World Meteorological Organization
Organisation météorologique mondiale

WMO OMM

Secrétariat

7 bis, avenue de la Paix – Case postale 2300 – CH 1211 Genève 2 – Suisse
Tél.: +41 (0) 22 730 81 11 – Fax: +41 (0) 22 730 81 81
wmo@wmo.int – www.wmo.int

TEMPS · CLIMAT · EAU
WEATHER · CLIMATE · WATER

الرسالة رقم: WDS/DPFS/GDPFS-NWP/2012   جنيف، 4 نيسان/ أبريل 2012

عدد المرفقات: 2 (متوافران بالإنكليزية فقط)

الموضوع: التقرير المرحلي الفني السنوي الموحد للمنظمة (WMO) بشأن النظام العالمي لمعالجة البيانات والتنبؤ (GDPFS)، والأنشطة البحثية المتصلة بالتنبؤ العددي بالطقس (NWP) لعام 2011

الإجراء المطلوب: تقديم إسهاماتكم في التقرير المرحلي الفني السنوي للمنظمة (WMO) بشأن النظام العالمي لمعالجة البيانات والتنبؤ، مشفوعة بالتقرير المتعلق ببحوث التنبؤ العددي بالطقس (NWP) **على ألا يتجاوز ذلك 30 أيار/ مايو 2012**

تحية طيبة وبعد،

يستخدم التقرير المرحلي الفني السنوي الموحد للمنظمة (WMO) بشأن النظام العالمي لمعالجة البيانات والتنبؤ (GDPFS)، إلى جانب التقرير المتعلق ببحوث التنبؤ العددي بالطقس (NWP) كوسيلة لإبلاغ الأعضاء بآخر التطورات بشأن المرافق والبحوث والخدمات السريعة التطور والمستجدة الجاري تنفيذها في المراكز التابعة للنظام العالمي (GDPFS) وفقاً لتطور المتطلبات والتكنولوجيا. فيزود التقرير الخبراء التشغيليين والباحثين بالمعلومات عن حالة

إلى: الممثلين الدائمين لأعضاء المنظمة (أو مديري مرافق الأرصاد الجوية أو الأرصاد الجوية الهيدرولوجية التابعة لأعضاء المنظمة) (PR-6634)
مدير المركز الأوروبي للتنبؤات الجوية المتوسطة المدى (ECMWF)
مدير المركز الأفريقي لتطبيقات الأرصاد الجوية لأغراض التنمية (ACMAD)

صورة إلى: رئيسي ونواب رئيسي لجنة علوم الغلاف الجوي ولجنة النظم الأساسية   (
أعضاء فريق الإدارة التابع للجنة علوم الغلاف الجوي (CAS)   (
أعضاء اللجنة العلمية المشتركة للفريق المفتوح العضوية المعني بالمجال   (
البرنامجي الخاص بالبرنامج العالمي لبحوث الطقس (OPAG-WWRP) التابع   (
للجنة (CAS)   (
الأفرقة العاملة التابعة للفريق المفتوح العضوية (OPAG-WWRP)   ((للعلم)
أعضاء فريق الإدارة التابع للجنة النظم الأساسية (CBS) وأعضاء الفريق   (
المفتوح العضوية المعني بالمجال البرنامجي التابع للجنة (CBS) والمعني   (
بنظم معالجة البيانات والتنبؤ (DPFS)   (
جهات الاتصال، المراكز الإقليمية المتخصصة (RSMCs) للتصدي للطوارئ   (
البيئية و/ أو التتبع العكسي   (

المراكز التابعة للنظام العالمي (GDPFS) المتعلقة بما يلي: (1) تنفيذ المعدات التشغيلية والمرافق ذات الصلة، بما في ذلك نظم التحليل – التنبؤ والتنبؤ العددي بالطقس (NWP) المتخصص التابع لها من أجل تنفيذ تطبيقات محددة، (2) جهودهم البحثية والتطويرية في مجال فهم العمليات الفيزيائية والنماذج العددية وأساليب التنبؤ التشغيلي. وإضافة إلى ذلك، فإن هذا الاستعراض الشامل يؤدي وظيفة هامة تتمثل في ضمان الدعم الذي تقدمه المنظمة (WMO) على كل من الصعيد العالمي والإقليمي والوطني من خلال تنفيذ وتشغيل النظام العالمي (GDPFS) بنجاح.
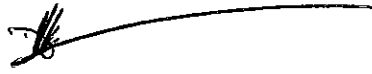
وفي هذا السياق، يسرني أن أبلغكم أن تقارير عام 2010 التي قدمها الأعضاء (يرد في المرفق الأول قائمة بالبلدان التي قدمت تقارير عن عام 2010 أو أعوام سابقة) قد جُمعت، إلى جانب تقارير الأعوام السابقة، على الصفحة الشبكية للمنظمة (WMO) على العنوان التالي: http://www.wmo.int/pages/prog/www/DPFS/ProgressReports/2011/2010_GDPFS-NWP.html. والأعضاء مدعوون الآن إلى إعداد إسهاماتهم في التقرير المرحلي الفني السنوي للمنظمة (WMO) بشأن النظام العالمي (GDPFS) إلى جانب التقرير المتعلق ببحوث التنبؤ العددي بالطقس لعام 2011، وتقديمها إلى أمانة المنظمة (WMO).

وتيسيراً لتقديم المعلومات المتعلقة بأنشطة النظام العالمي (GDPFS) المنفذة تشغيلياً من قِبل مركز و/ أو المجموعة التابعة للنظام العالمي، فضلاً عن أنشطة بحوث التنبؤ العددي بالطقس ذات الصلة، بما في ذلك الأنشطة التي تشمل التنبؤ الآني وتصل إلى التنبؤ لفترات ممتدة والتنبؤ على المدى الطويل، والتنبؤات العددية المتخصصة بالطقس (مثل ما يتعلق بأمواج البحار وعُرام العواصف والجليد البحري وانتقال التلوث البحري والانحلال بفعل العوامل الجوية والأعاصير المدارية وانتقال التلوث الجوي وتشتته والإشعاع فوق البنفسجي الشمسي والتنبؤ بجودة الهواء والدخان والرمل والتراب وما إلى ذلك)، أعد قالب نموذجي (النسخة الإلكترونية متوافرة على وحدة خدمة المنظمة (WMO) على العنوان التالي: ftp://ftp.wmo.int/Documents/PublicWeb/www/gdpfs/GDPFS-NWP_Annualreports10/TEMPLATE_2011.doc (يرد جدول المحتويات والتوجيهات في المرفق الثاني). وأود أن أنتهز هذه الفرصة لأشكركم على دعمكم وإسهاماتكم المستمرة في هذا التقرير منذ سنوات طويلة، ولأشجع بقوة البلدان التي لم تسهم أو لم تستوف تقاريرها على القيام بذلك لصالح كافة أعضاء المنظمة (WMO).

وسأكون ممتناً لو تفضلتم باتخاذ الإجراءات اللازمة لاستيفاء الاستمارة وتقديم إسهاماتكم الوطنية، والإسهامات في إطار الشراكة في المجموعة التابعة للنظام العالمي (GDPFS)، **بالنسق الإلكتروني فقط**، إلى أمانة المنظمة (WMO) في أقرب وقت ممكن، ويفضل ألا **يتجاوز ذلك 30 أيار/ مايو 2012**، بواسطة البريد الإلكتروني (dpfsmail@wmo.int) أو على قرص مدمج (CD) (ويفضل باستخدام برمجية (World 2003) أو أي نسق متوافق آخر)، وتوجيهها إلى عناية السيدة Pascal. Gomez.

وتفضلوا بقبول فائق الاحترام،

(ج. لنغواسا)
عن الأمين العام

GDPFS / NWP REPORTS

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

W O R L D   M E T E O R O L O G I C A L   O R G A N I Z A T I O N

===

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

TABLE OF CONTENTS

Introduction

National Contributions and/or Consortia

   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)

   4.2.4.1 In operation
   4.2.4.2 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)
- Analysed 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 runs 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 Internet and on 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 WEB sites addresses.