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| WORLD METEOROLOGICAL ORGANIZATIONCOMMISSION FOR BASIC SYSTEMS OPAG on DPFS Meeting of the Expert Team on Operational Weather forecasting Process and support (ET-OWFPS)  Montreal, Canada, 09-13 May 2016 |  | CBS-DPFS/ET-OWFPS /Doc. 3.3  (9.V.2016)  \_\_\_\_\_\_\_  Agenda item : 3.3  ENGLISH ONLY |

**FUTURE GLOBAL DATA-PROCESSING AND FORECASTING SYSTEM**

*(Submitted by Secretariat)*

##### Summary and purpose of document

This document provides background information on the future Global Data-processing and Forecasting System (GDPFS). It complements the information provided in Doc 3.1.

##### Action Proposed

The meeting is invited to comment and advise on follow up actions, and to consider them during discussions under the relevant Agenda items.

**FUTURE GLOBAL DATA-PROCESSING AND FORECASTING SYSTEM (GDPFS)**

**1. Global Data-processing and Forecasting System (GDPFS)**

1.1 Cg-17 highlighted that the GDPFS contributes to many of the WMO’s high priorities through: (i) the use of NWP and Ensemble Prediction Systems (EPS) for severe weather forecasting, particularly through the Severe Weather Forecasting Demonstration Project (SWFDP) that contribute to disaster risk reduction, and capacity development of LDCs; (ii) the application of NWP/EPS to predict severe and high-impact weather events, including the propagation of the weather forecasts into impact models that contribute to disaster risk reduction; (iii) a network of centres that carry out global monthly and seasonal forecasts that are essential for the Climate Services Information System (CSIS) of the Global Framework for Climate Services (GFCS); and (iv) the provision of benefits to other socioeconomic sectors, including aviation, agriculture, marine safety, transport, tourism, and energy.

1.2 Progress will continue to be made in many areas of GDPFS, to ensure that research and development results are introduced into operations. These GDPFS areas include: Severe Weather Forecasting (especially through the SWFDP), Ensemble Prediction Systems (EPS), Extended- and Long-range Forecasting, Nowcasting and Very Short-range Forecasting, and Forecast Verification, as well as the Emergency Response Activities (ERA).

**2. Seamless Data-processing and Forecasting System**

2.1 Considering the conclusions of the first World Weather Open Science Conference (WWOSC-2014, Montreal, Canada, August 2014), Cg-17 recognized that a seamless system spans multiple dimensions including: (a) timescales; (b) multi-hazard forecasts; and (c) supporting applications, including the use and propagation of NWP/EPS into high-impact weather forecasting and hazard risk management. Cg-17 noted that with technological advances, new areas of research addressing these dimensions will require transition to operations. Cg-17 noted that CBS-Ext.(2014) agreed that the Global Data-processing and Forecasting System (GDPFS) is at the heart of the WMO operational system, and in order to support adequately the high priorities of WMO, the GDPFS needs to evolve, be flexible and adaptable so that it can respond efficiently to current and emerging needs, and user’s requirements. Cg-17 therefore agreed to initiate a process for the gradual establishment of a future enhanced integrated and seamless WMO Data-processing and Forecasting System, and adopted Resolution 11 (Cg-17) – Towards a future enhanced integrated and seamless WMO Data-processing and Forecasting System.

2.2 The implementation of a seamless data-processing and forecasting system will take time and will need all component of WMO to contribute and facilitate its implementation. The implementation of a seamless GDPFS will also necessitate a new definition of role and responsibilities of GDPFS Centres which will, undeniably, result in the review of designation criteria in the Manual on the GDPFS and in the restructuring and strengthening of Global and Regional Centres to deliver their services seamlessly. A meeting of Experts representing all Technical Commissions will be held in Geneva, from 10 to 12 February 2016 to discuss a path forward. Expected outcomes include review of requirements and the DPFS activities carried out by the various Technical Commissions; and development of a Roadmap and a Plan for a White Paper, which will be presented to EC-68 for consideration.

**3. Manual on the Global Data-processing and Forecasting System (GDPFS)**

3.1 Cg-16 through Resolution 6 (Cg-16) recognized the central role of the GDPFS by affirming that the Manual on the GDPFS (WMO-No 485) is the single source of technical regulations for all operational data-processing and forecasting systems operated by WMO Members. A new Manual is being developed and its adoption is planned for EC-69 following Recommendation from the upcoming CBS-16 (Nov 2016). Key elements of the new Manual includes clear definition of designation criteria and procedures (including those coordinated by CBS, jointly with other technical commissions and/or WMO Programmes, as well as other international organizations), requirement for detailed information regarding Centres’ implementation, system description and characteristics, products metadata, verification of outputs and rolling review (Regular Audit) of Centres compliances. Recognizing that some GDPFS centres may report temporary non-compliance with regard to some of the requirements, CBS-Ext.(2014) recommended a transition plan for the implementation of the new Manual (which was approved by Cg-17) to manage the technical changes and the initial designation of the GDPFS centres as defined in the new Manual, including WMCs and RSMCs. In particular:

1. The new Manual introduces clear definitions of the functions of WMCs and of several types of RSMCs, and describes a process for regular compliance assessment of RSMC and WMC status.
2. The term WMC is no longer restricted to specific defined centres. Following Quality Management principles, any centre which meets the required criteria in terms of functions, activities and compliance assessment processes may be designated as a WMC.
3. The term RSMC is used as a general term for a designated centre. There have always been a number of different types of RSMC, but the list is expanded to include several more types of specialization. A number of types of centre with other names including RCC (Regional Climate Centre), GPC (Global Producing Centre for Long-Range Forecasts) and LC (Lead Centre) are also types of RSMC. Such centres may be referred to using both the specific names (RCC, GPC, LC) and/or the general term RSMC.
4. RSMC with geographical specialization is discontinued. Replaced with several new RSMC designations with appropriate required activities and compliance assessment processes:
   * RSMC for Regional Severe Weather Forecasting (SWFDP-like)
   * RSMC for Global NWP
   * RSMC for Limited Area NWP
   * RSMC for Global EPS
   * RSMC for Limited Area EPS
5. The definition of a geographical Region (for example, the area of responsibility of an RSMC performing limited area NWP) is not specified in a general way in the Manual, so the decision is made on a case-by-case basis and depends on the context and requirements for regional support. Information on the areas covered by specific centres is provided in Part III of the Manual.
6. The concept of RSMC for Regional Severe Weather Forecasting originates from the model of the SWFDP Regional Centre. The SWFDP provides a framework for the development of a Regional Centre providing severe weather support to NMHSs in a region. In the final phase of the SWFDP the project transitions from demonstration phase to sustainable operations, and at this stage the regional centre could be designated as RSMC for Regional Severe Weather Forecasting. Outside of established SWFDP projects, a Centre which has consistently demonstrated, over a sustained period, all the required capabilities for Regional Severe Weather Forecasting in collaboration with associated NMCs may be designated as an RSMC with the specialization of Regional Severe Weather Forecasting.
7. The new Manual requires Members of WMO to support an NMC and defines the minimum functions of an NMC.

**4. Severe Weather Forecasting Demonstration Project (SWFDP) and Mechanism to Strengthen Operational Centres**

4.1 Significant benefits have been realized from the Severe Weather Forecasting Demonstration Project (SWFDP), either underway or under development in nine project regions (i.e. Southern Africa, South-west Pacific, Eastern Africa, Southeast Asia, Bay of Bengal, Central Asia, Western Africa, Caribbean, and Southeast Europe) around the world, hosted by five Regional Associations (RAs I, II, IV, V and VI). Plans include implementing projects in all WMO Regions. The planned expansion of the SWFDP and the ongoing implementation of the existing SWFDP regional projects would require significant increase of resources to support training, contributions by participating global products centres and RSMCs, and coordination functions by the WMO Secretariat. The SWFDP expansion can only be realized with an appropriate and resourced Project Office at the WMO Secretariat, and extrabudgetary contributions to augment the regular budget allocations. Currently, a number of Trust Funds are being closed and there is no clear indication of future extrabudgetary contributions for the implementation of existing and planned SWFDP regional projects.

4.2 In sub-regions where the demonstration phase of the SWFDP had been concluded, it would be necessary to pass into the operational phase and to rename the project appropriately as an operational activity. The operational phase would require a regional entity responsible for ensuring all countries achieve and maintain compliance and oversee project/programme management and related aspects with continuing support from the Project Office at the WMO Secretariat.

4.3 In addition, advances made in Numerical Weather Prediction and Ensemble Prediction Systems (NWP/EPS) by advanced global NWP centres requires their outputs tailored (or “downscaled”) for practical use by National Meteorological and Hydrological Services (NMHSs). As a clear lesson learnt from the SWFDP, strengthening and sustaining WMO operational centres, particularly those centres with Regional or sub-regional operational responsibilities (e.g. Regional Specialized Meteorological Centres (RSMCs), satellite product centres, technical training), through their linkages to NMHSs and their national meteorological centres, will increase and sustain the benefits of the development of much needed severe weather forecasting and warning services capabilities at NMHSs of developing and Least Developed Countries (LDCs).

4.4 SWFDP has been engaging all WMO Programmes concerned with the real-time prediction of hydrometeorological hazards, through their respective Technical Commissions, from observations, to information exchange, to delivery of services, education and training, and to the transfer of relevant promising research outputs into operations. In particular, collaboration has been initiated between CBS and the Commission for Hydrology (CHy) for the integration of SWFDP with the Flash Flood Guidance System (FFGS) in Southern Africa and possible expansion of this approach to other regions, as appropriate. Such integration (including synergy with the Coastal Inundation Forecast Demonstration Project (CIFDP)) would facilitate implementation of operational support to Multi-Hazard Early Warning Systems.

**5. Collaboration with Research**

5.1 The operationalization of research results would necessitate significant implication of the GDPFS and it is important to ensure smooth transition of science results from both Research and Development Projects (RDPs) and Forecast Demonstration Projects (FDPs) (i.e. Aviation Research and Development Project (AvRDP), Sub-seasonal to Seasonal (S2S) Prediction Project, the Polar Prediction Project (PPP), and the High Impact Weather (HIWeather) Prediction Project) into operations. CBS has been working closely with CAS/WWRP to ensure that an Operational Forecast Demonstration phase is established for each of the Research Projects following conclusive Research Development phase.

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