research in the Atmosphere (CIRA) Colorado State University (CSU) Ft. Collins, CO 80523-1375 USA Tel.: +(1 970) 491 8510 Fax: +(1 970) 491 8241 E-mail: purdom@cira.colostate.edu
Dr Susan Barrell Co-Chair	Bureau of Meteorology G.P.O. Box 1289 MELBOURNE, VIC 3001 Australia Tel.: +61 3 9669 4222 Fax: +61 3 9669 4168 E-mail: s.barrell@bom.gov.au
Dr John Eyre	Head of Satellite Applications Met Office FitzRoy Road EXETER EX1 3PB United Kingdom Tel.: +44 1392 885175 Fax: +441392 885681 E-mail: john.eyre@metoffice.gov.uk
Mr Jeff Wilson	Bureau of Meteorology Training Centre GPO 1289 MELBOURNE, VIC 3001 Australia Tel.: +61 3 9669 4470 Fax: +61 3 9669 4366 E-mail: j.wilson@bom.gov.au
Dr Jochen Dibbern (Rapporteur on AMDAR Activities)	Deutscher Wetterdienst Kaiserleistrasse 29-35 D-63067 OFFENBACH Germany Tel.: +(49 69) 8062 2828 Fax: +(49 69) 8062 3827 E-mail: jochen.dibbern@dwd.de
Dr Matthew Menne (Rapporteur on GCOS matters)	National Climatic Data Center National Environmental Satellite, Data and Information Service NOAA (E/CC21), Federal Building, Room 514 151 Patton Avenue ASHEVILLE, NC 28801-5001 USA Tel.: +(828) 271 4449 Fax: +(828) 271 4328 E-mail: Matthew.Menne@noaa.gov

<p>Dr A. Vasiliev (Rapporteur on Regulatory Material)</p>	<p>Hydromet Center of Russia Bolshovi Predtechenskiy 9-13 MOSCOW 123242 Russian Federation Tel.: +(7 495) 255 2343 Fax: +(7 495) 255 1582 E-mail: kharlashin@mecom.ru</p>
<p>Dr Jean Pailleux</p>	<p>Météo-France, CNRM/GMAP 42 Av. G. Coriolis 31057 TOULOUSE, Cédex 1 France Tel.: +335 6107 9961 Fax: +335 6107 9600 E-mail: jean.pailleux@meteo.fr</p>
<p>Mr Ko Koizumi</p>	<p>Japan Meteorological Agency 1-3-4 Ote-machi, Chiyoda-ku TOKYO 100-8122 Japan Tel.: (+81 3) 3211 8341 or 8408 Fax: (+81 3) 3211 8407 E-mail: kkoizumi@met.kishou.go.jp</p>
<p>Mr Alan Douglas</p>	<p>Head-Observations Met Office FitzRoy Road EXETER EX1 3PB United Kingdom Tel.: +(44 1392) 885600 Fax: +(44 1392) 88 5681 E-mail: alan.douglas@metoffice.gov.uk</p>
<p>Mr William Nyakwada</p>	<p>Kenya Meteorological Department Dagoretti Corner Ngong road P.O. Box 30259 00100 – GPO NAIROBI Kenya Tel.: +254 20 567880 to 9 Fax: +254 20 576955; 577373 E-mail: william.nyakwada@lion.meteo.go.ke</p>
<p><i>Invited Experts:</i></p>	
<p>Mr Mahaman Saloum</p>	<p>Service météorologique du Niger B.P. 218 NIAMEY Niger Tel.: +227 9689 8238 / 9485 2113 Fax: +227 735512 / 733837 E-mail: msaloum1@yahoo.fr nigermt@asecna.org</p>

Mr Yongqing Chen	China Meteorological Administration 46 Zhongguancunnandajie BEIJING China Tel.: +(86 10) 684 064 21 Fax: +(86 10) 621 742 41 E-mail: chenyq@cma.gov.cn
Mr Sunarjo	Director of Center for Observation Network System Meteorological and Geophysical Agency Jl. Angkasa 1/2 JAKARTA 10720 Indonesia Tel.: +6221 4241169; Mobile: 081588440715 Fax: +6221 4246703 E-mail: sunaryo@bmg.go.id
Mr Gaston Torres	Direccion Meteorologica de Chile Avenida Portales N°3450 – Estacion Central Casilla 140 – Sucursal Matucana SANTIAGO Chile Tel.: +(56 2) 436 4520 Fax: +(56 2) 437 8212 E-mail: gtorres@meteochile.cl
Mr Werner E. Stolz	Instituto Meteorologico Nacional (IMN) Apartado Postal 5583 1000 SAN JOSE Costa Rica Tel.: +(506) 222 5616 Fax: +(506) 257 8287 E-mail: wstolz@imn.ac.cr
Mr Terence Hart	Bureau of Meteorology GPO Box 1289 MELBOURNE, VIC. 3001 Australia Tel.: +(613) 9669 4505 Fax: +(613) 9669 4695 E-mail: t.hart@bom.gov.au
Mr Knut Bjorheim	Director, Observing Systems Norwegian Meteorological Institute P.O. Box 43 Blindern 0313 OSLO Norway Tel.: +47 22 96 3000 Fax: +47 22 96 3050 E-mail: knut.bjorheim@met.no

<p>WMO SECRETARIAT</p> <p>7 bis, avenue de la Paix Case postale No. 2300 CH-1211 Geneva 2 Switzerland</p>	<p>WWW website: www.wmo.int/web/www/www.html</p>
<p>Dr John L. Hayes</p>	<p>Director World Weather Watch Department Tel.: +(41 22) 730 8567 Fax: +(41 22) 730 8021 E-mail: JHayes@wmo.int</p>
<p>Dr Donald E. Hinsman</p>	<p>Director, WMO Space Programme Tel.: +(41 22) 730 8285 Fax: +(41 22) 730 8181 E-mail: DHinsman@wmo.int</p>
<p>Dr Alexander Karpov</p>	<p>Chief, Observing System Division World Weather Watch Department Tel.: +(41 22) 730 8222 Fax: +(41 22) 730 8021 E-mail: AKarpov@wmo.int</p>
<p>Dr Miroslav Ondras</p>	<p>Senior Scientific Officer World Weather Watch Department Tel.: +(41 22) 730 8409 Fax: +(41 22) 730 8021 E-mail: MOndras@wmo.int</p>
<p>Dr Hans Teunissen</p>	<p>GCOS Secretariat Tel.: +(41 22) 730 Fax: +(41 22) 730 E-mail: HTeunissen@wmo.int</p>
<p>Mr Jérôme Lafeuille</p>	<p>WMO Space Programme Tel.: +(41 22) 730 8228 Fax: +(41 22) 730 8181 E-mail: JLafeuille@wmo.int</p>
<p>Mr Etienne Charpentier</p>	<p>Senior Scientific Officer Ocean Affairs Division Applications Programme Department Tel.: +(41 22) 730 8223 Fax: +(41 22) 730 8128 E-mail: ECharpentier@wmo.int</p>
<p>Mr Bruce Sumner</p>	<p>Consultant World Weather Watch Department Tel.: +(41 22) 730 8004 Fax: +(41 22) 730 8021 E-mail: BSumner@wmo.int</p>

PROPOSED ET-EGOS WORK PLAN FOR 2007-2008

- Update CEOS/WMO databases of user requirements and observing system capabilities and include user reviewed R&D expected performances (upon receiving information from data users and data producers).
 - Expand user requirements database to include “break-through” values
- Continue Rolling Review of Requirements for ten application areas and expand to new areas as required
- Work with application area Points-of-Contact to update Statements of Guidance
- Review with Rapporteurs and NWP experts the progress concerning OSE guidance for evolution of GOS
 - Organise and hold next NWP Impact Studies Workshop in early 2008
- Initiate actions, monitor and assure progress on Implementation Plan for the Evolution of the GOS (EGOS-IP) and coordinate this activity with the Rapporteurs/Coordinators on the Regional aspects of the GOS. Prepare a summary of progress on EGOS-IP.
- Follow up CBS approved recommendations for the evolution to the GOS with particular attention to the developing countries; develop a summary of these activities.
- Maintain and improve ET-EGOS web page

New activities

- Interaction between ET-EGOS and IPY: Take actions to ensure near real-time distribution of IPY observations where possible; review results of observation gap analysis performed by IPY SC on Observations
 - Support Chair of ICT/IOS on preparation of a Brochure on the evolution of the GOS
 - Support activities EC Task Team on Integrated WMO Observing Systems
 - Review proposal for GCOS Reference Upper Air Network
 - Improve interaction between GOS performance statistics and EGOS-IP
 - With other IOS Ets prepare updated vision for the GOS.
-

PROPOSED ET-SAT WORK PLAN FOR 2007-2008

- 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
 - Review CM recommendations for the relevant period and provide input to OPAG IOS and ICT work programmes
 - Review SOGs and plans for GOS evolution and provide input to ET-EGOS towards improvement of system capabilities, particularly with respect to developing countries
 - 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
 - Provide input to other WMO sponsored expert groups and meetings, e.g. JCOMM, GCOS, WCRP and GAW, with regard to satellite system capabilities and their requirements
 - Review progress on the Implementation Plan for Evolution of the Space and Surface-based Subsystems of the GOS, initiate actions as appropriate and coordinate this activity with ET-EGOS
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PROPOSED ET- SUP WORK PLAN FOR 2007-2008

- 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.
 - 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;
 - 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;
 - Represent WMO Member needs to the CGMS/WMO Virtual Laboratory for Satellite Data Utilization (VL) in relevant areas.
 - In conjunction with WSP 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.
 - Further the concept of Regional/Specialized Centres on Satellite Products
 - 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
 - Further develop "R&D to operations transition" concept and identify in more detail the role WMO could assume.
 - Prepare documents to assist Members, summarizing the results from the above activities.
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**PROPOSED ET- AWS WORK PLAN FOR 2007-2008
(Additional items)**

- Collaborate with CIMO in defining a list of AWS Functional Specifications;
 - Develop the requirements and implementation plan for a robust, low power, continuous communications platform for all AWS, particularly those in remote locations;
 - Develop the requirements and subsequent implementation plan for AWS hosted sensors to contribute directly to the calibration and ground truth of space-based observations;
 - Develop the requirements for new sensors or the integration of sensors to meet the deficiencies of AWS following the migration from manual observations;
 - Address, in collaboration with CIMO, the need for integration of point measurements with area measurements;
 - Develop network guidelines and procedures to assist in the transition from manual to automatic surface observing stations;
 - Coordinate efforts with other programs and Commissions in preparing guidelines for the implementation of new data types from either new sensors or following the successful integration of sensors.
 - Develop the recommended four categories of AWS metadata;
 - Develop Guidelines for the siting classification of AWS;
 - Collaborate with other technical commission in finalization of a list of standard and optional variables to be reported by AWS;
 - Review BUFR descriptors for inconsistencies and traceability to the International Meteorological Vocabulary, WMO-No. 182.
 - With other IOS ET's update the vision for the GOS
-

**SUGGESTED FORMAT FOR REPORTS TO THE ICT FROM REGIONAL
RAPORTEURS/COORDINATORS ON THE GOS**

Topic	Possible sources of information
1. General comments	
2. Surface-based components	
<ul style="list-style-type: none"> - Performance (quality and quantity) - achievements - deficiencies - issues - recommendations 	
(a) RBSN Surface synoptic observations Upper air observations AWS	<ul style="list-style-type: none"> • Monitoring statistics from RTHs • Annual Status Report on Implementation of WWW • Results of Annual and Special monitoring (Information on the AGM and SMM is available from http://www.wmo.int/web/www/ois/monitor/monitor-home.htm.) • Regional Association reports • National Focal Points on the RBSN
(b) RBCN	<ul style="list-style-type: none"> • Results of annual monitoring on WMO web site (Information on the AGM and is available from http://www.wmo.int/web/www/ois/monitor/monitor-home.htm.) • ftp://www.wmo.int/GTS_monitoring/AGM/From_WMO/
(c) GSN and GUAN	<ul style="list-style-type: none"> • GCOS Lead Centre reports • NFPs on GCOS • Web sites ...??
3. Space-based component	<ul style="list-style-type: none"> • Centres of Excellence • Reports of ET-SAT and ET-SUP • Regional Rapporteurs on WMO Space Programme
<ul style="list-style-type: none"> - data and products used - 	
4. Other in-situ systems	
(a) AMDAR	<ul style="list-style-type: none"> • Regional Rapporteur on AMDAR • CBS Rapporteur on AMDAR activities
(b) Marine systems - including AWS and ASAP	<ul style="list-style-type: none"> • Regional Rapporteurs on Marine Meteorological and Oceanographic Services • Portal to be established by JCOMM • JCOMMOPS access point: www.jcommops.org/network_status
(c) Weather radars	
(d) Lightning detection systems	
(e) Other observing systems	
<ul style="list-style-type: none"> - wind profilers - high density precipitation networks - GPS water vapor 	

5. Regulatory material and Volume A	<ul style="list-style-type: none"> • CBS Rapporteur on Regulatory Material • National focal points on Volume A
6. Report on progress towards implementation of the plan for the evolution of the GOS	<ul style="list-style-type: none"> • Secretariat • Relevant ETs • Assessment against regional versions of the global plan
7. Report on GEOSS activities	<ul style="list-style-type: none"> • Regional Rapporteur on GEOSS • Regional Rapporteur on Regional Aspects of GEOSS in the Working Group on PI-WWW
8. Report on THORPEX, IPY and other relevant research activities	<ul style="list-style-type: none"> • Regional Rapporteur on WWRP-THORPEX
9. Other issues - resources?	
10. Progress against work plan and TORs defined by Regional Association	
10. Plans	

It is suggested that these reports be prepared annually (around March). They can be used as input to the Report on World Weather Watch required by the President of the Regional Association for EC, Congress or regional meetings. They can then be used as reports to the ICT meeting.

Copies of the report should be circulated to:

- Chair of the region's Working Group on Planning and Implementation of the WWW
- Chair of OPAG on IOS
- Rapporteurs on IOS in other regions

Notes:

1. The list of sources of information needs refinement by the Secretariat and needs to be made specific for each region
2. The Secretariat is requested to provide a list of all relevant NFPs and Regional Rapporteurs to the IOS Rapporteurs
3. It is also recommended that the NFPs be updated. It is recommended that an appropriate NFP would be the person responsible for the Observation Network in the NMHS.

REQUIREMENTS FOR ACTIONS

No.	Action	Person Tasked	Deadline	Comments
1	PWS questionnaire on cross cutting programmes	Co-Chair IOS	Done	
2	Update Implementation on PowerPoint presentation of Implementation Plan for the GOS	J. Eyre, J. Purdom	mid 2007	
3	ET-SAT and ET-SUP to provide information on current and planned data and products availability from both operational and research satellites	J. Wilson, Zhang	Nov 2007	
4	To obtain information of space-based components of regional GOS implementation from ET SAT and ET SUP	Regional Rapporteurs, with Wilson and Zhang to take initiative	Nov 2007	Secretariat set up a list server for this
5	Implementation of the GOS, particularly the space-based components, to be brought to the attention of Regional Association meetings	Secretariat		RA meetings are advised. Training workshops. EGOS Imp Plan, blessed by EC has data requirements
6	Update and review the template for reports from Regional Rapporteurs on the GOS to be developed	Secretariat	Update by CBS ext	To be coordinated with Regional rapporteurs. Include information on data timeliness, hourly reports, etc. Doc 5.1(5) possible template.
7	Letter from CAeM to CBS to request transference of AMDAR programme to CBS	AMDAR Rapporteur		AMDAR Rapporteur to approach Chairman of AMDAR Panel to assist in facilitating this.
8	Propose further steps to integrate the AMDAR Panel into the WWW programme.	Secretariat, ICT		
9	Continuing funding for Argo floats to be ensured.	Argo Steering Group	Ongoing	
10	Recommended that all 1250 buoys be fitted with barometers – cost consideration	Data Buoy Cooperation Panel (DBCP)	Oct 2006	

11	Need to ensure common data formats for marine data, particularly between WMO and the IOC component of JCOMM.	JCOMM Data Management Coordination Group (DMCG)	Oct 2006	To be reviewed at next DMCG
12	Map of world showing responding countries to the questionnaire on Impacts of new instrumentation on the GOS	Secretariat	October 12, 2006	Responding countries in green, non-responding countries in pale red.
13	Ensure questionnaires and corespondance that have in-situ data requirements are copied to Regional rapporteurs on the GOS, OPAG Co-chairs and heads of the Ets, and questionnaire dealing with space-based issues are sent to Centres of Excellence.	Secretariat	ongoing	
14	Change of the Terms of Reference of the Co-Rapporteurs on Impacts of New Instrumentation on the GOS to liaise with Regional rapporteurs on the GOS and with the regional Centres of excellence.	Secretariat		
15	Reissue the Impacts of new instrumentation questionnaire	Secretariat		Who signs the questionnaire? CC to members of CBS in members countries & Chairs of WWW Implementation.
16	Revise the Impacts of New Instrumentation questionnaire to make it better and target it to the correct people/groups.	Co-Rapporteurs		
17	There is a concern that MMS's, when budgeting for an upgrade to a reference GUAN (GRUAN) station, may be tempted to degrade the RBSN.			This should not be allowed to occur.
18	Compare CLIMAT TEMP reports received versus TEMP reports which can be used to generate CLIMATE TEMP, with aim of determining usefulness of CLIMAT TEMP reports being distributed	Matthew Menne	Nov 15, 2006	
19	Investigate ability of Members to provide assistance and support in developing WMO No. 9 Volume A, using a Members Oracle station dictionary as a starting point.	Secretariat		
20	All correspondence regarding Observing Systems to be copied to Regional Rapporteurs/Coordinators	Secretariat		
21	Suggest WMO/GEO Members included WIS in GEO 2007-2009 Work Plan	Secretariat	Oct 2006	

22	Request to have data for IPY ion realtime	Secretariat, Chair OPAG-IOS	CBS- Ext.(06).	Chair OPAG-IOS Chair to send letter to Chair OPAG-ISS
23	Provide OPAG-IOS ET Chairs with TORs and Work Plans of other OPAGs and their Ets.	Sue Barrell	After CBS- Ext.(06).	
24	Endorse the continued updating of EGOS-IP as a means of monitoring progress against the published version of the Plan		CBS- Ext.(06).	
25	All Members to supply a point of contact responsible for reporting progress and plans in their country related to EGOS-IP		CBS- Ext.(06).	
26	Gather information from Members on progress and plans in their country related to EGOS-IP, with a focus on those activities not covered through established mechanisms, e.g. WMO Space Programme, AMDAR Panel, JCOMM	Secretariat	CBS- Ext.(06).	
27	Advise on appropriate mechanisms for issue of reports on progress and plans of Members related to EGOS-IP	Secretariat	CBS- Ext.(06).	
28	Request ET-EGOS to analyse information on progress and plans supplied by Members related to EGOS-IP, and to summarise progress	ET-EGOS	CBS- Ext.(06).	

Activities of Rapporteurs/Coordinators on Regional Aspects of the GOS

Meetings of the ICT on GOS provide an opportunity for the Regional Rapporteurs/Coordinators (henceforth referred to as Regional Rapporteurs) to meet to discuss the means for carrying out their roles both within their Regional Association and in their contribution to the work of the OPAG on IOS. The following information represents guidance material developed from such meetings in 2004 and 2006.

Terms of Reference (TOR)

The Rapporteurs have agreed to review their own TOR with a view to proposing revised versions to the Chair of their respective WG on Planning and Implementation of WWW. It was recognized that there are differences in roles among the regions but agreed that it would assist in clarifying roles if there were consistency in expressing the tasks that were common to all regions. The Rapporteurs agreed that the following elements should be included in their TOR:

- Liaison with other Rapporteurs and sub-groups in the Region on matters relevant to the GOS, including training matters, to ensure coordination of matters relating to the GOS;
- Ongoing monitoring of the performance of the GOS in their region;
- A reference to the observing system to include both surface-based and space-based observations;
- Responsibility for coordinating input to regional plans for the evolution of the GOS;
- Coordination of the implementation of agreed plans with other Regional Rapporteurs on Observations and the Chair and other members of the OPAG on IOS;
- Acting as the focal point for the region in maintaining regulatory material related to the GOS (including WMO Publication no. 9, Vol. A and the Manual on the GOS).

Means of carrying out their role

Regional Rapporteurs agreed that they must be pro-active and become the focal point on IOS issues for their Region, and secure a position which enables them to influence outcomes or have access to those that can.

The meeting of Rapporteurs suggested ways to effectively carry out their assigned tasks and facilitate dissemination within their region of information on developments in the GOS. These included:

- The annual reports on activities prepared for the Chair of the WG on WWW in their region should also be provided to members of the OPAG on IOS and to the relevant area of the Secretariat;
- Plans for their activities prepared for the Chair of the WG on WWW should be provided to members of the OPAG on IOS and to the relevant area of the Secretariat;
- To actively use the National Focal Points (NFP) designated by Members as a source of information (questionnaires, surveys) for technical information, noting that it would be appropriate to send requests through the PR with a copy to the NFP if there may be policy issues. E-mail is generally acceptable in most cases;
- Use of the Secretariat and Regional Offices for advice and assistance with conveying information to or seeking information from Member countries;
- Preparation by the Secretariat of procedures followed in formulating the RBSN and RBCN as endorsed by CBS
- To assist in ongoing monitoring of the GOS in the region, the Secretariat should provide the Regional Rapporteurs with copies of requests from Members for minor changes to the RBSN and RBCN

- Copies of letters and surveys to Members on matters related to the GOS should be copied to the Regional Rapporteurs.

Means for conveying information to the Regions are:

- Reports to the Chair of the WG on WWW;
- Reports to the NFPs;
- Participation in the meetings of the WG on WWW;
- Reports via e-mail or, on very significant issues, formal letters to Members through the Secretariat;
- Inclusion of news items in Regional newsletters where these exist;
- Addition of information to the relevant Regional section of the WMO web page.

Note: The work of the Rapporteurs on GOS would be helped by the nomination and active involvement of NFPs. Lists of the NFPs on GCOS, Volume A and the RBSN are maintained by the Secretariat and should be provided to the Regional Rapporteurs.

Coordination among Regional Rapporteurs and Chair of the OPAG on IOS

An exchange of what is going on (in each Region), the successes and the issues needing addressed, will help keep Regional Rapporteurs informed and involved – and form a mutual support group. Successes should feature in the information exchange as much, if not more, than issues and problems. The Rapporteurs should be open with, and supportive to each other as it is a win/win scenario.

The Regional Rapporteurs should also keep the OPAG Chair(s) in touch with the developments and issues of the day.

Contact point for Regional Rapporteurs in the Secretariat:

Dr Alexander Karpov
Akarpov@wmo.int

Attachment:
Standard format for reports to OPAG on IOS (See Annex V)

Procedures in formulating the RBSN and RBCN (adopted by CBS-XIII) ?

The Rapporteur on the regional aspects of the GOS, in close cooperation with Members concerned, reviews and makes proposals regarding the design of observing systems in the Region, in particular the RBSN and the RBCN in the context of the WWW Programme in the WMO Long-term Plan.

For the purpose of the exercise of the composition of the RBSN and RBCN, it is recommended to use the objective criteria developed by the WG on Planning and Implementation of the WWW in RA VI for inclusion and exclusion of stations. It is noted that the RBCN includes the GCOS network.

The Rapporteur in consultation with the Secretariat, submits the proposed lists of stations to be included in the RBSN and RBCN to the WG PIW in his Region for review and approval.

The Secretariat on the recommendation of the WG PIW in the Region circulates the proposed lists of stations to Members for review and any amendments.

The Secretariat compiles the feedback and the amendments made by Members to their lists of Stations in the RBSN and RBCN and a draft proposal is submitted to the Regional Association (which meets once in 4 years) for consideration and inclusion in the RBSN and RBCN.

The Secretariat on the recommendation of the Regional Association circulates once again to Members the final draft of the proposed lists of stations to be included in the RBSN and RBCN for review and any amendments within a reasonable time frame.

The lists of stations on the RBSN and RBCN for the Region are then finalized by the Secretariat as an annex to the respective Resolutions of the Regional Association.

Certain minor changes in the RBSN and RBCN that do not affect the data requirements of the Region as a whole are inevitable from time to time. To provide a simple and rapid means of effecting changes proposed by the Members concerned, the following procedures shall be followed:

(a) The Regional Association authorizes the President of the Association to approve, at the request of the Member concerned and in consultation with the Secretary-General, minor changes to the RBSN and RBCN without a formal consultation of the Members of the Association, it being understood that any change of substance, i.e. one adversely affecting the density of the network or proposing a change in observational hours, would still require the formal agreement of Members through the adoption of a resolution by postal ballot;

(b) The Secretary-General shall notify all Members of WMO by circular letter of changes agreed with the president of the Association.

The RBSN and RBCN are reviewed and revised at each session of the Association by adopting a Resolution containing the current RBSN and RBCN networks. This Resolution is included in the report of the most recent session of the Association.
