



World Meteorological Organization

Weather • Climate • Water

WMO Activities for the Global Exchange of Radar Data

Daniel Michelson, SMHI

Paul Joe, Environment Canada

Stuart Goldstraw, UK Met Office

Dean Lockett, WMO

Contributions from:

Daniel Michelson: SMHI, Sweden

Paul Joe: Environment Canada

Dean Lockett, Steve Foreman: WMO, Geneva

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

Elena Saltikoff, FMI

Akihito Umehara, Japan Meteorological Agency

Li Bai: China Meteorological Administration

Andreas Becker, Thomas Hohmann: Deutscher Wetterdienst, Germany

Konstantine Georgakakos: Hydrological Research Center, USA

Enrico Fucile: ECMWF

A. Kamilliddin: Malaysian Meteorological Service

Nicolas Gaussiat, Remy Giraud, Jean-Francois Mahfouf, Eric Wattrelot: Météo France

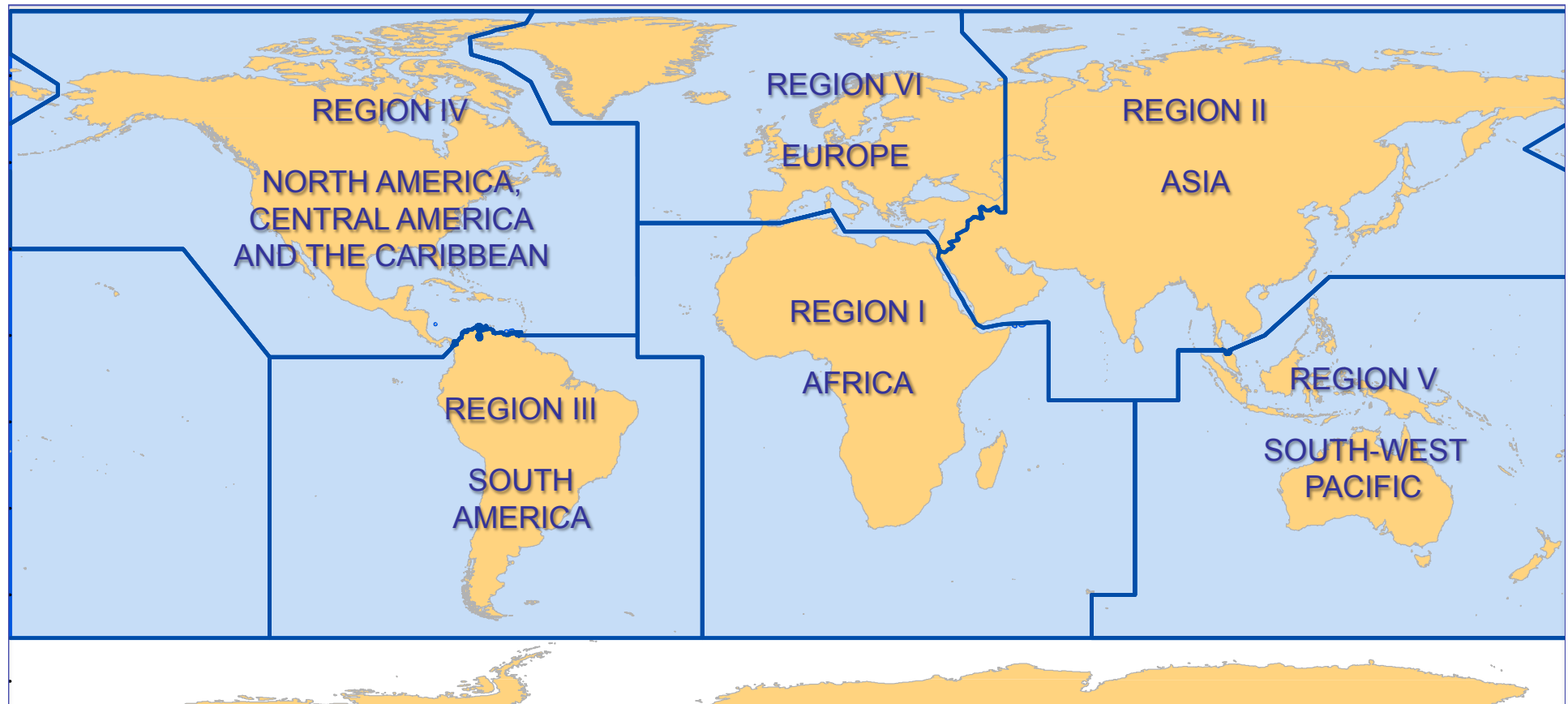
José Mauro de Rezende: Instituto Nacional de Meteorologia, Brazil

Oguzhan Sireci: Turkish State Meteorological Service

Marco Aurelio de Barros Teixeira, CINDACTA 2, Brazil

Karel de Waal, National Center of Meteorology & Seismology, United Arab Emirates

WMO Regional Associations



WMO Technical Commissions

Commission for Aeronautical Meteorology – CAeM

Commission for Agricultural Meteorology – CAgM

Commission for Atmospheric Sciences – CAS

Commission for Basic Systems – CBS

Commission for Climatology – CCI

Commission for Hydrology – CHy

Commission for Instruments and Methods of Observation – CIMO

Joint WMO-IOC Commission for Oceanography and Marine
Meteorology - JCOMM



Weather radar in CBS

- Open Programme Area Group on Integrated Observing Systems (OPAG-IOS)

Chair: Jochen Dibbern, DWD, Germany

Co-chair: Anthony Rea, Bureau of Meteorology, Australia

- Expert Team on Surface-Based Observations (ET-SBO)

Chair: Stuart Goldstraw, UK Met Office

- ✓ Task Team on Weather Radar Data Exchange (TT-WRDE)

Chair: Daniel Michelson, SMHI, Sweden



WMO Regulatory Material

- Manuals – rules for members to implement and follow
- Guides – recommendations

E.g.

WMO No. 544: Manual on the Global Observing System

WMO No. 488: Guide on the Global Observing System

WMO No. 8: CIMO Guide

Migration from GOS RM to WMO Integrated Global Observing System (WIGOS) RM has started.

ET-SBO to draft weather radar contributions to WIGOS RM.



WRDE Workshop, April 2013, Exeter, UK

- 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, 2012]



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

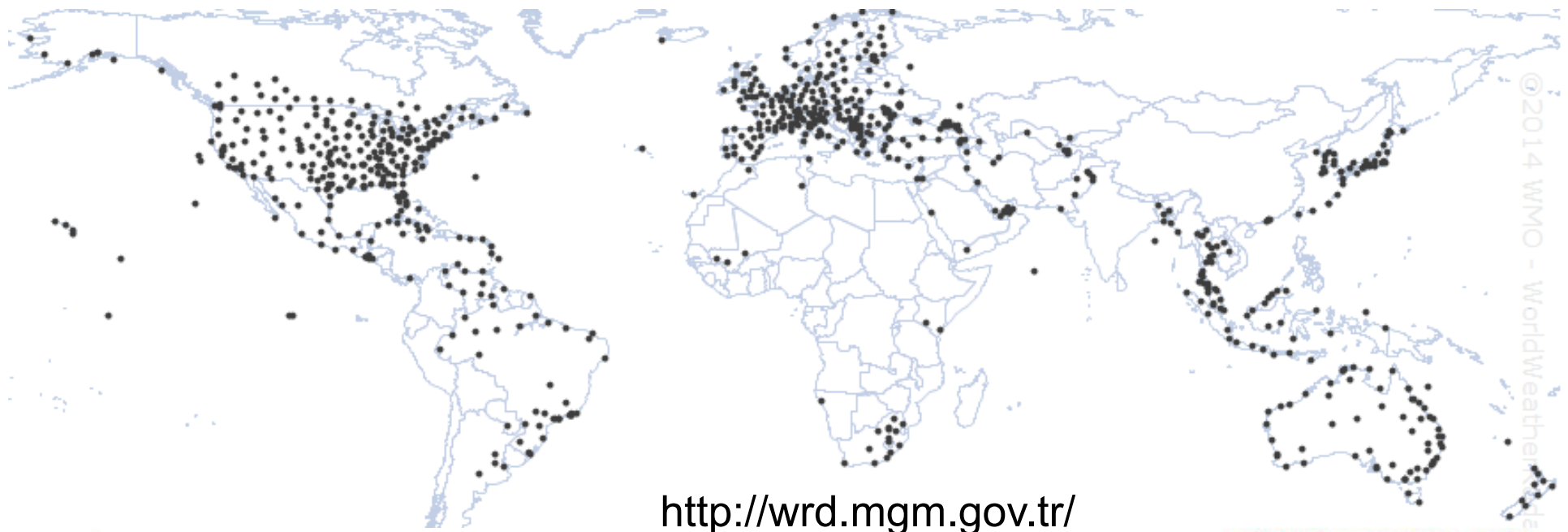


Workshop Outcomes – Determination of requirements

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 ² Future: 1 km ² ? 15 min 15 - 30 min	Different requirements for different NWP consortia Future standard: polar data?
NWP – High resolution	Polar data (Météo France)	Horizontal resolution Cycle Latency	2 km ² Future: 1 km ² ? 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 ² possibly later inc. to Future: 0.25 km ² 1 hour Future: 5 min? 48 hrs	Access to long-term high quality archived data is critical.

Workshop Outcomes – Weather Radar Database

- Hosted by Turkish State Meteorological Service for WMO
- Global: 832 radars (18 August 2014)
- Workshop recommended new information be added:
 - ✓ Additional radars, existing and new
 - ✓ Exchange agreements



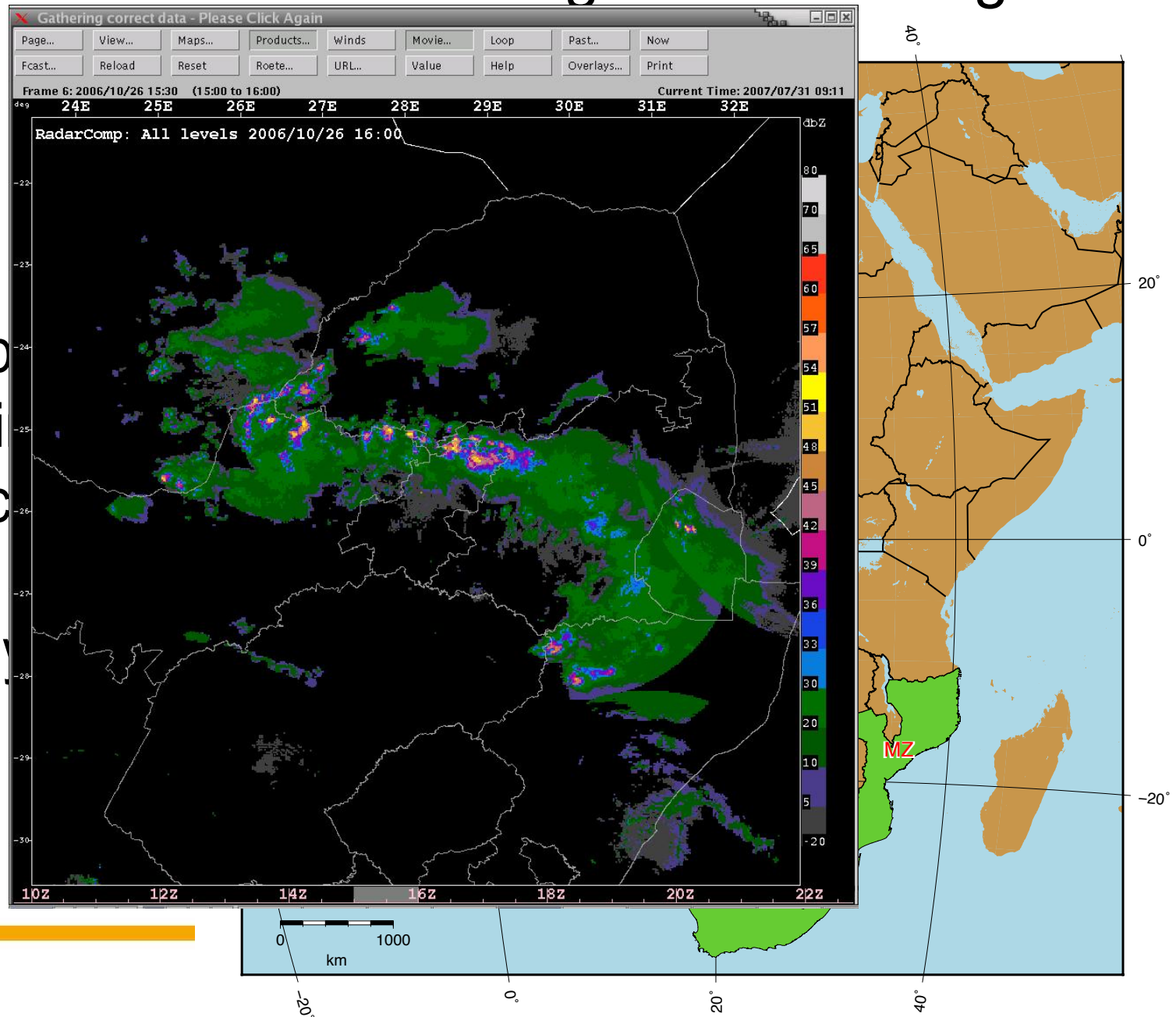
What is the networking in “radar networking”?

1. Data exchange mechanisms - protocol
 - a. **Passive**, indirect transaction, e.g. FTP (GTS)
 - b. **Active**, sender/recipient transact directly, e.g. BALTRAD
2. Network configuration - topology
 - a. **Centralized**: all data are collected at a data centre and processed, products disseminated. E.g. OPERA
 - b. **Decentralized**: members exchange data among themselves and generate products locally. E.g. BALTRAD
 - c. By WMO RA, sub-Region, cross-Region?



Workshop Outcomes – Existing Data Exchange Africa

Countries lab
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known to exc
radar data
internationally



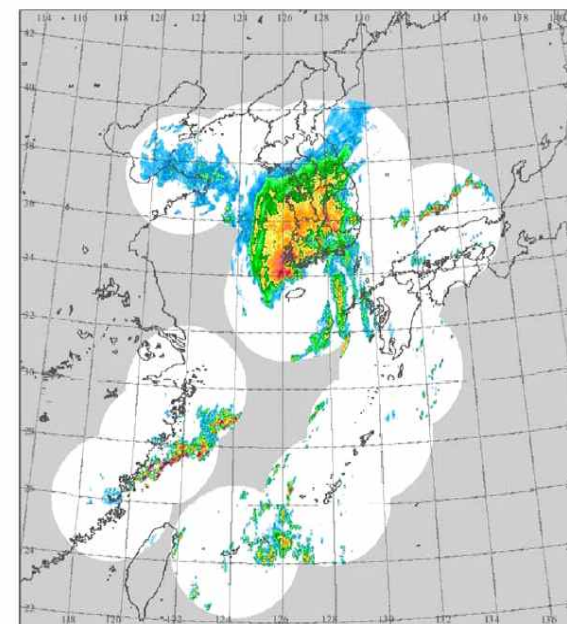
Asia



1st Asian Conference on Radar Meteorology

6(Wed) to 9(Sat) Nov, **2013**

SEOGWIPO KAL Hotel, JEJU island
SOUTH KOREA(ROK)



☎ Emergency call:

SEOGWIPO KAL HOTEL: +82-64-730-9660

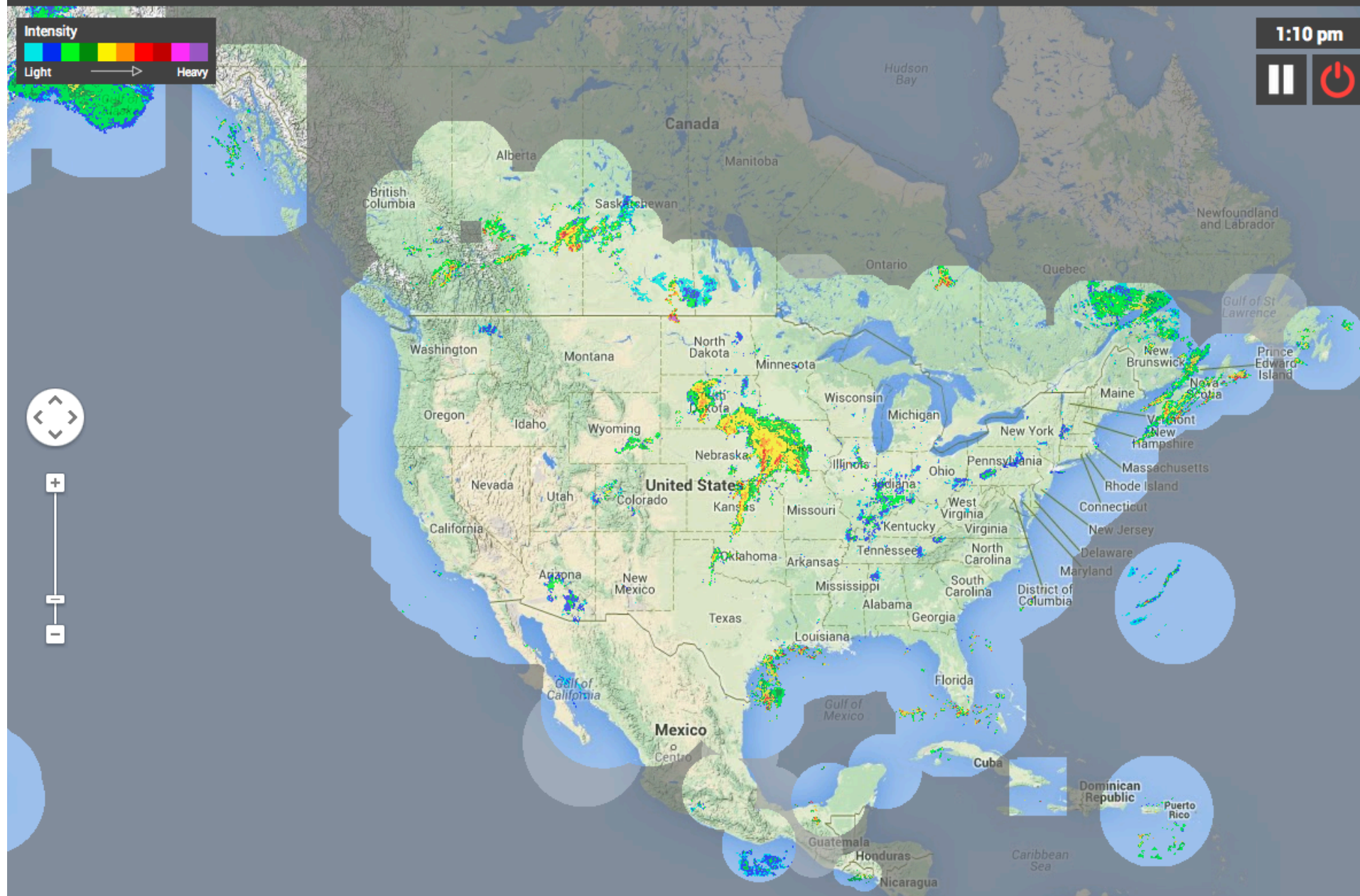
OCEAN PALACE HOTEL: +82-64-730-5800



Rain Alarm



1:10 pm



-120°

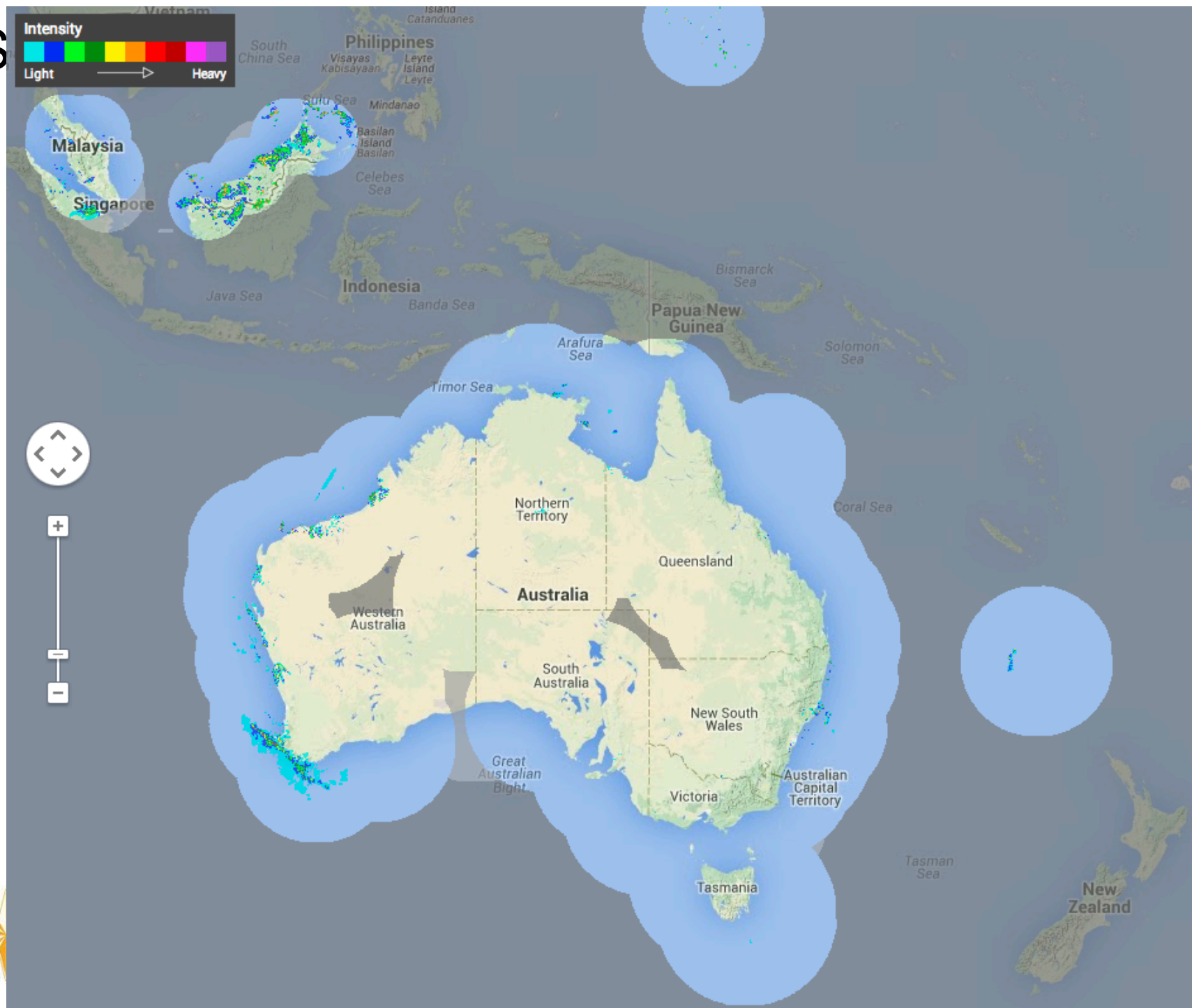
-90°

-80°

-70°

-60°

S



Water

Europe

EUMETNET OPERA
Currently 29 members

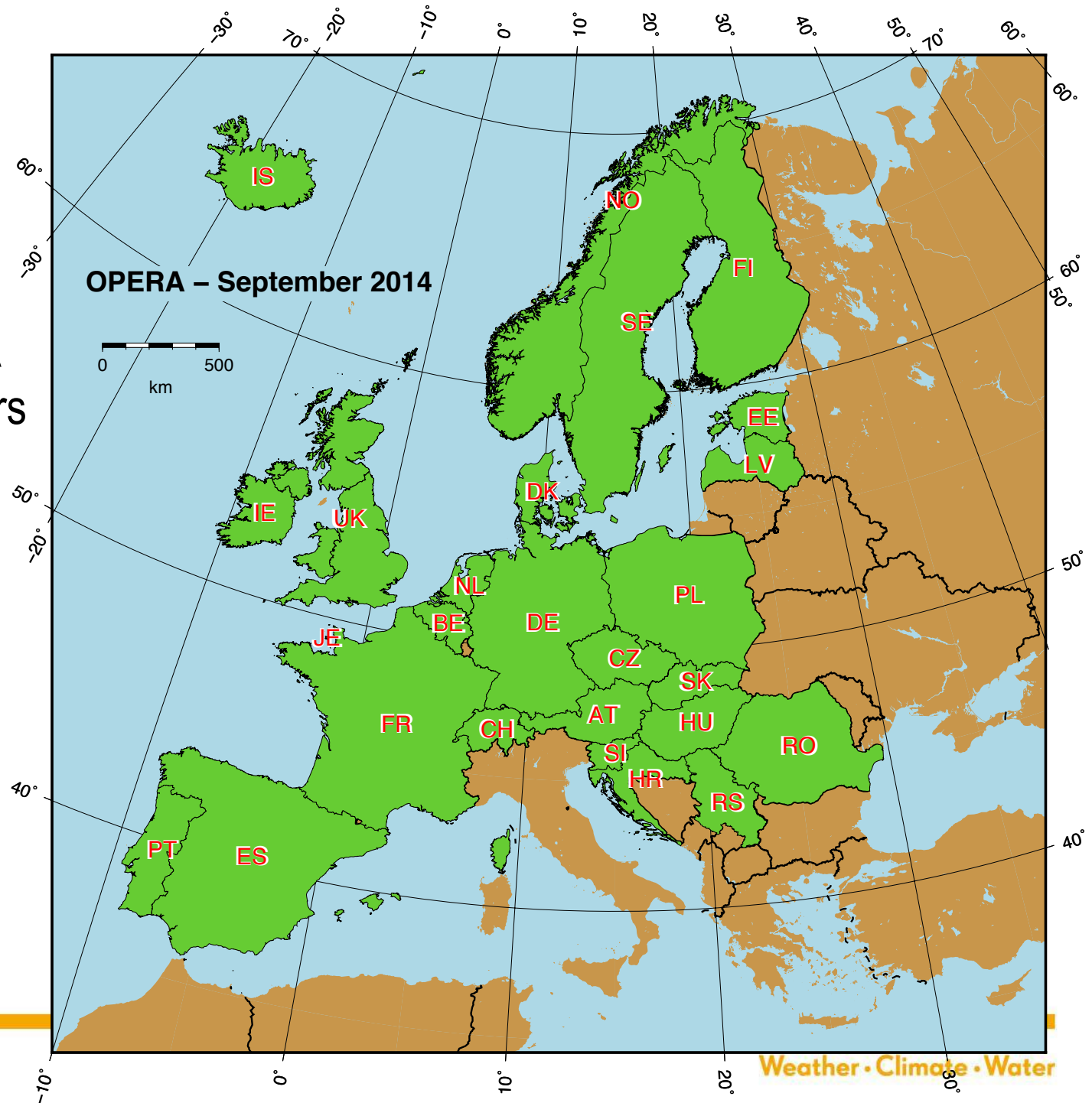
Other examples:

NORDRAD

BALTRAD

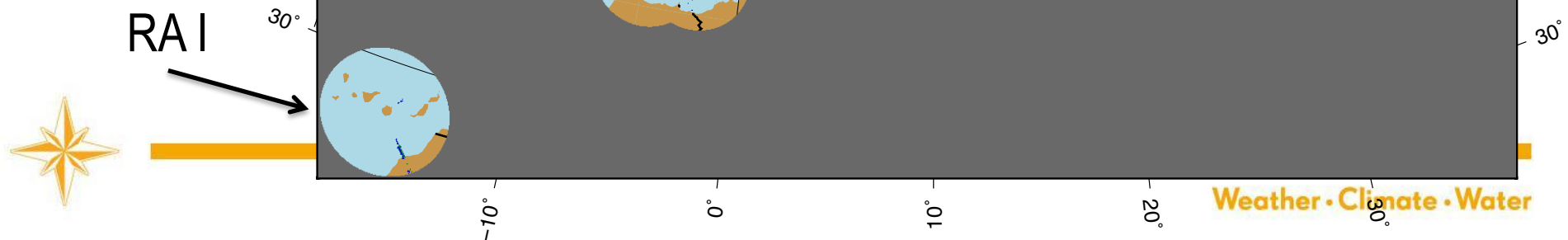
CERAD

Bilateral agreements

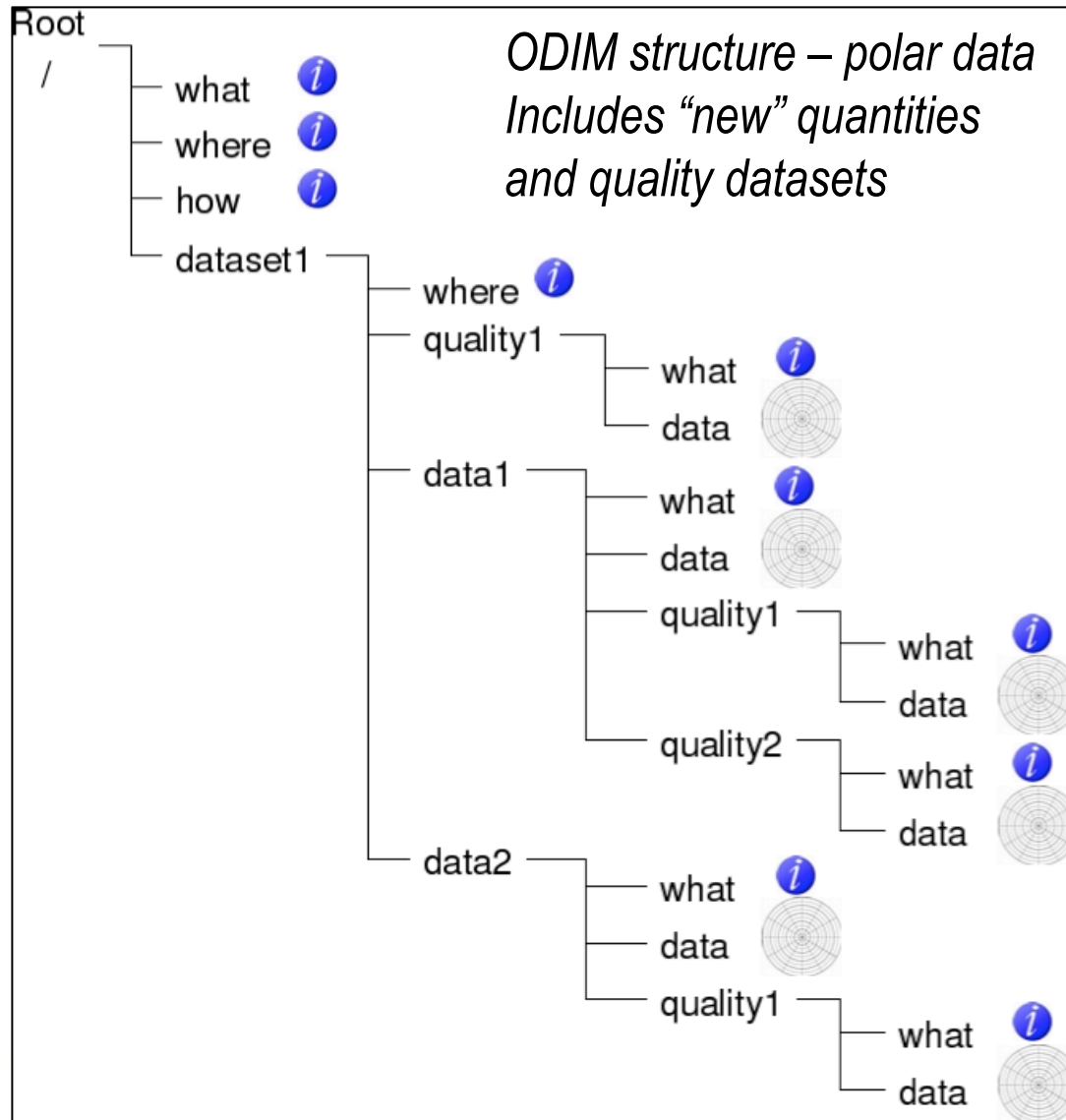


“RA VI
composite”
in the not-
too-distant
future?

22 August
06:00 UTC



Data models and formats



in Europe and the USA.

ed: BUFR, GRIB, “TITAN”,

OE work plan:

M (OPERA) as a basis for

onal exchange

radar data exchange

ern alternative format such

cies”

TT-WRDE timeline

- Work plan drafted
- Most work to be performed during 2014-2015
- Scientific basis for increased WRDE is strengthening:
 - Users are important drivers
 - Infrastructural support to user needs as needs evolve
- Report “upward” in CBS for decision making in 2016

Related topics

- Collaborative (Open Source) software?
- Data models/formats for adaptive, electronically scanning radars?





**World
Meteorological
Organization**

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More info: Google “WMO OPAG-IOS”

Thank you very much!