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

Presented by Alexander Baklanov, WMO, Research Department, Atmospheric Research & Environment Branch

Melita Keywood, Johannes Kaiser, Johann Goldammer, Stéphane Mangeon, William de Groot, Dodo Gunawan, Christopher Gan, Jakarta workshop participants and GAW APP SAG members

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

Alexander Baklanov - WMO Secretariat representative
GOALS OF THE WORKSHOP:

1. Share experience and knowledge between SE Asian and international scientists, national agencies and practitioners on the underlying reasons, meteorological, environmental and human health impacts of vegetation fires and smoke pollution.

2. Provide initial overview of the tools for forecasting and train personnel of responsible agencies in forecasting vegetation fire smoke emissions, transport, air quality and impact on human health.

3. Explore the interest and feasibility in setting up Regional Facilities that can assist WMO Members in the region in forecasting vegetation fire smoke emissions, its transport, pollution and impacts and to evaluate the capacity of countries in the area in supporting/providing such facilities.
Outcomes from the Jakarta Workshop

• Arising from the keen interest of WMO Members in several impacted regions, the note provides guidance for addressing the issues of vegetation fire and smoke pollution.

• It also proposes the establishment of a Vegetation Fire and Smoke Pollution Warning and Advisory System (VFSP-WAS) and to support the potential foundation of regional centers on the topic.

GAW Report No. 235

Vegetation Fire and Smoke Pollution Warning and Advisory System (VFSP-WAS): Concept Note and Expert Recommendations
Vegetation Fire and Smoke Pollution Warning and Advisory System (VFSP-WAS): Concept Note and Expert Recommendations

Areas of vegetation fire in Asian Russia
WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)

Forecast Models

NASA A-Train MODIS CALIPSO & Geostationary Satellite IR Obs

GALION
Surface-based LIDAR

European PM10

GAW/AERONET/SKYNET
Surface-based AOD

WMO, Atmospheric Research & Environment Branch, Research Dept.
Dust Storms: SDS-WAS Dissemination

WMO AIRBORNE DUST BULLETIN
Sand and Dust Storm Warning Advisory and Assessment System

No. 1 | February 2017

WMO SDS-WAS web-sites and reports:
http://www.wmo.int/sdswas
https://public.wmo.int/en/our-mandate/focus-areas/environment/sand-and-dust-storm

SDS-WAS Regional Nodes and Operational Forecasts:
for Northern Africa, Middle East and Europe: http://sds-was.aemet.es;
for Asia: http://eng.nmc.cn/sds_was.asian_rc;
for the Americas: http://sds-was.cimh.edu.bb/
Operational Barcelona Center: http://dust.aemet.es/

WMO SDS-WAS Video «Protecting People from Sand and Dust Storms»
https://www.youtube.com/watch?v=lYXcpYYlm8I
Overview of a potential Vegetation Fire and Smoke Pollution Warning and Advisory System

Interested countries are welcome!
Suggested structure of the Vegetation Fire and Smoke Pollution Warning and Advisory System
Schematic structure of a WMO Regional Node and Fire and Smoke Pollution Warning and Advisory Center (RVFSP-WAC)
A conceptual series of steps to the implementation of a Regional Vegetation Fire and Smoke Pollution Warning and Advisory Center

1. Research
2. Validation
3. Web-based platform and portals
4. Training and capacity-building
5. Operation
6. Impact-based products and services

Once a step is completed, attention should be maintained on the preceding ones to ensure sustained improvement and applicability.
Workflow of a potential Regional Fire and Smoke Pollution Warning and Advisory Center: Example for South-East Asia
Global Data-processing and Forecasting System (GDPFS)

- Central activity/delivery mechanism of the Commission for Basic System
  - CBS: Operational arm of WMO
  - WIS and WIGOS are part of the infrastructure that support the GDPFS

- Main objective: Enabling worldwide use of timely, reliable and accurate Numerical Weather Prediction (NWP) products and services in all time-scales for applications related to weather, climate, water and environment.
  - The GDPFS is the world-wide network of operational centres operated by WMO Members
GDPFS and potential VFSP-WAS regional centers

1st WMO RSMC for ASEAN countries in Singapore
TOPIC SPECIFIC RECOMMENDATIONS

- Fire danger and seasonal forecast
  - S2S project
  - ECMWF/Copernicus service
- Fire emissions and haze forecast
  - Fire Radiative Power
  - Smoke detection
  - Burnt area
  - CAMS global forecast and regional downscaling
- Observations and data production for verification and assimilation
  - GAW and other observations for verification
  - NRT data for assimilation
  - GALION with Lidar and ceilometer observations
  - Satellite new data and retrievals
  - Low-cost sensors applicability?
Air Pollution Observations in the Region

WMO Global Atmosphere Watch (GAW) observations in the ASEAN region

- Little observations exist in the region
- Existing do not share data timely
- Gaps can be filled by EANET
- => but EANET is not a contributing network to WMO GAW
GAW Observations

- Stratospheric Ozone and vertical ozone distribution
- Greenhouse Gases ($CO_2$ and its isotopes, $CH_4$ and its isotopes, $N_2/O_2$ ratio, $N_2O$, $SF_6$, CFCs and substitutes)
- Reactive Gases ($O_3$, $CO$, VOCs, $NO_x$, $SO_2$)
- Atmospheric Deposition and Precipitation Chemistry
- Aerosols (chemical and physical properties, AOD)
- UV Radiation
- GAW Urban Meteorology and Environment (GURME) project
- GAW Modelling Applications SAG
- GAW co-sponsors GESAMP

The Role of Black Carbon in Atmospheric and Climate Research

Some questions and suggestions

• Modelling exercise within APP SAG for these US Field Campaigns
• GAW APP SAG Contacts: Pablo Saide, Johannes Kaiser, Arlindo da Silva, Greg Carmichael, Gorg Grell, Paul Makar, Mikhail Sofiev,
• GFAS and Ensemble model forecasting: building and evaluation for specific regions
• Seasonal forecast of fire danger meteorological conditions
• «Last mile»: how to reach potential users on time and in proper form (Impact based prediction)?
• What regions are the most important for VFSP-WAS?
Ceilometers network (assessment by Werner Thomas, DWD)
Low Cost Sensor – Activities
(Possible tests for wild fires pollution?)

Some highlights:
- Citizens will use more and more sensors. Professionals should be prepared for this. Clear communication is key.
- There is an urgent need for sharing information on the available sensor tests, calibration practices and algorithms.
- Sensor calibrations pose impressive challenges.
- Everyone agreed: we should promote and stimulate open (calibration) systems.
- Sensors can benefit from embedding in AQ model systems. Though this requires quite some (model) work.
- Is a niche available for sensors in combination with models?
- A European community is desirable. The concept of FAIRMODE can serve as an example.
- We should discuss the possibility of a sensor community with FAIRMODE, AQUILA and CEN communities.

Thanks!

We are open for collaboration with IBBI!

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale