

WMO GAW Overview

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WEATHER CLIMATE WATER
TEMPS CLIMAT EAU



WMO OMM

World Meteorological Organization
Organisation météorologique mondiale



2017 IBBI Workshop • 10-11 July 2017 • Boulder, CO, USA





GAW

Outline



- **WMO and CAS priorities**
- **Global Atmosphere Watch (GAW)**
- **Observation System and Data Centers**
- **Modelling and Applications areas,**
- **WWRP and WCRP: S2S project**
- **Dust Pollution and WMO SDS-WAS**
- **IBBI / Vegetation Fires**
- **From Research to Services**



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RESEARCH PRIORITIES: 10-YEAR FUTURE VIEW

WMO Commission for Atmospheric Science (CAS):

- **High Impact Weather and its socio-economic effects in the context of global change**
- **Water: Modelling and predicting the water cycle for improved DRR and resource management**
- **Integrated GHG Information System: Serving society and supporting policy**
- **Aerosols: Impacts on air quality, weather and climate**
- **Urbanization: Research and services for megacities and large urban complexes**
- **Evolving Technologies: impact on science and its use**

WMO Executive Management (2017):

- **There is also a need to coordinate activities related to air quality forecasting for ecosystem impacts, such as biomass burning episodes**



GAW



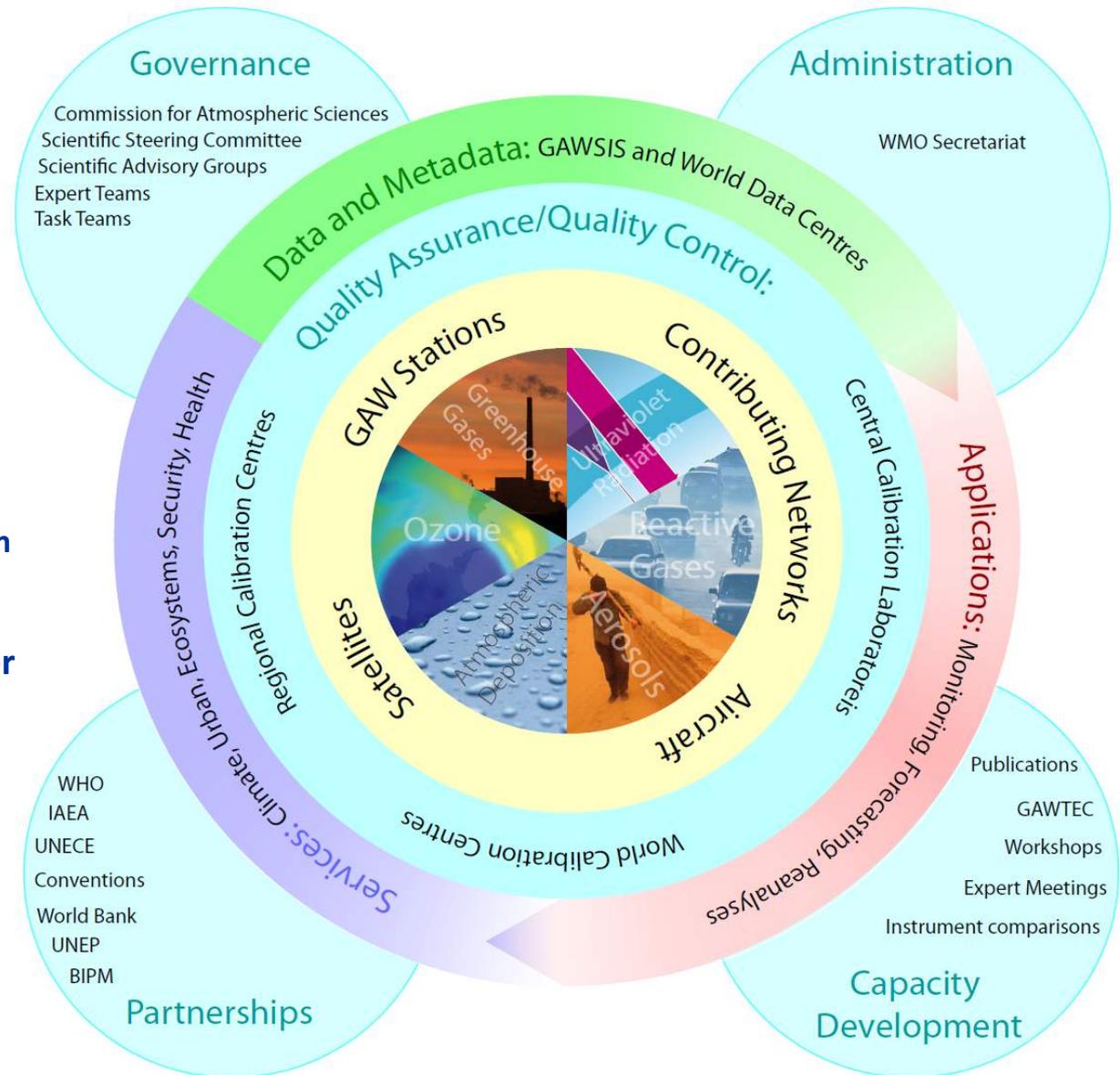
WMO Global Atmosphere Watch Program



GAW Mission:

- Systematic long-term monitoring of atmospheric chemical and physical parameters globally
- Analysis and assessment
- **Development of predictive capability**
(GURME and **Sand and Dust Storm Warning System**)
and now for **chemical weather** (e.g. incl. volcanic ash, **wildfires**)

GAW SSC Chair G. Carmichael
WMO AERD Chief O. Tarasova





Overview of the Structure of GAW

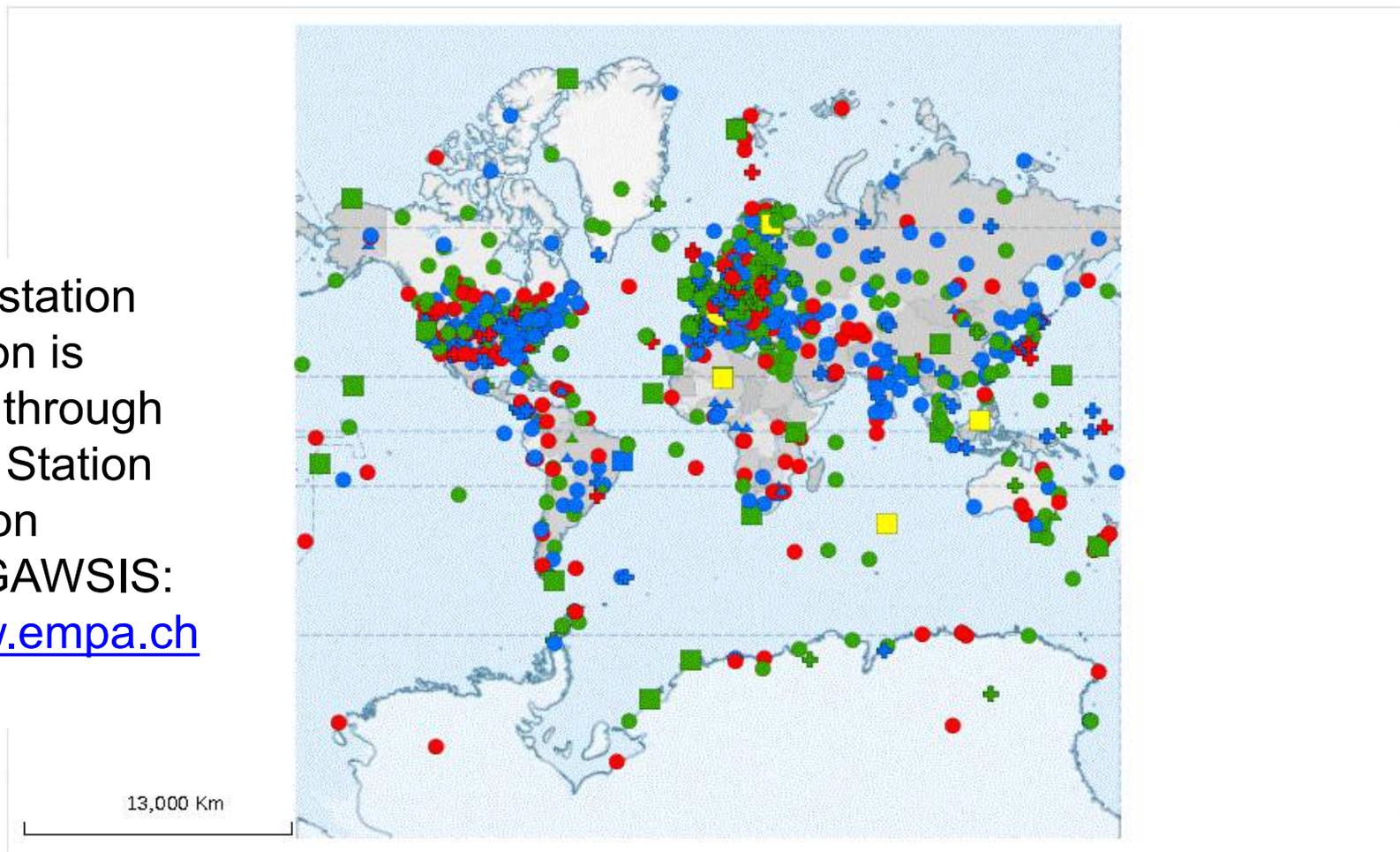
- More than 100 countries have registered **more than 800 stations** with the GAW Station Information System (**GAWSIS**). Established 27 years ago.
- Various **GAW expert groups and central facilities** exist under the oversight of the WMO Commission for Atmospheric Sciences (CAS) and its Environmental Pollution and Atmospheric Chemistry Scientific Steering Committee (EPAC SSC).
- **8 Scientific Advisory Groups (SAGs)** to organise and co-ordinate GAW activities by parameter and application, and the Expert Team on World Data Centres (ET-WDC).
- 4 Quality Assurance/Science Activity Centres (QA/SACs) perform network-wide **data quality and science-related functions**.
- 35 Central Calibration Laboratories (CCLs) and World and Regional **Calibration Centres** (WCCs, RCCs) maintain calibration standards and provide instrument calibrations and **training** to the stations.
- **6 World Data Centres** archive the observational data and metadata, which are integrated by the GAW Station Information System (GAWSIS).
- **GAW Training (GAWTEC)**: More than 270 persons trained from 58 countries



GAW stations network



Versatile station information is available through the GAW Station Information System GAW SIS: <http://gaw.empa.ch/gawsis/>



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Office of Meteorology and Climatology MeteoSwiss

- | | | |
|-----------------------|--------------------|--------------------|
| Global | ■ Reporting | ● Reporting |
| Regional | ● Partly Reporting | ● Partly Reporting |
| Contributing networks | ▲ Non-reporting | ● Non-reporting |
| Local | ★ Closed | ● Closed |
| Other networks | + Planned | ● Planned |
| | | ● Pre-operational |



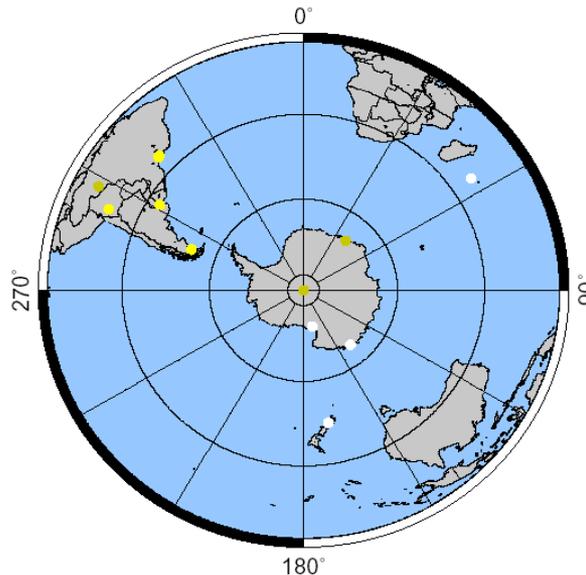
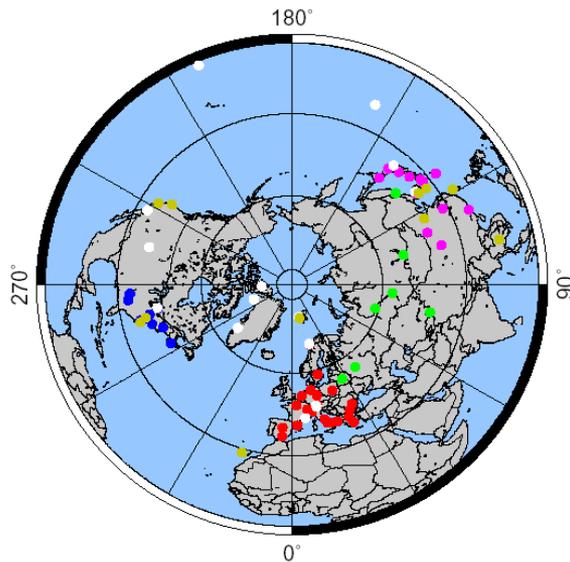
Aircraft and satellite measurements also contribute to the observations



GAW Aerosol Lidar Observation Network

GALION is organized as a Network of Networks, coordinating

- American Lidar Network (ALINE), Latin America (●)
- Asian Dust and Aerosol Lidar Observation Network (AD-Net), East Asia (●)
- CIS-LINET, Commonwealth of Independent States (Belarus, Russia and Kyrgyz Republic) Lidar NETwork (●)
- Canadian Operational Research Aerosol Lidar Network (CORALNet), Canada (●)
- European Aerosol Research Lidar NETwork (EARLINET), Europe (●)
- Network for the Detection of Atmospheric Composition Change (NDACC), Global Stratosphere (○)
- CREST, Eastern North America (●)
- MicroPulse Lidar NETwork (MPLNET), Global (●)



Applications

- Climate research and assessment
- Impact on radiation
- Air quality
- Plumes from special events
- Support for spaceborne observations



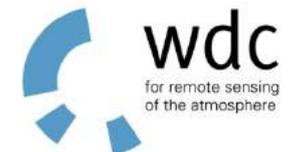
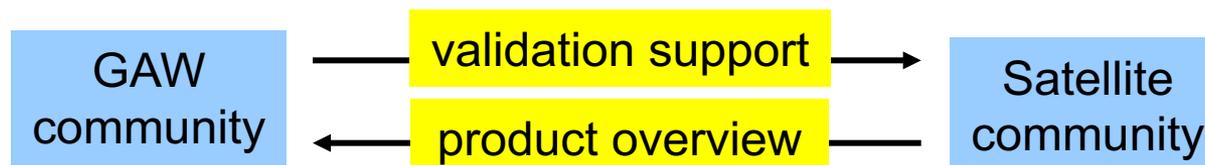
World Data Center for Remote Sensing of the Atmosphere

Satellite “one stop shop” for aerosols

- Support easier access to satellite datasets by the GAW community
- Promote GAW datasets for satellite product validation

Support from WDC-RSAT for WMO-GAW

- Link different GAW-relevant data sets with each other and with models
- Cooperate with other international actors on interoperability (NASA, CNES)
- Assign ‘Digital Object Identifiers’ (DOI) to data sets
- Develop techniques to provide stations with satellite-based data and information products
- Develop computing-on-demand applications
- Develop and test strategies and techniques to validate satellite data sets



GAW – enhancing modeling



GAW

The broad “atmospheric chemistry” application area was substituted with more specific application areas:

- “atmospheric composition forecasting”,
- “atmospheric composition analysis and monitoring”
- “urban services”.



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

- ☑ urban air quality forecasting capabilities through GURME,
- ☑ new Modelling Applications SAG (“Apps”) – usefulness exchanging chemical observational data in NRT
- ☑ expanding collaborations with WWRP/WCRP/WGNE and others

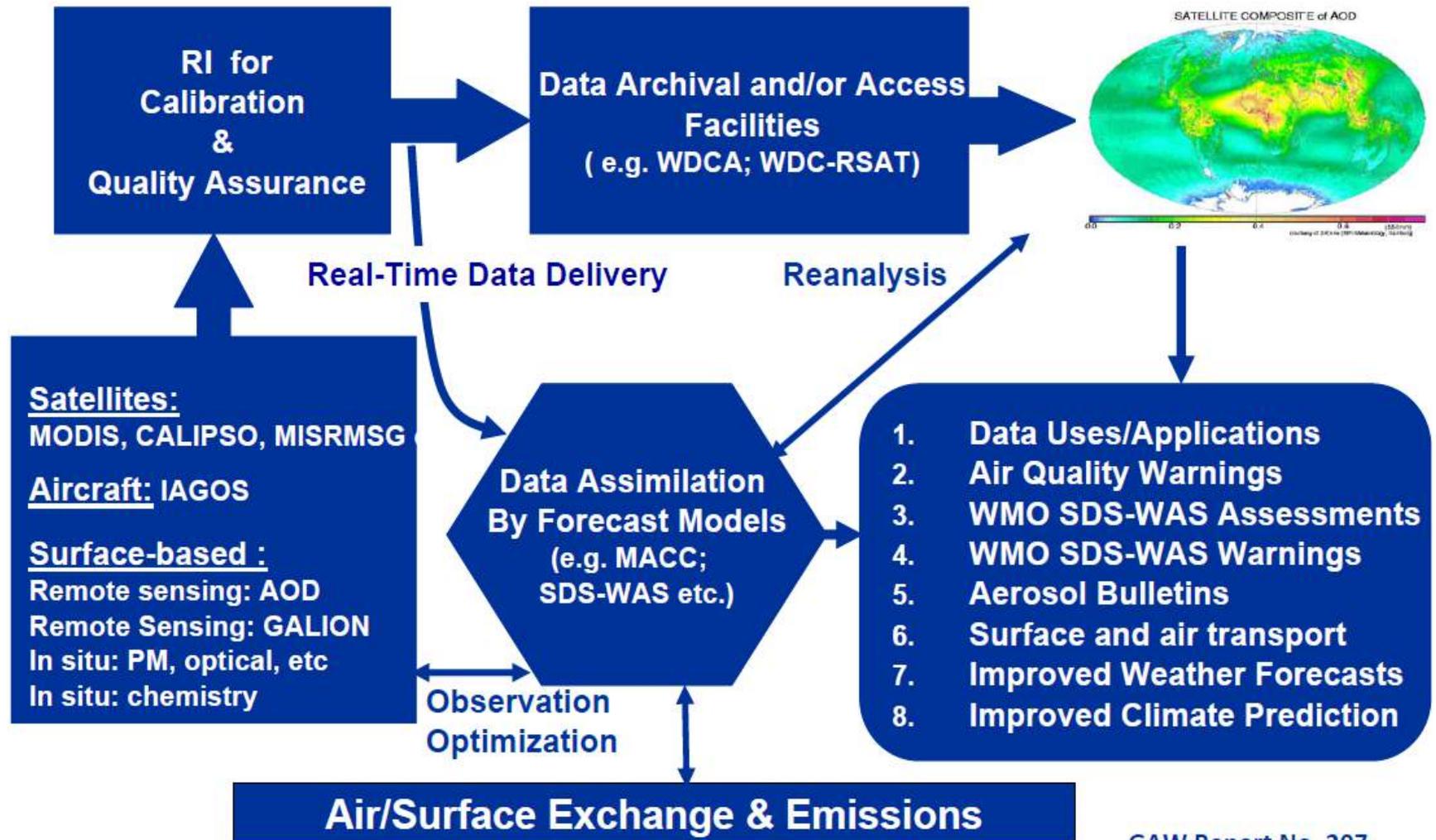


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WMO Global Atmosphere Watch (GAW)

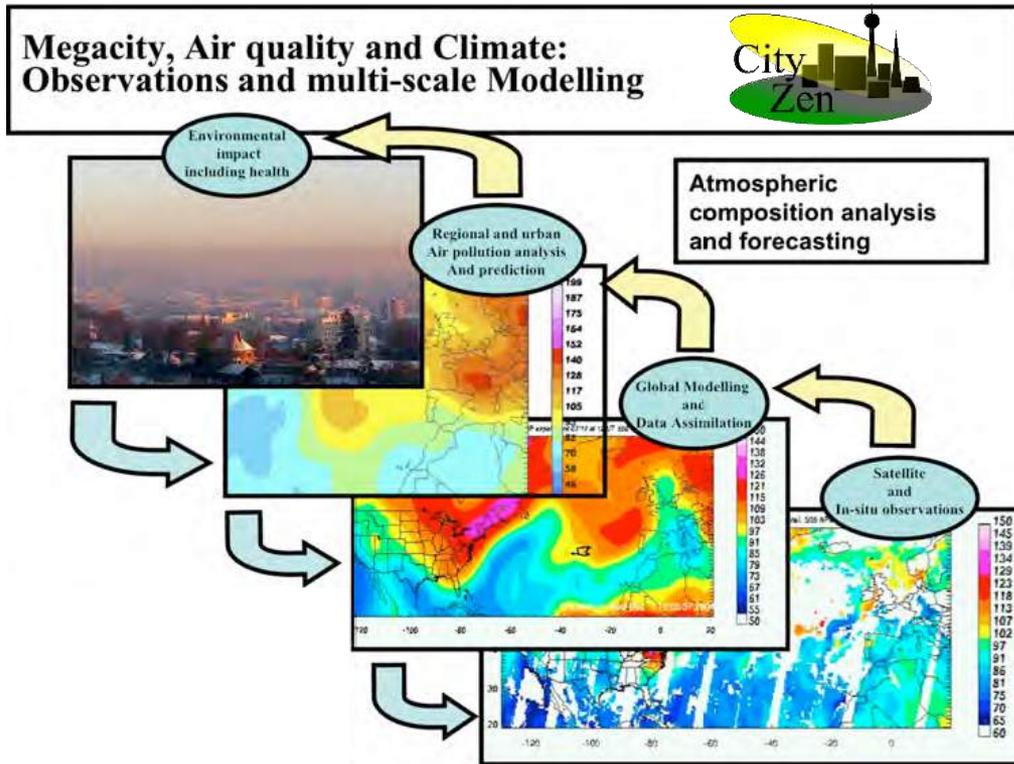
Integrated Global Aerosol Observing System

Global Products



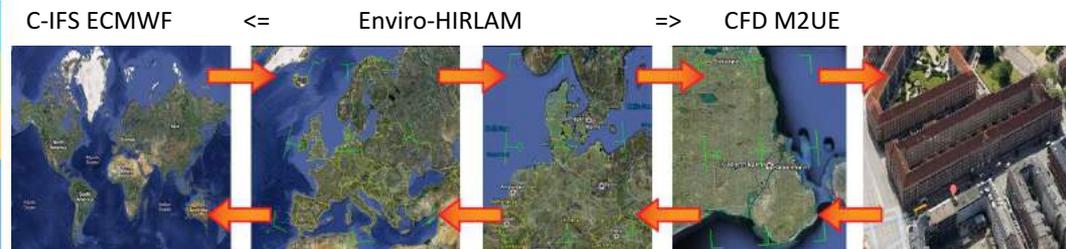
Seamless Methodology and Research Tools

Multi-scale Modelling Chain / Framework: from Global to Street



Seamless coupling for:

- Time scales: from nowcasting till decades
- Spatial scales: from street till global
- Processes: physical, chemical, biological, social
- Earth system elements: atmosphere, water, urban soil, ecosystems
- Different types of observations and modelling
- Links with health and social consequences, services and end-users



← 2-way nesting, Zooming, Nudging, Parameterizations, Urban increment

=> New generation of seamless models integrated with GAW observations



GAW

Modelling Applications SAG

- **SAG contributes to enhancing exchanges between the GAW community and different end-user and modeling communities requested atmospheric composition data, especially for near-real-time data applications on regional to global scales.**
- ***Possible Focus Area on the Arctic as a joint study with YOPP, PACES and AMAP ??***

Science Advisory Group members:

Vincent-Henri Peuch, co-chair, ECMWF, UK

Frank Dentener, co-chair, JRC, HTAP, Italy

Arlindo Da Silva, NASA, USA

Georg Grell, NOAA, USA

Mathew Hort, Met Office, UK

Michaela Hegglin, UniReading, UK

Michail Sofiev, FMI, Finland

Paul Makar, ECCC, Canada

Taichu Tanaka, Japan, ICAP

Zhou Chunhong, CMA, China

Alexander Baklanov - WMO Secretariat representative

Ex-officio from other SAGs:

Greg Carmichael, Iowa Uni, USA – Chair
GAW SSC

Angela Benedetti, ECMWF – SDS-WAS

Gelsomina Pappalardo, Italy - Aerosol SAG

Johannes Kaiser, MPIC, Germany - IBBI

Veronique Boucher, ECCC, Canada - GURME
SAG

Valerie Thouret, France - RG SAG

Alex Vermeulen, Sweden - GHG SAG

Example of the applications in GAW

- *Support of climate negotiations: IG³IS*
- *Ecosystem services: analysis of total deposition, nitrogen cycle, deposition to the oceans/marine geoengineering*
- *Health: sand and dust storms, global and urban air quality, biomass burning*
- *Food security: atmospheric composition and agriculture*
- *Transport security: volcanic ash forecasting*
- *Weather forecasting: aerosol effects on NWP, high impact weather*



World Weather Research Programme

- WWRP: sister programme to GAW
- WWRP: Research activities focusing on high-impact weather – from basic research in the academic community to operational contributions
 - international mechanism to promote cooperative research for improved weather and environmental prediction services over various time scales.
 - ensures the implementation of a research strategy towards the seamless prediction of the Earth system from minutes to months.

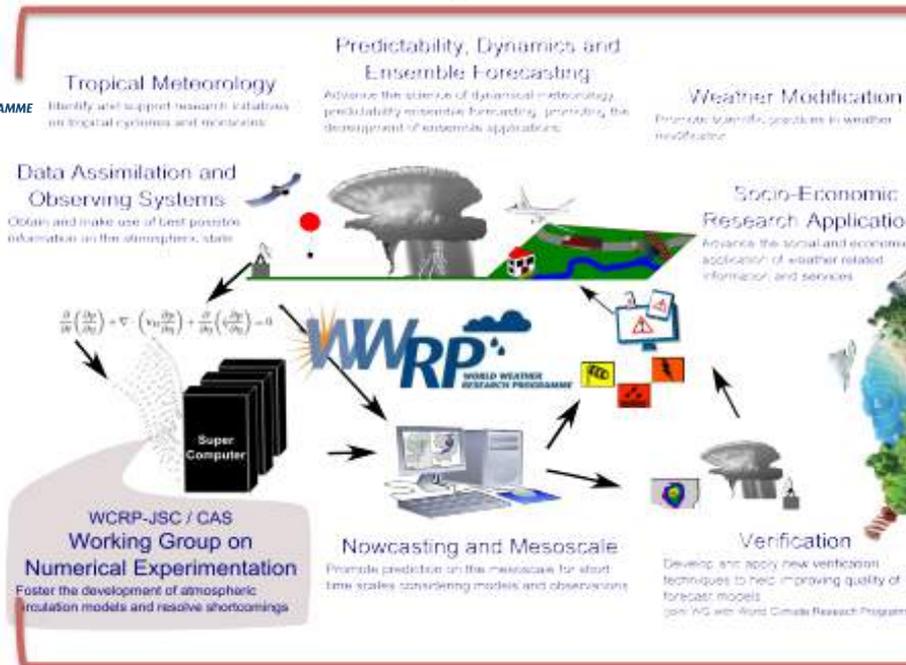


Sarah Jones,
Chair WWRP
SSC, DWD

Paolo Ruti,
Chief WWRP,
WMO



WWRP Working Groups



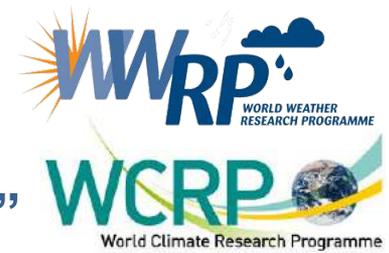
WWRP Core Projects



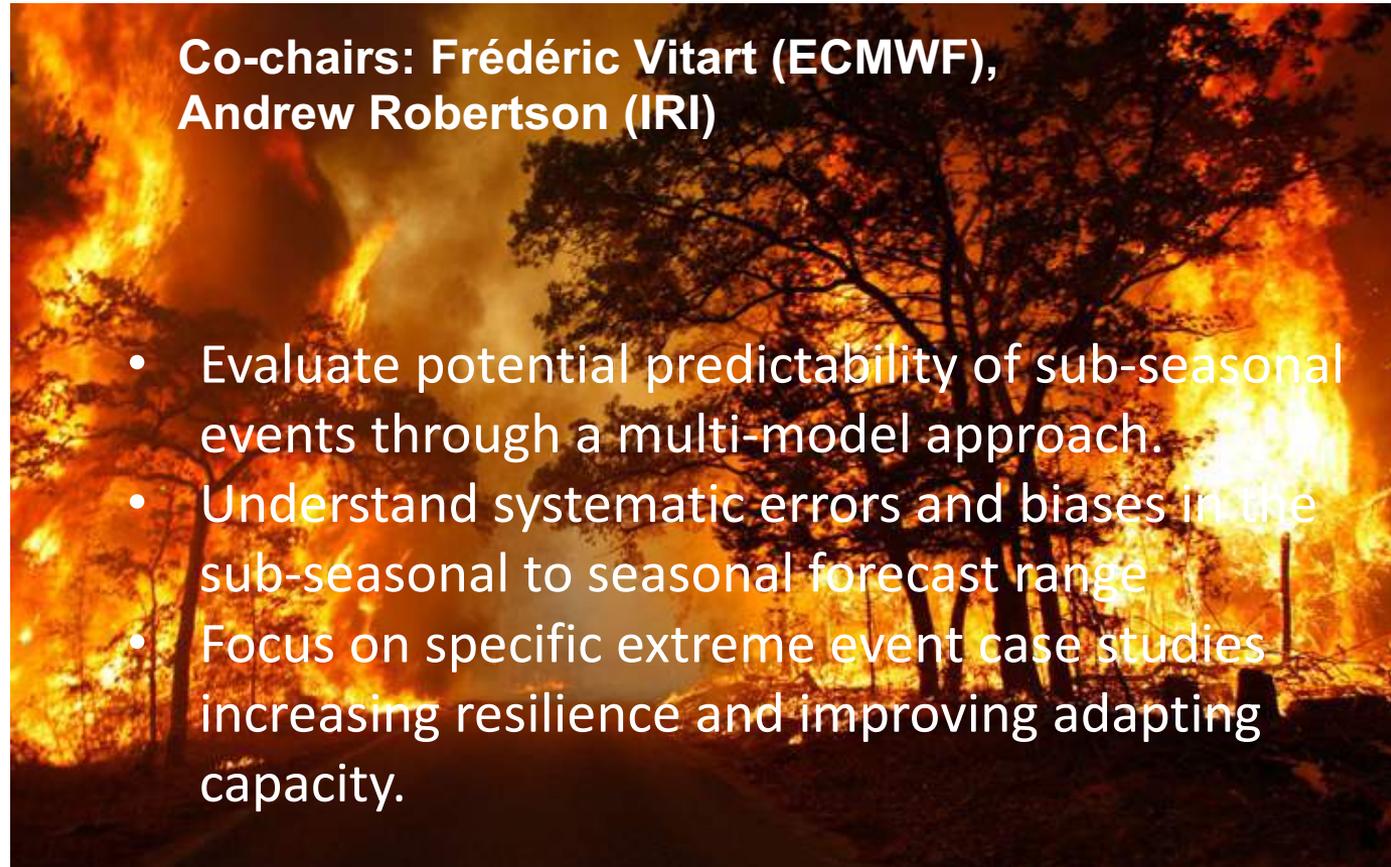
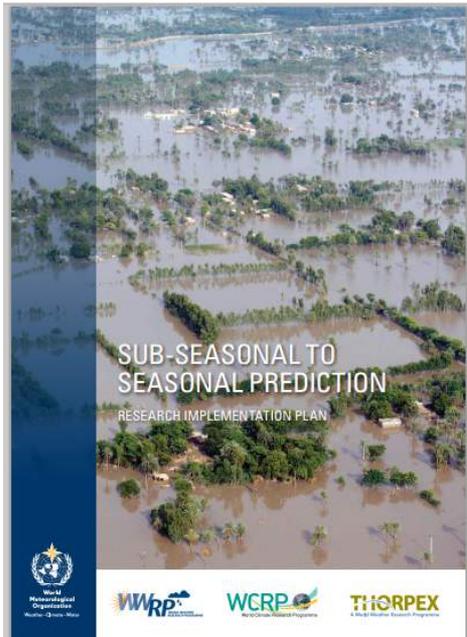


Sub-seasonal to seasonal (S2S)

“Bridging the gap between weather and climate”



New Project



**Co-chairs: Frédéric Vitart (ECMWF),
Andrew Robertson (IRI)**

- Evaluate potential predictability of sub-seasonal events through a multi-model approach.
 - Understand systematic errors and biases in the sub-seasonal to seasonal forecast range
 - Focus on specific extreme event case studies increasing resilience and improving adapting capacity.
- unique data-base for research and impact analysis
 - 11 centers provide S2S sub-seasonal forecast

Project Office:

KMA/NIMR





WMO GAW-WWRP activities related IBBI:



- Prediction of Vegetation Fire & Smoke Pollution as priority
- WMO GAW is one of the co-founders of IBBI
- Joint WMO-IBBI Workshop in Jakarta, Indonesia, 2016
- Vegetation Fire and Smoke Pollution Warning and Advisory System
- Joint IBBI-WMO plan for further studies is needed



Forecasting Emissions from Vegetation Fires and their Impacts on Human Health and Security in South East Asia

International workshop organized by the World Meteorological Organisation (WMO) and the International Biomass Burning Initiative (IBBI)

Supported by the WMO, UNISDR/IWPM, GIZ, IGAC, UNU, the Global Wildland Fire Network and Indonesian Agency for Meteorological, Climatology and Geophysics (BMKG), Jakarta, Indonesia
29 August – 1 September 2016



Thanks!



**We are open for
collaboration with
IBBI!**

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