



## WMO OMM

World Meteorological Organization  
 Organisation météorologique mondiale  
 Organización Meteorológica Mundial  
 Всемирная метеорологическая организация  
 المنظمة العالمية للأرصاد الجوية  
 世界气象组织

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Our ref.: 10541/2021/I/ESP/GDPFS-reporting

14 May 2021

Annexes: 2 (available in English only)

Subject: Annual WMO Technical Progress Report on the Global Data-processing and Forecasting System (GDPFS) and related Research Activities on Numerical Weather Prediction (NWP) for 2020

Action required: To submit your contribution for the Annual WMO Technical Progress Report on GDPFS and related Research Activities on NWP for 2020, preferably **by 31 August 2021**

Dear Sir/Madam,

The Annual WMO Technical Progress Report on the Global Data-processing and Forecasting System (GDPFS), combined with the report on related Research Activities on Numerical Weather Prediction (NWP), hereafter referred to as "Report", serves as one way of updating Members on the rapidly evolving and emerging facilities, research and applications being implemented at GDPFS Centres as requirements and technology advance. The Report provides operational experts and researchers with information on the status in GDPFS Centres related to the (1) installation and updating of operational equipment and related facilities, including weather analysis-forecasting and NWP systems, and their specialized systems for specific applications; and (2) their research and development efforts in the area of understanding meteorological processes, and continuous developments in numerical models and techniques for supporting operational forecasting. Additionally, a comprehensive review based on all the reports received plays an important function in ensuring WMO understanding of, and continuing attention to the state of the operation of GDPFS at its global, regional and national levels.

In this context, I would like to thank Members who have provided the 2019 reports along with those of previous years (Annex I) on the [WMO website](#).

Members are now invited to prepare and submit to the WMO Secretariat their contributions to the Report for the year 2020. To facilitate the provision of relevant information related to activities at your GDPFS Centre and/or its collaboration in a Consortium, spanning from nowcasting to extended- and long-range forecasting, as well as specialized NWP/post-processing applications (e.g. for ocean waves, storm surge, sea ice, marine pollution transport and weathering, tropical cyclones, air pollution transport and dispersion, solar ultraviolet (UV) radiation, air quality forecasting, smoke, sand and dust, etc.), a template in the form of the Report's Table of Contents (Annex II) has been prepared and is available on the above website.

To: Permanent Representatives of Members with WMO  
 Ms Florence Rabier, Director-General, European Centre for Medium-Range Weather Forecasts (ECMWF)  
 Mr Andre Kamga Foamouhoue, Director General, African Centre for Meteorological Applications for Development (ACMAD)

I should be grateful if you could kindly arrange for the completion of your contribution to the Report for 2020, in electronic form only, and send it **preferably before 31 August 2021** to the WMO Secretariat by e-mail to [dpfsmail@wmo.int](mailto:dpfsmail@wmo.int), preferably in MS Word or other compatible formats.

I would like to inform you that the contents and the reporting method of the Report will be reviewed to facilitate the ability of Members to contribute to and develop performance requirements for monitoring GDPFS Centres. The Standing Committee on Data Processing for Applied Earth System Modelling and Prediction (SC-ESMP) in collaboration with the Research Board and its relevant subsidiary bodies will conduct the review in compliance with the request from the president of the Commission for Observation, Infrastructure and Information Systems (INFCOM) at the first INFCOM session (third part) (INFCOM-1(III)).

I would like to thank you for your continuous support and contribution to this Report, and strongly encourage those Members who have not contributed, or have not updated their respective Reports for several years, to do so for the benefit of all WMO Members.

Yours faithfully,



Dr Wenjian Zhang  
for the Secretary-General

**Annual WMO Technical Progress Reports on GDPFS and related Research  
Activities on NWP (for 2019, or latest report year)**

ECMWF (2015)	Lithuania (2016)
Algeria (2018)	Libya (2018)
Argentina (2016)	Madagascar (2019)
Armenia (2018)	Malaysia (2017)
Australia (2010)	Mali (2019)
Austria (2019)	Montenegro (2008)
Belarus (2012)	Morocco (2017)
Belgium (2008)	Mozambique (2015)
Bolivia (2010)	Myanmar (2015)
Bosnia and Herzegovina (2019)	Netherlands (2019)
Botswana (2010)	New Zealand (2018)
Brazil (2016)	Oman (2015)
Bulgaria (2006)	Pakistan (2017)
Canada en - fr (2017)	Paraguay (2016)
Chile (2019)	Panama (2005)
China (2019)	Peru (2018)
Colombia (2019)	Philippines (2018)
Côte d'Ivoire (2004)	Poland (2019)
Croatia (2018)	Portugal (2011)
Cyprus (2015)	Qatar (2012)
Czech Republic (2016)	Republic of Korea (2019)
Denmark (2019)	Romania (2015)

Ecuador (2008)	Russian Federation (2018) Khabarovsk en - ru Moscow en - ru Novosibirsk en - ru
Egypt (2019)	Saudi Arabia (2017)
Estonia (2008)	Serbia (2017)
Fiji (2010)	Singapore (2019)
Finland (2019)	Slovakia (2018)
France (2018)	Slovenia (2012)
Georgia (2004)	Spain (2019)
Germany (2019)	Sri Lanka (2018)
Greece (2013)	Sudan (2016)
Hong Kong, China (2019)	Sweden (2018)
Hungary (2019)	Switzerland (2019)
India (2011)	Thailand (2018)
Indonesia (2009)	Republic of North Macedonia (2010)
Ireland (2019)	Tunisia (2018)
Islamic Republic of Iran (2006)	Turkey (2019)
Israel (2012)	Ukraine (2018)
Italy (2019)	United Kingdom (2015)
Japan (2019)	United Republic of Tanzania (2018)
Kazakhstan (2018)	United States of America (2013)
Kenya (2016)	Uruguay (2008)
Kyrgyzstan (2004)	Uzbekistan (2015)
Latvia (2013)	

**JOINT WMO TECHNICAL PROGRESS REPORT ON THE  
GLOBAL DATA PROCESSING AND FORECASTING SYSTEM AND  
NUMERICAL WEATHER PREDICTION RESEARCH ACTIVITIES FOR 2020**

**"[Click here and type your country/centre name]"**

Ref.: 10541/2021-1.6 I/ESP

**1. Summary of highlights**

"[Major changes in the data processing and forecasting system during the last year]"

**2. Equipment in use**

"[information on the major data processing units]"

**3. Data and Products from GTS/WIS in use**

- SYNOP-500 (please modify according to your situation)
- .....
- .....

**4. Forecasting system**

**4.1 System run schedule and forecast ranges**

"[general structure of a prognostic system, models in operational use, run schedule, forecast ranges]"

**4.2 Medium range forecasting system (4–10 days)**

**4.2.1 Data assimilation, objective analysis and initialization**

4.2.1.1 In operation

"[information on Data assimilation, objective analysis and initialization]"

4.2.1.2 Research performed in this field

"[Summary of research and development efforts in the area]"

**4.2.2 Model**

4.2.2.1 In operation

"[Model in operational use, (*resolution, number of levels, time range, hydrostatic?, physics used*)] "

4.2.2.2 Research performed in this field

"[Summary of research and development efforts in the area]"

**4.2.3 Operationally available Numerical Weather Prediction (NWP) Products**

"[brief description of variables which are outputs from the model integration]"

#### **4.2.4 Operational techniques for application of NWP products (*MOS, PPM, KF, Expert Systems, etc.*)**

4.2.4.1 In operation

"[brief description of automated (formalized) procedures in use for interpretation of NWP output]"

4.2.4.2 Research performed in this field

"[Summary of research and development efforts in the area]"

#### **4.2.5 Ensemble Prediction System (EPS)**

4.2.5.1 In operation

"[Number of runs, initial state perturbation method, perturbation of physics?]" (*Describe also: time range, number of members and number of models used: their resolution, number of levels, main physics used, perturbation of physics, post-processing: calculation of indices, clustering*)

4.2.5.2 Research performed in this field

"[Summary of research and development efforts in the area]"

4.2.5.3 Operationally available EPS Products

"[brief description of variables which are outputs from the EPS]"

### **4.3 Short-range forecasting system (0–72 hrs)**

#### **4.3.1 Data assimilation, objective analysis and initialization**

4.3.1.1 In operation

"[information on Data assimilation (*if any*), objective analysis and initialization,]" (*Indicate boundary conditions used*)

4.3.1.2 Research performed in this field

"[Summary of research and development efforts in the area]"

#### **4.3.2 Model**

4.3.2.1 In operation

"[Model in operational use, (*domain, resolution, number levels, range, hydrostatic?, physics used*)] "

4.3.2.2 Research performed in this field

"[Summary of research and development efforts in the area]"

#### **4.3.3 Operationally available NWP products**

"[brief description of variables which are outputs from the model integration]"

#### **4.3.4 Operational techniques for application of NWP products**

4.3.4.1 In operation

"[brief description of automated (formalized) procedures in use for interpretation of NWP output]"  
(MOS, PPM, KF, Expert Systems, etc.)

4.3.4.2 Research performed in this field

"[Summary of research and development efforts in the area]"

#### **4.3.5 Ensemble Prediction System**

4.3.5.1 In operation

"[Number of runs, initial state perturbation method, perturbation of physics?]" (Describe also: time range, number of members and number of models used: their domain, resolution, number of levels, main physics used, for post-processing: calculation of indices, clustering)

4.3.5.2 Research performed in this field

"[Summary of research and development efforts in the area]"

4.3.5.3 Operationally available EPS Products

"[brief description of variables which are outputs from the EPS]"

### **4.4 Nowcasting and Very Short-range Forecasting Systems (0–12 hrs)**

#### **4.4.1 Nowcasting system**

4.4.1.1 In operation

"[information on processes in operational use, as appropriate related to 4.4]"  
(Note: please also complete the CBS/PWS questionnaire on Nowcasting Systems and Services, 2014)

4.4.1.2 Research performed in this field

"[Summary of research and development efforts in the area]"

#### **4.4.2 Models for Very Short-range Forecasting Systems**

4.4.2.1 In operation

"[information on models in operational use, as appropriate related to 4.4]"

4.4.2.2 Research performed in this field

"[Summary of research and development efforts in the area]"

### **4.5 Specialized numerical predictions**

[Specialized NP on sea waves, storm surge, sea ice, marine pollution transport and weathering, tropical cyclones, air pollution transport and dispersion, solar ultraviolet (UV) radiation, air quality forecasting, smoke, sand and dust, etc.]

#### **4.5.1 Assimilation of specific data, analysis and initialization (where applicable)**

4.5.1.1 In operation

"[information on the major data processing steps, where applicable]"

4.5.1.2 Research performed in this field

"[Summary of research and development efforts in the area]"

**4.5.2 Specific Models (as appropriate related to 4.5)**

4.5.2.1 In operation

"[information on models in operational use, as appropriate related to 4.5]"

4.5.2.2 Research performed in this field

"[Summary of research and development efforts in the area]"

**4.5.3 Specific products operationally available**

"[brief description of variables which are outputs from the model integration]"

**4.5.4 Operational techniques for application of specialized numerical prediction products (MOS, PPM, KF, Expert Systems, etc.) (as appropriate related to 4.5)**

4.5.4.1 In operation

"[brief description of automated (formalized) procedures in use for interpretation of specialized NP output]"

4.5.4.2 Research performed in this field

"[Summary of research and development efforts in the area]"

**4.5.5 Probabilistic predictions (where applicable)**

4.5.5.1 In operation

"[Number of runs, initial state perturbation method, etc.]" *(Describe also: time range, number of members and number of models used: their resolution, main physics used, etc.)*

4.5.5.2 Research performed in this field

"[Summary of research and development efforts in the area]"

4.5.5.3 Operationally available probabilistic prediction products

"[brief description of variables which are outputs from probabilistic prediction techniques]"

**4.6 Extended range forecasts (ERF) (10 days to 30 days)**

**4.6.1 In operation**

"[information on Models and Ensemble System in operational use, as appropriate related to 4.6]"

**4.6.2 Research performed in this field**

"[Summary of research and development efforts in the area]"

**4.6.3 Operationally available NWP model and EPS ERF products**

"[brief description of variables which are outputs from the model integration]"



## **4.7 Long range forecasts (LRF) (30 days up to two years)**

### **4.7.1 In operation**

"[Describe: Models, Coupled? (1 tier, 2 tiers), Ensemble Systems, Methodology and Products]"

### **4.7.2 Research performed in this field**

"[Summary of research and development efforts in the area]"

### **4.7.3 Operationally available EPS LRF products**

"[brief description of variables which are outputs from the model integration]"

## **5. Verification of prognostic products**

### **5.1 Annual verification summary**

"[annual verification summary to be inserted here]"

### **5.2 Research performed in this field**

"[Summary of research and development efforts in the area]"

## **6. Plans for the future (next 4 years)**

### **6.1 Development of the GDPFS**

#### **6.1.1 Major changes in the operational DPFS which are expected in the next year**

"[major changes in the Operational DPFS which are expected in the next year]"

#### **6.1.2 Major changes in the operational DPFS which are envisaged within the next 4 years**

"[major changes in the Operational DPFS which are envisaged within the next 4 years]"

### **6.2 Planned research Activities in NWP, Nowcasting, Long-range Forecasting and Specialized Numerical Predictions**

"[Summary of planned research and development efforts in NWP, Nowcasting, LRF and Specialized Numerical Predictions for the next 4 years]"

#### **6.2.1 Planned Research Activities in NWP**

#### **6.2.2 Planned Research Activities in Nowcasting**

#### **6.2.3 Planned Research Activities in Long-range Forecasting**

#### **6.2.4 Planned Research Activities in Specialized Numerical Predictions**

- 7. Consortium (if appropriate)**
  - 7.1 System and/or Model**
    - 7.1.1 In operation**
    - 7.1.2 Research performed in this field**
  - 7.2 System run schedule and forecast ranges**
  - 7.3 List of countries participating in the Consortium**
  - 7.4 Data assimilation, objective analysis and initialization**
    - 7.4.1 In operation**
    - 7.4.2 Research performed in this field**
  - 7.5 Operationally available Numerical Weather Prediction (NWP) Products**
  - 7.6 Verification of prognostic products**
  - 7.7 Plans for the future (next 4 years)**
    - 7.7.1 Major changes in operations**
    - 7.7.2 Planned Research Activities**
- 8. References**

*"[information on where more detailed descriptions of different components of the DPFS can be found]"*  
*(Indicate related Internet Websites also)*

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