WMO Sand and Dust Storm – Warning Advisory and Assessment System

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International Workshop on Middle East (Regional) Dust Sources and Their Impacts, Istanbul, Turkey, 23-25 Oct 2017
Summary

- Introduction
- Dust monitoring
- Dust prediction
- Climate products
- Collaboration with other UN agencies / programmes
The dust cycle

A significant part (30-40%) of the dust sources can be considered as anthropogenic: desiccated lakes or other water bodies, agricultural lands or direct human activity as mining, construction, ...
Dust Impacts

- AQ & health
- Weather & climate
- Transportation (visibility reduction)
- Energy
- Agriculture, fishing
- ...

[Image of people wearing masks and blurred images of solar panels and train schedule]
Dust deposition
Jickells et al. (2005)

Dust deposition is a source of micro-nutrients for both continental and maritime ecosystems.

Saharan dust is thought to fertilize the Amazon rainforest.

Dust supply of Fe and P benefit marine biomass production in parts of the oceans suffering from the shortage of such elements.
Mission:
Enhance the capacity of countries to generate and distribute to end-users dust observations, forecasts, information and knowledge

Structure:
Regional Center for Northern Africa, Middle East and Europe, Barcelona
Regional Center for Asia, Beijing
Regional Center for Pan-America, Bridgetown
Regional Center for West Asia (??)
W. Asia is the 2nd largest source after the Sahara. Unlike N. Africa, most population lives in the vicinity of dust sources.

Mixture of natural and anthropogenic sources of pollution

Land degradation, water overuse

Climate change (higher temperature and evapotranspiration) may lead to drier soils and greater dust emissions

Cuevas et al. (2014)

Candidates: Turkey, Iran
SDS-WAS objectives

- Identify and improve products for observation and prediction of atmospheric dust through collaboration with research and operational organizations as well as with users
- Facilitate user access to information
- Strengthen the capacity of countries to use the observations, analyses and predictions provided

SDS-WAS Science and Implementation Plan 2015-2020 (Nickovic et al., 2014)
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Why do we need dust observation?

- Monitoring dust events
- Data assimilation into models
- Forecast verification
- Research, impact assessment
- Validation of other observations (i.e. ground observations to validate satellite products)

Mali, 2001
Foto: Remi Benali/Corbis
Satellite products

The basic tools for dust monitoring are satellite images

EUMETSAT RGB-Dust is an RGB composite based upon three infrared channels of SEVIRI (Meteosat Second Generation).

Drawbacks:
- Qualitative product
- No information below-cloud
- No information on near-surface conditions

19 Mar 2017: Sandstorm named Madar, originated in Libya, swept through Egypt, KSA, Iraq, Kuwait and Iran
Air quality monitoring stations

Drawbacks:
- Few stations near dust sources
- No protocol for data exchange
- Lack of harmonisation in the measurements
- Species integration
- Most stations in urban environments
Meteorological reports

19 Mar 2017

Drawbacks:
- Indirect estimation (no mass concentration)
- Subjective nature
- Limited to severe events

http://sds-was.aemet.es
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SDS-WAS: Model inter-comparison

Contributors
- BSC, Spain
- Copernicus, EU
- SEEVCCC, Serbia
- Met Office, UK
- NASA, USA
- NCEP, USA
- EMA, Egypt
- CNR, Italy
- NOA, Greece
- FMI, Finland
- TNO, The Netherlands

http://sds-was.aemet.es

10 May 2017
SDS-WAS: Multi-model products

10 May 2017

http://sds-was.aemet.es
May 2013
WMO designates the consortium of AEMET and the BSC to host a Center that generates and distributes operational dust forecasts for Northern Africa, Middle East and Europe.

Feb 2014
The Centre starts operations under the name of Barcelona Dust Forecast Center (BDFC)

June 2017
WMO designates CMA to host an operational Center for Asia
Operational forecasts are distributed through:

- Website [http://dust.aemet.es](http://dust.aemet.es)
- WMO Global Telecommunications System
- EUMETCast
- WMO, UNEP websites
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Climate monitoring: 2016

Average dust AOD @ 550 nm in 2016 and anomaly based on Copernicus forecasts. Source: WMO Airborne dust bulletin N. 1

Negative anomalies over most of the Sahara. Conversely, more transport than usual to the Gulf of Guinea and the rest of equatorial Africa (due to strong activity in the Sahel during the first weeks of the year).

Uneven distribution of anomalies in the Middle East: small negative values in the N part and important positive anomalies in the South of the Arabian Peninsula (strong activity in spring).

Positive anomalies in the Pakistan-India region and no clear sign in China-Mongolia.

Negative values in Australia.
Long-term trends

Although there is controversy over the long-term global trend, major changes over the last few years have been found on a regional scale.
Dust Storms Assessment for the development of user-oriented Climate Services in Northern Africa, Middle East and Europe
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Cooperation with other UN agencies / programmes: workshops

Side event
The edge of crisis: Dust and sand storms
Cooperation with other UN agencies / programmes: publications