

Catalyzing Innovation in Weather and Environmental Sciences

Estelle de Coning, Paolo Ruti, Oksana Tarasova
World Meteorological Organization



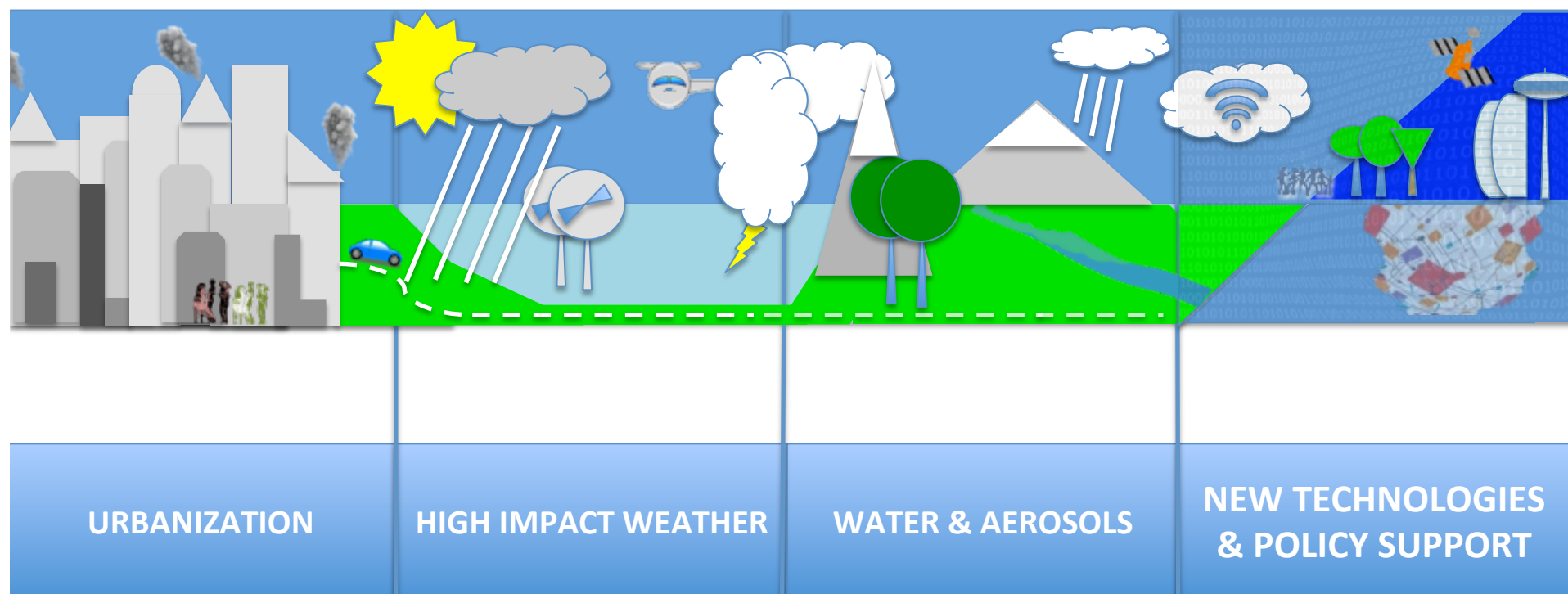
WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Societal Challenges/Drivers

The Commission for Atmospheric Sciences, WMO's body entrusted with supporting research in atmospheric sciences, has identified six emerging societal and scientific challenges that need to be tackled in the decade to come:

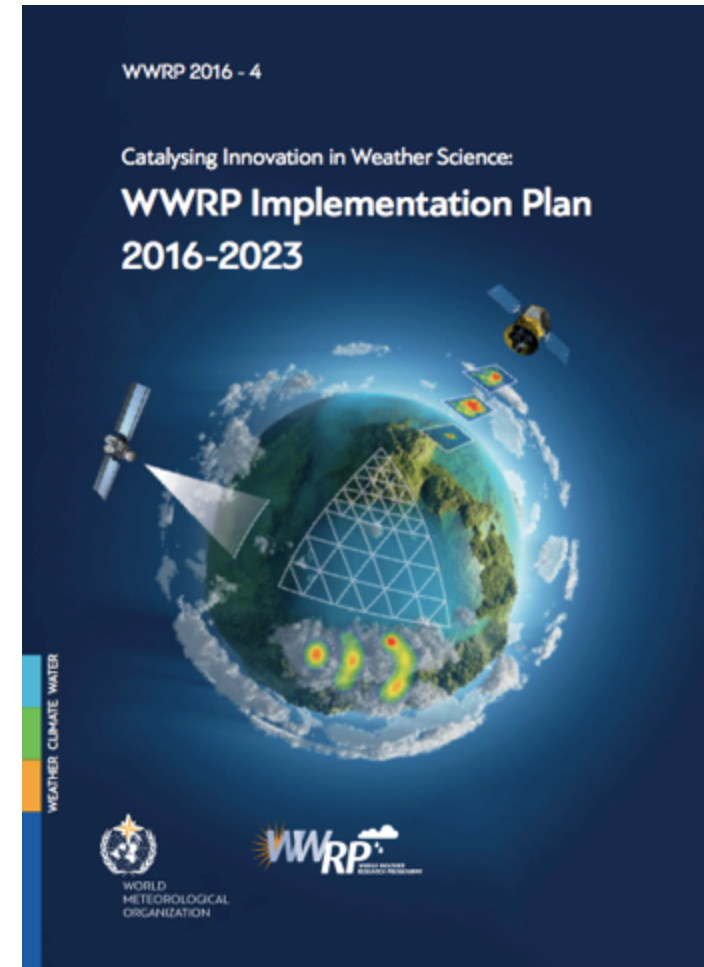
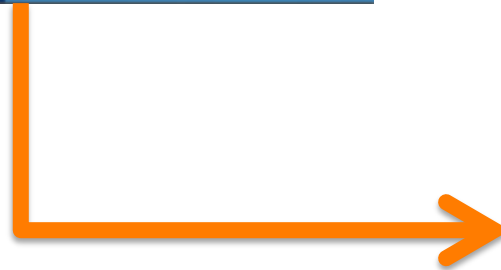


→ These set the frame for ongoing and future WMO research activities

WWRP Implementation Plan



Based on outcome of the World Weather Open Science Conference (2014) and on the engagement of all the WWRP community



WWRP webpage: http://www.wmo.int/pages/prog/arep/wwrp/new/wwrp_new_en.html





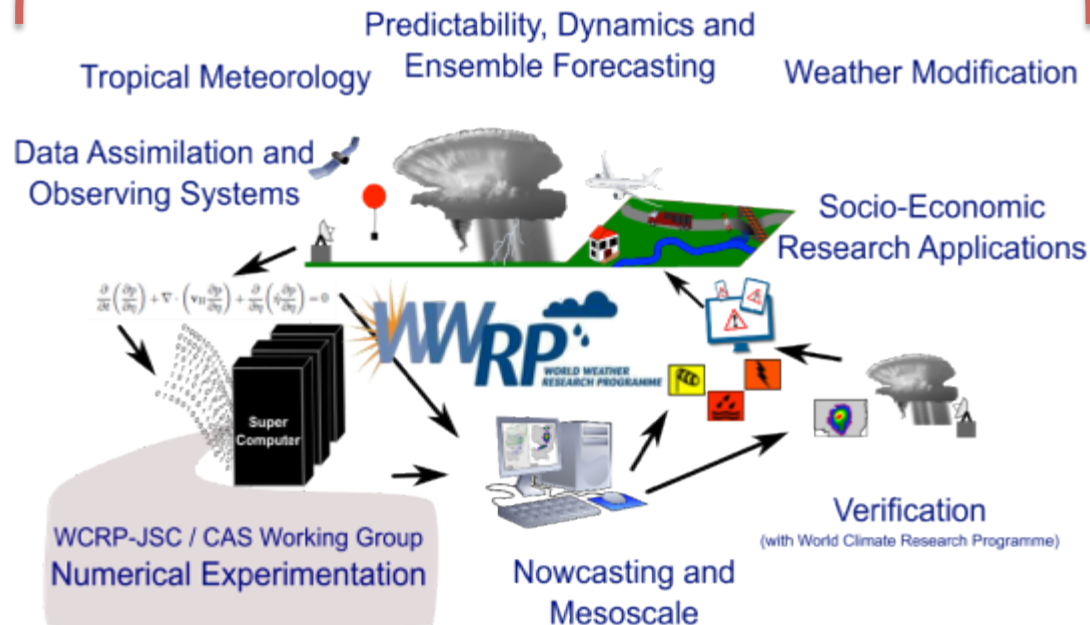
WWRP Implementation Plan (2016-2023)

Aims:

- *Seamless Prediction* - increasing convergence between weather, climate and environmental approaches;
- Strengthened *partnerships* between academics and operational users as well as interdisciplinary collaborations;
- Enhanced role of *Early Career Scientists*.

WWRP Structure

WWRP Working Groups



WWRP Core Projects

Polar Prediction



WCRP
World Climate Research Programme



Subseasonal-to-Seasonal
S2S
Prediction Project

High Impact Weather



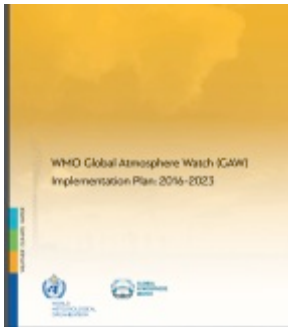
WWRP Regional Portfolio

Research Development & Forecast Demonstration Projects

- Convective Systems, Tropical Cyclones, Aviation, Olympic Games, Nowcasting Systems, Sand & Dust Prediction etc
- *China, Argentina, US, HIGHWAY (Lake Victoria), Mediterranean, Hong Kong, South Africa, Canada, Australia, South Korea*



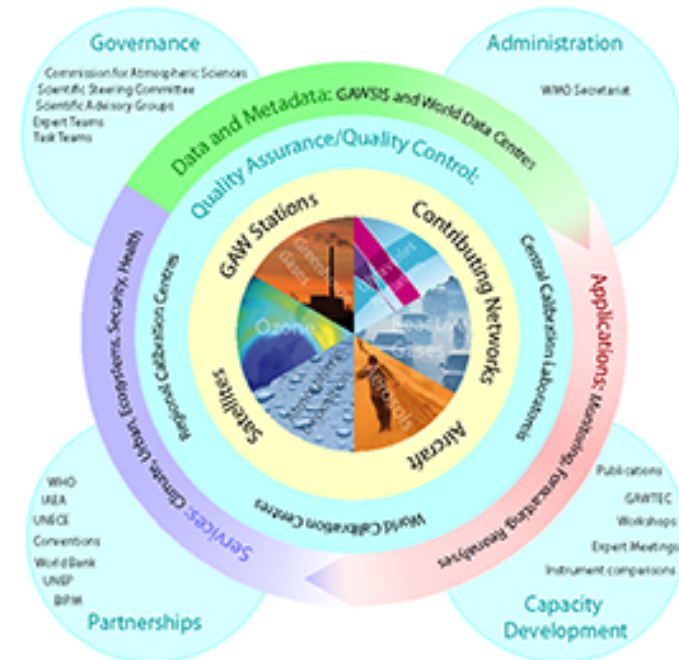
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GAW Implementation Plan (2016-2023)

Implementation Plan builds upon the premise that **atmospheric composition matters** to –
climate and weather forecasting,
human health,
terrestrial and aquatic ecosystems,
agricultural productivity,
aeronautical operations,
renewable energy production....

Website: https://library.wmo.int/opac/doc_num.php?explnum_id=3395



GAW – enhancing modeling

Expand GAW's role in enhancing predictive capabilities (of atmospheric composition and its uses)

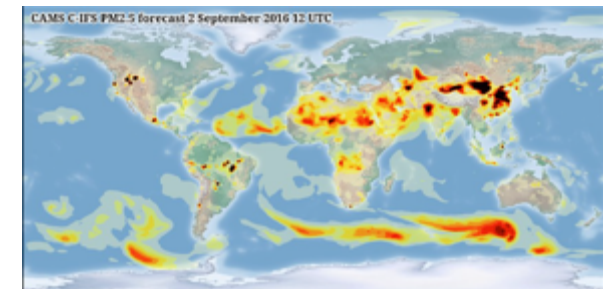
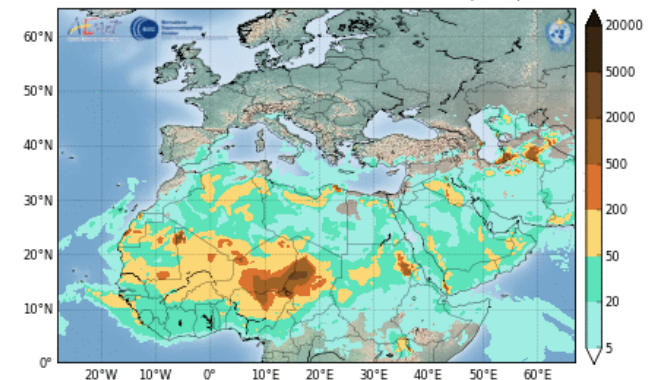
☑ Further developing **urban air quality** forecasting capabilities (GURME) – high resolution, DA

☑ **enhance forecasting and monitoring** functions at scales from regional to global – larger scale

☑ expanding **collaborations** with WWRP/ WCRP/WGNE and others to ensure model consistency on all scales

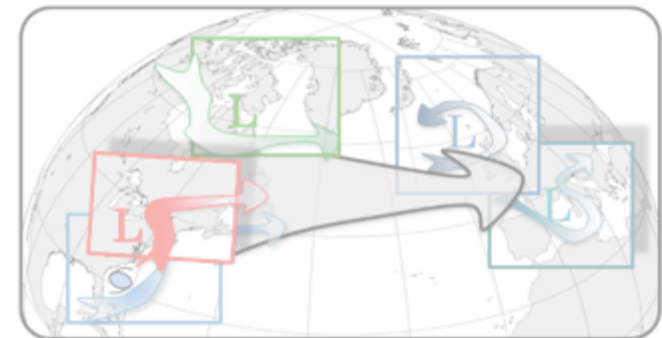


Barcelona Dust Forecast Center - <http://dust.aemet.es/>
NMMB/BSC-Dust Res: 0.1°x0.1° Dust Surface Conc. (µg/m³)
Run: 12h 15 OCT 2016 Valid: 18h 17 OCT 2016 (H+54)



Key common interests for weather, climate and environment (1)

- Understanding the multi-scale interaction between high-impact weather events and the environment in which they develop (HIWeather and GC Extremes; clouds to circulation GC; SPARC-PDEF link; GAW Aerosols modeling)
- Improving forecast skill and understanding on the subseasonal to seasonal timescale (S2S)
- Linking the impact of regional circulation systems and air quality to decision making processes, locally and globally (Monsoons, tropical cyclone variability and impacts, air-quality)
- Increasing predictive skill for both weather and climate through coupled earth system modeling (Polar Prediction Project & YOPP, coupled data assimilation, carbon cycle, pollutants ...)



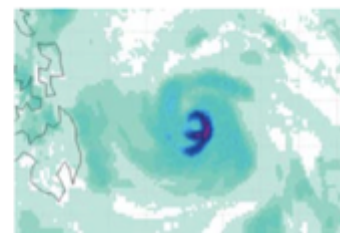
Key common interests for weather, climate and environment (2)

A. ADVANCING MODELLING AND OBSERVATIONS:

- Research to define the future observing system must *consider needs for weather, climate and environment, because*
- Distinction between weather and climate models is becoming less meaningful ([WGNE](#), [WWRP/GEWEX-GASS-GLASS](#), [GAW-SPARC](#))
- Major future challenge: HPC and data handling
- Innovation in ensemble prediction, data assimilation, verification, post-processing on all scales ([Reanalysis](#), [CMIP](#), ...)
- Shared expertise needed on vulnerability and risk for modelling and observing impacts



1981: Global models run at ~200 km resolution.
Example: Total precipitation of Typhoon Haiyan (2013) in DWD ICON shown at 200 km resolution



2016: Global models run at ~12 km resolution.
Example: Total precipitation of Typhoon Haiyan (2013) in DWD ICON, shown at 12 km resolution

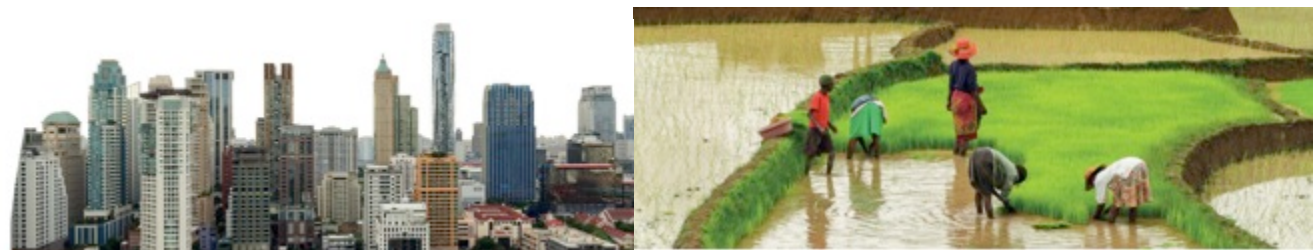
Key common interests for weather, climate and environment (3)

B. STRENGTHENING REGIONAL ACTIVITIES:

- *Societal impacts* depend crucially on regional characteristics => joint regional projects e.g. WWRP & WCRP involvement in HyMEX
- *Sustainable development* requires working in partnership to enhance regional capacity

C. PREPARING FOR THE FUTURE:

- Research expertise must contribute to capacity development, e.g. Joint WG Verification training courses
- The long term success of research programmes depends on the involvement of Early Career Scientists e.g. YESS



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Thank you
Merci



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