

### World Meteorological Organization

Weather • Climate • Water

# WMO Initiative for the Global Exchange of Radar Data

Workshop on Regional & Global Exchange of Weather Radar Data, 24-26 April 2013, Exeter, UK

Weather 

· Climate 
· Water

### Authorship

Daniel Michelson: SMHI, Sweden

Paul Joe: Environment Canada

Dean Lockett, Steve Foreman: WMO, Geneva

Stuart Goldstraw, Nicolas Gaussiat, Malcolm Kitchen, Elizabeth Kyte, Stuart Matthews: UK Met Office

Li Bai: China Meteorological Administration

Andreas Becker, Thomas Hohmann: Deutscher Wetterdienst, Germany

Konstantine Georgakakos: Hydrological Research Center, USA

Enrico Fucile, Remy Giraud: ECMWF

A. Kamilliddin: Malaysian Meteorological Service

Jean-Francois Mahfouf, Eric Wattrelot: Meteo France

José Mauro de Rezende: Instituto Nacional de Meteorologia, Brazil

Oguzhan Sireci: Turkish State Meteorological Service

Marco Aurelio de Barros Teixeira, CINDACTA 2, Brazil

### Reasons for the Workshop

- 1) WMO-internal: Undertake Action (Global 48) associated with EGOS-IP
- 2) Lack of guidance in Manual on the GOS (WMO No. 544), less than 150 words ... contrast with ~1-2 billion US dollars in investments in national weather radar networks
- 3) Increasing evidence of positive impact of radar on NWP

"The results of recent impact studies provide strong support for exchange of more observations between regions, and between countries within regions: e.g. ground-based GPS data, radar data, hourly surface observations and MODE-S data at airports".

[Final Report of the Fifth WMO Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction, Page 5]



### Workshop Aims, Scope, Objectives

- 1. Define weather radar data to be exchanged at regional and global levels;
- 2. Propose formats and frequency of exchange of those data; and;
- 3. Agree the next steps needed to enable the regional and global exchange of these data.

Scope limited to reflectivity and radial wind data, without QPE

Eight workshop objectives: gathering information, providing recommendations



### Workshop Deliverables

- 1. A consolidated set of current and future data requirements for the regional and global weather radar data exchange;
- 2. A recommended set of data models to be used for Weather Radar Data Exchange;
- A plan for a pilot study/studies to demonstrate the methodology for sustained operational regional and global data exchange;
- 4. A series of next steps actions to facilitate the regional and global exchange of Weather Radar Data.



### Workshop Details

- Held: 24-26 April 2013, Exeter, UK
- Final Report:

http://www.wmo.int/pages/prog/www/CBS-Reports/documents/ Final Report Workshop Radar Data Exchange Exeter April 2013.pdf

- Participants:
  - Regional representatives (All except RA I late withdrawal)
  - Users:
    - Regional and global NWP
    - Hydrological
    - Climate
  - Radar experts
  - Data format & exchange experts

### Workshop Outcomes – Determination of requirements

Data User Area	Parameter/Field	Requirement Category	Requirement	Comment
NWP - Global	ECMWF Now: US Stage IV prec. Composites Future: polar data?	Horizontal resolution Cycle Latency	2 km <sup>2</sup> Future: 1 km <sup>2</sup> ? 15 min 15 - 30 min	Different requirements for different NWP consortia Future standard: polar data?
NWP – High resolution	Polar data (Meteo France)	Horizontal resolution Cycle Latency	2 km <sup>2</sup> Future: 1 km <sup>2</sup> ? 1 hour 15 - 30 min	
Hydrology	Quantitative Precipitation Estimate	Horizontal resolution Cycle Latency		Access to long-term high quality archived precipitation data is critical.
Climate	Quantitative Precipitation Estimate	Horizontal resolution Cycle Latency	1 km <sup>2</sup> possibly later inc. to Future: 0.25 km <sup>2</sup> 1 hour Future: 5 min?	Access to long-term high quality archived data is critical.
			48 hrs	Weather • Climate • Water

### Workshop Outcomes – Weather Radar Database

- Hosted by Turkish Meteorological Service for WMO
- Global: 812 radars (707 NMHS, 105 "other")
- Workshop recommended new information be added:
  - Additional radars, existing and new
  - Exchange agreements



### Workshop Outcomes – Existing Data Exchange RAI – Africa

Countries shaded in red known to exchange radar data





## Workshop Outcomes – Existing Data Exchange RA II – Asia



#### Weather · Climate · Water

## Workshop Outcomes – Existing Data Exchange RA III – South America

Exchange between regions: RA II – RA V: ASEAN RA III – RA IV: Curaçao RA IV – RA VI: NCEP – ECMWF



### Workshop Outcomes – Existing Data Exchange RA IV – North and Central America, the Caribbean



### Workshop Outcomes – Existing Data Exchange RA V – Southwest Pacific





Weather · Climate · Water

### Workshop Outcomes – Existing Data Exchange RA VI – Europe & Middle East



### Workshop Outcomes – "Data models":

- Data models are most advanced in Europe and the USA.
- Data exchange formats being used: BUFR, GRIB, TITAN, HDF5, netCDF, others
- Workshop determined that:
  - best approach is to use ODIM (OPERA) as a basis for finalising a model for international exchange
  - finalise a BUFR template for radar data exchange
  - investigate use of more modern alternative format such as HDF5.



### Workshop Outcomes – "Data models":



### Workshop Outcomes – Pilot Projects

Pilot projects can:

- Advance data exchange aspirations in a particular region;
- Facilitate testing of ideas and concepts leading to improvement, e.g.
  - "hybrid exchange model"
  - transferability of existing data processing technology;
- Promote and demonstrate benefits of data exchange.



### Workshop Outcomes – Pilot Projects

- Proposed PPs:
  - a. RA II/RA V through the ASEAN Sub-Committee on Meteorology and Geophysics (ASCMG)
  - b. RA III no pilot specified but could be pursued through Regional WIGOS IP.
  - c. RA VI OPERA and Turkey

Possible interest in a PP in the Caribbean but requires further investigation with key people - review of R-WIP.



### Workshop Outcomes – Next Steps

- 20 recommendations made
- Key recommendations:
  - Establishment of a Task Team under ET-SBO to advance and finalise data exchange model and format(s).
  - CBS (via ET-SBO) should investigate the possibility of forming and resourcing a scientific authority to determine requirements and provide solutions for WR regional and international data processing, exchange and data provision.



### Workshop Outcomes – Next Steps

- 20 recommendations made
- Key recommendations:
  - CBS (via ET-SBO) is invited to determine mechanisms to involve GCOS and CHy in future activities on the issue of global and regional exchange of radar data.
- ET-SBO to determine actions in response to recommendations.





World Meteorological Organization

Weather • Climate • Water

### Thank you for your attention

www.wmo.int