

SERVING SOCIETY THROUGH THE WORLD METEOROLOGICAL ORGANIZATION SAND AND DUST STORM WARNING ADVISORY AND ASSESSMENT SYSTEM

ISPRS VIII/WG-2 Symposium
Santa Fe, New Mexico
September 12-13, 2011

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Barcelona, Spain

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China

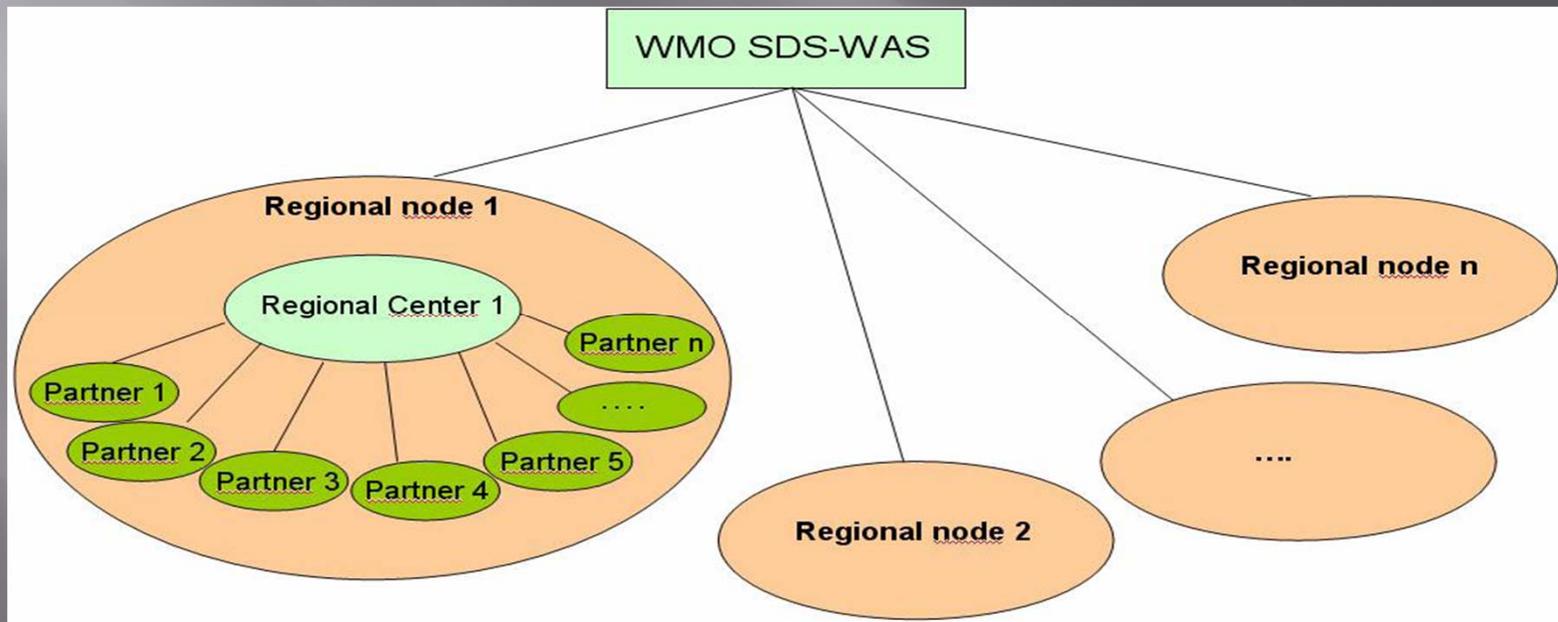
Slobodan Nickovic, World Meteorological Organization,
Geneva, Switzerland



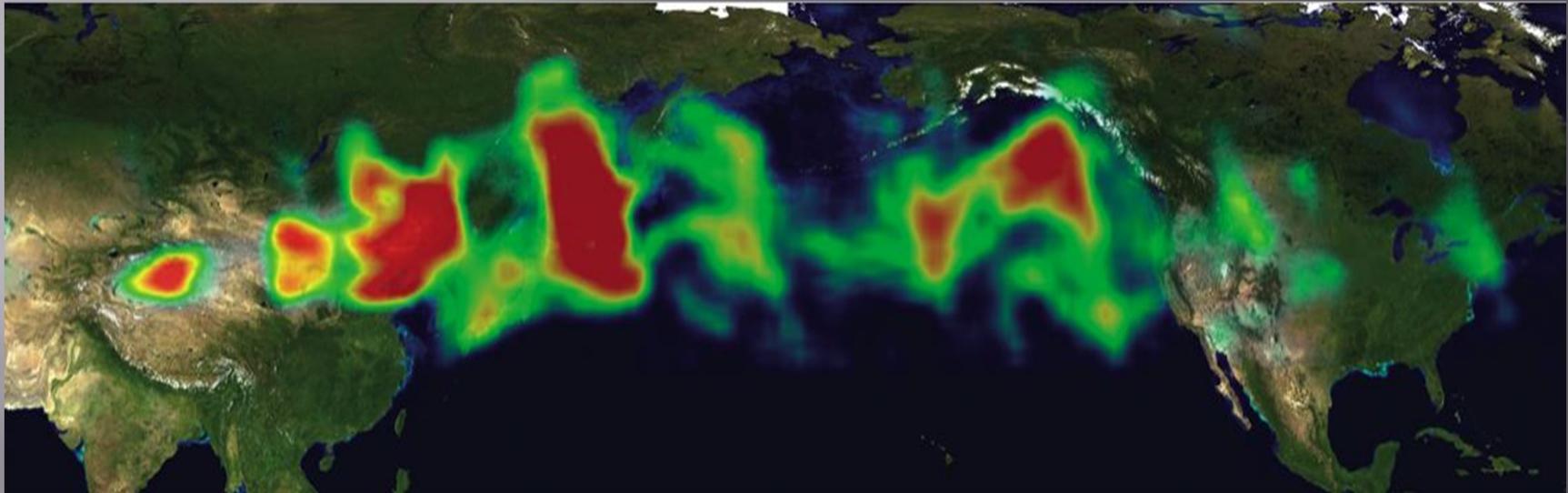
Serving Society through the WMO SDS-WAS

A Federated System ... To reduce risks associated with sand and dust storms around the world

- ❑ Coordinated through World Meteorological Organization research offices in Geneva
- ❑ Two regional nodes of the Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) ... assemble data and create value-added forecasts and analyses



Desert Dusts Travel the World



**Satellite-derived Aerosol Optical Depth Over Several Days
in April 2001 (a NASA composit)**

Transcontinental Transport

- ▣ Desert soils contain **bacteria, fungi, viruses, plant pollen, heavy metals** and unknown quantities of **imported toxins** ¹
- ▣ Tampa, Florida: **airborne PM 0.3 - 1.0** concentrations during an African dust event were 10 times above background ¹
- ▣ **Fungal Diseases of Crops** (e.g. sugarcane, bananas) appear in the Caribbean within a few days of an outbreak in Africa, and **Foot and Mouth Disease** (endemic to the Sahel) may be ²
- ▣ **Bacterial Pathogens of Rice & Beans, and Bacterial Bearers of Disease of Fruit & Trees** are transported from Africa to the Caribbean ^{1,2}
- ▣ **Paediatric Asthma** emergency admissions on Trinidad are linked to African dust clouds ³

[1] Griffin, D.W. (2007); [2] Kellogg & Griffin (2005); [3] Gyan, K., et.al. (2005)

See also presentations by Centeno, Lyles, Plumlee

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Two nodes: (1) Barcelona, Spain, and (2) Beijing, China

And collaborating countries within their regions

- ▣ Use satellites and a network of cooperating monitoring stations to document sand and dust storms and their downwind plumes
- ▣ Use atmospheric models to simulate and predict them
- ▣ Create value-added products for client applications

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EXAMPLE

- ▣ The SDS-WAS in the World Health Organization (WHO) Meningitis Environmental Risk Information Technologies (MERIT) project See also presentations by Onoda, Trzaska, LaFaye & Haynes
- ▣ MERIT supports meningococcal meningitis prevention and control in the African Sahel
- ▣ SDS-WAS Barcelona performed a multi-decadal re-analysis of meteorology and airborne dust using a regional dust atmospheric model for MERIT epidemiology
- ▣ All information from the SDS-WAS is available to the public.

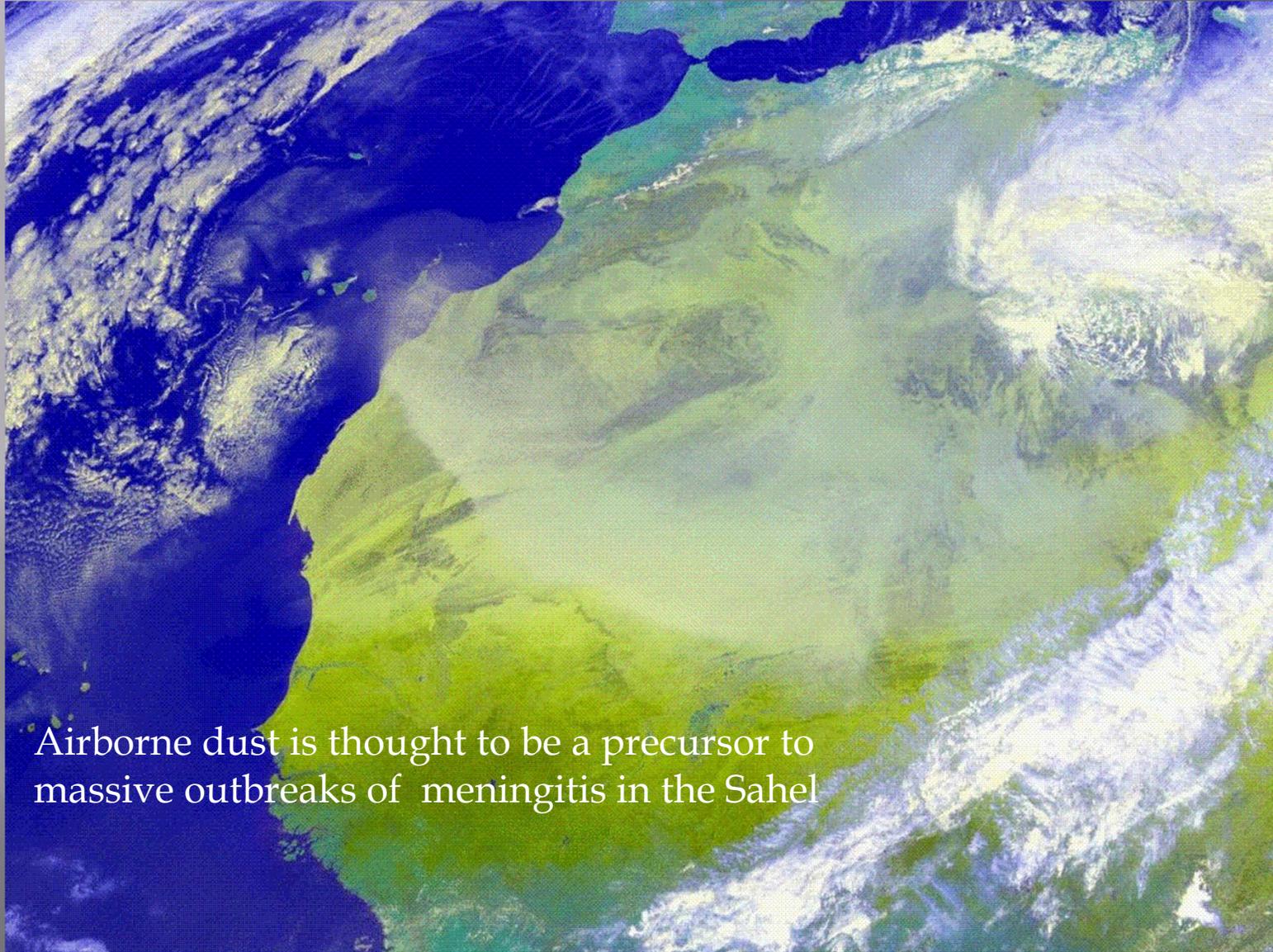
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Meningitis in Africa



Meningococcal meningitis occurs worldwide but especially so in dry Sub-Saharan Africa: the "African meningitis belt", including Nigeria, Burkina Faso, Mali, Niger, Chad, Cameroon....

Saharan Dust Storm



Airborne dust is thought to be a precursor to massive outbreaks of meningitis in the Sahel

Serving Society through the WMO SDS-WAS Regional Centres

- *Mediterranean North Africa, Middle East, Europe Centre* –
Meteo France, U. of Athens, U. of Tel Aviv,
Egyptian Meteorological Agency

- **Hosts:**

- **Barcelona Supercomputing Centre**
- **National Institute of Meteorology**
- **National Research Council**

- *East Asian Centre*

- *Pan-American Centre (proposed)*

The Regional Center

Managed by a consortium of the Spanish Meteorological Agency (AEMET) and the Barcelona Supercomputing Center (BSC-CNS)



GOBIERNO
DE ESPAÑA

MINISTERIO
DE MEDIO AMBIENTE
Y MEDIO RURAL Y MARINO



Agencia Estatal de Meteorología



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación

Nexus II building. Campus Nord
Catalonia Technical University
Barcelona

MareNostrum supercomputer



J.M.Baldasano



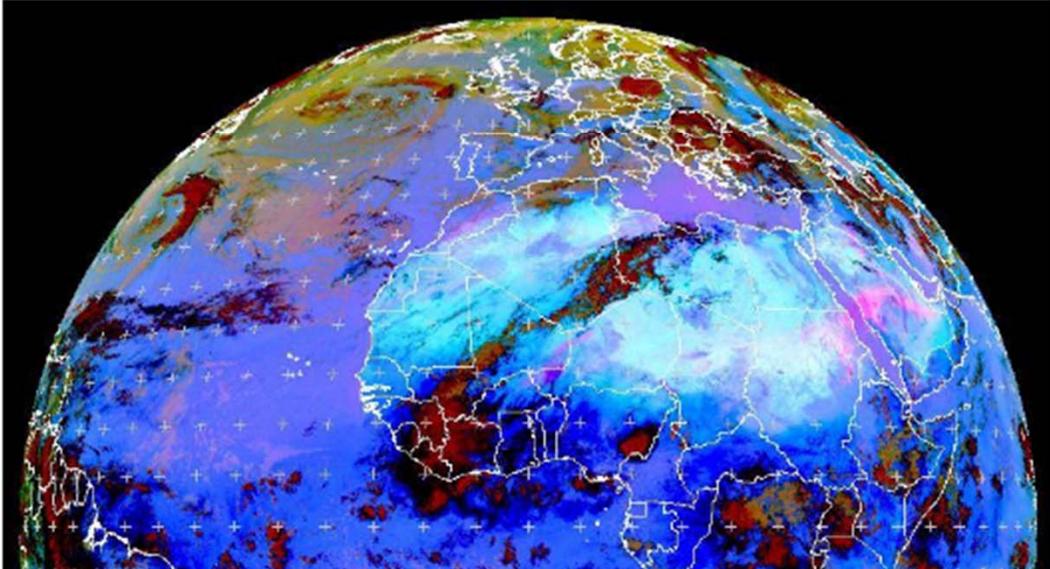
<http://sds-was.aemet.es>

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Northern Africa-Middle East-Europe (NA-ME-E) Regional Center
by [admin](#) — last modified Mar 14, 2011 06:05 PM

LATEST RGB dust image (courtesy of [EUMETSAT](#))



Search

Search Site

Latest News

[The U.K. Met Office dust product is available again](#)
May 03, 2011

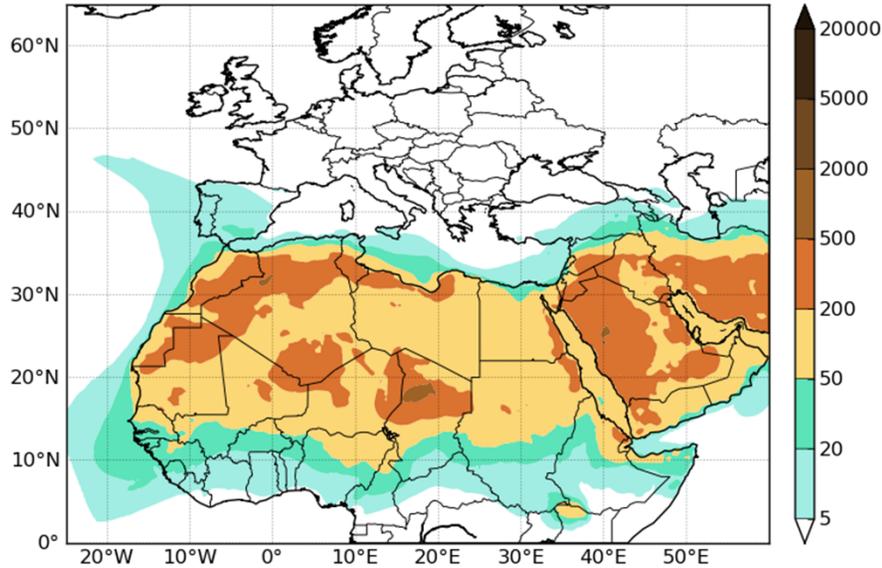
sdswas@aemet.es

Objectives of the Regional Center

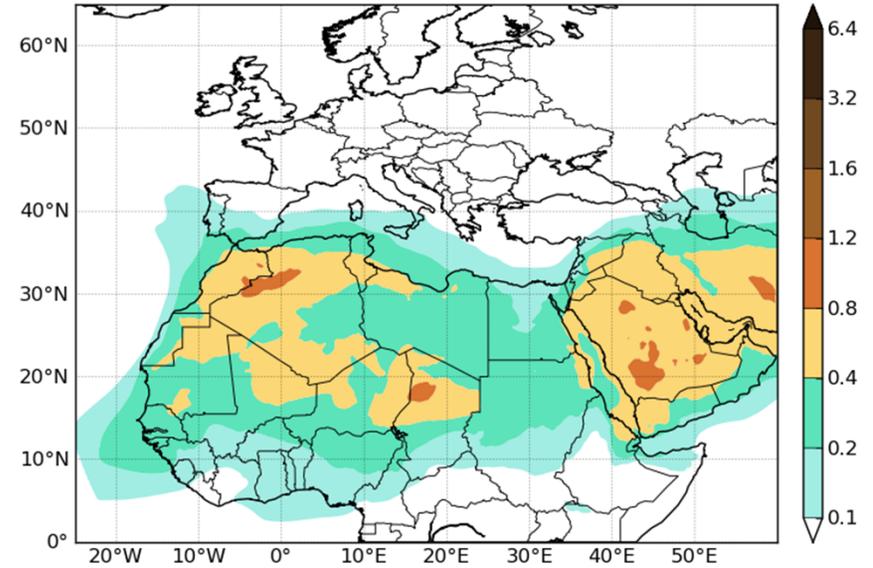
- ▣ Identify and improve products to monitor and predict atmospheric dust by working with research and operational organizations, as well as with users
- ▣ Facilitate user access to information
- ▣ Strengthen the capacity of countries to use the observations, analysis and predictions provided by the WMO SDS-WAS programme

Time averaged products

WMO SDS-WAS N.Africa-Middle East-Europe RC
BSC-DREAM8b Dust Surface Concentration ($\mu\text{g}/\text{m}^3$)
Average: APR 2011



WMO SDS-WAS N.Africa-Middle East-Europe RC
BSC-DREAM8b Dust Load (g/m^2)
Average: APR 2011



African Centre of Meteorological Application for Development
Centre Africain pour les Applications de la Météorologie au Développement

CLIMATE AND HEALTH BULLETIN

JULY 2010

J.M.Baldasano

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Model Applications in AQ

- ▣ Simulate & Predict Threshold 'Dust' Concentrations
- ▣ Monitor Regional AQ
- ▣ Identify Airborne Dust Sources
- ▣ Evaluate Dust Control Policies
- ▣ Assess AQ in Future Climates

Serving Society through the WMO SDS-WAS Regional Centres

- *East Asian Centre* – China, Japan, Korea, Mongolia

- **Host:**

- **China Meteorological Administration**

- **Satellite Meteorological Centre**

- **National Meteorological Centre**

- **Centre for Atmospheric Watch & Services**

- *Mediterranean North Africa, Middle East, Europe Centre*

- *Pan-American Centre (proposed)*

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HOME - SDS - Microsoft Internet Explorer

文件(F) 编辑(E) 查看(V) 收藏(A) 工具(T) 帮助(H)

地址: http://www.sds.cma.gov.cn:8080/business/website/mainPageIndex.do

http://www.sds.cma.gov.cn

WMO Sand and Dust Storm Warning Advisory and Assessment System(WMO SDS-WAS)
ASIA/CENTRAL PACIFIC REGIONAL CENTRE

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FORECAST

Concentration
Movies of surface dust concentration distribution over Asia in 3 hours interval for 3 days forecast from the model CUACE/Dust.
CUACE/DUST OF CMA see more>> MORE

MASINGAR OF JMA To be decided see more>> MORE

ADAM OF KMA To be decided see more>> MORE

News & Event

- Severe Solar Blast Affects China's Communication
- Science Steering Committee
- Workshop on the Implementation of the WMO SDS-WAS Asia Node (28- 30 October 2009, Seoul, Korea)
- Workshop on the Implementation of the WMO SDS-WAS Asia

OBSERVATION

PM10

CMA JMA KMA Other

AOD

CMA JMA KMA Other

Satellite Observation

CMA JMA KMA Other

MODEL COMPARISON

LOGIN

username
password
checking
Login Register

SDS COLOR INDEX

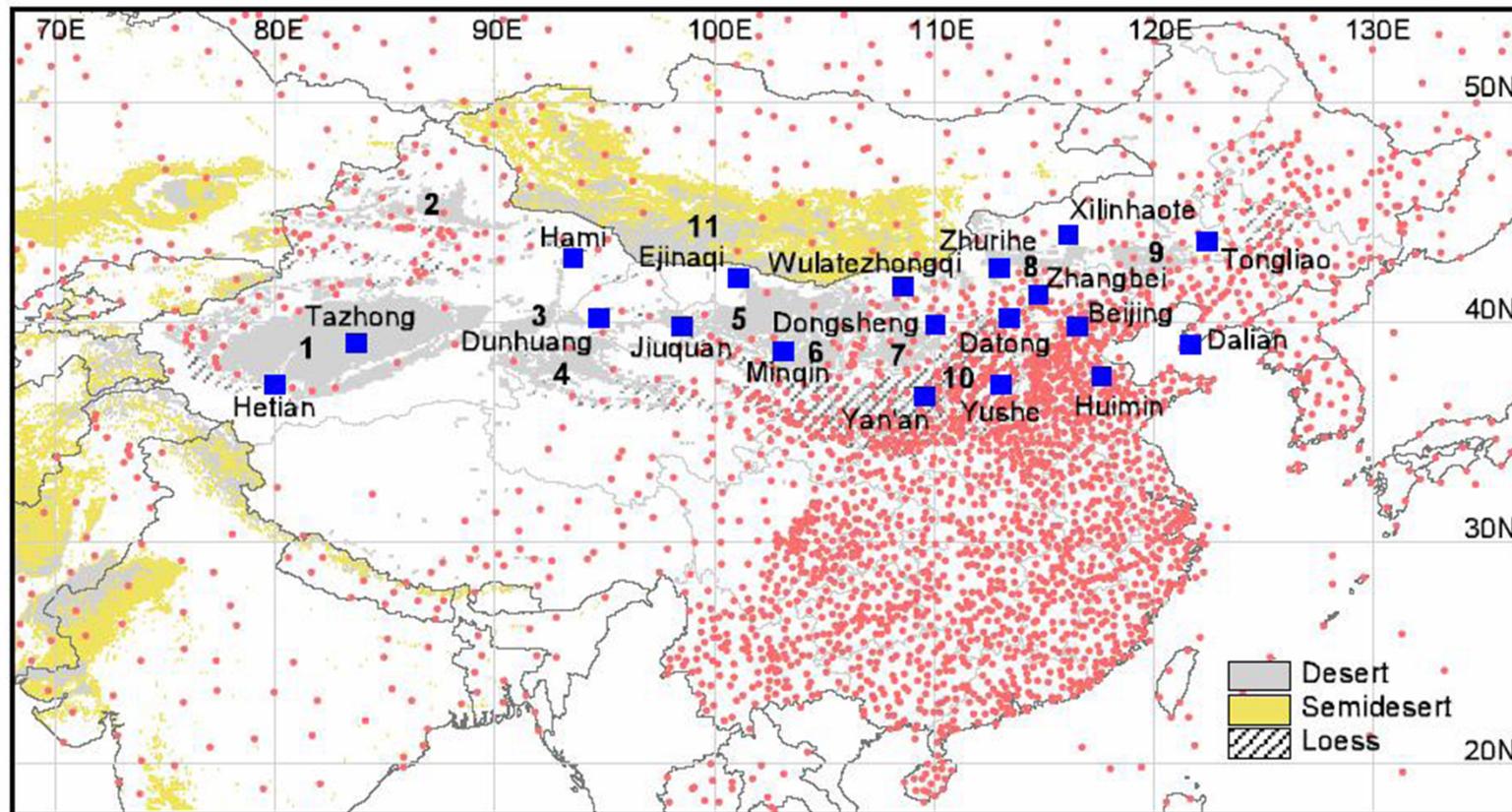
No SDS
Suspended dust
Blowing sand
Sand And Dust Storm
Severe SDS
Extreme Severe SDS

HOT LINKS

- cma
- wmo sds was
- ca was
- cams
- name regional center

Internet

Documenting Mineral Dust Regions



PM10



Visibility

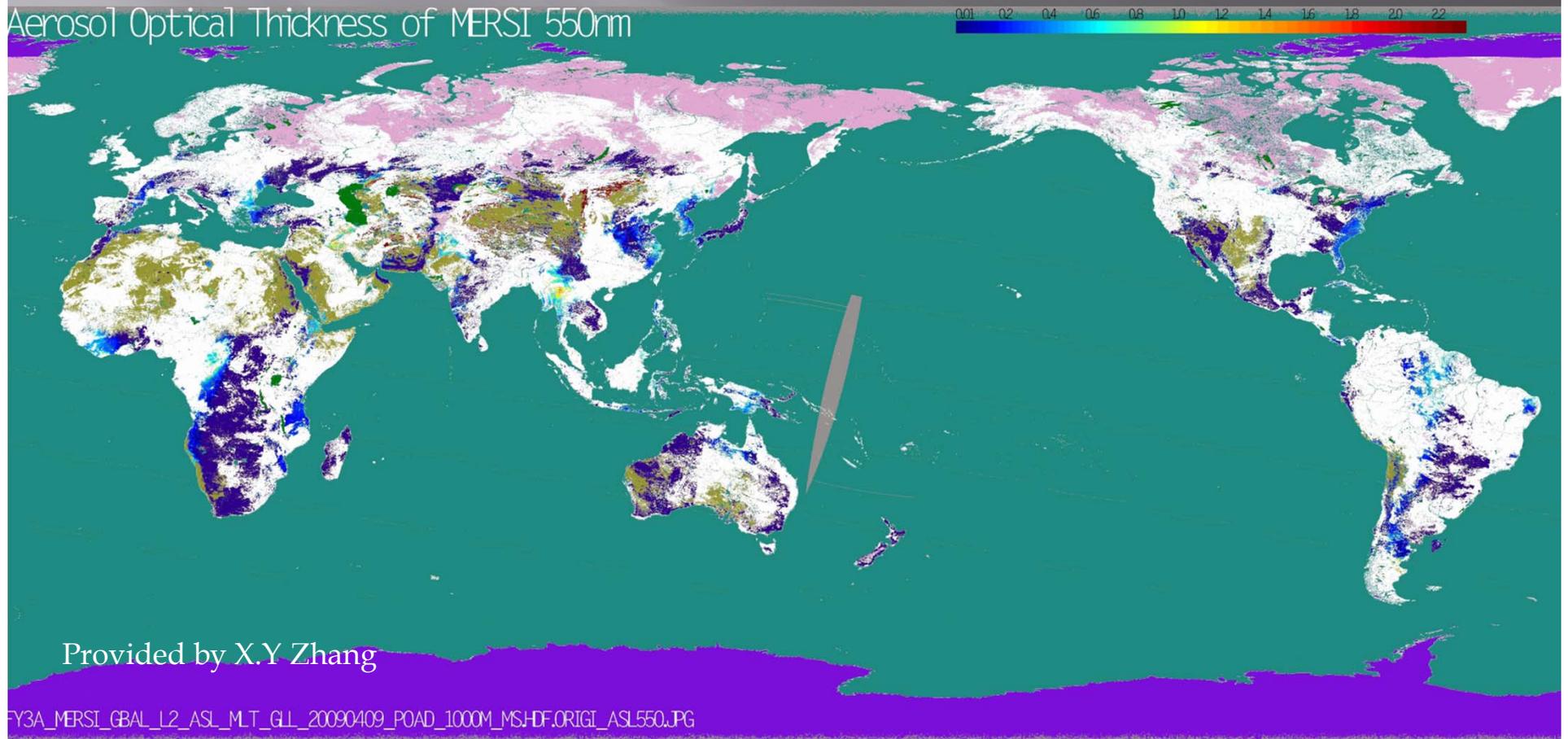
Main dust source regions: 1, Taklimakan Desert; 2, Gurbantunggut Desert; 3, Kumtag Desert; 4, Qiadam Basin Desert; 5, Badain Juran Desert; 6, Tengger Desert; 7, Mu Us Desert; 8, Onqin Daga sandy land; 9, Horqin sandy land; 10, Loess Plateau; 11, Mongolia.

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- ▣ MERSI - Medium Resolution Spectral Imager
- ▣ MERSI a scanner aboard the third FengYun ("Wind and Cloud") series of meteorological satellites launched by China. FY-3A, launched June 2008

2009/04/09 MERSI/FY3A Aerosol Optical Thickness over land (spatial resolution $0.01^\circ \times 0.01^\circ$)

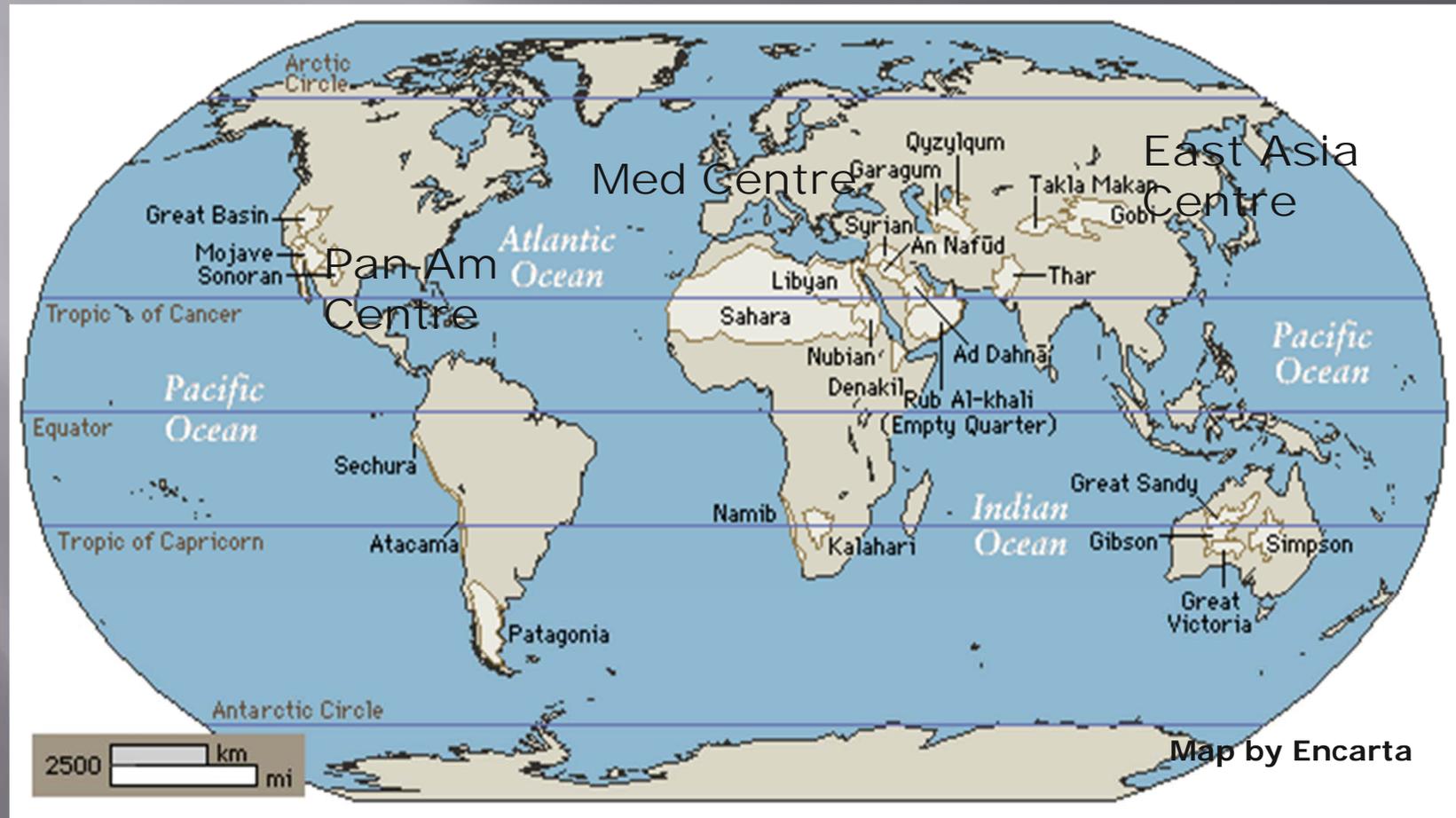
Aerosol Optical Thickness of MERSI 550nm



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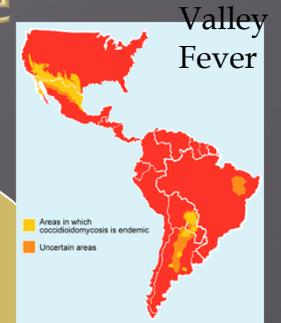
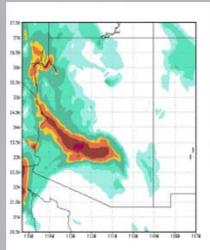
Regional Centres

Centres Are Hubs for Collaboration



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Proposed Pan-American SDS-WAS Centre



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Example: Valley Fever Endemic Zone



W.A.Sprigg

Hector and Laniado-Laborin, 2002

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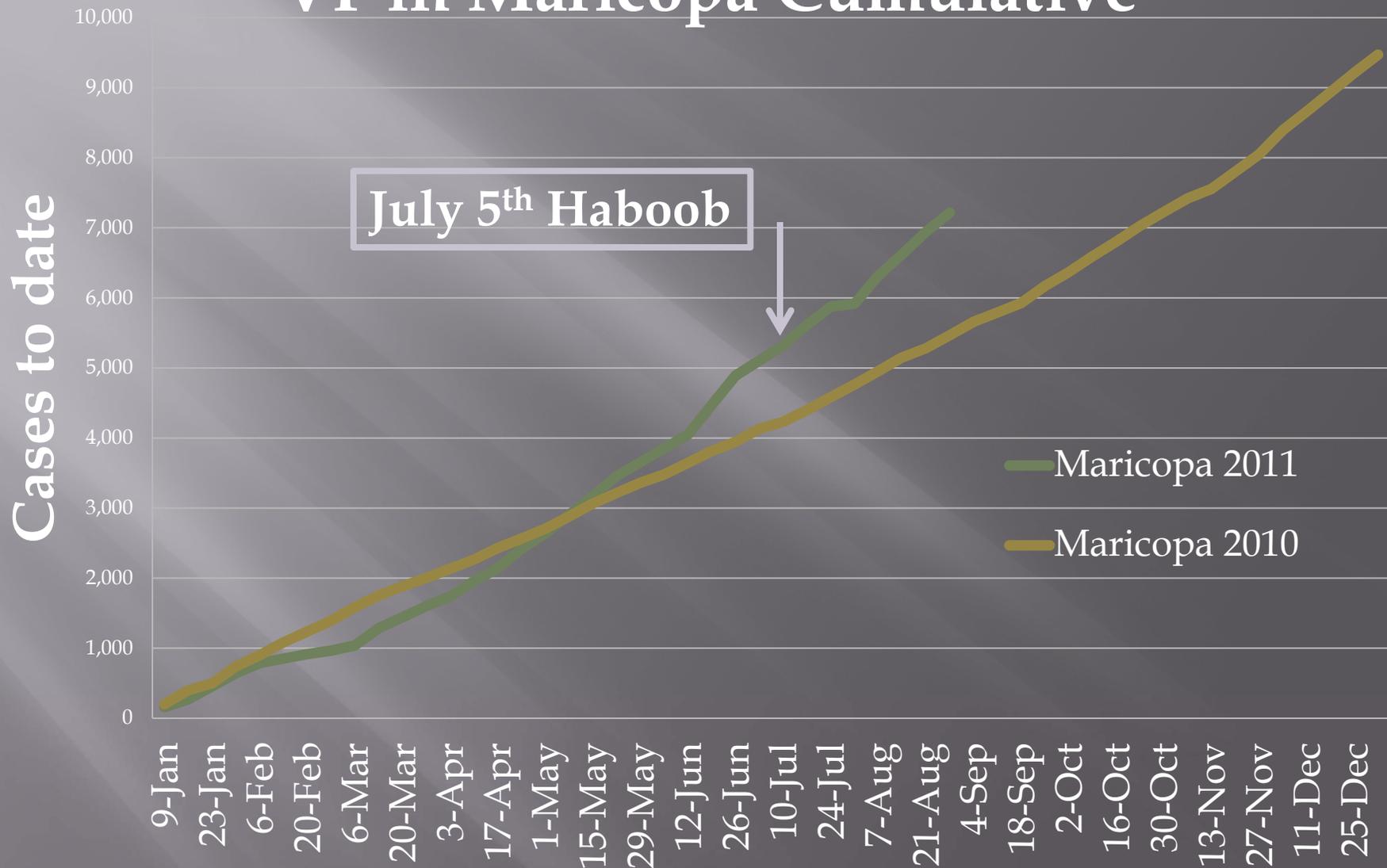
5 July 2011
Phoenix
Arizona

7:45 PM looking south from the NWS Phoenix office in Tempe as the dust storm neared.



W.A.Sprigg, S. Nickovic, G. Pejanovic, J. Galgiani, A. Vukovic

VF in Maricopa Cumulative

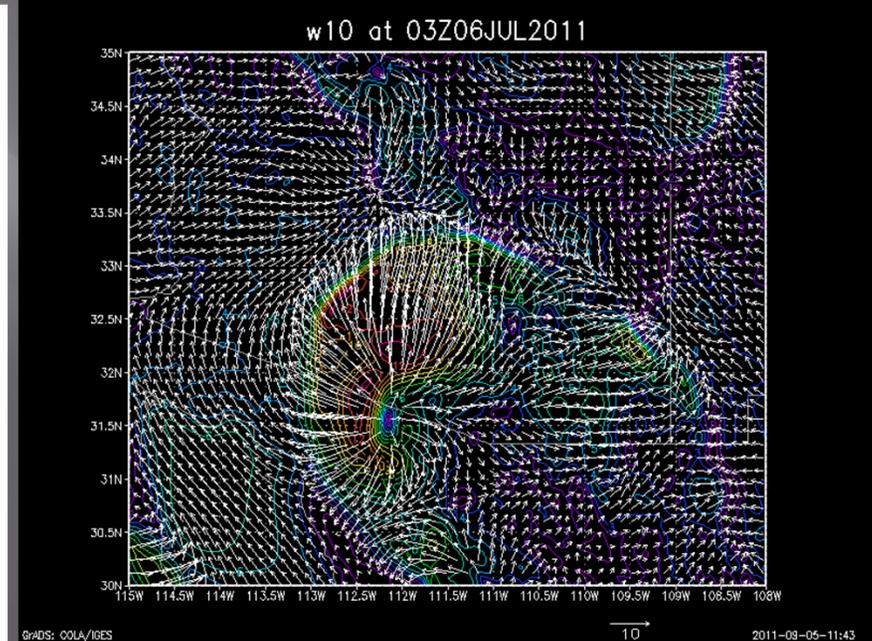
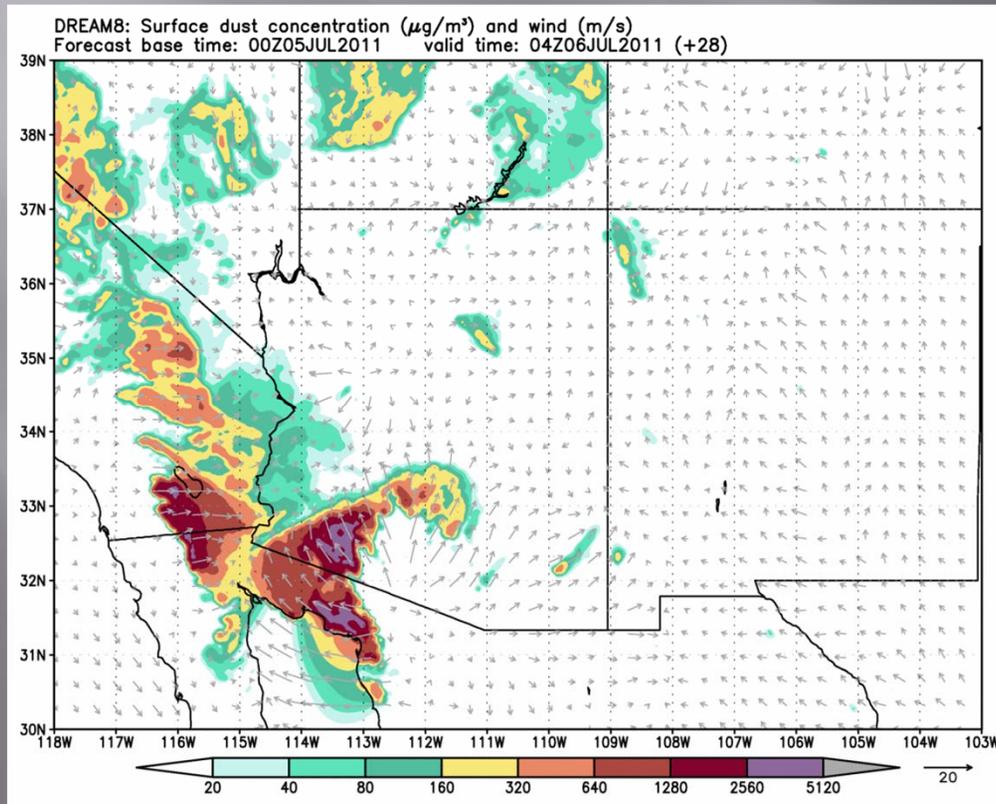


Courtesy J. Galgiani

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DUST 28-HOUR "FORECAST"
SHOWING HABOOB - 6 KM
HORIZONTAL RESOLUTION

WIND MAGNITUDE AND STREAM
FUNCTION -- 3.5 KM HORIZONTAL
RESOLUTION



NASA Applied Science support led to this high-resolution forecast & simulation capability

Serving Society through the World
Meteorological Organization Sand and Dust
Storm Warning Advisory and Assessment
System

Thank You

Mediterranean North Africa, Middle East, Europe Centre

East Asian Centre

Chapman University

WMO SDS-WAS, Geneva