



World Meteorological Organization
Organisation météorologique mondiale

Secrétariat

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Weather • Climate • Water
Tempé • Climat • Eau

Nuestra ref.: WDS/DPFS/GDPFS-NWP/2013

GINEBRA, 19 de marzo de 2013

Anexos: 2 (disponibles en inglés solamente)

Asunto: Informe técnico conjunto anual de la OMM sobre el Sistema Mundial de Proceso de Datos y de Predicción y las actividades de investigación conexas en predicción numérica del tiempo para 2012

Finalidad: Presentar su contribución al Informe técnico anual de la OMM sobre el Sistema Mundial de Proceso de Datos y de Predicción y las actividades de investigación en predicción numérica del tiempo **a más tardar el 30 de mayo de 2013**

Estimado señor/Estimada señora:

El Informe técnico anual de la OMM sobre el Sistema Mundial de Proceso de Datos y de Predicción (SMPDP), combinado con el informe sobre la investigación en predicción numérica del tiempo (PNT), permite mantener informados a los Miembros sobre la rápida evolución y emergencia de las instalaciones, las investigaciones y los servicios que se incorporan en los centros SMPDP para responder a las necesidades y los avances de la tecnología. Esta publicación tiene por objeto informar a los expertos operacionales y a los investigadores sobre las últimas novedades que se han producido en los centros del SMPDP en relación con: 1) la aplicación del equipo operacional e instalaciones conexas, y en particular de los sistemas de análisis-predicción y las correspondientes PNT especializadas para aplicaciones específicas, y 2) las actividades de investigación y desarrollo en la esfera de la comprensión de los procesos físicos, los modelos numéricos y las técnicas de predicción operativa. Además, este examen exhaustivo desempeña una función esencial para garantizar el apoyo de la OMM a escala mundial, regional y nacional, mediante la aplicación y el funcionamiento exitoso del Sistema Mundial de Proceso de Datos y de Predicción.

A los Representantes Permanentes (o Directores de los Servicios Meteorológicos o Hidrometeorológicos) de los Miembros de la OMM (PR-6694)
Director del Centro europeo de predicción meteorológica a medio plazo (CEPMMP)
Director del Centro Africano de Aplicaciones Meteorológicas para el Desarrollo (ACMAD)

copias: Presidentes y vicepresidentes de la Comisión de Ciencias)
Atmosféricas (CAS) y de la Comisión de Sistemas Básicos (CSB))
Miembros del Grupo de gestión de la CAS)
Miembros del Comité Científico Mixto del GAAP sobre)
el Programa Mundial de Investigación Meteorológica de la CAS)
Grupos de trabajo del GAAP sobre el Programa Mundial de)
Investigación Meteorológica) (para información)
Miembros del Grupo de gestión y del Grupo abierto de área)
de programa (GAAP) sobre el Sistema de Proceso de Datos)
y de Predicción (SPDP) de la CSB)
Puntos de contacto de los CMRE para la respuesta en casos)
de emergencia ambiental y/o el procedimiento de búsqueda)
retrospectivo)

En este contexto, me es grato informarle de que los informes correspondientes a 2011 remitidos por los Miembros (en el Anexo I figura la lista de países que han presentado un informe para 2011 o un año precedente) se han compilado y puestos a disposición, junto con los de años anteriores, en el sitio web de la OMM:

http://www.wmo.int/pages/prog/www/DPFS/ProgressReports/2012/2011_GDPFS-NWP.html

Se invita a los Miembros a preparar y presentar a la Secretaría de la OMM sus contribuciones al Informe técnico anual de la OMM sobre el Sistema Mundial de Proceso de Datos y de Predicción, combinado con el Informe sobre las actividades de investigación en predicción numérica del tiempo, correspondiente a 2012.

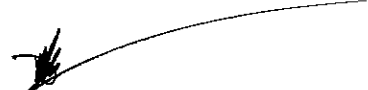
A fin de facilitar la presentación de información sobre las actividades operacionales llevadas a cabo por su centro y/o los consorcios de centros SMPDP, así como las actividades de investigación sobre predicción numérica del tiempo conexas, incluyendo desde la predicción inmediata a la predicción a largo y a más largo plazo, y las predicciones numéricas del tiempo especializadas (por ejemplo, para olas oceánicas, mareas de tempestad, hielos marinos, transporte y deterioro natural de la polución, ciclones tropicales, transporte y dispersión de contaminación atmosférica, radiación ultravioleta (UV), predicción de la calidad del aire, humo, arena y polvo, etc.), se ha preparado una nueva plantilla (formulario electrónico disponible en el sitio web de la OMM en el servidor FTP, en la siguiente dirección:

ftp://ftp.wmo.int/Documents/PublicWeb/www/gdpfs/GDPFS-NWP_Annualreports2012/TEMPLATE_2012.doc.)

En el Anexo II figuran el índice y la orientación. Quisiera aprovechar esta oportunidad para expresarle mi agradecimiento por su continuo apoyo y contribución a este informe, a lo largo de numerosos años, e insto encarecidamente a los países que no hayan contribuido aún o no hayan actualizado sus informes, a que lo hagan, en beneficio de todos los Miembros de la Organización.

Mucho le agradecería que tome las disposiciones necesarias para completar el formulario y remitir sus contribuciones nacionales, y las de los asociados en los consorcios SMPDP, **únicamente en formato electrónico**, a la Secretaría de la OMM a la brevedad posible, y **a más tardar el 30 de mayo de 2013**, por correo electrónico (dpfsmail@wmo.int) o en un CD (de preferencia en Word 2003 u otros formatos compatibles), a la atención de la señora Pascale Gómez.

Le saluda atentamente.



(J. Lengoasa)
por el Secretario General

WORLD METEOROLOGICAL ORGANIZATION

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WDS/DPFS/GDPFS-NWP/2013, ANNEX I

2011 GDPFS / NWP REPORTS

<u>ECMWF</u> (2011)	<u>Kenya</u> (2011)
<u>Algeria</u> (2009)	<u>Kyrgyzstan</u> (2004)
<u>Argentina</u> (2010)	<u>Latvia</u> (2011)
<u>Arménia</u> (2011)	<u>Lithuania</u> (2009)
<u>Australia</u> (2010)	<u>Madagascar</u> (2008)
<u>Austria</u> (2010)	<u>Malaysia</u> (2011)
<u>Belarus</u> (2011)	<u>Montenegro</u> (2008)
<u>Belgium</u> (2008)	<u>Morocco</u> (2006)
<u>Bolivia</u> (2010)	<u>Mozambique</u> (2010)
<u>Bosnia and Herzegovina</u> (2008)	<u>Netherlands</u> (2010)
<u>Botswana</u> (2010)	<u>New Zealand</u> (2011)
<u>Brazil</u> (2010)	<u>Oman</u> (2011)
<u>Bulgaria</u> (2006)	<u>Pakistan</u> (2010)
<u>Canada</u> (2011) <u>(EN)</u> <u>(FR)</u>	<u>Panama</u> (2005)
<u>Chile</u> (2008)	<u>Peru</u> (2007)
<u>China</u> (2010)	<u>Poland</u> (2011)
<u>Côte d'Ivoire</u> (2004)	<u>Portugal</u> (2011)
<u>Croatia</u> (2011)	<u>Qatar</u> (2011)
<u>Cyprus</u> (2011)	<u>Republic of Korea</u> (2009)
<u>Czech Republic</u> (2010)	<u>Romania</u> (2009)
<u>Denmark</u> (2010)	<u>Russian Federation</u> - English (2011)
<u>Ecuador</u> (2008)	<u>Russian Federation</u> - Russian (2011)
<u>Egypt</u> (2008)	<u>Saudi Arabia</u> (2008)
<u>Estonia</u> (2008)	<u>Serbia</u> (2008)
<u>Fiji</u> (2010)	<u>Singapore</u> (2010)
<u>Finland</u> (2011)	<u>Slovakia</u> (2011)
<u>France</u> (2011)	<u>Spain</u> (2010)
<u>Georgia</u> (2004)	<u>Sri Lanka</u> (2010)
<u>Germany</u> (2011)	<u>Sweden</u> (2011)
<u>Greece</u> (2011)	<u>Switzerland</u> (2011)
<u>Hong Kong, China</u> (2011)	<u>Thailand</u> (2011)
<u>Hungary</u> (2011)	<u>The former Yugoslav Republic of Macedonia</u> (2010)
<u>India</u> (2011)	<u>Tunisia</u> (2003)
<u>Indonesia</u> (2009)	<u>Turkey</u> (2009)
<u>Iran, Islamic Republic of</u> (2006)	<u>United Kingdom of Great Britain and Northern Ireland</u> (2011)
<u>Ireland</u> (2010)	<u>United Republic of Tanzania</u> (2009)
<u>Israel</u> (2009)	<u>United States of America</u> (2007)
<u>Italy</u> (2011)	<u>Uruguay</u> (2008)
<u>Japan</u> (2011)	<u>Uzbekistan</u> (2011)
<u>Kazakhstan</u> (2011)	

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WDS/DPFS/GDPFS-NWP/2013, ANNEX II

ANNUAL JOINT WMO TECHNICAL PROGRESS REPORT ON THE GLOBAL DATA-PROCESSING AND FORECASTING SYSTEM (GDPFS) INCLUDING NUMERICAL WEATHER PREDICTION (NWP) RESEARCH ACTIVITIES FOR 2012

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 - 4.2 Medium-range forecasting system (4-10 days)**
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 - 4.2.4.1 In operation
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 - 4.2.5 Ensemble Prediction System (EPS) (Number of members, initial state, perturbation method, model(s) and number of models used, number of levels, main physics used, perturbation of physics, post-processing: calculation of indices, clustering)
 - 4.2.5.1 In operation
 - 4.2.5.2 Research performed in this field
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 - 4.3 Short-range forecasting system (0-72 hrs)**
 - 4.3.1 Data assimilation, objective analysis and initialization
 - 4.3.1.1 In operation
 - 4.3.1.2 Research performed in this field

4.3.2 Model

4.3.2.1 In operation

4.3.2.2 Research performed in this field

4.3.3 Operationally available NWP products

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

4.3.4.1 In operation

4.3.4.2 Research performed in this field

4.3.5 Ensemble Prediction System (Number of members, initial state, perturbation method, model(s) and number of models used, perturbation of physics, post-processing: calculation of indices, clustering)

4.3.5.1 In operation

4.3.5.2 Research performed in this field

4.3.5.3 Operationally available EPS products

4.4 Nowcasting and Very Short-range Forecasting Systems (0-6 hrs)

4.4.1 Nowcasting system

4.4.1.1 In operation

4.4.1.2 Research performed in this field

4.4.2 Models for Very Short-range Forecasting Systems

4.4.2.1 In operation

4.4.2.2 Research performed in this field

4.5 Specialized numerical predictions (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

4.5.1.2 Research performed in this field

4.5.2 Specific models (as appropriate related to 4.5)

4.5.2.1 In operation

4.5.2.2 Research performed in this field

4.5.3 Specific products operationally available

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

4.5.4.2 Research performed in this field

4.5.5 Probabilistic predictions (where applicable)

4.5.5.1 In operation

4.5.5.2 Research performed in this field

4.5.5.3 Operationally available probabilistic prediction products

4.6 Extended range forecasts (10 days to 30 days) (Models, Ensemble, Methodology)

4.6.1 In operation

4.6.2 Research performed in this field

4.6.3 Operationally available EPS products

4.7 Long range forecasts (30 days up to two years) (Models, Ensemble, Methodology)

4.7.1 In operation

4.7.2 Research performed in this field

4.7.3 Operationally available products

5. Verification of prognostic products

5.1 Annual verification summary

5.2 Research performed in this field

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

6.1.2 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

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

EXPLANATORY NOTES

to the suggested contents of Annual Joint WMO Technical Progress Report on the Global Data-processing and Forecasting System (GDPFS) and Numerical Weather Prediction (NWP) Research Activities

The WMO progress report will be jointly compiled annually by the WDS and AREP Departments of the WMO Secretariat on the basis of contributions from WMO Members and/or GDPFS centres.

The publication will begin with an introduction prepared by the WMO Secretariat explaining the major purposes of the publication with the appropriate references.

Each individual contribution should contain appropriate parts of the following items.

1. **Summary of highlights.** This should reflect the major changes in the data-processing and forecasting system during the last year.
2. **Equipment in use at the centre.** This paragraph should contain information on the major data-processing units, especially in the large centres. Here and in the following paragraphs the information for the first national contribution to the Progress Report should be given in a complete form to avoid too many references. In the next contribution, the information can be restricted to the indication of major changes during the year being reported on.
3. **Data and products from GTS in use.** It is suggested that only the bulletin headings with the basic information (SYNOP, SHIP, TEMP, SATEM etc.) and the types of products (GRID, GRIB, facsimile charts etc.) received through the GTS or other means and used at the centre will be indicated in this paragraph. The daily statistics for each type of bulletin and the product should be included, if such statistics are available. For example, SYNOP-500, TEM-600, GRID-20.
4. **Forecasting system.** There are several aspects of this system since some centres run several models which have different approaches to the data assimilation, use different numerical techniques and so on. Consequently, this paragraph is divided into several sub paragraphs.
 - 4.1 **System run schedule.** It is suggested that the general structure of a prognostic system should be described in the paragraph with an indication of models in operational use, including those for specialized applications, the run schedule and the forecast ranges.
 - 4.2-4.6 These sub-paragraphs are a series of similarly structured texts describing different operational sub-systems of a numerical weather forecasting system: Medium-range forecasting (section 4.2); Short-range forecasting (section 4.3); Nowcasting and very-short-range forecasting (section 4.4), Specialized numerical predictions for various sector specific applications, including 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. (section 4.5), extended-range forecasting (section 4.6) and long-range forecasting (section 4.7). Each sub-paragraph contains the same components starting with data assimilation and objective analysis, description of the model, of operational techniques for application of NWP products, and a section on Ensemble Prediction Systems if used for that range. List of products available for WMO members should be indicated. All sub-paragraphs should include information regarding any performed research activities in the related field.

The list of suggested items in each sub-paragraph is given for 4.2 (it is assumed that for 4.3-4.7 they will be similar).

4.2 Medium-range forecasting system (4-10 days)

4.2.1 Data assimilation objective analysis and initialization

4.2.1.1 In operation

- . Assimilated data
- . Assimilation cycles, including cut-off time
- . Method of analysis (e.g. 3 D-VAR, 4D-VAR)
- . Analyzed variables
- . First guess
- . Coverage
- . Horizontal resolution
- . Vertical resolution (levels)
- . Initialization (non linear normal mode, diabatic etc.)

4.2.1.2 Research performed in this field

4.2.2 Model

(If no model is operationally run for this time range, indicate, if any, the other GDPFS centre and its model from which you use products.)

4.2.2.1 In operation

- . Basic equations
- . Independent variables
- . Dependent variables
- . Numerical technique (in horizontal, vertical and in time), hydrostatic or non hydrostatic
- . Integration domain (in horizontal and vertical)
- . Horizontal and vertical resolution
- . Time step
- . Orography, gravity wave drag, bathymetry (ocean models)
- . Horizontal diffusion
- . Vertical diffusion
- . Planetary boundary layer
- . Treatment of sea surface earth surface and soil
- . Radiation
- . Convection (deep and shallow)
- . Atmospheric moisture
- . Boundaries
- . Type of ocean model (deep and shallow waters)
- . Source of input (e.g. wind etc.) data (ocean models).

4.2.2.2 Research performed in this field

4.2.3 Operationally available Numerical weather prediction products. This item should contain a brief description of variables which are outputs from the model integration and the list of products available for WMO Members on the Internet and on the GTS. *(If no model is operationally runs for this time range, indicate the list of products, if any, you use from another GDPFS centre.)*

4.2.4 Operational techniques for application of NWP products. This item should include only a brief description of automated (formalized) procedures in use for interpretation of NWP output

(MOS, PPM, Kalman filter, Expert System, etc.) for example, "the MOS from ECMWF NWP is used to derive extreme temperatures and daily precipitation".

4.2.4.1 *In operation*

4.2.4.2 *Research performed in this field*

4.2.5 *Ensemble Prediction System (Number of members, initial state perturbation method, number and different models used, perturbation of physics, post-processing: calculation of indices, clustering).* This item should be a brief but clearer description of the techniques used for the ensemble prediction system, including the main post-processing techniques applied.

4.2.5.1 *In operation*

4.2.5.2 *Research performed in this field*

4.2.5.3 *Operationally available EPS products.* This item should contain a brief description of variables which are outputs from the EPS integration and the list of products available for WMO Members on Internet and on GTS.

5. Verification of prognostic products. Centres producing standard scores are requested to produce an annual summary for insertion in the WMO Progress Report on the GDPFS. The recommended content of this summary is given below:

VERIFICATION SUMMARY FOR INCLUSION IN THE ANNUAL WMO PROGRESS REPORT ON THE GDPFS

RSMC error	Z 500	NH, SH: against analysis 4 extra tropical standard area: against observations
RMS vector wind error	W 250	Same areas
RMS vector wind error	W 250	Tropics: against analysis
RMS vector wind error	W 850	Tropical standard area: against observations

Forecast range: 1, 3 and 5 days

All values to be the average of the monthly values over the year.

For ensemble system, provide annual and seasonal averages of the Brier Skill Score at 24, 72, 120, 168 and 240 hours for Z500 and T850.

6. Plans for the future (next 4 years)

6.1 Development of GDPFS.

6.1.1 Indicate major changes in the data processing and forecasting system which are expected in the next year.

6.1.2 Indicate major changes in the data processing and forecasting system which are envisaged within the next 4 years.

6.2 Planned Research activities in NWP, Nowcasting, Long-range Forecasting and Specialized Numerical Predictions. Indicate your planned research and development efforts in the area of understanding of physical processes, models, EPS and other techniques 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)

There are a number of GDPFS Centres participating in Consortia. Those Centres participating in and/or responsible for a Consortium should indicate it in this item. Details on the system and/or model developed and/or operated by a Consortium, including approaches to the data assimilation, use of different numerical techniques and so on, should be reported in sub-paragraphs 7.1-7.7, using a similar approach as described in item 4.

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: Give references to the sources where more detailed descriptions of different components of the data processing and forecasting system can be found, including Websites addresses.
