"Seamless Prediction of Air Pollution for Africa: from Regional to Urban"
Overview of WMO news and current status after the Pretoria workshop

The EGU splinter meeting for the Africa AQ initiative
Vienna, Austria, Tue, 10 Apr, 08:30–10:00 / Room 2.83
https://meetingorganizer.copernicus.org/EGU2018/session/29948

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World Meteorological Organization
Organisation météorologique mondiale

Splinter Meeting Draft Agenda
(with very short talks and more discussions):

1. Alexander gives a brief overview of WMO news and the current status after the Pretoria workshop;

2. Kobus gives overview presentation from African partners;

3. All Topics/WGs leaders/members, who are available, give a short status of their Topic (e.g. Emission by GEIA or Mikhail, etc.)

4. CAMS/ECMWF/APP SAG colleagues, e.g. Angela give short view from Global to PanAfrican

5. Guy is not on EGU, but if some of his colleagues are here (or on teleconf), e.g. Katinka, provide their view/news.

6. Mikhail informs about FMI and EU relevant news

7. Paul Young informs about UK efforts and his news

8. All others, please, suggest if you wish to inform/present...

9. DISCUSSION on the current status, coordination and further steps with this initiative.

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Participants by teleconference

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- × j.kaiser@mpic.de
- ×

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International Workshop "Seamless Prediction of Air Pollution for Africa: from Regional to Urban" Pretoria, S.Africa, Dec 2017. <u>Main objectives:</u>

- To establish together with the MAP-AQ (Monitoring, Analysis and Prediction of Air Quality) core group and Global Atmosphere Watch (GAW) teams (SAG-GURME and SAG-Application) a number **of federated projects** and a sustained **network of partners** with complementary expertise, which will:

- develop and implement a **forecast and assessment system for air quality (AQ) over Africa** with downscaling capability over certain African countries and cities in support of different applications.

- To help decision makers to improve air quality and public health, mitigate the occurrence of **acute air pollution episodes**, particularly in urban areas, and reduce the associated impacts on agriculture, ecosystems and climate.

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Towards Integrated Air Quality Forecast Systems in Africa

Summary:

A Plan for Action

(elaborated on the Workshop)

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Statement (1)

- The energy resources in Africa are increasingly stressed by the rapid growth in population and in the economy. As a result, air pollution, which already exceeds national and international thresholds on a regular basis in many hotspots across the continent, is posing a serious threat to human health especially in rapidly developing urban areas.

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Statement (2)

- To mitigate air pollution effects on human health, air quality forecasting systems with warning capability to inform population of expected acute pollution events must be developed.

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Statement (3)

- With the scientific and technical capabilities existing in Africa and abroad, a pan-African forecast system including meteorological information, knowledge of emissions, availability of space and in situ observations could be co-developed with the support of weather and environmental services, universities and research centers, the involvement of users and other stakeholders and the international coordination of WMO and partners.

- The monitoring, analysis and forecasting systems will operate at different spatial scales from the pan-African scale to the regional, national, urban and sub-urban scales.
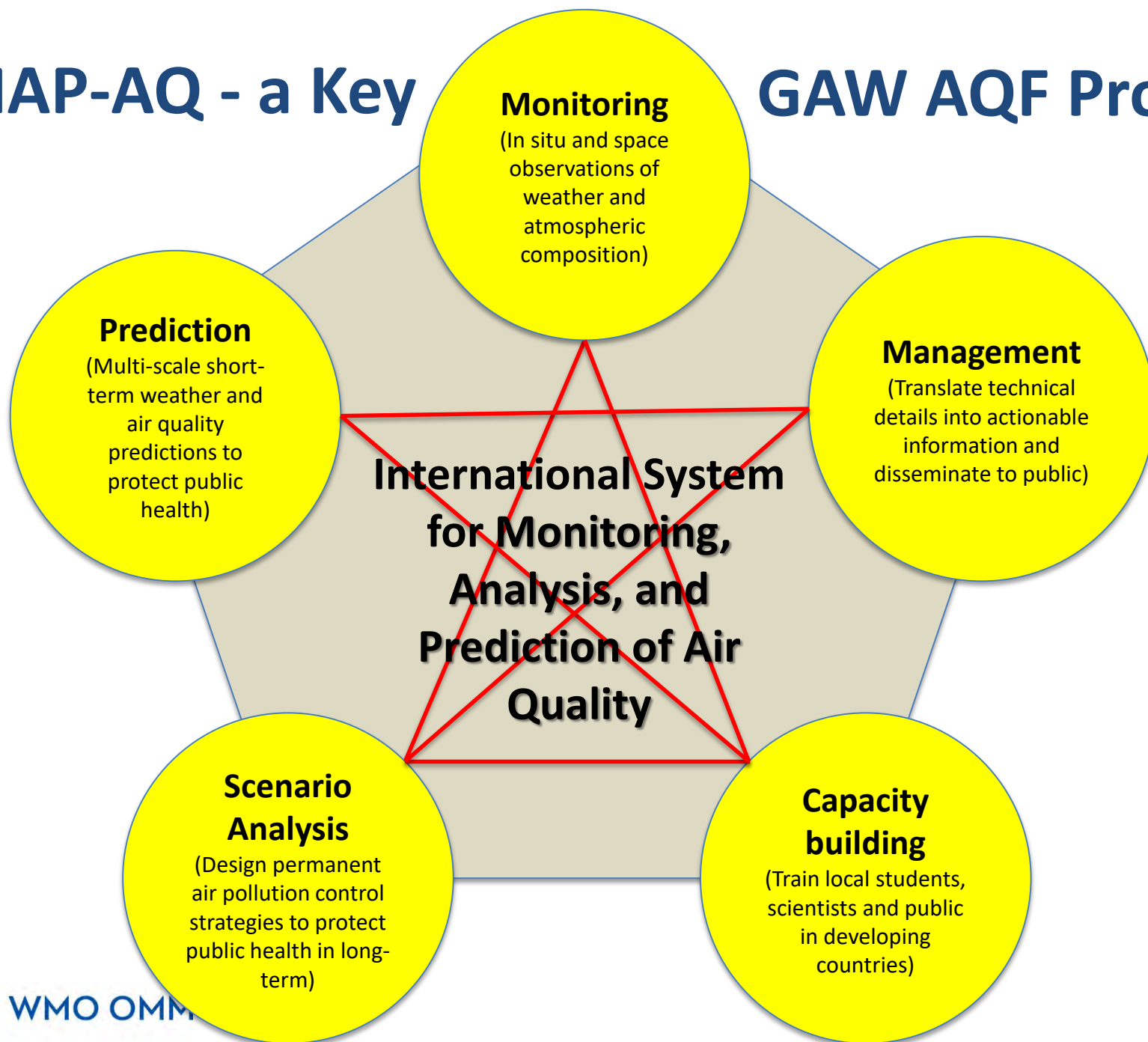
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Statement (4)

- The project will facilitate the development and improvement of the infrastructure (intellectual and facilities) and will enable a broad host of applications beyond the existing ones. It will also support capacity development by joint educational and training initiatives.

- In addition to determining the short-term risks of air pollution, the project will support assessments that will help improve air quality in the long-term under different socio-economic pathways and climate scenarios.

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MAP-AQ - a Key GAW AQF Project

Monitoring (In situ and space observations of weather and atmospheric composition)

Prediction (Multi-scale short-term weather and air quality predictions to protect public health)

Management (Translate technical details into actionable information and disseminate to public)

Scenario Analysis (Design permanent air pollution control strategies to protect public health in long-term)

Capacity building (Train local students, scientists and public in developing countries)

International System for Monitoring, Analysis, and Prediction of Air Quality

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MAP-AQ: The Regional Dimension

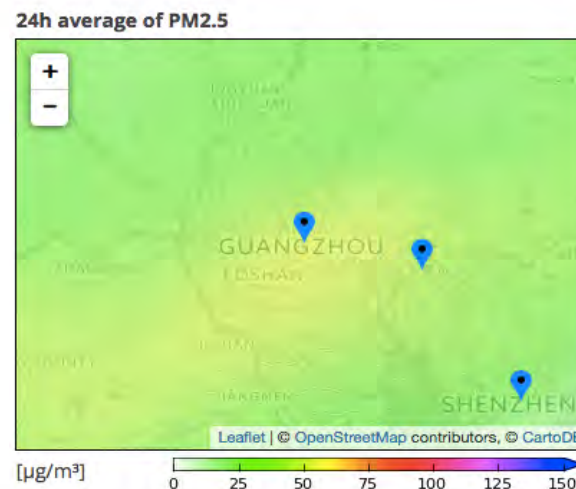**Panda & MarcoPolo Projects in Asia:** http://www.marcopolo-panda.eu/forecast
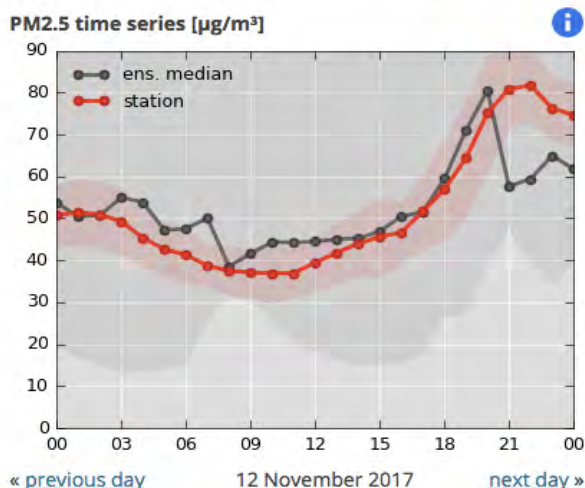
Papila Project for Latin America

GURME Projects for Asia and Americas

SDS-WAS Project & NAMEE Node for Africa, Europe and ME

Air Quality Forecast for Guangzhou

The Vision for the Project

Issues
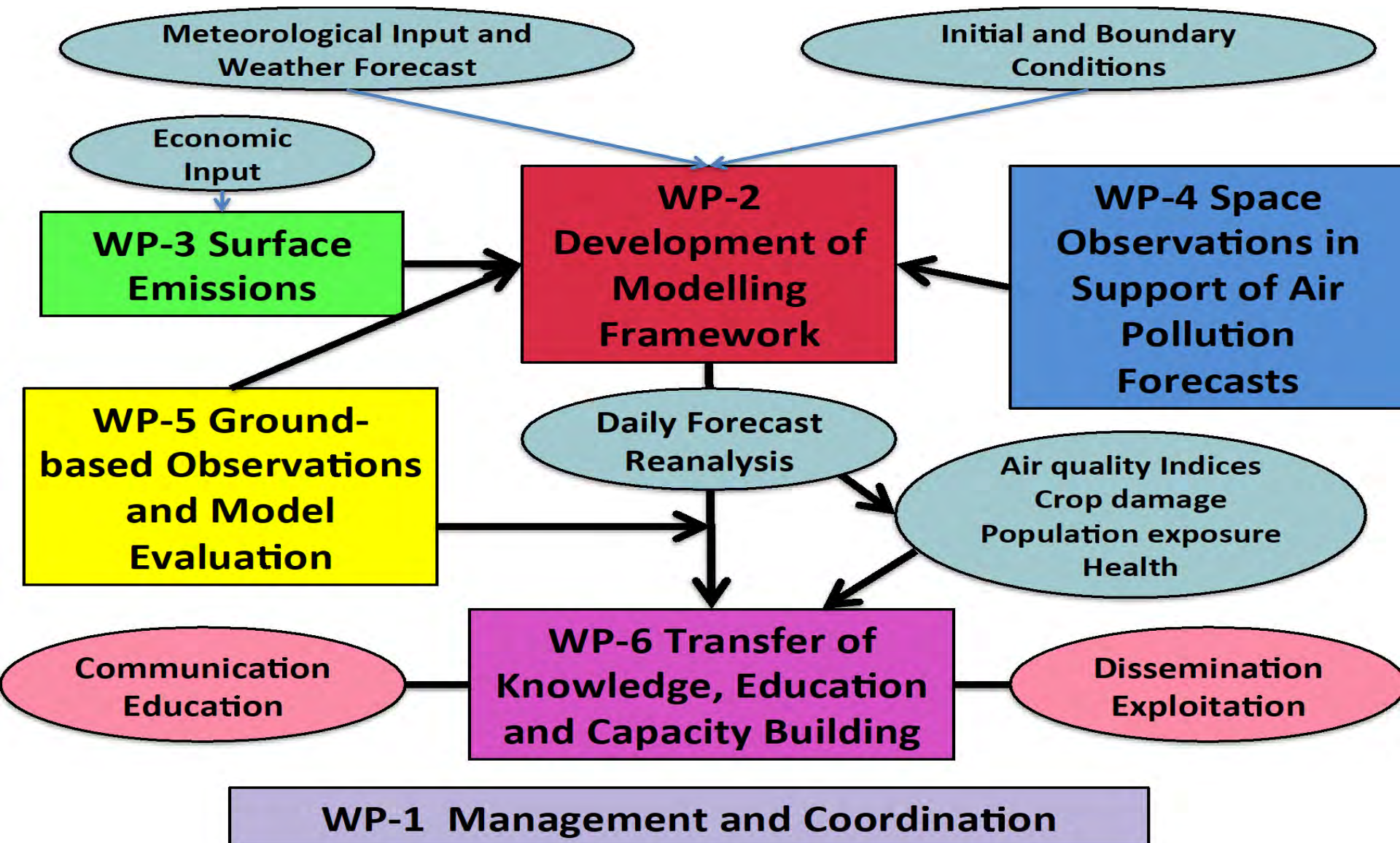
❖ Emissions

❖ Observation

❖ Modeling

❖ Infrastructure

Regions

❖ Africa

❖ Pilot regions

❖ Pilot countries/cities
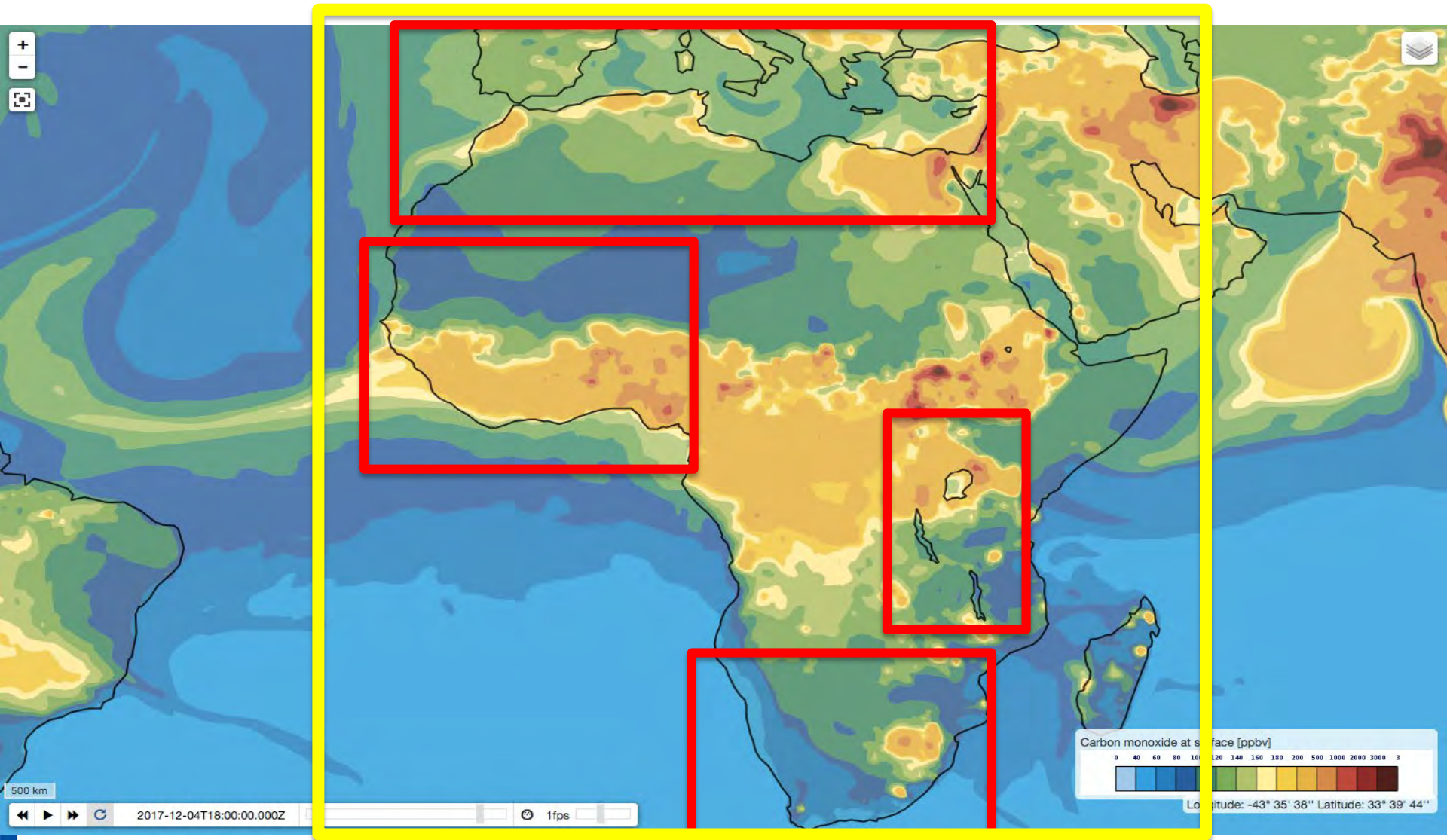
Dissemination

❖ Products, Services

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The Different Elements of the Project

Using Global AQ Forecasts (CAMS and others) for Regional and Urban Downscaling in Africa

See: http://www.wmo.int/pages/prog/arep/gaw/WorkshoponSeamlessPredictionofAirPollutionforAfrica.html

Matrix

Region	Emissions	Obs (in situ)	Obs (space)	Modeling	Dissemination/ End-users/ Capacity building
South					
East					
North					
West					
All regions of Africa					

Seamless approach: regional-national-urban (Please suggest cities!)

Essential Aspects

- High-level international Initiative
- Driven by Needs (Interaction with stakeholders)
- Framework: MAP-AQ under GAW under WMO. Open to other groups
- Three-levels
  - Pan-African
  - Regional
  - Country to cities
- Two-way flow of information between levels

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Essential Aspects

- Areas to focus on:
  - Emissions
  - Observations
  - Models (to test knowledge and deliver products)
  - Capacity building
  - Infrastructure to share data and capacity
- Collaborative aspects (teams) to stimulate exchanges

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Essential Aspects

- Make progress beyond current status (Importance of scientific research – IGAC)

- Co-design and co-produce information service (Involvement of Met and Environmental Services)

- Advertise results, organize training and capacity building (Role of WMO, individual initiatives, and MAP-AQ)

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Development of the Plan for the project

- **March 2018**: Drafts of the input to the plan

- **May 2018**: Final Draft for the input to the plan

- **July 2018**: publication of the entire Plan

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Main News after the Workshop

- Web-site:
  http://www.wmo.int/pages/prog/arep/gaw/WorkshoponSeamlessPredictionofAirPollutionforAfrica.html
- Questionnaire to African partners & Survey
- Contributions from WGs and Countries
- Draft Report / White Paper – *Leader is needed*
- Concept of the Project
- MAP-AQ as a key GAW WMO Project
- Prepared a Draft Decision for EC-70 (June 2018)
- Coordination and Resource mobilization
- Several proposals: submitted, preparing, in plan
- First steps and draft plan

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Proposals: drafts, plans and ideas

- WMO Resource Mobilization Department
- Copernicus Africa Program
- Proposal **AFAIR (A**ir quality **F**or **A**frica **I**nnovative **R**esearch network), **Call: H2020-MSCA-ITN-2018**
- PREFIA proposal / AQMEE-II / CORDEX for Africa
- USA NCAR / NOAA / NASA ideas of proposal(s)
- New EU Call for Africa (more climate oriented)
- COST: InDUST Action, other suggestions?
- UK, Norway, Sweden, France, Germany, …

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Prediction and Forecasting Improvement for Africa (PREFIA): the way forward

Some of the immediate actions are:

- Define the first model intercomparison base case for 2015
- Coordinate emissions inventory for the base case
- Coordinate observational datasets
- Consider common model evaluation protocols to compare outputs
- Archiving model input and output datasets and observation datasets
- Agree on timescales. We have suggested a workshop ~ Oct/Nov 2018 – need a venue

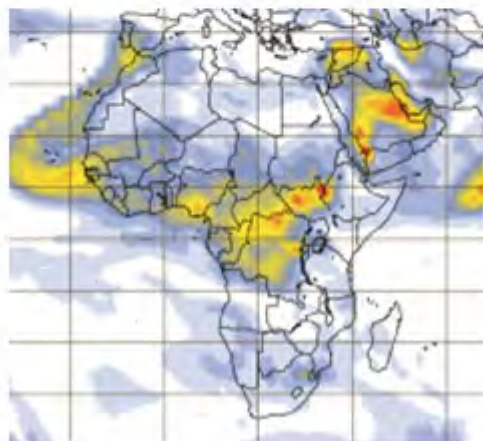Contact: Prof. Ranjeet Sokhi

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Draft of the report

World Meteorological Organisation (WMO)

Global Atmosphere Watch (GAW)

WMO Report on

International Workshop

"Seamless Prediction of Air Pollution for Africa:

from Regional to Urban"

March 2018

DRAFT CONTENTS

GROUP PICTURE

EXECUTIVE SUMMARY

1. INTRODUCTION (based on the Workshop program)

2. STATEMENT (based on the draft prepared by Guy et al.)

3. STATE OF THE SCIENCE, KNOWLEDGE AND PRACTICE FOR MAIN TOPICS (4-6 pages for each topic)

3.1 Emissions

3.2 Observations

3.3 Pan-African forecasts and related products (modelling)

3.4 "Priority areas" forecasts and related products (sub-regions)

3.5 Dissemination of data and on web & mobile platforms

3.6 ....

4. STATUS REPORTS FOR SELECTED COUNTRIES (2-4 pages for each country following an extended template suggested by Kobus)

4.1 S. Africa

4.2 Cote d'Ivoire

4.3 Egypt   Comment [A51]: Missing

4.4 Morocco

4.5 Namibia   Comment [A52]: Only questiona

4.6 Nigeria

4.7 Rwanda

4.8 Senegal   Comment [A53]: Missing

4.9 All other countries are welcome (we need to think how to open the door for other countries)

5. RECOMMENDATIONS AND PATH FORWARD FOR A GAW MAP-AQ Africa PROJECT

REFERENCES

Annex I - List of participants

Annex II - Workshop agenda

Annex III – Workshop context, discussion topics, sub-regional groups, ...

Additional Slides for discussion

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Parallel implementation & planning sessions

Emissions	GEIA - M. Sofiev/ R. Kouznetsov (FMI)
Observations	C. Galy-Lacaux (Lab. Aérologie)
Pan-African forecasts and related products	R. Sokhi (Uni Hertfordshire)
"Priority areas" forecasts and related products	K. Pienaar (NW Uni)
Dissemination of data and on web & mobile platforms	M. Gauss (Met Norway)
Wrap-up discussion on the action plans	A. Baklanov (WMO)

Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)

WMO SDS-WAS Asia/Central Pacific RC
Sand and Dust Storm Forecasting (2013-02-28 03:00 UTC)

SDS Forecasting
No SDS
Suspended dust
Blowing sand
Sand and dust storm
Severe SDS
Extreme severe SDS

❑**Objectives:**

▪ **To enhance the ability of countries to deliver:**
  - ▪ timely and quality forecasts of sand and dust storms,
  - ▪ observations of aerosols: sand and dust
  - ▪ information and knowledge to users

  through

  an international partnership of research and operational experts and users

❑**Global Coordination**: Three Regional Nodes (**North Africa, Europe and Middle East Node**, (East) Asian Node and Pan-American Node) need global coordination to exchange information and enhance collaboration. The West Asian Node will also be established in near future.

❑**First Operation Centre opened in Spain:** The Barcelona Dust Forecast Centre was inaugurated in 2014.

❑**Trust fund and Steering Committee**: to ensure the global coordination activity on SDS-WAS.

Web: http://www.wmo.int/pages/prog/arep/wwrp/new/Sand_and_Dust_Storm.html
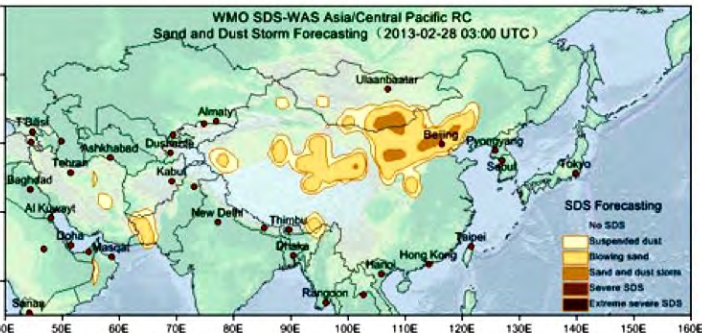
NA-ME-E Exchange of SDS Model Products
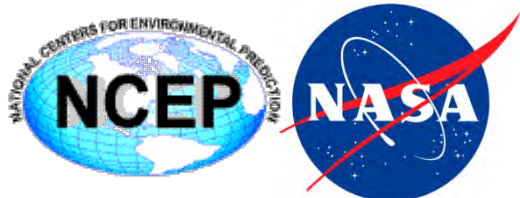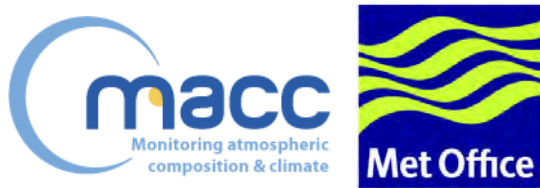
MODEL	INSTITUTION	RUN TIME	DOMAIN	DATA ASSIMILATION
BSC-DREAM8b	BSC-CNS	12	Regional	No
MACC	ECMWF	00	Global	MODIS AOD
DREAM-NMME-MACC	SEEVCCC	00	Regional	MACC analysis
NMMB/BSC-Dust	BSC-CNS	12	Regional	No
MetUM	U. K. Met Office	00	Global	MODIS AOD
GEOS-5	NASA	00	Global	MODIS reflectances
NGAC	NCEP	00	Global	No
RegCM4	EMA	12	Regional	No
DREAMABOL	CNR	00	Regional	No

- Dust surface concentration and dust optical depth at 550 nm
- Lead times: 0-72 h every 3 hours

WMO SDS-WAS: from Research to Operations

Regional Specialized Meteorological Center with activity specialization on Atmospheric Sand and Dust Forecast (RSMC-ASDF) (**Barcelona Dust Forecast Center) enables** daily dust forecasts; Operational from 2014
The Asian region is arranging such a center hosted by **China Meteorological Administration, Beijing**
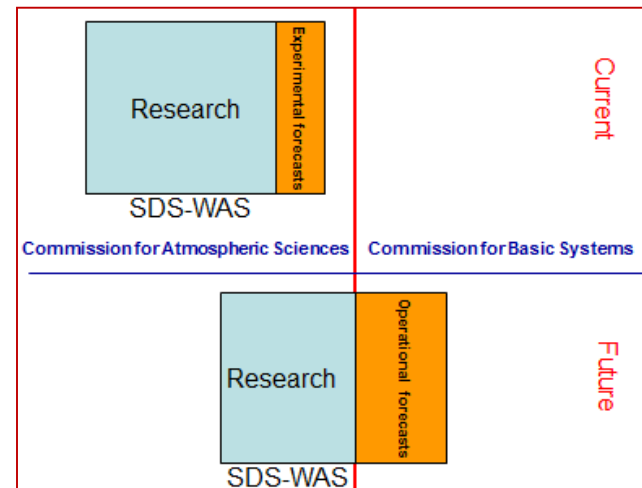
Regional domains for operational SDS forecasts:

WMO SDS-WAS   N.Africa-Middle East-Europe RC
MEDIAN   Dust Surface Concentration (µg/m³)
Run: 12h 28 MAR 2014   Valid: 12h 30 MAR 2014 (H+48)

WMO SDS-WAS Asia/Central Pacific RC
Sand and Dust Storm Forecasting (2013-02-28 03:00 UTC)

NAMEE/Barcelona Center
http://dust.aemet.es/forecast
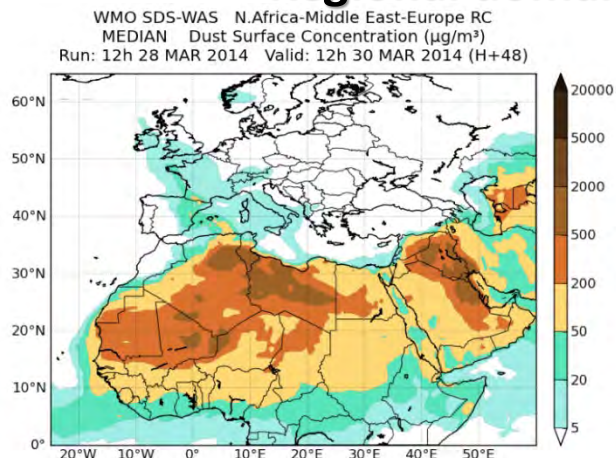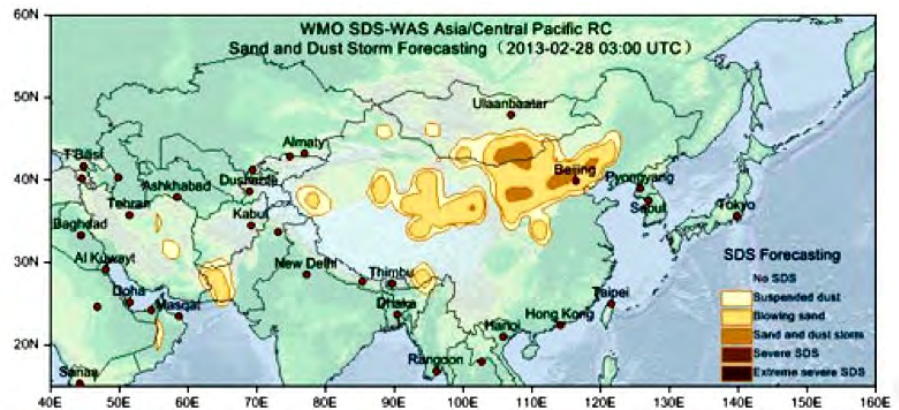
Asia Node/CMA Center (test):
http://eng.nmc.cn/sds_was.asian_rc/

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Suggestions for a **Regional Vegetation Fire and Smoke Pollution Warning and Advisory System (VFSP-WAS)**

Partner institutions

Links to fire danger forecasts undertaken by several organizations/institutions from local to global scale, from national meteorological services to the global fire early warning system (GFEWS).

Fire Danger Forecast / Early Warning

Regional Fire and Smoke Pollution Warning Center

Verification

Smoke Forecast

Multi-model Air Quality Forecast

Products and Services

Smoke forecast
- Early Warning Systems for Populations and Institutions (days)
- Smoke Ensemble Forecasts and Analyses (days)
  - Graphical Outputs (website)

Fire and Smoke – Current Situation
- Active Fires (georeferenced)
  - Air Quality Situation

Platform for Partner Products
- Fire Danger Forecast (days-months)
  - El-Niño Forecast (months-years)
    - Fire Management

Fire Management

Partnership with the new Fire Management Resource Center for the South East Asia region (FMRC-SEA) (in prep.): Provision of fire management & policy advice, and capacity building.

Link to global centers of excellence (e.g. Global Fire Monitoring Center)

Assimilation

Air Quality Observations

Meteorological Observations

Emission Estimates Systems

Satellite Products: Active Fires, Burned Area, Air Quality

Current Situation

Fire and Smoke Observations

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Interested countries are welcome !