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CBS MANAGEMENT GROUP

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ENGLISH

Report of the chair of the OPAG on Data Processing and Forecasting Systems
(Submitted by A. Simard)

Summary and purpose of document

This document summarises the work of the expert teams and rapporteurs within the OPAG-DPFS.

1. ACTIVITIES OF TEAMS AND THE GROUP

Emergency Response Activities Co-ordination Group

- At the kind invitation of USA the meeting of the Emergency Response Activities Co-ordination Group (CG) was held in Washington on 10-14 September 2001. The agenda and meeting were disrupted by the September 11 terrorist attacks; however, the CG succeeded in making good progress during the rest of the week and completed the agenda.
- The meeting proposed some changes to the manual on Global Data Processing System and to WMO TD 778 to clarify and improve the ERA's operational procedures and standards. These changes are based on recent experience (incidents and exercises). With these changes, the procedures are harmonized with the Joint Radiation Emergency Management Plan of the International Organizations (IAEA, Dec 2000). A test will be undertaken in April 2002 to confirm these clarifications or changes. These changes will be submitted to CBS EXT (2002) for consideration and approval.
- In the March-May 2001 period, considerable effort was focused on improving the operational IAEA-to-WMO notification procedures that are implemented at the IAEA-ERC and RTH Offenbach interface. These procedures were aligned to the concept of operations contained in the Joint Radiation Emergency Management Plan of the International Organizations (Appendix A, WMO section).
- The use of web-based technology has been successfully demonstrated during many regional and international exercises. As a result, CG agreed to develop standards and a framework for improved operational exchange and distribution of RSMC products using web-based technology, including password-protected or other measures to exchange information securely.
- RSMC Obninsk and RSMC Tokyo informed the CG about their observing networks for atmospheric radioactivity. Further work is required to better define ERA requirements for additional observations in the event of a nuclear accident and to examine options.
- Preliminary work has taken place to assess the steps needed to uplink relevant CTBTO data sets on the GTS. RSMC Montreal accepted responsibility for uplinking the data to the GTS.
- To further advance the collective ability of all RSMCs in EER, the meeting agreed to work together in expanded areas of EER model applications. In particular, RSMCs are encouraged to explore the development and application of finer scale models for various localities within their regional area, with the goal of providing guidance for emergency measures for public safety. Examples include modelling which handles airborne viruses, volcanic gas emissions, smoke from wild fires, or chemical spills.
- WMO TD 778 is viewed as an important document as it contains background and guidance on the ERA as well as documentation from RSMCs on their specialized

products and is useful to NMHSs. In particular an annex provided by RSMC Melbourne on the critical role of NMHSs in EER is being added. Many NMHSs are involved in international exercises, which is helping to demonstrate their important role in ERA.

- The working relations today with the main collaborating agencies (IAEA, CTBTO, ICAO), in particular with individuals involved, are in excellent shape. Organizations are involved in testing the operational arrangements and improving procedures, and contributed to the success of the meeting.

ET on Ensemble Prediction System

- At the kind invitation of Japan, the meeting of the ET on EPS was held in Tokyo on 15-19 October 2001 and addressed issues related to procedures and arrangements for making widely available EPS products to Members and related necessary training issues. The team reviewed the status of operational EPS activities and related research developments and future plans in WMCs/RSMCs/NMHSs, for short-range and medium-range forecasting in general, and in particular for severe weather and extreme events. Together, Medium Range Ensemble Forecasting and Short Range Ensemble Forecasting are viewed as integral in a “seamless suite” of products. The current trend is to apply EPS on a wide range of applications and to explore a number of approaches some being more complex than others. There is a tendency to increase the number of members, the resolution of members and the frequency of the runs, which all have potential impacts on the telecom bandwidth required.
- The Expert Team further refined the basic list of products that was presented at CBS XII, to be exchanged on a routine basis. It includes:
 - Probabilities of precipitation exceeding 1,5,10, 25 and 50mm/24h
 - 10 m sustained wind and gusts exceeding thresholds 10, 15m and 25m/s
 - T850 anomalies with thresholds -4,-8,+4 and +8 degrees with respect of a reanalysis climatology specified by the producing centre
 - Ensemble mean + spread of Z500, PMSL,Z1000, vector wind at 850 and 250hPa
 - Tropical storm tracks (lat/long location from EPS members)
 - Model fields to be made available to requesting WMO members for specific applications
- The FM-92 GRIB Edition 2 format was considered by the ET to be the most practical code for the exchange of gridded EPS data. The EPS data producer should add an EPS version number with the products (e.g. octets 13,14, in GRIB2). ECMWF has indicated that they will produce operationally EPS data in GRIB2 in 2002. NCEP has also indicated its intent to do so during 2002. The volume of set of products recommended for routine transmission above is estimated to be about 50 MegaBytes/day of EPS products (about 7 MB per day per centre at 2.5x2.5 degree global grid). If divided into quadrants, the amount necessary to disseminate will be reduced, the whole globe being not required for everybody. The fields, direct output of the models of one centre, may have a volume of several hundreds MB/day. This now requires the help of the OPAG on ISS to determine appropriate means of dissemination and to assess telecommunication implications. Text and graphical products can generally be accessed by Internet. Lat/long position of tropical cyclone tracks could be transmitted using BUFR code. However, some adjustment will be necessary for having

the ensemble set of tracks identified and included in one single BUFR report. It requested the ET on Data Representation and Codes to finalize common sequences in BUFR Tables for that purpose.

- The ET also indicated that on the producer Web site, a catalogue of EPS fields and products should be available. Documentation on the EPS system should be provided: time of availability of products, version number of EPS system, last modifications, perturbation method, etc... The ET also discussed the development of standard verification measures for EPS. The team came up with some recommendations.. Performance measures recommended are:
 - Ensemble mean verified in the same manner as deterministic NWP forecasts;
 - Measures of spread (standard deviation) provided for the same parameters as the ensemble mean;
 - Reliability tables for event probabilities.
- The team recommended a set of updates to the Manual on the GDPS to take into account EPS. It was also recommended to add in the Appendix II-6, of the Manual on the GDPS, the list of EPS products defined by the meeting.
- The Team recommended that one or two week seminars entirely devoted to EPS should be organized at least 1-2 seminars per year. Further more, CAL (Computer Aided Learning) modules should be developed and roving seminars and training workshops should be organized. The ET recommended that a consultant contracted by WMO should gather material and write guidance on the methodology for the use of EPS products by forecasters for medium-range, and perhaps later for short-range. It is worth mentioning that possible regional training workshops on ensemble prediction systems (EPS) was discussed at the first CBS-MG. The MG agreed that this was a priority area since many NMHSs were not sure how these products should be used. However, the MG felt that this training should not take place until EPS products were available within the relevant NMHSs.

ET on the Infrastructure for Long-range Forecasting

- The first meeting of the ET was held in Geneva, 12-16 Nov 2001. The team was invited to take into account relevant directives and conclusions from EC-LIII in particular to report on the progress to further develop the WWW aspects of the infrastructure for long-range forecasting. Some of the deliverables of the ET include the provision of input to the ICTT concerning the establishment of appropriate operational infrastructure for the production and exchange of long-range forecasts; and the development of procedures for exchange and definition of products, terms and conditions for and actual implementation of experimental exchange. The meeting included participation from IRI, ECMWF, National Institute of Water and Atmospheric Research (New Zealand), and the CLIPS office and other WMO members.
- There is significant effort being devoted by several organizations to improve and develop products for Long-Range Forecasting. A number of products are already being exchanged on ad-hoc basis via access to web sites or FTP. The availability of products varies considerably among producing centres, and a variety of products and

standards are used. It is worth mentioning APEC Climate Network (APCN) project being carried out by KMA, which includes the participation from several organizations, and which involves real-time multi-model ensemble experiments to build up an infrastructure for joint operational seasonal forecasts. The multi-model ensemble products can be distributed through the provision of access to the APCN web site, upon agreement under the auspices of WMO.

- The meeting noted that an invitation was being sent from WMO to potential global-scale producing centres as listed by EC-LIII. It recommended that the ET be advised of the responses to the invitations with a view to revising the list of products to be exchanged. The meeting supported the concept of a workshop of potential global producing centres to facilitate experimental sharing of products.
- The team reviewed the list of products and information to be shared that was developed by the ICTT. It requested that WMO secretariat maintain a WEB page with URLs for sources of global LRF products and related information. The team did not develop conditions for exchange of products but indicated that registered user or password-restricted access can be used. The team agreed of the use of GRIB-2 for dissemination on the GTS and recommended that the OPAG on ISS monitor the use of GRIB2 for EPS and LRF products.
- Finally, the team recommended to the President of CBS to invite WCRP/CLIVAR and CAS to consider with high priority the research needs for the development of the advanced data assimilation schemes based on the coupled ocean-atmosphere GCMs, in the context of SI operational prediction.

ET on development of a verification system for Long-Range Forecasts

- The ET is expected to meet in the first quarter of 2002. The chair has contacted members via e-mail and has started some discussions. He has indicated that he will be contacting the CLIVAR Working Group on Seasonal to Interannual Prediction (WGSIP) and CLIPS to ensure collaboration between the different groups.
- Some exchange of products is taken place already but not to the level initially planned. It appears that the initial plan was too ambitious and that only a subset of the initial proposal should be exchanged in the first place.

Implementation Co-ordination Team on Data Processing and Forecasting System.

The ICT on DPFS will hold its meeting in the second quarter of 2002. It will address implementation co-ordination issues of the OPAG on DPFS.

Rapporteur on the Application of NWP to Severe Weather Forecasting

The rapporteur gathered information concerning severe weather forecasting on various Internet sites from NMHs. He wrote a draft paper on the results of its work and is proposing to do a survey to be distributed to RSMCs and some NMHs for their input. The survey will be used to determine what are the main severe weather events and their occurrence, the NWP tools being used as guidance, thresholds to be used, etc...

Rapporteur on the Impact of Changes to GOS on NWP

The rapporteur has indicated that an OSSE system is being built at NCEP, and that they have considered the impact of space-based Doppler Wind Lidar. Wind impacts in the simulated world of minimal Lidar instruments are comparable to that of the TOVS instruments suites. He also reported that NAOS has been considering an initiative for a US mesoscale observing system.

It is also worth noting that at a recent ECMWF Operational Workshop, there was a session on data impacts. There was an interesting study by ECMWF on the impact of Aircraft Ascent/Descent soundings. The experiments were performed with the current operational system (T519 about 40 km) and covered one month. The results showed a very significant negative impact when the aircraft soundings were removed over North America at day 2 and beyond

Intercommission task Team on regional Climate Centres (ITCC)

- The chair of the OPAG represented CBS at the ITCC meeting held in Geneva 30 April - 3 May 2001. The ICTT recognized that certain structures exist that are relevant to the work of the ICTT specifically the OPAG on DPFS. It noted that functions of Regional Climate Centres (RCC) may extend beyond those of NMHS and involve other organizations.
- It discussed the designation of RCCs and agreed that a process similar to that of RSMC is necessary. There is a need to build on existing structure as much as possible and avoid duplication. The ICTT noted and supported the activities towards the development of a standardized verification system for SI forecasts and recommended liaison between CBS and CLIPS groups working on verification.
- A set of requirements have been developed from a user perspective. This may lead to high expectations. No consideration has been given to the feasibility of production nor to the ability of individual producers to satisfy the requirements. The ICTT also recommended that any exchange of forecast products should always be accompanied by verification information.
- The ICTT also noted that the perceived necessity of RCCs varies from Regions to regions and across Regions and that further development will require close coordination with RAs. Where needed, RCCs may be physical or virtual entities. The long term sustainability of the RCCs need to be demonstrated.

- The ICTT noted the designation procedure for RSMCs (WMO , no 485) and agreed that this appears to have the inherent flexibility necessary for the designation of RCCs. It recommended that the designation follow established CBS practice but may be revised in the light of experience gained. Demonstration of capability falls into the remits of both CBS and CCI. Proposed centres should be introduced at the first CBS or CCI constituent body meeting following receipt of the proposals and that both Commissions be represented at the meeting. Both Commissions should have equal rights to take the initiative in recommending to EC the designation of RCCs.
- The work of the ICTT has been presented at EC LIII. The ICTT is to report again at EC LIV. The report will include proposals on suitable structures and mechanisms to meet Members needs for SI forecasts and RCC services in a well organized manner. Among the tasks to come are:
 - Initiate Follow-up action leading to the creation of RCCs
 - Establish a mechanism for cooperation between centres producing SI forecasts
 - Advise on requirements for workshop and implementation/coordination meetings
 - Recommend suitable infrastructure for the delivery of climate services
 - Advise on improved inter-program cooperation ie. mechanisms to deal with relevant cross-cutting issues.

Other Expert meetings

- An expert meeting on GDPS solutions for data quality monitoring procedures is being planned for the second quarter of 2002 to develop standard procedures for quality monitoring of Satellite, Aircraft and marine data. The participation of other lead centres on upper air data will be required to share experiences and fine tune their procedures.
- An Expert Meeting on Applications requirements and delivery matters is being planned for the fourth quarter of 2002 to review requirements of application programmes for GDPS products and services and refine related and delivery issues.

Issues with respect to verification

- There are some issues with respect to verification that needs some attention. Current procedures for short-term to medium -range NWP forecasts have a definition of Tropical boundaries as (20N-20S) all inclusive since June 1999. It is not clear that all centres follow those procedures and indications are that results can differ significantly if you do not include 20N-20S boundary itself.
- In addition, for the verification of seasonal forecasts, the ET decided to use 30N-30S. CBS-XII however approved the experimental use of these boundaries under the understanding that the short to medium range tropical boundary procedure would be harmonised with the long-range verification system. It does not seem appropriate to change the boundaries currently used for NWP, as it will result in a discontinuity in the historical data.
- It has also been brought to my attention by the UK that centres are still using different climatologies for NWP verification and that this impact the results. There were

discussions to that effect in the past but there is no-one leading this file which means that it is unlikely that anything will be done.