Forecasting the North African dust outbreak towards Europe in April 2011: A model intercomparison

FORECAST AND PRODUCTS

- Data exchange
- Joint visualization
- Common forecast evaluation
- Generation of multimodel products
- Calculation of monthly evaluation metrics
- New sources of data for model evaluation
- Sharing model output data files
- Time-averaged products
Dust event 5-10 April 2011

OMI Aerosol Index

April 5
April 7
April 10

SEVIRI

April 5

AERONET

Saada (8.16 W, 31.63 N)

Evora (7.91 W, 38.57 N)

Birkenes (8.25 E, 58.39 N)

North Africa
Portugal
Norway

MACC-II Open Science Conference, Brussels, 27-30 January 2014
## Dust event April 2011: Dust forecast models

<table>
<thead>
<tr>
<th>Model</th>
<th>Institution</th>
<th>Domain</th>
<th>Spatial resolution</th>
<th>Transport size bins</th>
<th>Data Assimilation</th>
<th>Meteo. Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECMWF/MACC-Dust</td>
<td>ECMWF</td>
<td>Global</td>
<td>1°x1° 91 layers</td>
<td>3 bins 0.03-20 µm</td>
<td>Yes</td>
<td>ECMWF</td>
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<tr>
<td>NMMB/BS C-Dust</td>
<td>BSC-CNS</td>
<td>Regional</td>
<td>0.25°x0.25° 40 η-layers</td>
<td>8 bins 0.1-10 µm</td>
<td>No</td>
<td>NMMB/NCEP</td>
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<tr>
<td>BSC-DREAM8b</td>
<td>BSC-CNS</td>
<td>Regional</td>
<td>0.3°x0.3° 24 η-layers</td>
<td>8 bins 0.1-10 µm</td>
<td>No</td>
<td>Eta/NCEP</td>
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<tr>
<td>MetUM</td>
<td>UK Met Office</td>
<td>Regional</td>
<td>0.35°x0.23° 70 layers</td>
<td>2 bins 0.1-10 µm</td>
<td>No</td>
<td>MetUM</td>
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<tr>
<td>DREAM</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Aerosol Optical Depth: AERONET stations
Aerosol Optical Depth (24hr Forecast)

April 5

MACC-Dust
MetUM
NMMB/BSC
BSC-DREAM

April 7

April 9
Vertical Distribution

April 5

MACC-Dust  MetUM  NMMB/BSC  BSC-DREAM

April 7

• Spatial bilinear interpolation of the closest model grid point to the CALIOP overpass.

• Linear temporal interpolation to the closest model output to the time of the CALIOP observation
Dust Emission

April 5

MACC-Dust

MetUM

NMMB/BSC

BSC-DREAM
Synoptic conditions (500hPa)

April 5

April 7
Wind

10m wind speed

24hr Forecast 48hr Forecast 72hr Forecast
Conclusions

• Models reproduce the onset and duration of the event.

• Preliminary results show the ability of the models to forecast the event (AOD) with up to 72 hours.

• Larger divergence in the surface concentration and emission than aerosol optical depth.

• Results suggest that models do not transport enough dust northwards.

• Models mostly overestimate observed 10m winds but are lower than the MERRA winds.

• Models are successful in reproducing the general patterns of synoptic conditions and wind profiles.

• More in depth analysis is needed to understand the differences in emissions between models.

• Deposition will be included in the analysis.
Thank you