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Focus on sand and dust storms

The seventh volume of IOP's open-access Earth and Environmental Science conference series Earth and Environmental Science is now available online, covering the WMO/GEO Expert Meeting on an International Sand and Dust Storm Warning System hosted by the Barcelona Supercomputing Center – Centro Nacional de Supercomputación in Barcelona (Spain) on 7–9 November 2007 (<http://www.bsc.es/wmo> (<http://www.bsc.es/wmo>)).

A sand and dust storm (SDS) is a meteorological phenomenon common in arid and semi-arid regions and arises when a gust front passes or when the wind force exceeds the threshold value where loose sand and dust are removed from the dry surface. After aeolian uptake, SDS reduce visibility to a few meters in and near source regions, and dust plumes are transported over distances as long as thousands of kilometres. Aeolian dust can be considered as unique among aerosol phenomena: (1) with the possible exception of sea-salt aerosol, it is globally the most abundant of all aerosol species; (2) it appears as the dominating component of atmospheric aerosol over large areas of the Earth; (3) close to sources, it represents a serious hazard for life, health, property, environment and economy; and (4) its influence, impacts, complex interactions and feedbacks within the Earth system span a wide range of spatial and temporal scales.

From a political and societal point of view, the concern for SDS and the need for international cooperation were reflected after a survey conducted in 2005 by the World Meteorological Organization (WMO) in which more than forty WMO Member countries expressed their interest for creating or improving capacities for SDS warning advisory and assessment. In this context, major advances in research – including, for example, the development and implementation of advanced observing systems, the theoretical understanding of the mechanisms responsible for sand and dust storm generation and the development of global and regional dust models – represent the basis for developing applications focusing on societal benefit and risk reduction. However, at present there are interdisciplinary research challenges to overwhelm current uncertainties in order to reach full potential. Furthermore, the community of practice for SDS observations, forecasts and analyses is mainly scientifically based and rather disconnected from potential users. This requires the development of interfaces with operational communities at international and national levels, strongly focusing on the needs of people and factors at risk.

The general objective of the WMO/GEO Expert Meeting on an International Sand and Dust Storm Warning System was to discuss and recommend actions needed to develop a global routine Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) based on

integrating numerical SDS prediction and observing systems, and on establishing effective cooperation between data producers and user communities in order to provide products capable of contributing to the reduction of risks from SDS. The main specific objectives were:

- 1) to identify, present and suggest future real-time observations for forecast verification and dust surveillance: satellite, ground-based remote sensing (passive and active) and in-situ monitoring
- 2) to present ongoing forecasting activities
- 3) to discuss and identify user needs: health, air quality, air transport operations, ocean, and others
- 4) to identify and discuss dust research issues relevant for operational forecast applications

The meeting was sponsored and organized by the World Meteorological Organization (WMO), the Group on Earth Observations (GEO), the Agencia Estatal de Meteorología (AEMET), the Barcelona Supercomputing Center-Centro Nacional de Supercomputación (BSC-CNS) and the Consejo Superior de Investigaciones Científicas (CSIC).

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