

# ICAP and GAW Program

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\* On behalf of the GAW SAG App

# Outline

- Global Atmosphere Watch (GAW)
- GAW Observing System
- GAW Modeling and Forecasting Research
- Alphabet soup: SAG App and GAFIS, SDS-WAS, VFSP-WAS
- ICAP participation in GAW

# Global Atmosphere Watch



**GLOBAL  
ATMOSPHERE  
WATCH**

The mission of GAW is to:

- Reduce environmental risks to society and meet the requirements of environmental conventions
- Strengthen capabilities to predict climate, weather and air quality
- Contribute to scientific assessments in support of environmental policy.

Through:

- Maintaining and applying global, long-term observations of the chemical composition and selected physical characteristics of the atmosphere
- Emphasizing quality assurance and quality control
- Delivering integrated products and services of relevance to users.

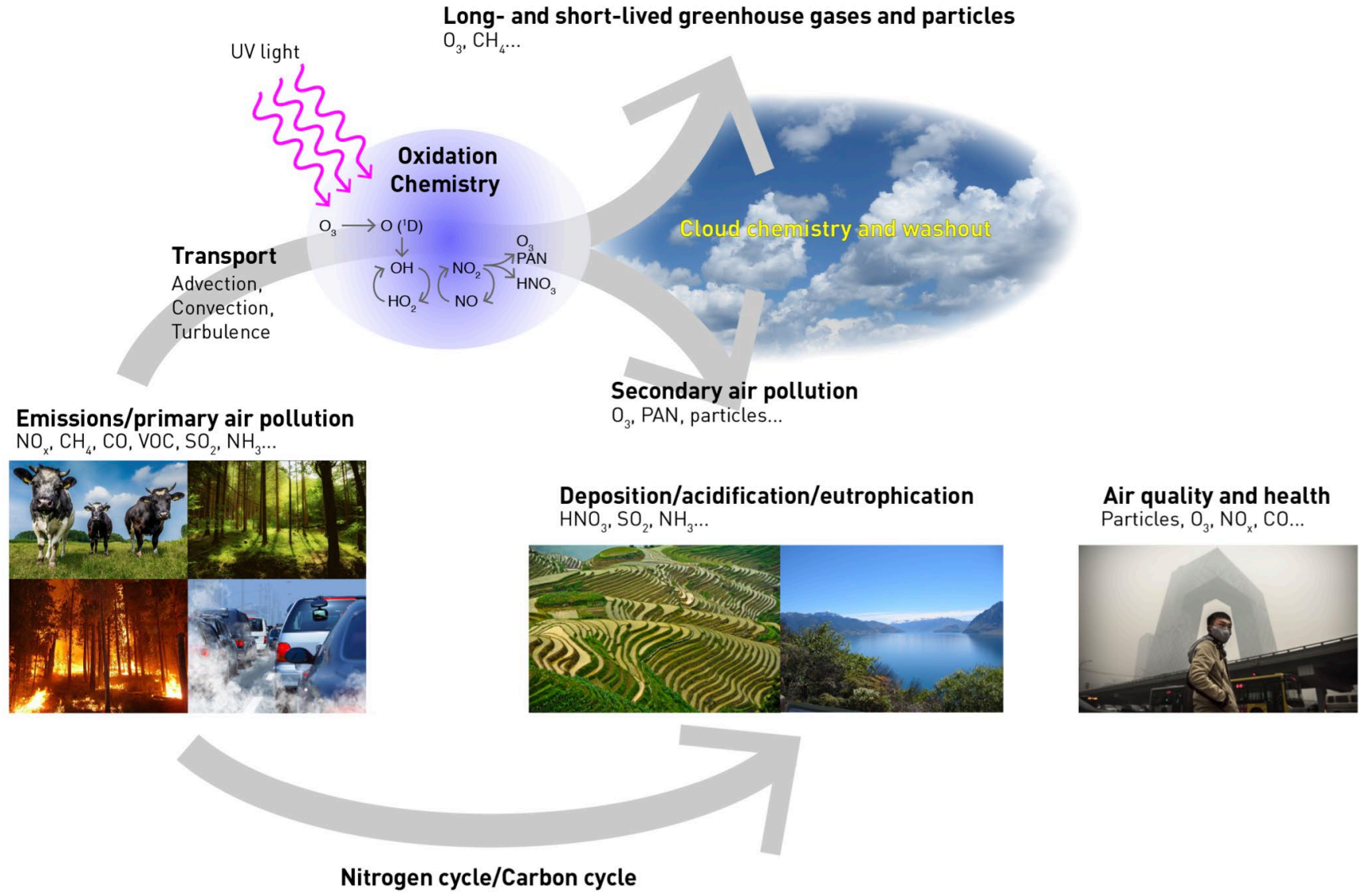


WMO OMM



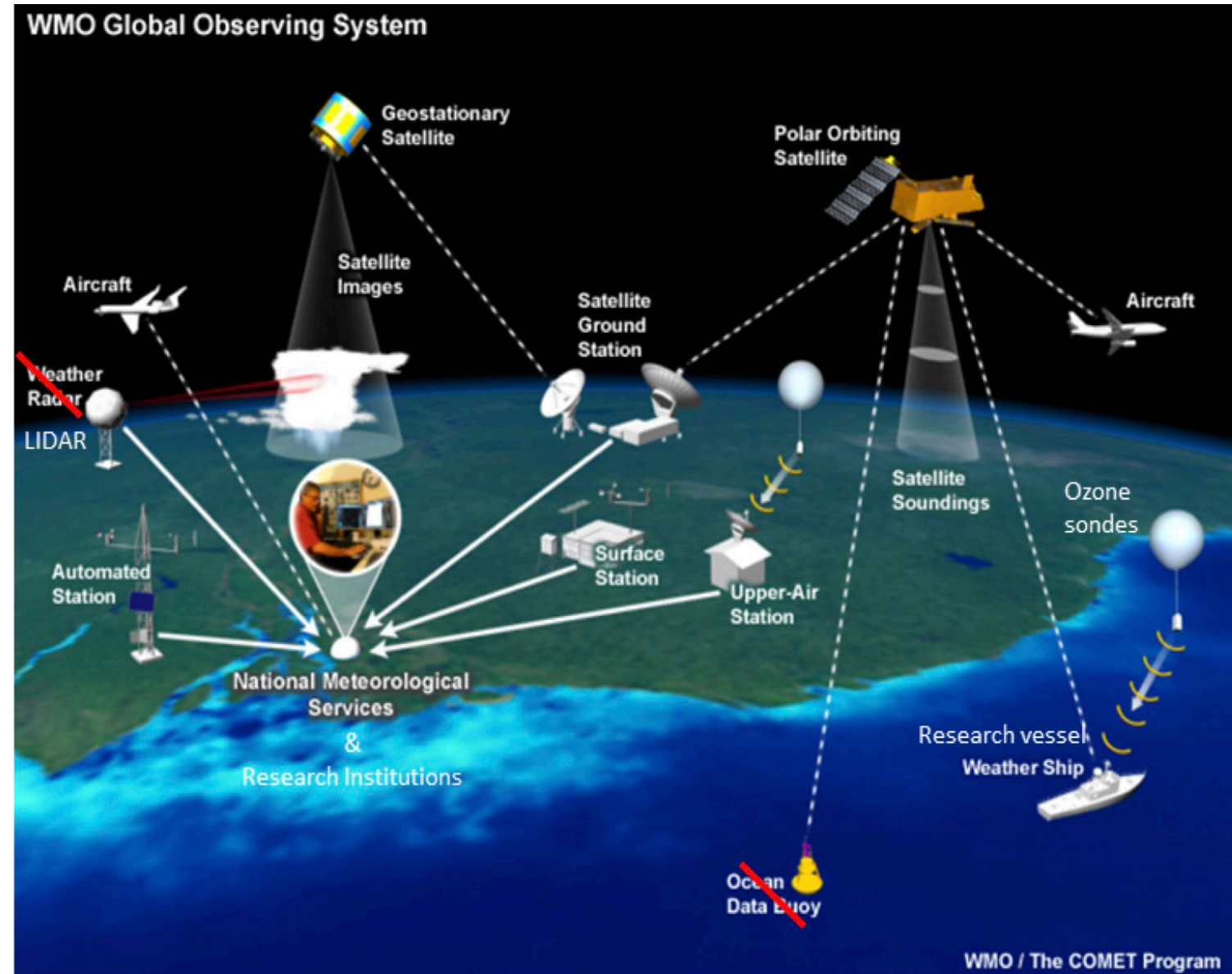
GAW

# Physical and chemical processes that control the composition of the atmosphere



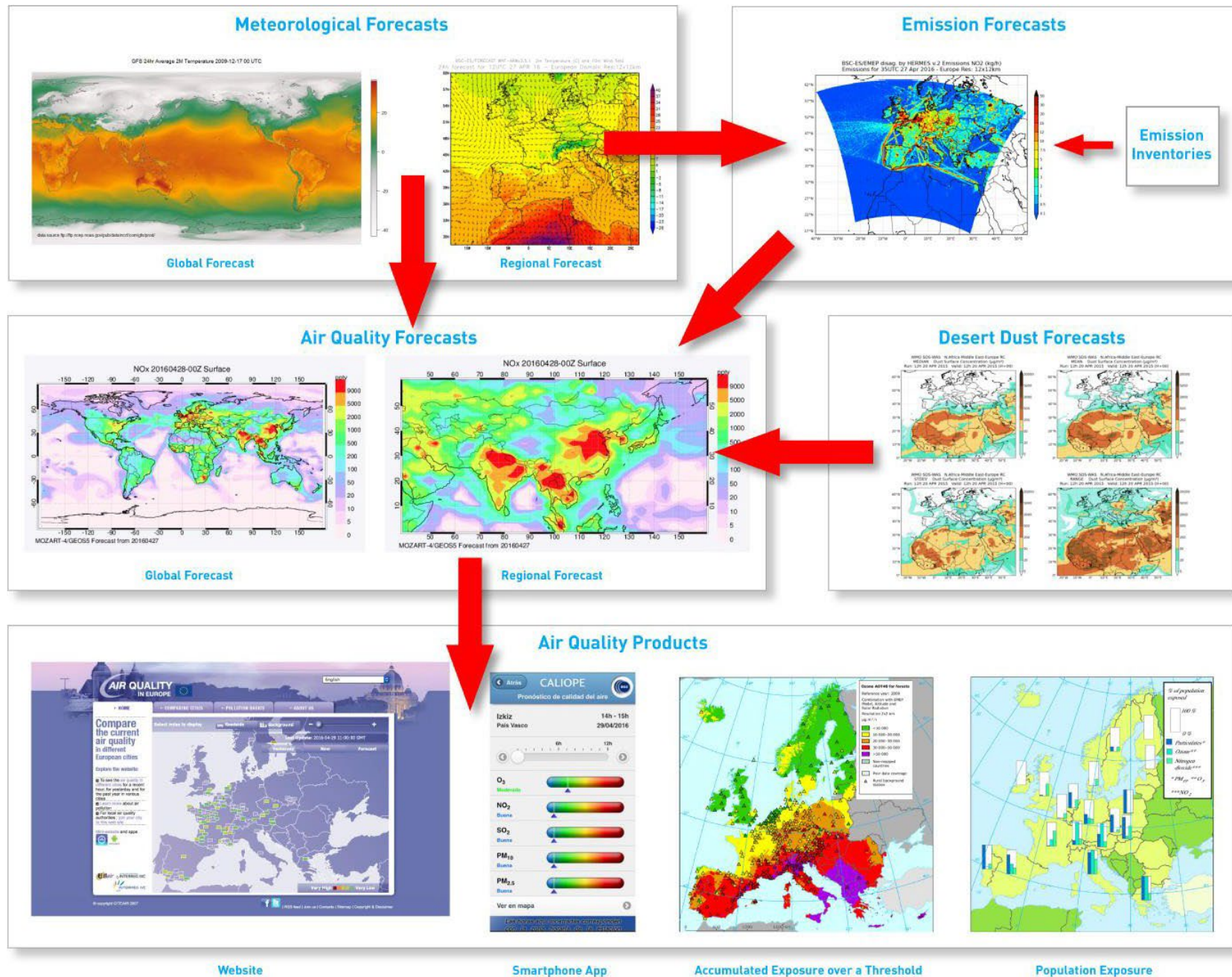
# WMO Global Observing System

The elements not applicable to GAW are crossed





# Schematic overview of GAW modelling and forecasting research



WMO OMM



GAW

# Relevant GAW Groups



## SAG App

Scientific Advisory Group for Modelling Applications

*The main objective of the SAG-Apps is to further develop a portfolio of modelling products and services related to atmospheric composition, and more specifically to demonstrate the usefulness of exchanging chemical observational data in Near-Real-Time in support of monitoring and forecasting applications.*

(**SAG App** → **MOSIS: Modeling Observing System Integration Science**)

## GAFIS

Global Air Quality Forecasting and Information System

*High-level objective: to enable and provide air quality forecasting and information services in a globally harmonized and standardized way tailored to the needs of*

**SAG App** is concerned with the Science of forecast systems while **GAFIS** is focused on operational implementation.

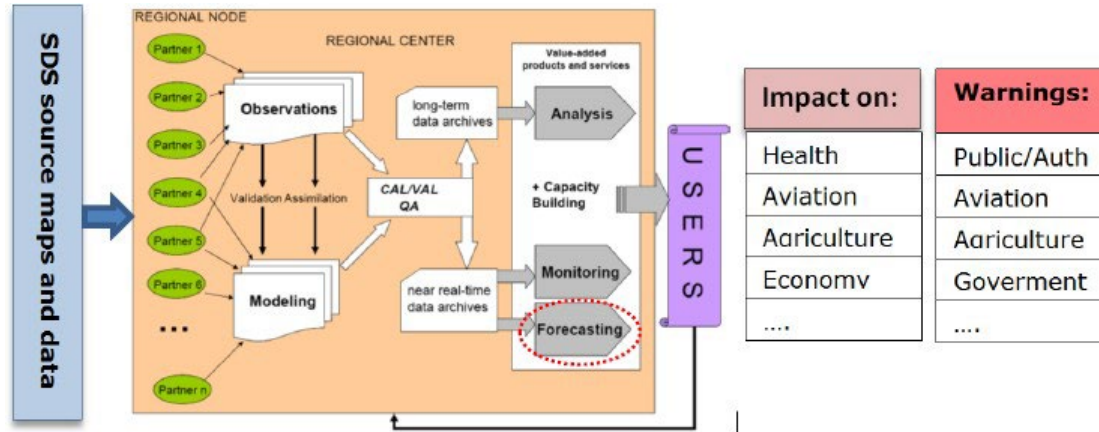
# SAG App priorities

- Scientific support of Coupled Chemistry Meteorology Models (CCMM) and ESM
  - Regional / global scale
- Atmospheric Composition (AC) in ESM
  - role of aerosols and reactive gases in ESM models
  - coupled chemistry and meteorology, feedbacks
- Technology development and evaluation
  - Data Assimilation, Data Fusion, Data Quality
  - Source inversion (aerosols, reactive gases, GHG)
  - Parameter estimation
- Topical contributions
  - vegetation fires: monitoring, prediction, emission assessment, plume modelling
  - wind-blown dust: monitoring, modelling, biological composition of dust
  - ABL processes: surface-atmosphere exchange, weather, AQ, and climate impact
- New contributions
  - Machine Learning and AI in ESM modelling
  - bioaerosols: monitoring, modelling



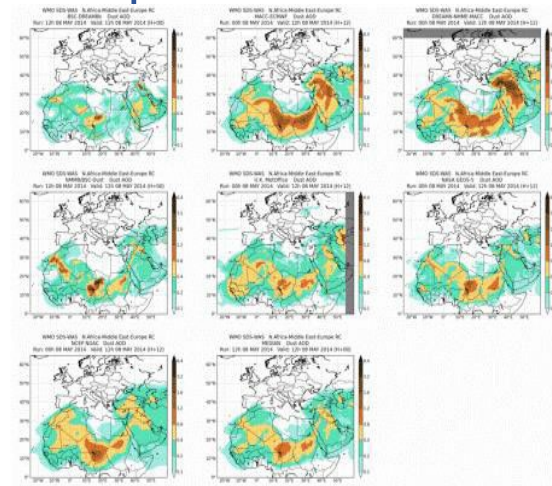
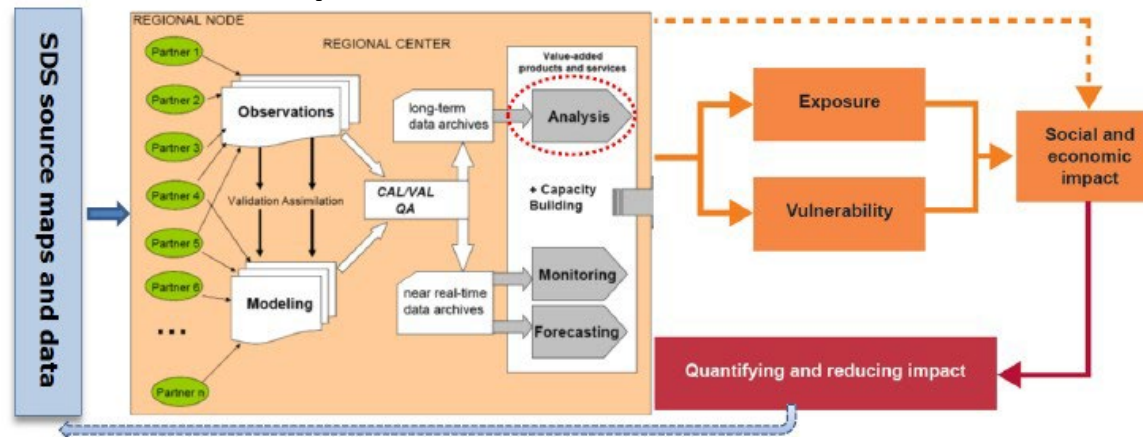
# WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) for UN SDS Coalition

## SDS-WAS for Early Warning:



- 9 global models
- 11 regional models
- 25 organizations
- 3 regional nodes & centers (*NAMEE, Asia, Americas*)
- 2 regional dust operational centers

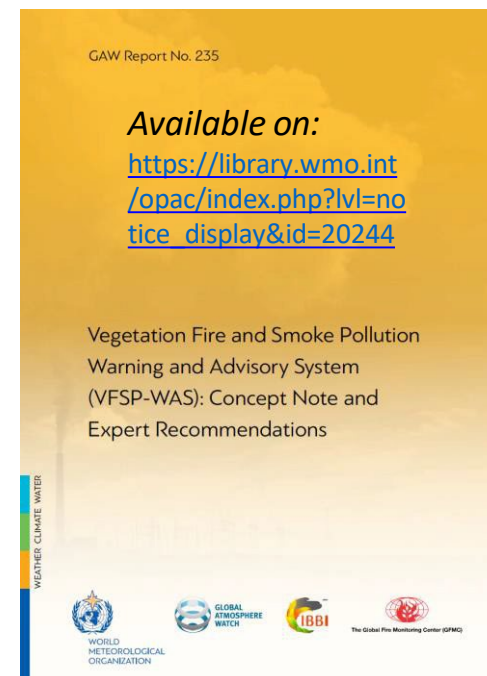
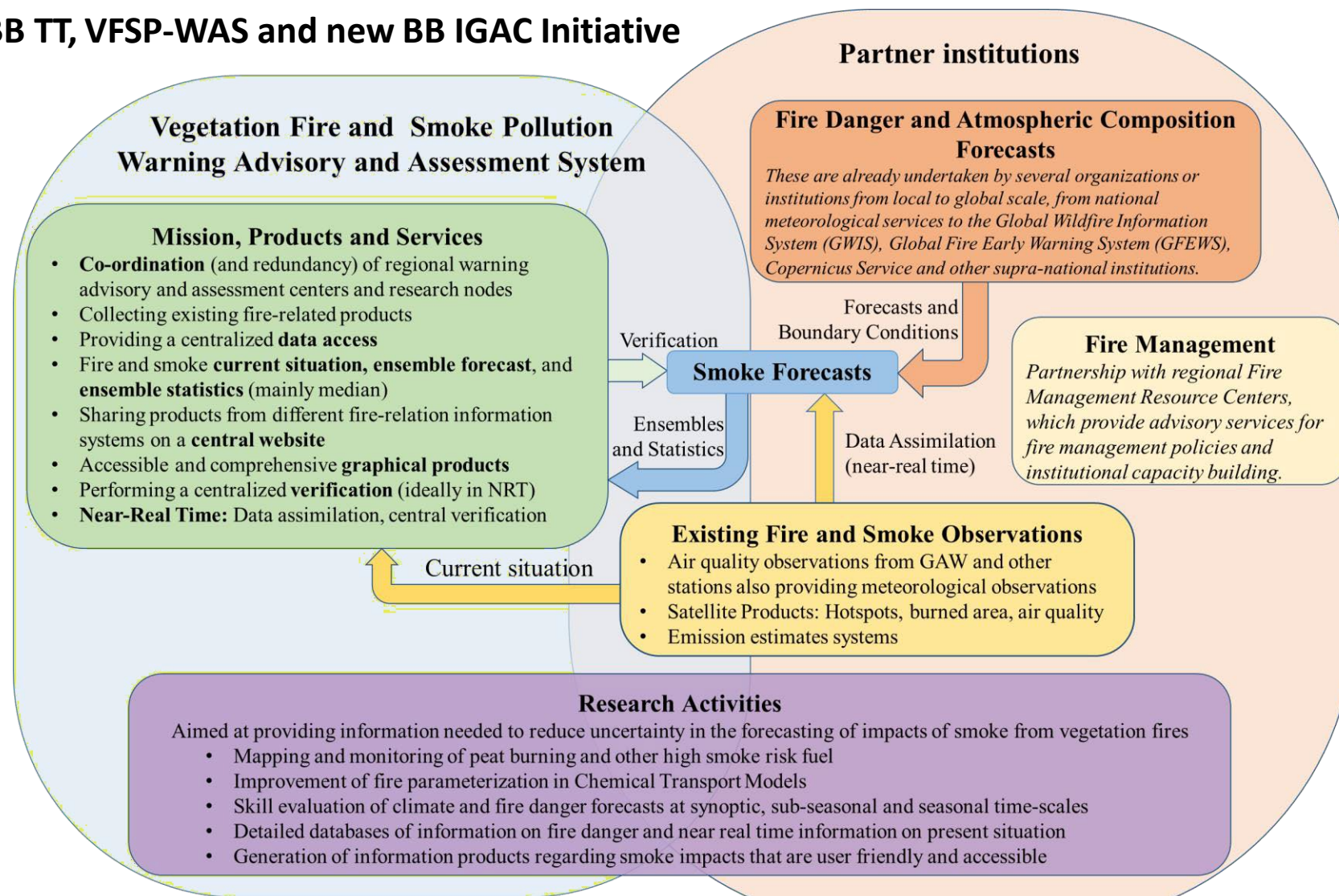
## SDS-WAS for Impact Assessment:



# Vegetation Fire and Smoke Pollution Warning Advisory and Assessment System (VFSP-WAS)

<https://community.wmo.int/activity-areas/gaw/science/modelling-applications/vfsp-was>

## GAW BB TT, VFSP-WAS and new BB IGAC Initiative



**Two first WMO VFSP-WAS regional centers on R&D phase:**

- 1) for SE Asia (MSS, BMKG, etc) – hosted by MS Singapore
- 2) for **Northern America** (ECCC, NOAA, etc.) – hosted by Env. Canada

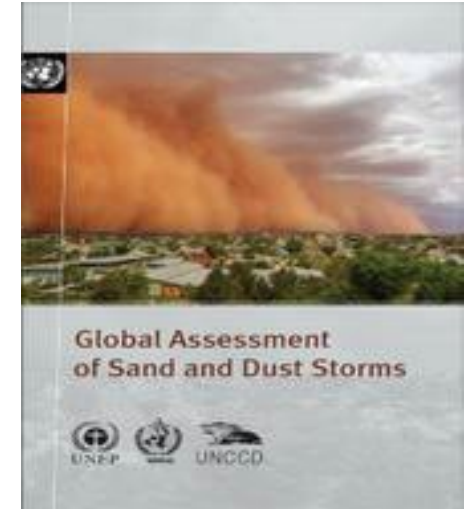
# ICAP and WMO's GAW Program

- **ICAP** joined as the 1st modeling contribution network to GAW
- Close & long-term collaboration with SDS-WAS, soon VFSP-WAS
- **Priority for collaboration:**
  - NRT GAW data access, friendly interface for ICAP modelers
  - Contribution to global SAG App & GAFIS, VFSP-WAS, SDS-WAS, etc.
  - Joint evaluation studies
- **SAG App** representatives in ICAP – Taichu Tanaka, Arlindo da Silva

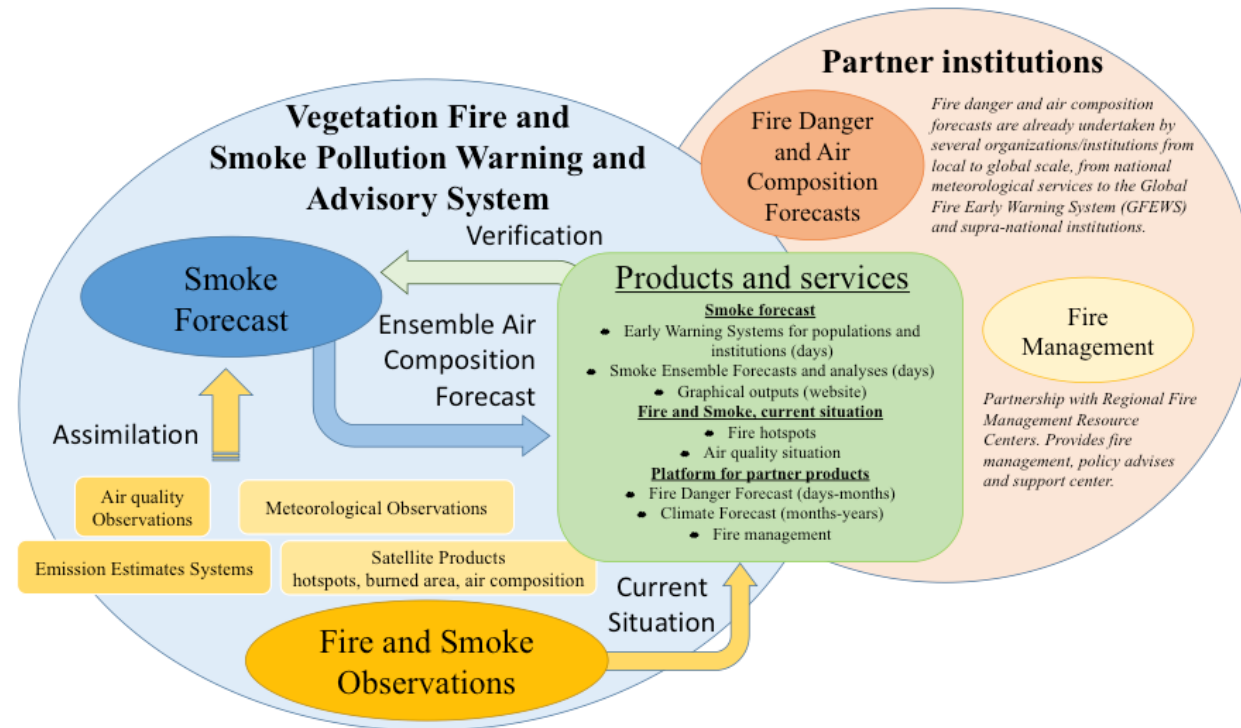
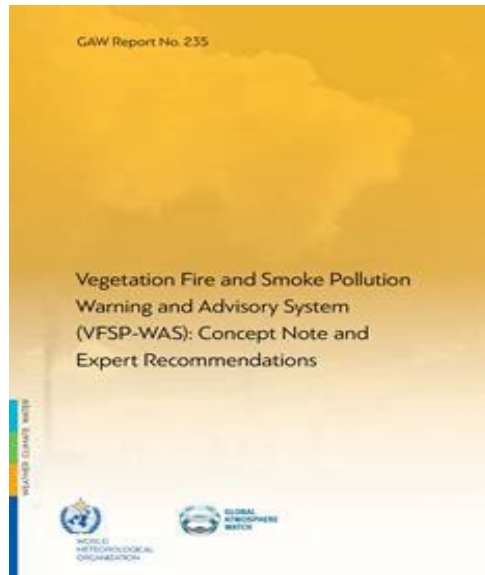
# Extra Slides

# Support of assessment of human health impacts

- Global Assessment of Sand and Dust Storms, a report jointly written by the United Nations Environment Programme (UNEP), WMO and the United Nations Convention to Combat Desertification (UNCCD) – WMO SDS-WAS supported the assessment



## Vegetation Fire and Smoke Pollution Warning and Advisory System



# Air Quality Prediction & Forecasting Improvement for Africa (PREFIA) Initiative



**Aim:** To develop and improve air quality prediction and forecasting capabilities and related meteorological analysis for African applications through an international **science and training** effort.

**Output:** The scientific development of a multiscale prediction and forecasting framework will be a key instrument to support air pollution training management strategies for Africa e.g.

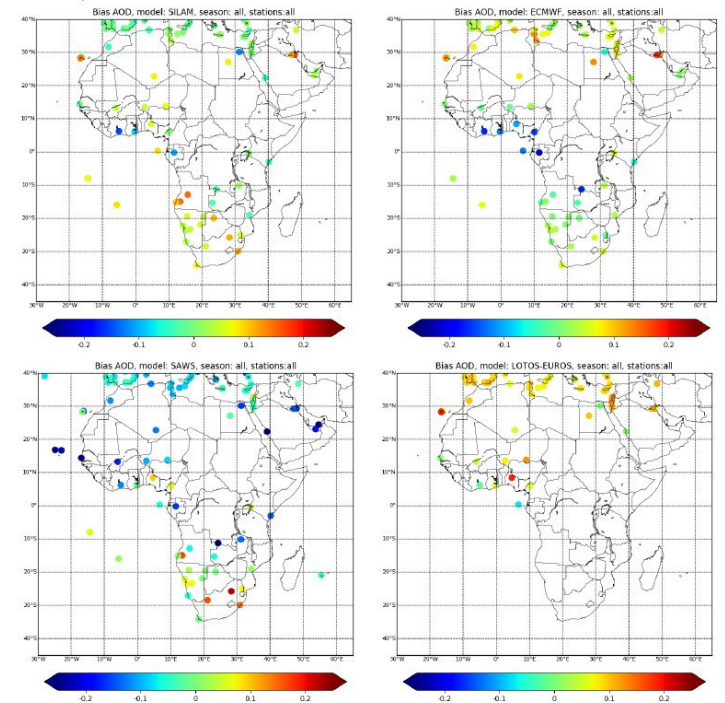
- Local, short term measures
- A regional response for longer term improvements in air quality;
- Contributions from long range transport;
- Quantifying health outcomes resulting from exposure to air pollution



## Training Materials and Best Practices for Chemical Weather/Air Quality Forecasting:

[https://library.wmo.int/docnum.php?explnum\\_id=10439](https://library.wmo.int/docnum.php?explnum_id=10439)

## Evaluation of AQ forecasting models for Africa



**Africa focus: DACCIVA, MAP-AQ, PREFIA, SPARA & new training, CLARA, GEIA WG, etc.**

Workshop on "Air Quality (AQ) Prediction and Forecasting Improvement for Africa (PREFIA)" and Training Course on "Seamless Prediction of Air Pollution for Africa (SPAPA)"

(WMO Regional Training Centre (IMTR), Nairobi, Kenya)



PREFIA Workshop, 7-8 October 2019



SPAPA Training Course, 9-12 October 2019



THE AFRICA-EU PARTNERSHIP  
LE PARTENARIAT AFRIQUE-UE



# APP SAG & WHO collaboration outcomes

- Shaddick, G.; Salter, J.M.; Peuch, V.-H.; Ruggeri, G.; Thomas, M.L.; Mudu, P.; Tarasova, O.; Baklanov, A.; Gummy, S. Global Air Quality: An Inter-Disciplinary Approach to Exposure Assessment for Burden of Disease Analyses. *Atmosphere* 2021, 12, 48, <https://doi.org/10.3390/atmos12010048>
- Second paper: The contribution of dust to global fine particulate air pollution; by J.M. Salter, G. Shaddick, V.-H. Peuch, O. Tarasova, A. Baklanov, P. Mudu, S. Gummy; is in revision.
- New report and webinar are in plans
- APP SAG is linked with new WHO WGs (Vincent-Henri is its member)



WMO is working together with the World Health Organization to tackle environmental health risks that cause an estimated **12.6 million** premature deaths every year.



WMO OMM

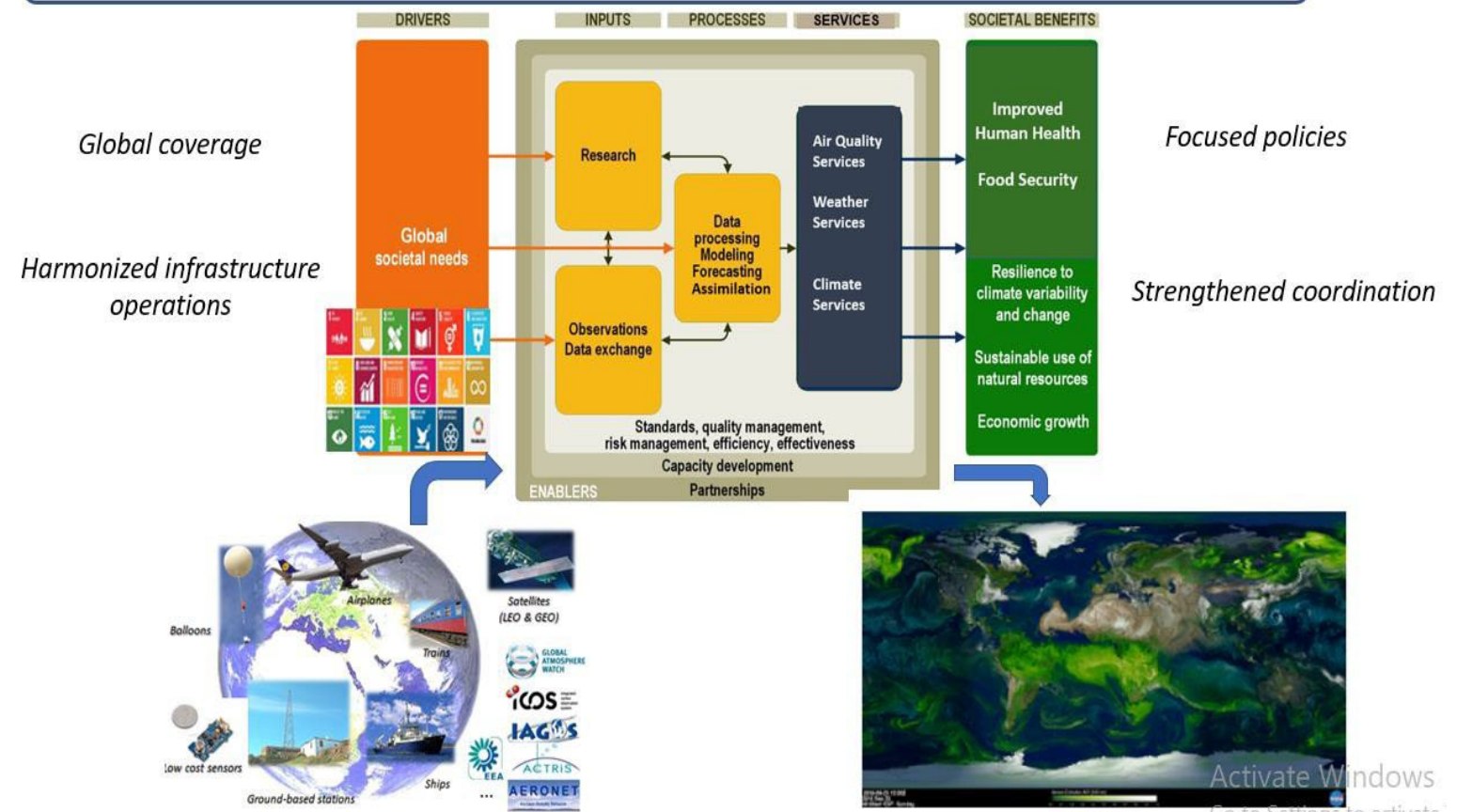


GAW

# GAW IP2024 Strategic Objectives aligned explicitly with new WMO strategic plan supporting Research, Infrastructure, Service and Capacity/regions

**Theme:** Advance and enhance atmospheric composition-related services and infrastructure, and support policies for society through applied research aimed at improved understanding of the roles of aerosols, reactive gases, and greenhouse gases in the Earth System.

*Achieving a comprehensive atmospheric composition observing and analysis infrastructure by closely linking operations and research*







# GAW Strategic Objectives

1

Strengthen the atmospheric composition (AC) infrastructure to better facilitate understanding of sources, sinks and transformations, and develop new services.

2

Improve predictive capabilities and analysis through applied research aimed at advancing the understanding of the roles of aerosols, reactive gases and greenhouse gases in the Earth System

3

Advance the application of AC information in support of policies and conventions, and expand societal services related to air quality and health, climate change and food security.

4

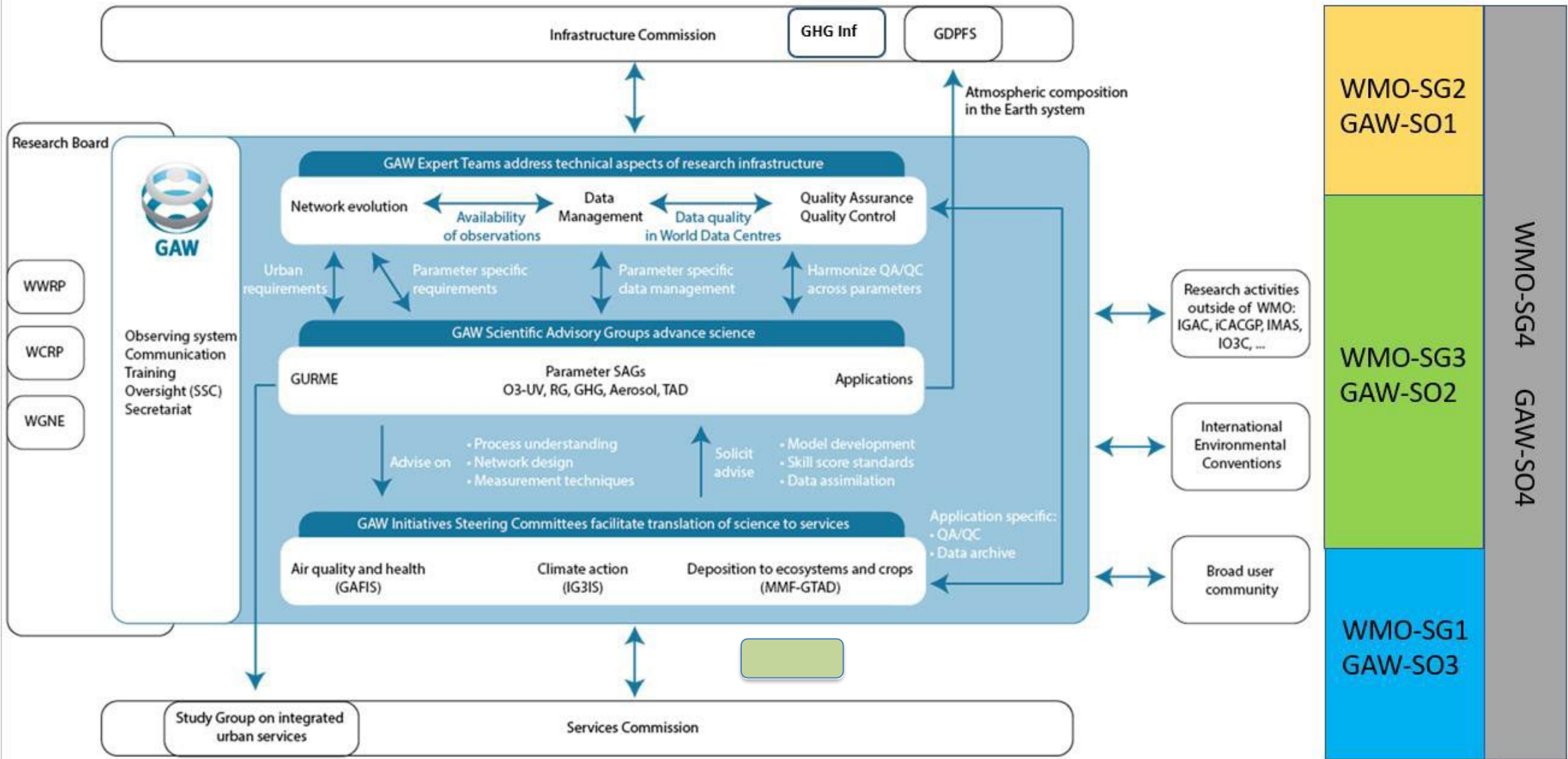
Enhance the capacity to the acquirer and use AC information and related services by better engaging member states, expanding regional outreach and promoting regional GAW developments, and better communicating the essential importance of atmospheric composition in advancing sustainable development goals.



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GAW



# Mapping of activities of GAW, WWRP and WCRP

## Current and future joint topics, a preliminary view

