WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS
OPAG ON INTEGRATED OBSERVING SYSTEMS

EXPERT TEAM ON
OBSERVATIONAL DATA REQUIREMENTS AND
REDESIGN OF THE GLOBAL OBSERVING SYSTEM
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Item 2

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REPORT OF THE CHAIRMAN

(Submitted by Dr Paul Menzel)

Summary and Purpose of Document

This document summarizes the events concerning the ET-ODRRGOS and outlines the goals for the current meeting.

ACTION PROPOSED

The meeting is invited to take the views and comments, contained in this document, into account during its discussion.

REPORT OF THE CHAIRMAN

1. Summary of ET-ODRRGOS accomplishments and findings

1.1 The WMO/CBS/OPAG IOS Expert Team on Observational Data Requirements and Redesign of the Global Observing System (ET-ODRRGOS) has been given two main tasks: (a) to continue the Rolling Requirements Review (RRR), under which requirements for observations to meet the needs of all WMO programmes are compared with the capabilities of present and planned observing systems to provide them, and; (b) to make recommendations to the Commission for Basic Systems (CBS) of WMO on the "re-design" of the Global Observing System (GOS).

1.2 The ET-ODRRGOS has been meeting since summer 1999 during which time the following has been accomplished.

1. Users Requirements and Observing System Capabilities were charted in ten application areas (after engaging ocean and climate communities). The Rolling Review of Requirements was pursued, and Statements of Guidance were issued in all ten areas (available in WMO/TD 913, 992, 1052 and summarized in the final report of the July 2002 ET-ODRRGOS meeting).
2. Several Observing System Experiments were pursued to test possible re-configurations of the (these have been summarized in the final report of the July 2002 ET-ODRRGOS meeting).
3. Candidate Observing Systems (space-based and ground-based) for the coming decade were studied and WMO/TD 1040 was published.
4. Recommendations for the evolution of space-based and surface-based components of the GOS were drafted and presented to CBS. (available in the final report of the October 2002 ICT meeting).
5. A vision for the GOS of 2015 and beyond was drafted (available in the final report of the October 2002 ICT meeting).
6. An implementation plan for the GOS 2015 was drafted (available in the final report of the November 2003 ET-ODRRGOS meeting).

1.3 Significant findings of ET-ODRRGOS are:

1. The Rolling Requirements Review (RRR) is readily applied to a diversity of applications areas, provided the data base of user requirements and observing system capabilities is accurate;
2. Working with the Rapporteurs of Regional and Global OSEs, it was found that hypothetical changes to the GOS can be explored in Observing System Experiments (OSEs) with NWP centre assistance, provided data assimilation procedures are well understood and impact studies are conducted in a statistically significant way. Further it was made apparent that Observing System Simulation Experiments (OSSEs) require huge human and computer resources and were beyond the available resources;
3. The future GOS should build upon existing components, both surface and space based, and capitalize on existing and new observing technologies not presently incorporated or fully exploited; each incremental addition to the GOS will be reflected in better data, products and services from the National Meteorological and Hydrological Services (NMHSs);
4. The scope of the next decades changes to the GOS will be so massive that new revolutionary approaches for science, data handling, product development, training, and utilization will be required. There is an urgent need to study comprehensive strategies for anticipating and evaluating changes to the GOS.

2. Recommendations for the Evolution of the GOS from ET-ODRRGOS

2.1 The evolution of the GOS has been framed in 42 recommendations found in the OPAG IOS ICT report for 14-18 October 2002. Those recommendations for evolution of the GOS reflect

- Statements of Guidance in eleven applications areas (available in WMO/TD No. 913, 992, 1052 and summarized in ET-ODRRGOS Meeting Report 1-5 Jul 2002);
- Results from regional programmes such as COSNA, EUCOS and NAOS,
- Conclusions from the Toulouse Workshop on Impact of Various Observing Systems on NWP (see WMO/TD No. 1034);
- OSEs prompted by suggested changes to the GOS (see OPAG IOS ICT report for 14-18 Oct 2002).

2.2 The 22 recommendations for the surface-based component of the GOS include: more complete and timely data distribution; enhanced AMDAR especially over data sparse areas; optimized rawindesonde launches; targeted observations; inclusion of ground based GPS, radars, and wind profilers; increased oceanic coverage through expanded Automated Ship balloon observations, drifting buoys, and ARGO; and possible use of Unmanned Aeronautical Vehicles.

2.3 The 20 recommendations for the space based component of the GOS (9 for operational geostationary and polar orbiting, 11 for R&D satellites) build upon the known plans of the operational and R&D satellite operators and call for rigorous calibration of remotely sensed radiances as well as improved spatial, spectral, temporal, radiometric accuracies. The wind profiling and global precipitation measurement missions were singled out for their importance to the GOS.

3. WMO Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction

3.1 On 9 – 12 March 2004, the World Meteorological Organization hosted the Third WMO Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction in Alpbach, Austria. Results from Observing System Experiments (OSEs) both with global and regional aspects were presented. H. Boettger, J. Pailleux, and P. Menzel were the conference organizers; 31 papers covering global NWP, regional NWP, and observing network design studies were heard. Some conclusions about observational data requirements beyond those expressed in the ET-ODRRGOS documents are:

1. Polar wind observations should be developed further and an operational follow-on to the MODIS winds should be secured (this will require a water vapour channel on the operational imagers on NPOESS and METOP). Timeliness of data delivery can be addressed through direct data read-out. The number of stations with direct read-out capability should be increased. Such data should be made available directly to the processing centres.

2. Timely distribution of radiosonde observations in BUFR is needed with all observation points included in the message together with the time and the position of each data point; information on instrument calibration prior to launch and information on sensor type and sub-sensor type is also required.

3. For regional forecasting systems, comprehensive and uniform coverage is needed with at least 12-hour frequency of temperature, wind, and moisture profiles over continental areas and coastal regions. The radiosonde network still plays an important role in meeting this requirement.

4. The extension of the coverage of vertical soundings into ocean areas (eg as pursued in the EUCOS programme) was supported and considered to be a valuable data source for general NWP.

5. More T, U/V, Q profiles, but especially winds, are needed in the tropics. Rapid development of the AMDAR programme could be one solution.

6. Timeliness requirements for observational data are becoming more stringent for NWP centres. HH + 20 to 90-minute data cut-off times are applied at present for many NWP short-range runs. Within the next few years, a data processing and delivery time of approx 20 to 30 minutes is expected to be the an operational requirement.

7. Ground based GPS processing (ZTD and PW, priority for ZTD) should be standardized to provide more consistent data sets. Data should be exchanged globally. The coordination of geodetic data between the GPS processing centres is required.

8. There is a requirement for exchange of high-resolution radar data (both reflectivity and radial winds, where available) for use in regional models, and also in global models in future.

9. Results on the usefulness of stratospheric observations should be consolidated and requirements for a stratospheric global observing system should be refined (need for radiosondes, radiances, wind data, humidity data, noting the availability and required density of existing data sources, including GPS sounders, MODIS winds and other satellite data).

4. THORPEX

At the November 2004 meeting, ET-ODRRGOS discussed THORPEX. THORPEX was established in May 2003 by the Fourteenth World Meteorological Congress as a ten-year international global atmospheric research and development program under the auspices of the WMO. It was agreed that THORPEX is an exceptionally important program that offers the opportunity to investigate the best mix of the various components of the Global Observing System. The program's success will help insure optimal utilization of satellite and in situ data across forecast scales from 1 day to two weeks and likely into seasonal to inter-annual scales. Information gleaned from THORPEX will help guide the future development of observing systems. ET-ODRRGOS drafted a list of science questions that THORPEX could assist in answering and forwarded these to the CBS representative to THORPEX International Core Steering Committee (ICSC) meeting. Subsequently, ET-ODRRGOS has been asked to assist in drafting plans for (1) field-demonstrations of prototype remote-sensing systems for future airborne and satellite deployments and (2) data assimilation and observing strategies. For each of those areas a statement of the task has already been developed and what is needed now are very brief, high level descriptions for each task in each of the following areas: (a) Expected Outcomes; (b) Timescale; (c) Approach; (d) Level of International Cooperation; (e) Key Players; (f) Infrastructure Requirements; and, (g) Links to other programs. Further guidelines will be offered by the OPAG chair at our July meeting.

5. ET-ODDRGOS plans for the July 2004 meeting

5.1 ET-ODDRGOS is expected to continue pursuing the work plan approved by CBS. The agenda includes hearing the outcomes from the Alpbach Workshop and the implications for the redesign of the GOS, getting an update on WMO participation in various meetings (the WMO consultative meetings on high level policy on satellite matters, CGMS, GEO), reviewing the observing system capabilities and user requirements and the associated statements of guidance with applications area experts (agrometeorology, hydrology, atmospheric chemistry, JCOMM), drafting field campaign and data assimilation task for THORPEX, finalizing a draft implementation plan for the Redesign of the Global Observing System that was started at the last ET-ODRRGOS meeting, and preparing for the next ICT and CBS.

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