



World Meteorological Organization

Weather • Climate • Water

**First WMO Workshop on
Operational Climate Prediction
9-11 November 2015, Pune, India**

Overview of the Global Data
Processing and Forecasting System
(GDPFS) and WMO infrastructure for
long-range predictions

Abdoulaye Harou

Chief Data Processing and Forecasting System (WMO)

Origin of the GDPFS

- UN Gen Assembly XVI (Dec 1961) adopted Resolution 1721 “International Cooperation in the Peaceful Uses of Outer Space”.
- WMO was requested to study measures to advance the state of atmospheric science and technology and to develop weather forecasting capabilities
- **WMO Cg 4 (1963) created WWW composed of GDPS, GOS -> WIGOS and GTS -> WIS operated by WMO Members for the collection, analysis and dissemination of meteorological data and processed products**
- **On Recommendation of CBS-Ext(02), Cg 14 (2003) changed GDPS to GDPFS**





Purpose of the GDPFS

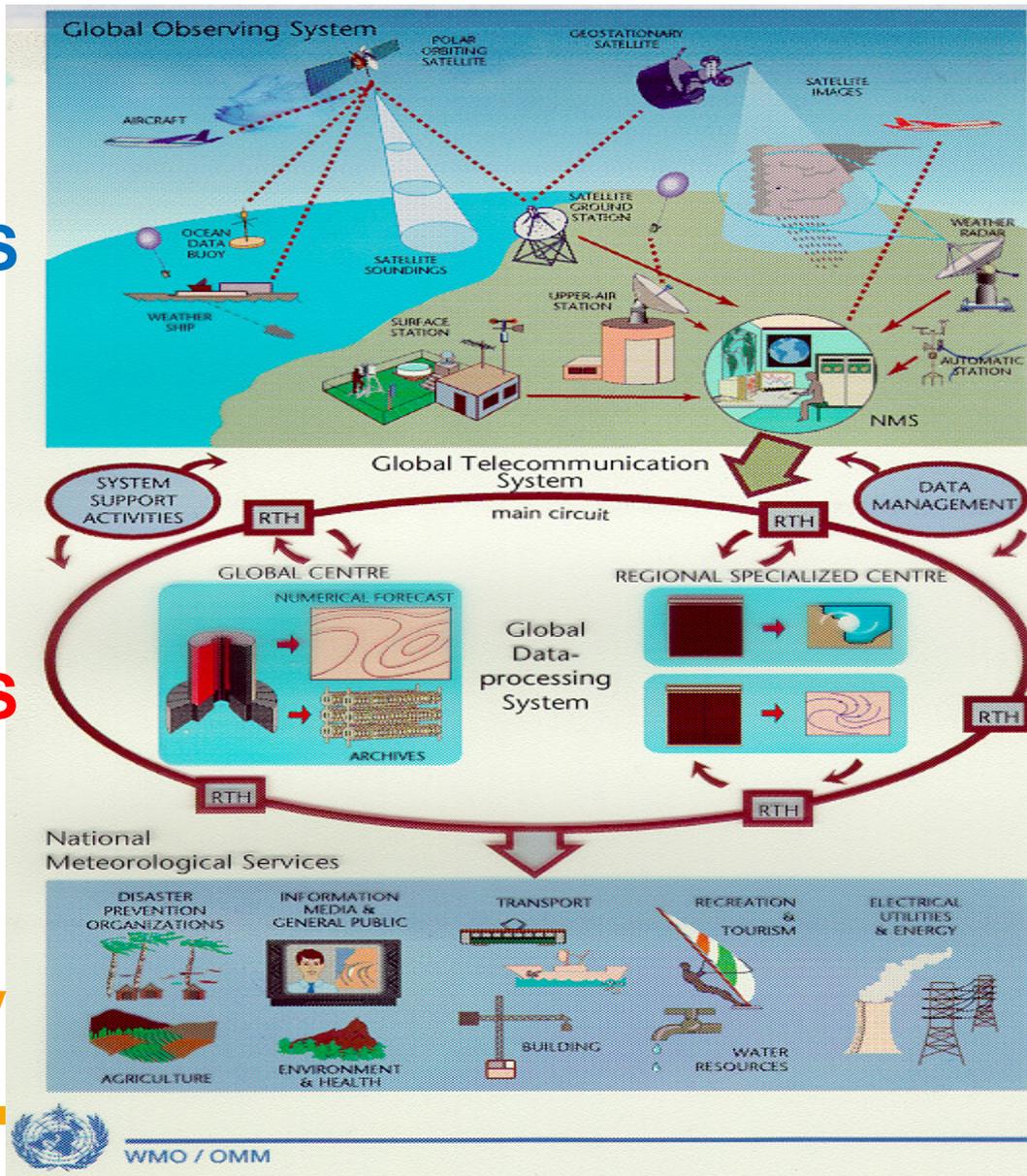
- The GDPFS provides the core operational prediction capabilities and systems of WMO (operated by Members – 191)
 - Nowcasting (VSRF) – 0-6h
 - Numerical Weather Prediction & EPS – 6h-15d
 - Long-Range Forecasting – Sub-seasonal to Longer Time Scales – up to 2 years
 - Emergency Response Activities for Nuclear and Non-Nuclear dispersion
 - Specialised centres – eg sand and dust-storm, tropical cyclone centres
-

WMO operational networks

WIGOS

WIS

GDPFS



191 NMHSs: satellites, land, ships, buoys, and aircraft contribute to Global Observing every day

Global Telecom with Regional Hubs – becoming the WMO Information System

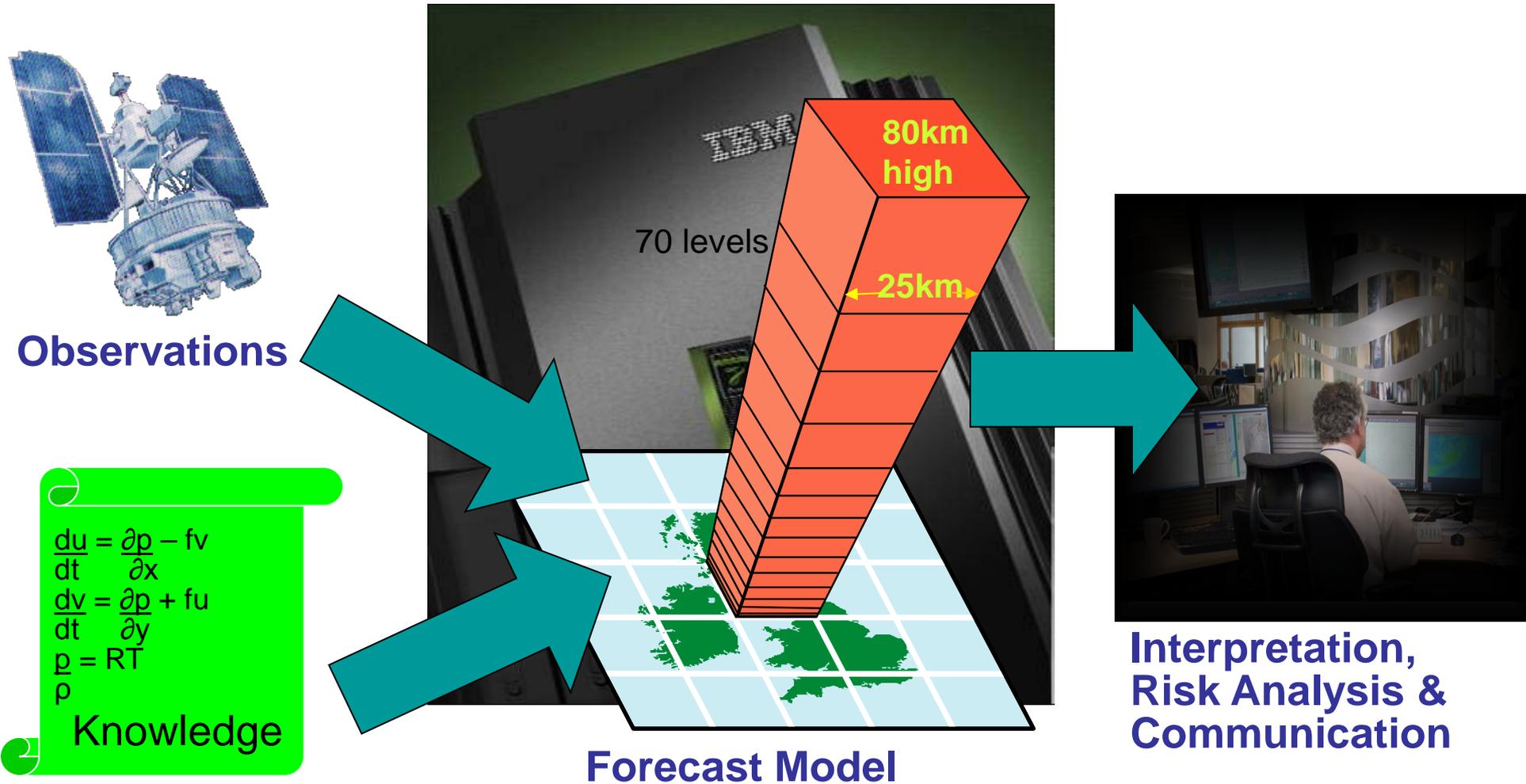
The **GDPFS**: Global, Regional Specialized Met. Centres (RSMC, RCC), and National Centres

NMHSs deliver analyses, forecast and early warning services

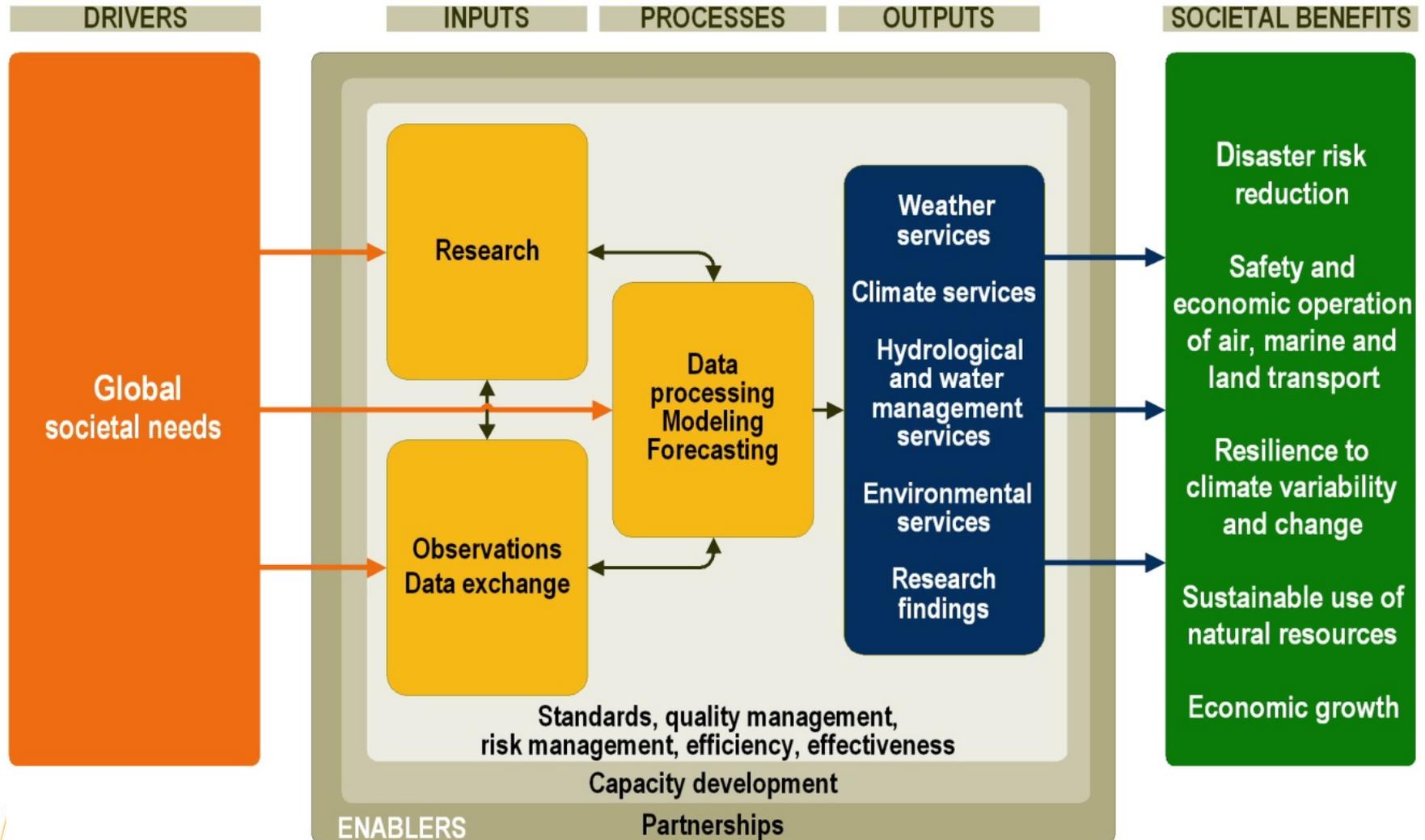
Service delivery



The Role of the GDPFS in creating services



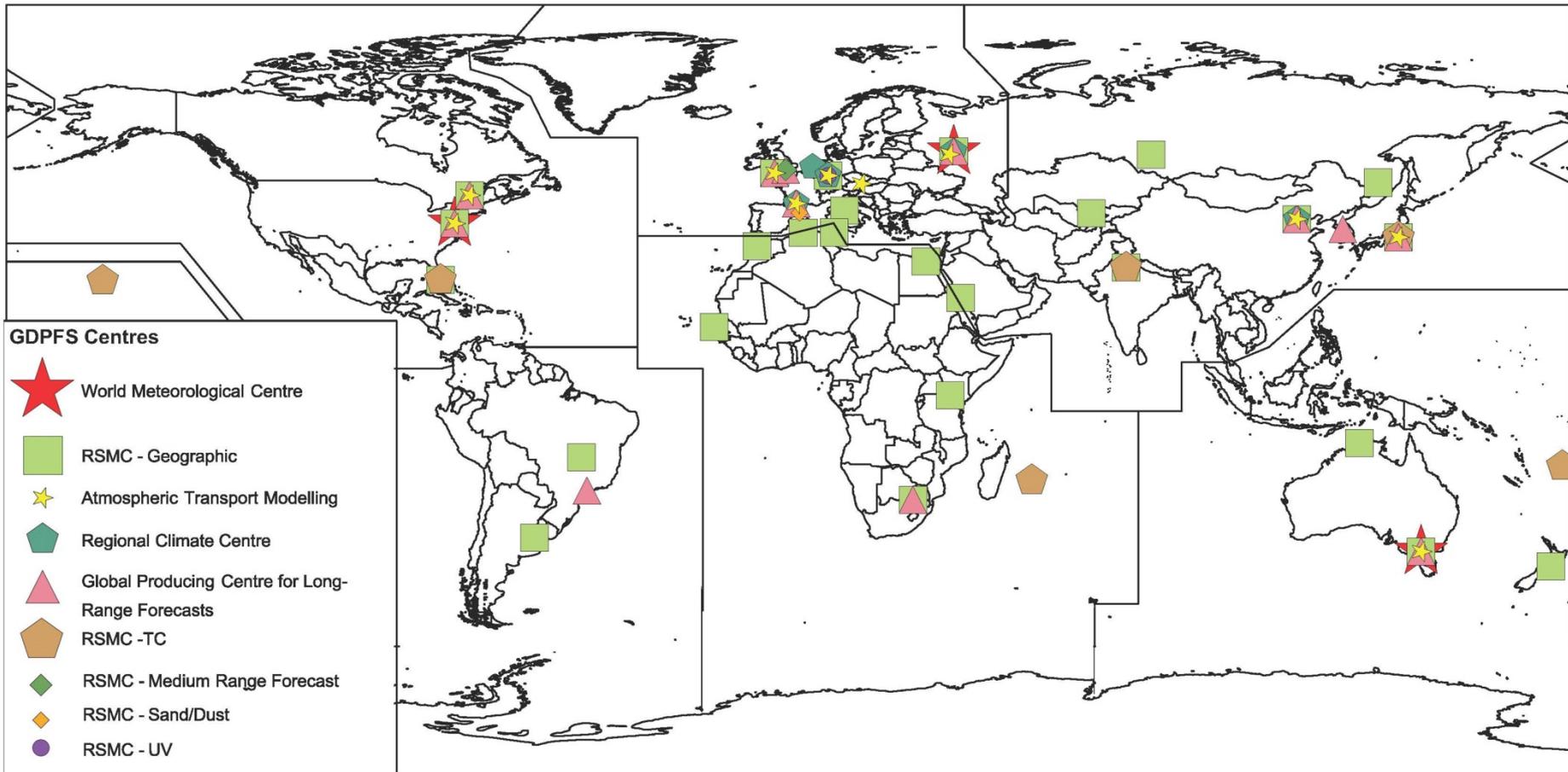
At the heart (engine room) of the WMO operational system



The GDPFS ...

- Is organized as a **three-level system** to carry out functions at global, regional and national levels
- World Meteorological Centre (WMC) / Global Producing Centre (GPC)
- Regional Specialized Meteorological Centre / Regional Climate Centre (RSMC / RCC)
- National Meteorological Centre (NMC) / National Climate Centre

The GDPFS today...



- **3 WMCs**
- **25 RSMCs with Geographical Specialization and 16 with Activity Specialization**
- **12 GPCs (LRF)**
- **5 RCCs and 1 RCC-Network**

Handling Long-Range Forecasting (LRF)

A network of Centres

- **12 Global Producing Centres of Long-Range Forecasts (GPCs):** Beijing, CPTEC (Brazil), Exeter, Melbourne, Montreal, Moscow, Pretoria, Seoul, Tokyo, Toulouse, Washington, ECMWF
- **Regional Climate Centres (RCCs):** Africa hosted by ACMAD (RA I), Beijing (RA II), Tokyo (RA II), Moscow (RA II) – NEACC, Western South America hosted by CIIFEN (RA III), Network (RA VI)
- **National Climate Centres (NCCs)**



Handling Long-Range Forecasting (LRF) A network of Centres (Cont...)

- Lead Centre for Standard Verification System of LRF (Melbourne-Montreal) : **LC- SVSLRF**

World Meteorological Organization
Lead Centre for the
Long Range Forecast Verification System

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DISCLAIMER

DOCUMENTATION
Participating Met. Agencies.
Lead Centre role.
Documentation and software.
Verifying datasets.
Submitting data.
Glossary.

USERS GUIDE
Variables to be assessed.
Levels of assessment.
Diagnostic measures.
What the Lead Centre provides.
How to submit results.
Format for submitting results.
Model system details.

VERIFICATION MAPS

The Lead Centre provides access to verification datasets, verifying software, documentation of the system, broad technical support, access to the final verification data as well as graphing and display of results.

The WMO Lead Centre for the SVS-LRF is jointly managed by the [Australian Bureau of Meteorology](#) and the [Meteorological Service of Canada](#).

Current seasonal forecasts from Global Producing Centre (GPC) models will become available via the [Lead Centre for Long-Range Forecast Multi-Model Ensemble Prediction](#).

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WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble

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Introduction | Deterministic MME | Probabilistic MME | References

Latest Forecast data

Latest PMME plot | Latest Individual Forecast plot

Notice / News
Check! System Requirements
All GPCs(12) for NDJ 2015 are uploaded 2015.10.22
All GPCs(12) for OND 2015 are uploaded 2015.09.30
All GPCs(12) for SON 2015 are uploaded 2015.08.21
All GPCs(12) for ASO 2015 are uploaded 2015.07.24
All GPCs(12) for JAS 2015 are uploaded 2015.07.01

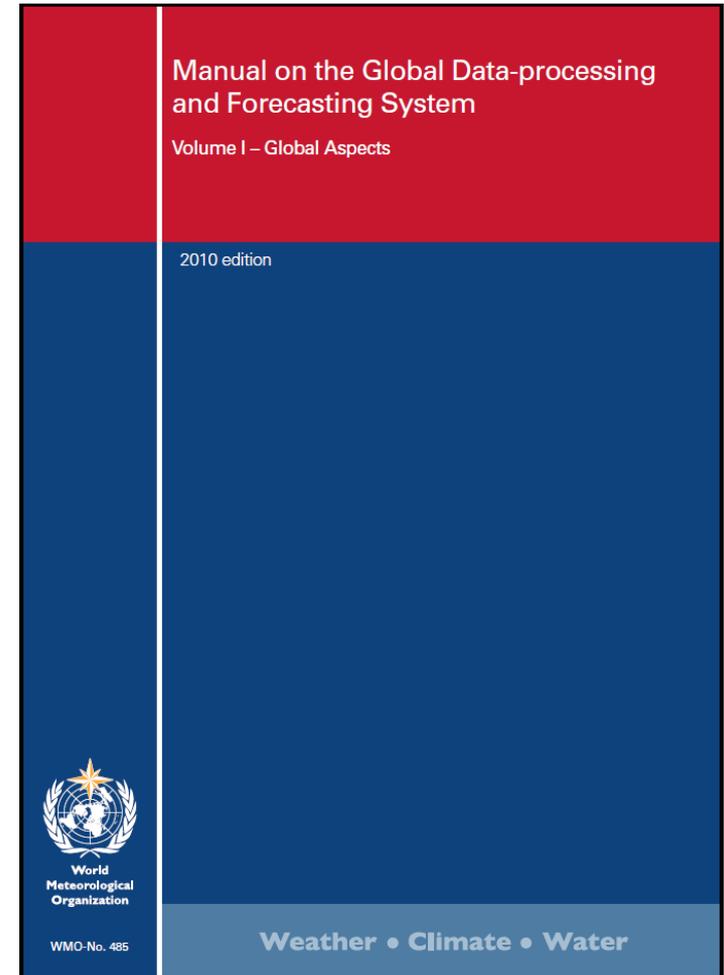
WMO Global Producing Centres
Canada: Montreal, Beijing, ECMWF, Moscow
Seoul, Tokyo, Toulouse, Washington
Exeter, JCMMA, Melbourne, Pretoria, CPTC

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today : 74 total : 135889
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- Lead Centre for LRF Multi-Model Ensemble (Seoul-Washington): **LC-LRFMME**

The Manual on the GDPFS (WMO-No. 485)?

- A single source of technical regulations for all operational data-processing and forecasting systems operated by WMO Members
- It includes the designation of meteorological centres, including those coordinated by CBS, jointly with other technical commission(s) and/or WMO Programme(s), as well as with other international organizations



Manual on the GDPFS (WMO-No. 485)

- Current version:

<https://www.wmo.int/pages/prog/www/DPFS/Manual/GDPFS-Manual.html>

- New Edition:

https://www.wmo.int/pages/prog/www/DPS/Manual/Table-of-content_Manual-gdpfs.html



What is new in the New GDPFS Manual?

- Clear Definition of Designation Criteria
- Provision of detailed information regarding Center's implementation
 - Systems description and characteristics
 - Product metadata
- Verification of products
- Rolling Review of Centre Compliance (Regular Audit)
- Clear Establishment of Procedures



Emerging Issues and Pressures on GDPFS...

- Requirement to move to Impact-Based Forecasting and Risk-based Warning: GDPFS need to integrate non conventional information: Vulnerability and Exposure
- Trajectory-Based Forecasting for Aviation: Nowcasting (landing/take off), short term forecasts (enroute): Seamless Met Info required for take off, enroute and landing – Requires seamless blending of nowcasting, mesoscale and global NWP
- Support to GFCS (Xtreme events, sub-seasonal to climate forecasting)
- Climate change and variability are imposing new challenges to National Meteorological and Hydrological Services (NMHSs) requiring them to produce information at various time scales.
- Users' needs are becoming more and more sophisticated and varied while the technology is evolving at high pace (ie doubling of Computing capacity every ~18 months)
- Requirement from Govts to produce more information with less resources – Fiscal restraints



To address these issues, the GDPFS needs to evolve to...

- Being Capable of serving more users with one integrated system
- Being more agile and adaptable to serve Applications Programmes (AeM, AgMet, MMO, PWS), HydroMet and weather (polar & mountain areas), climate and environment related needs (forest fire, chemical spills, sand & dust storms, etc)
- Provide information seamlessly across
 - Time scales (nowcasting, through weather forecasts for days and weeks ahead to long-range forecasts on seasonal and up to multi-annual scales) and;
 - Disciplines (Hydrology: flood, inundation, water management; Marine and Coastal: Wave, Storm Surge; Air Quality and Sand and Dust Storm; Natural resources and Energy sectors , Tourisme, Transports, etc.)



Cg17 Resolution 11 – Future of the GDPFS

- : **“Towards a future enhanced integrated and seamless Data-processing and forecasting system” expressed Congress decision to:**

“Initiate a process for the gradual establishment of a future enhanced integrated and seamless WMO Data-processing and Forecasting System, in the light of the conclusions of the first World Weather Open Science Conference held in Montreal, Canada in August 2014, in particular that a seamless system encompasses several dimensions including timescales, multiple weather related hazards and societal impacts”



Addressing the Cg 17 Resolution 11

- Setting up a team of Experts to discuss how to go about this task and to propose a:
 - Roadmap and;
 - White paper on the subject





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Thank you for your attention!