

GEMS Assembly Feb, 2006

Ireland Health Study

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EPA, Ireland



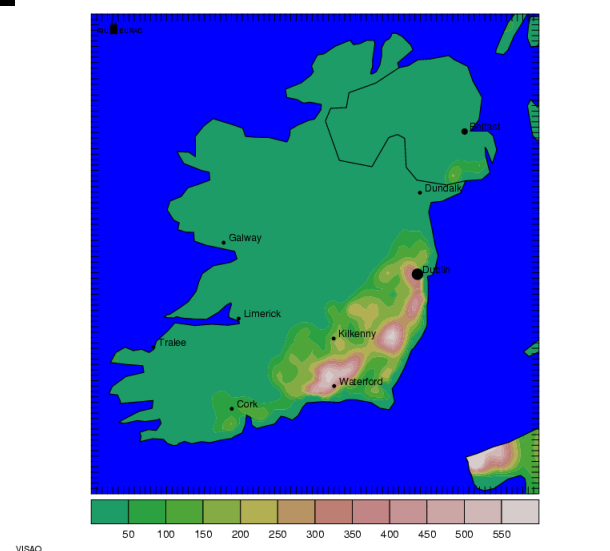
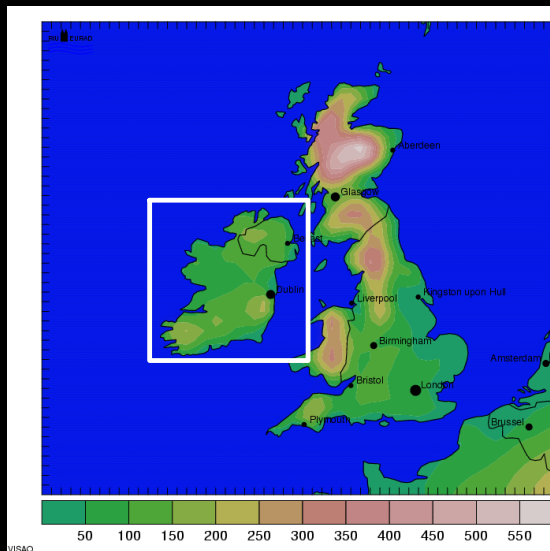
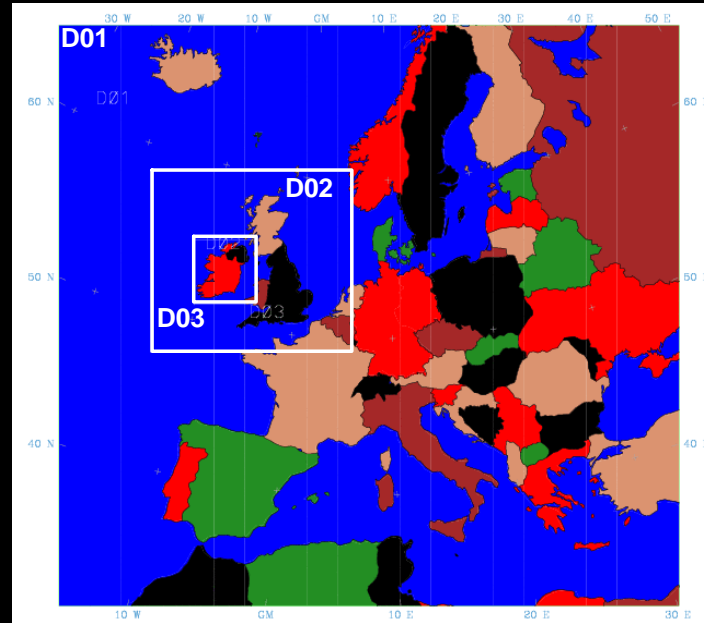
GEMS products for health studies

- Use GEMS products to establish transboundary transport episodes...models/satellite data.
- Use health data from across Ireland and UK to study effects of exposure to long-range air pollution
- Correlate health data with exposure estimates based on ground-based monitoring data
- Define possible detailed health study...

Europe/UK/ Ireland/Model

Domain Region Grid size

- D01 Europe 125 km
- D02 Ireland/UK 25 km
- D03 Ireland 5 km

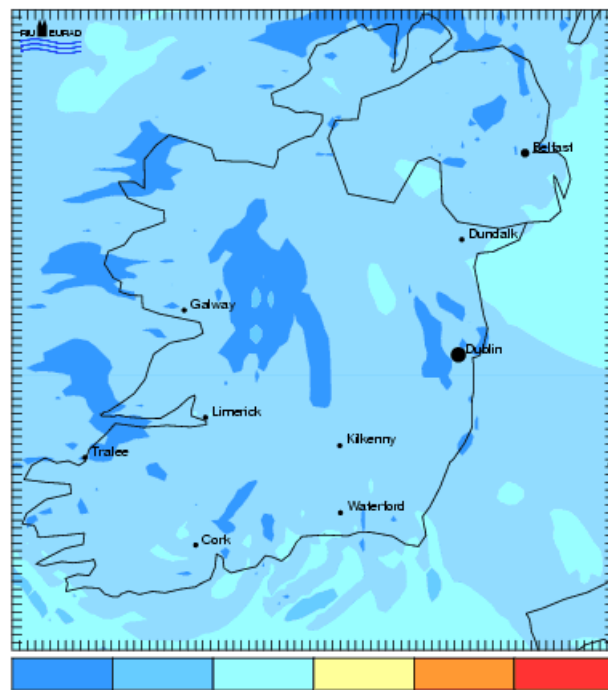


Model and Forecast

- Provides a model of current Air Quality in Ireland/UK
- ...and a forecast for 1-2-3 days ahead...
- ...for PM, Ozone, SO_x, NO_x, CO, Benzene...

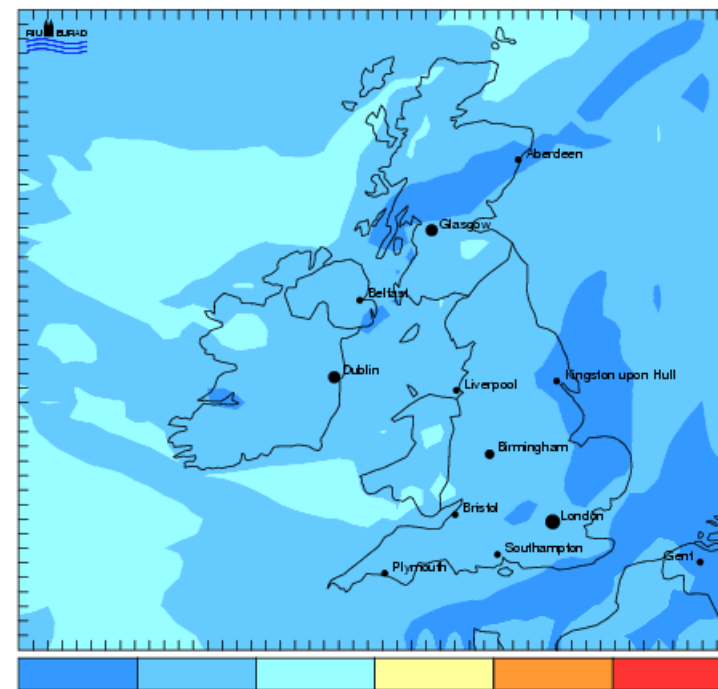
Forecasts...

Ozone $\mu\text{g}/\text{m}^3$ Level 1 20.04.2005 00 UTC (F+48)



V15AQ

Ozone $\mu\text{g}/\text{m}^3$ Level 1 25.05.2005 00 UTC (F+24)

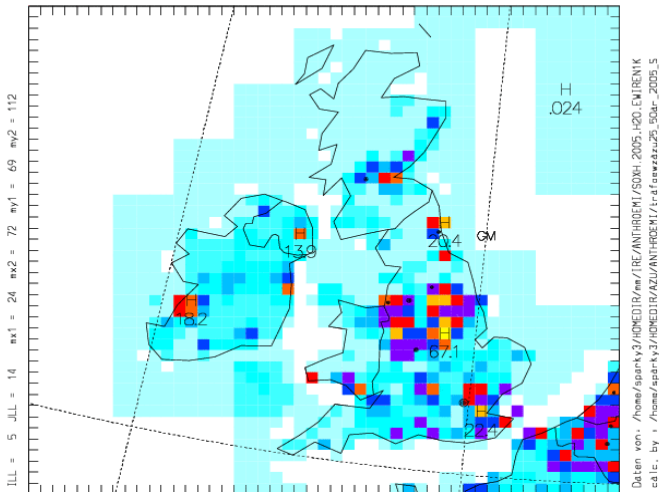


J15AQ

Emissions: Ireland/UK



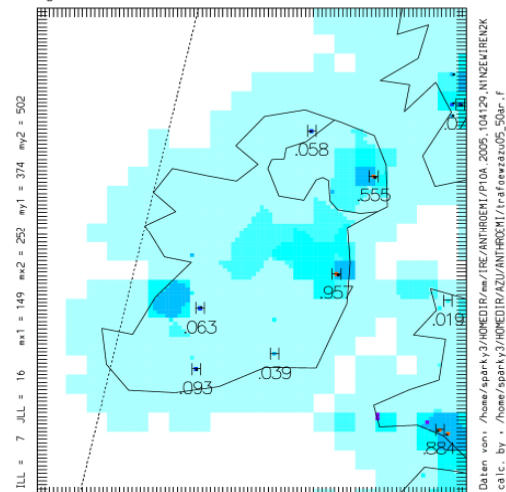
2005 CLE (based on 1999-2010) gridded SO_x emissions high-level)
 Gg as SO₂ PER GRID ELEMENT sccat (SNAP12): Total_sc1-sc10



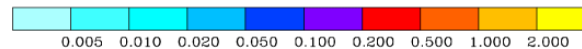
Max : 67.1000 Gg as SO₂ Fri Feb 25 14:18:08 2005
 Sum : 852.0067 Gg as SO₂ (with cities)



2005 CLE (based on 1999-2010) gridded PM₁₀ emissions
 Gg as PM₁₀ PER GRID ELEMENT sccat (SNAP12): Total_sc1-sc10



Max : 0.9570 Gg as PM₁₀
 Sum : 31.4222 Gg as PM₁₀



Tue Mar 1 16:31:19 2005

Operation/Validation Stage

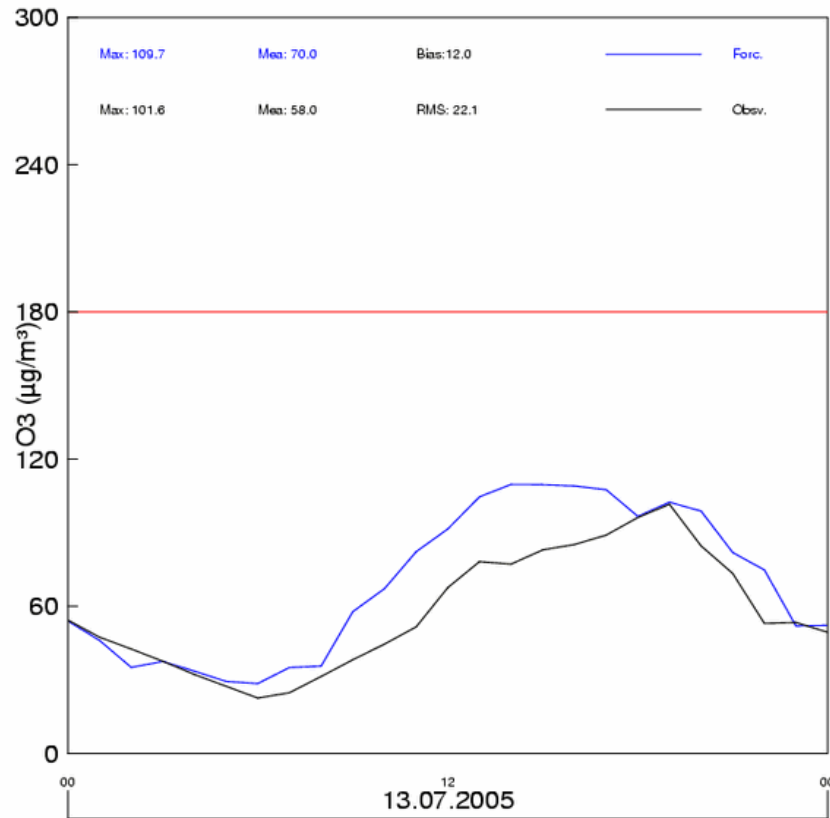
- Initial validation studies positive
- Currently in daily operational use by the EPA Air Quality team
- Compare forecast output with data from monitoring network

Validation: good news...



Forecast-Observation

EPAEmoCourt (53.11 °N, 7.20 °W)

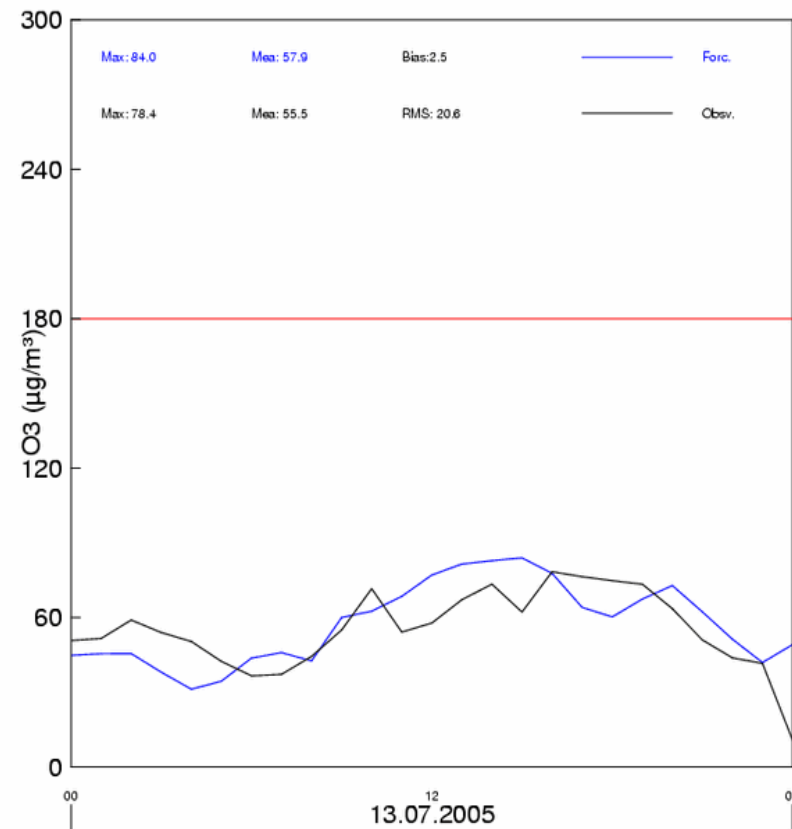


VISAQ



Forecast-Observation

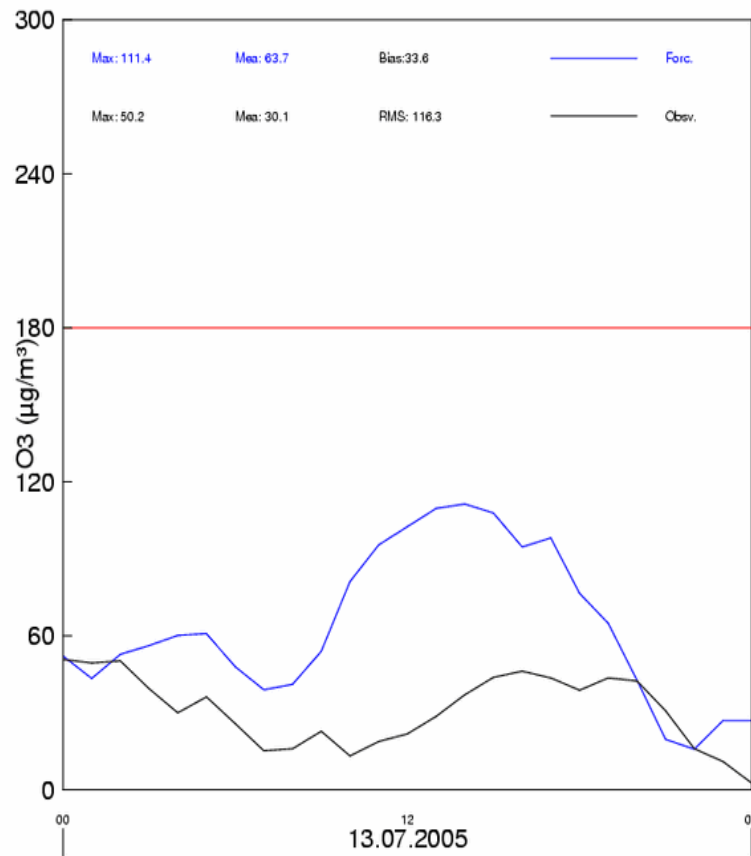
EPAGlashaboy (51.92 °N, 8.38 °W)



Validation: interesting news!

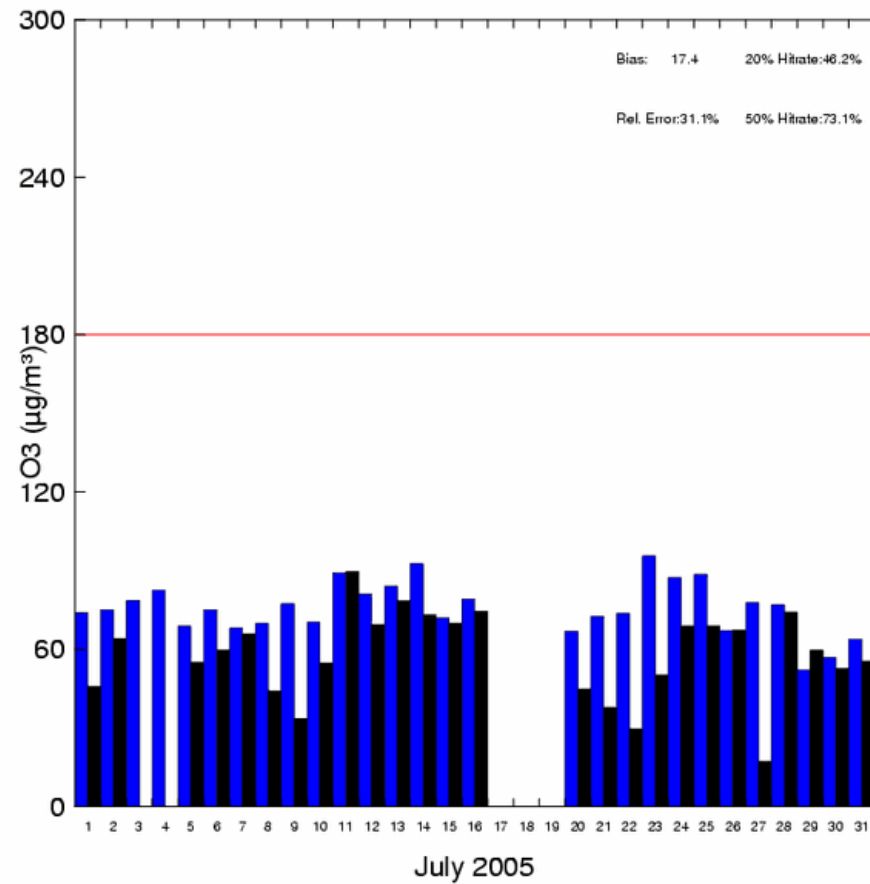
Forecast-Observation

EPARathmines (53.32°N, 6.63°W)



Monthly Validation

EPAGlashaboy (51.92°N, 8.38°W)



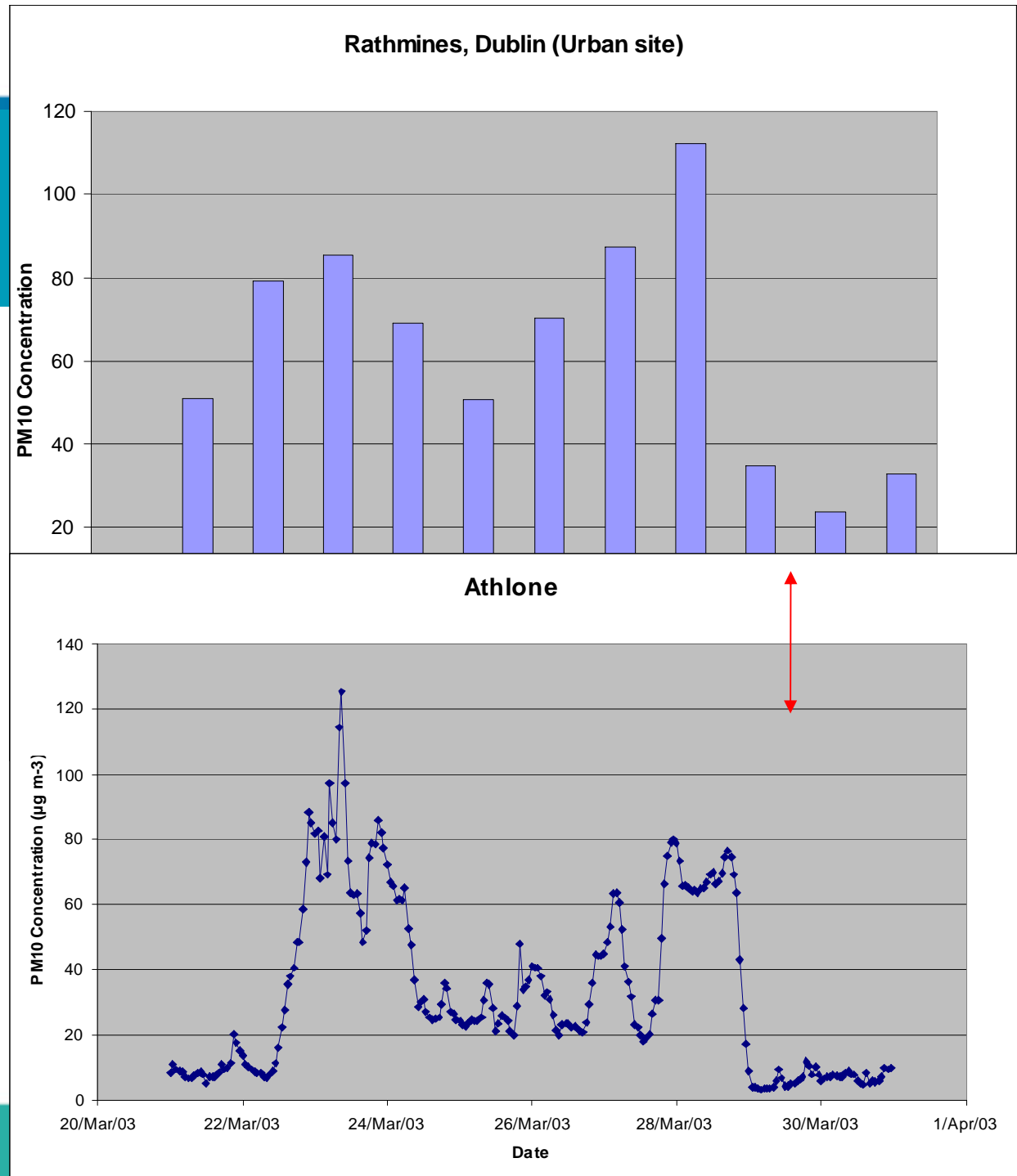
Episode analysis

- Initial study of 2003 episodes...example...

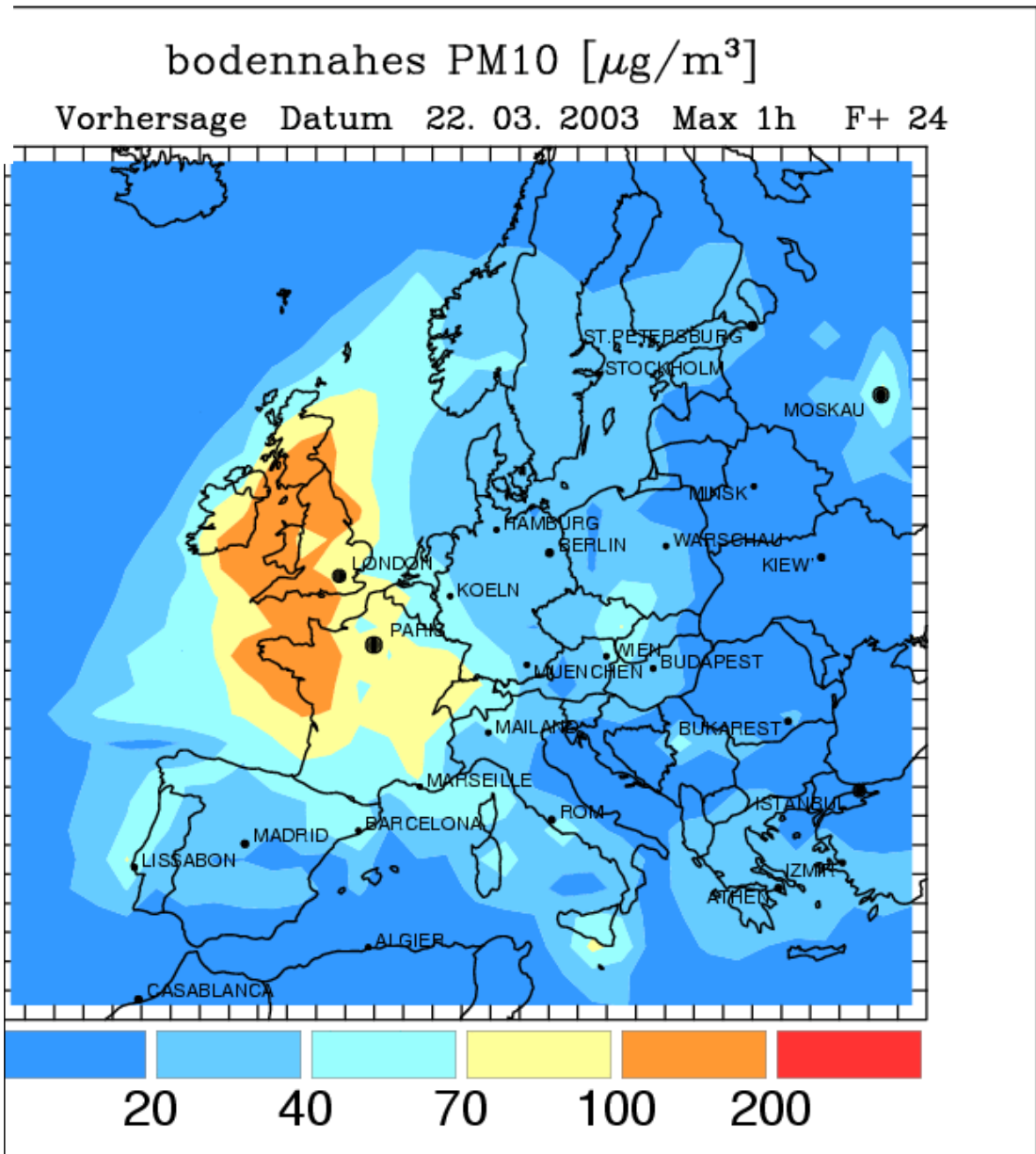
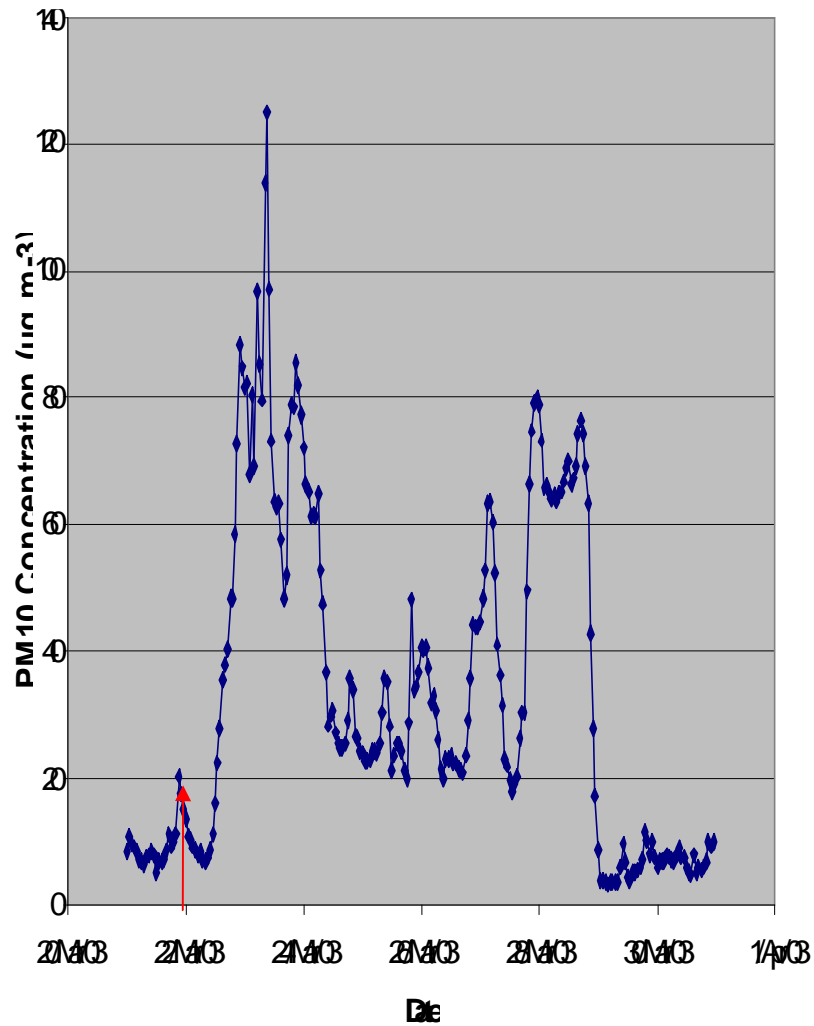
Example

Athlone, a town in the centre of Ireland, experienced a high PM10 episode between 22nd and 30th March, 2003...compared with data from a Dublin site, it had a similar character of event but even higher PM10 levels

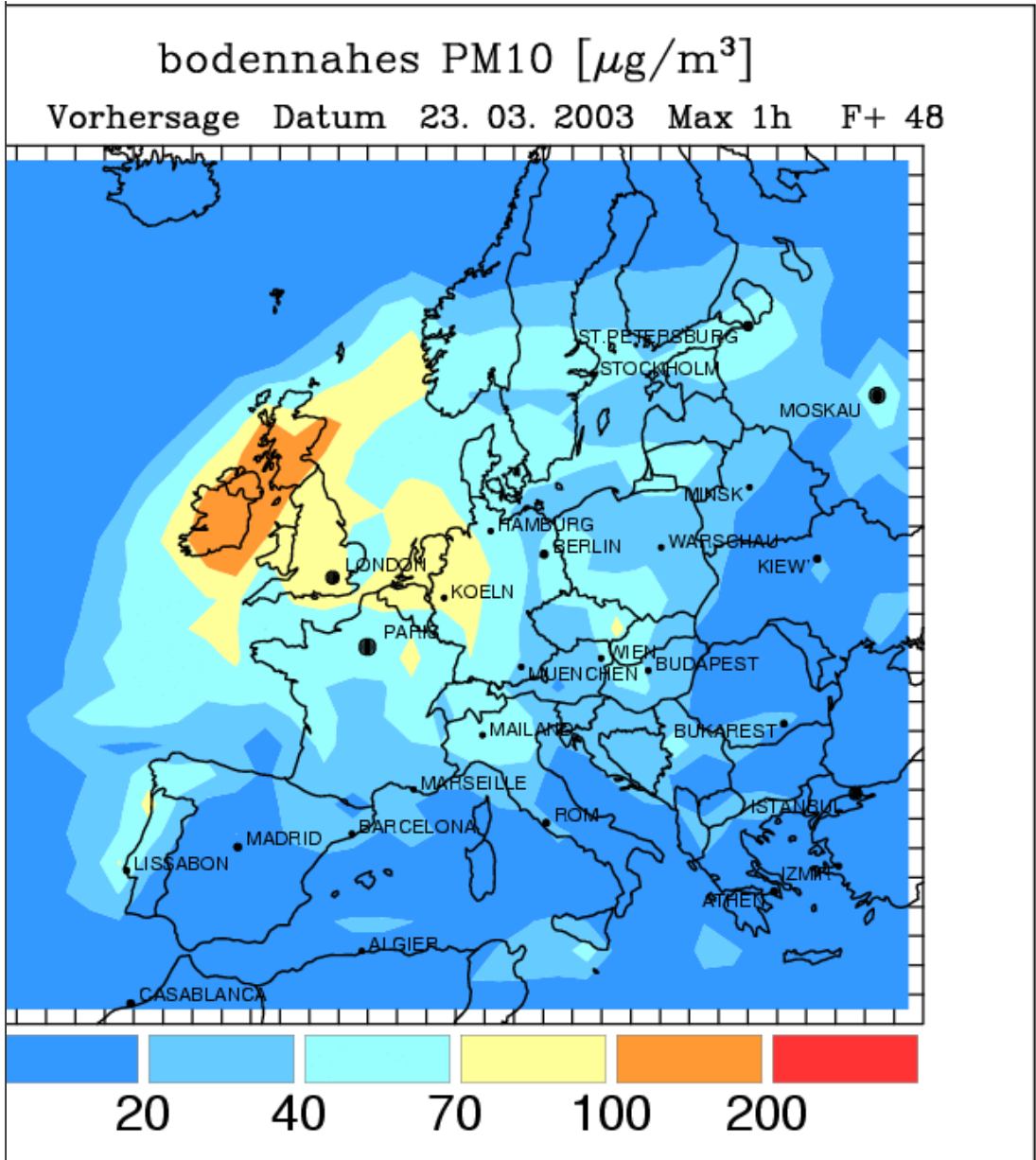
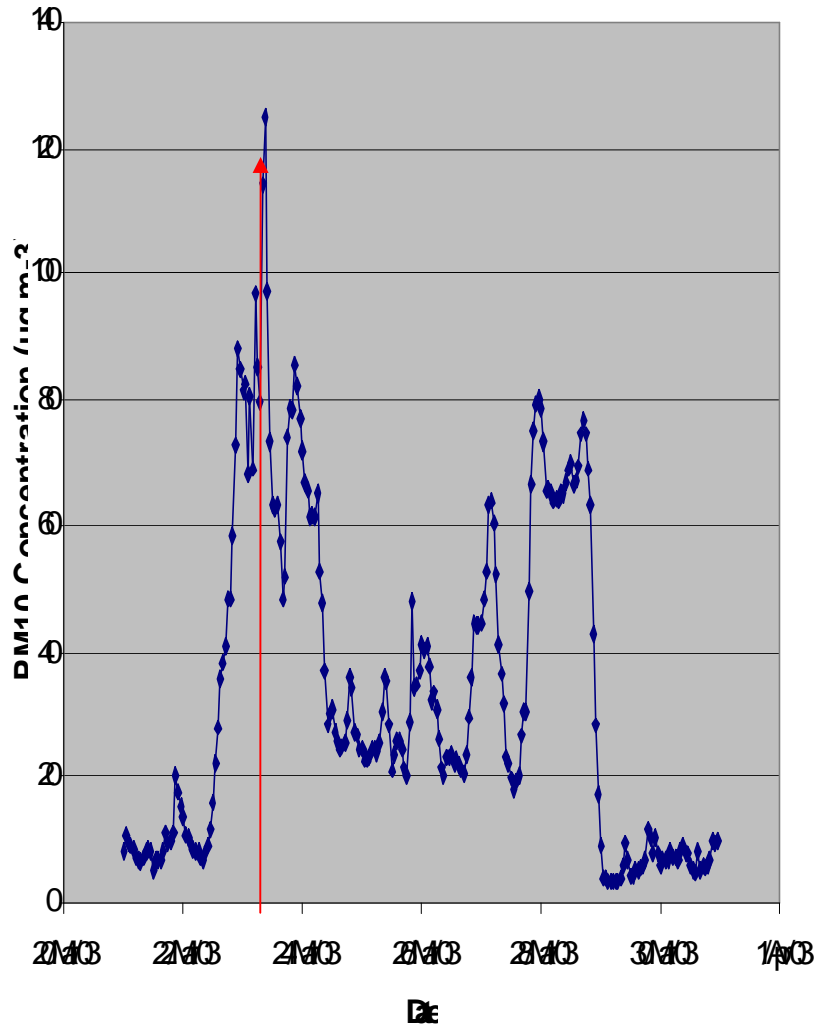
+ Back-trajectory analysis



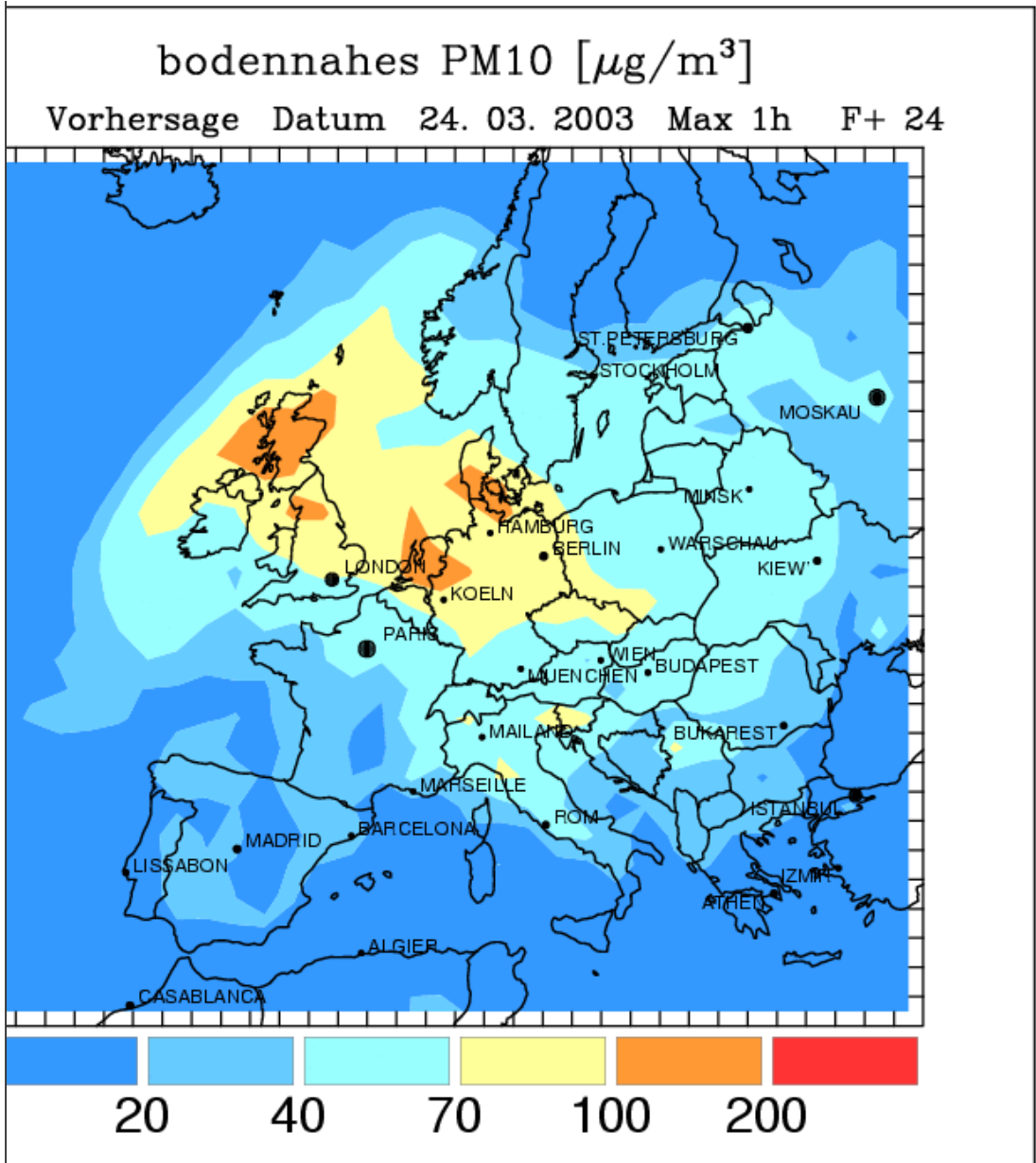
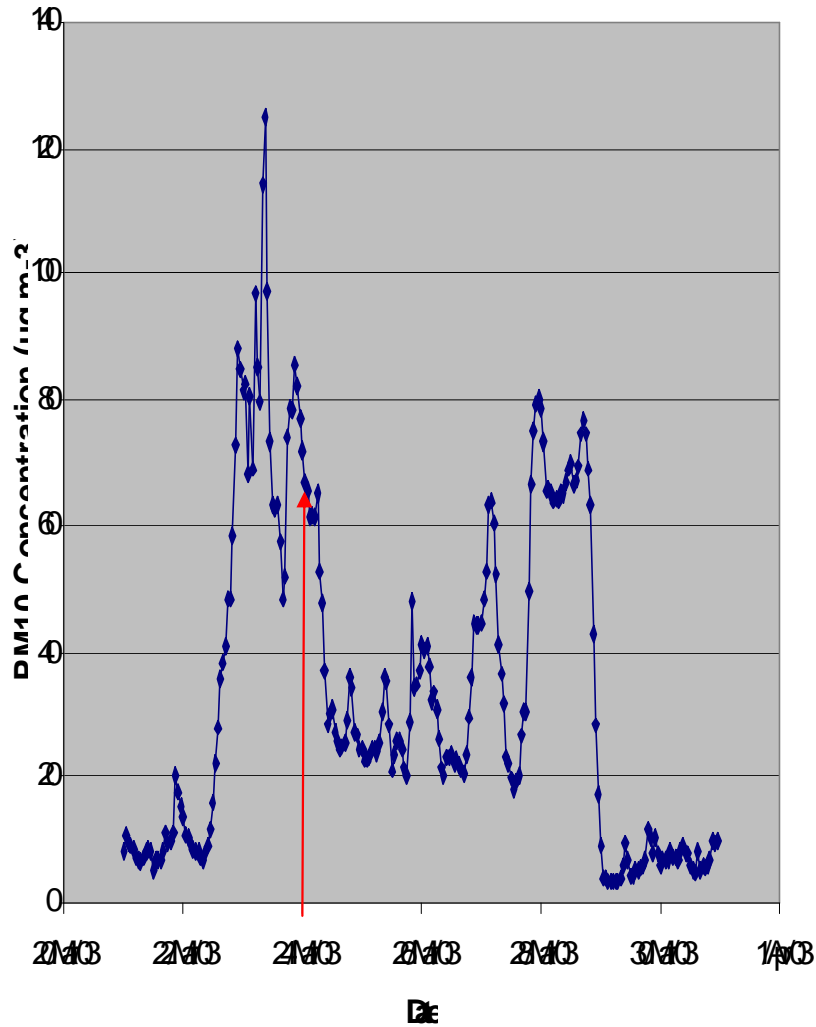
Review Athlone episode with European view...



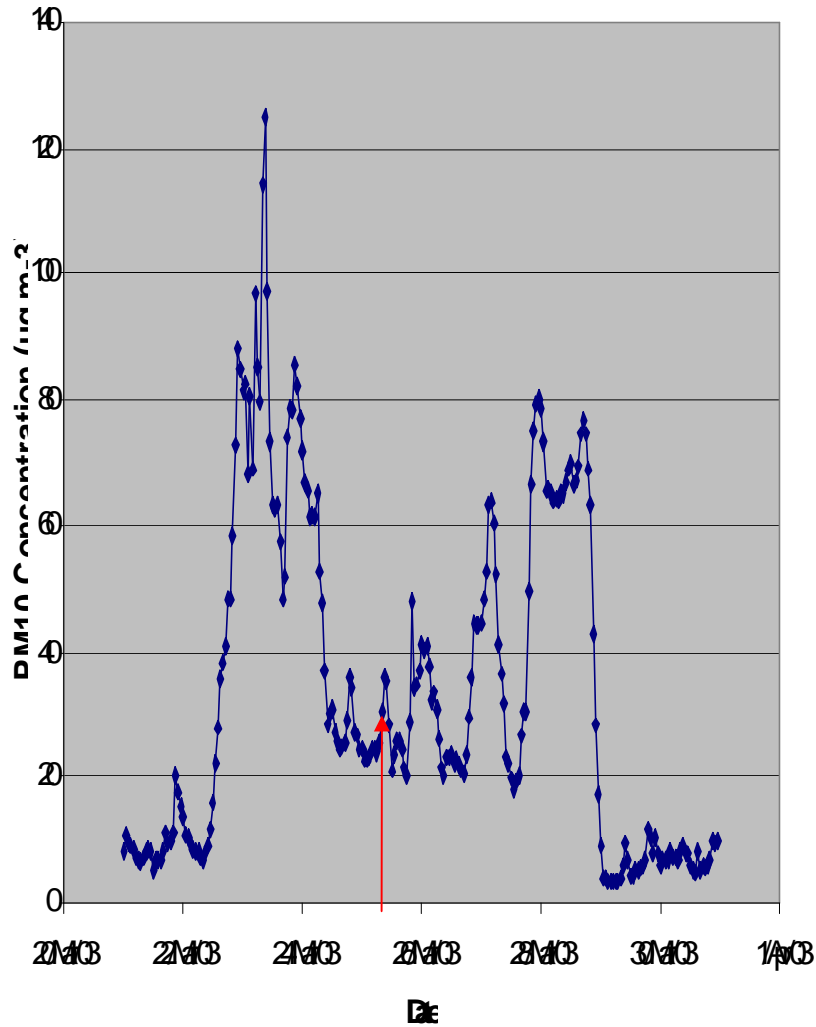
Abw



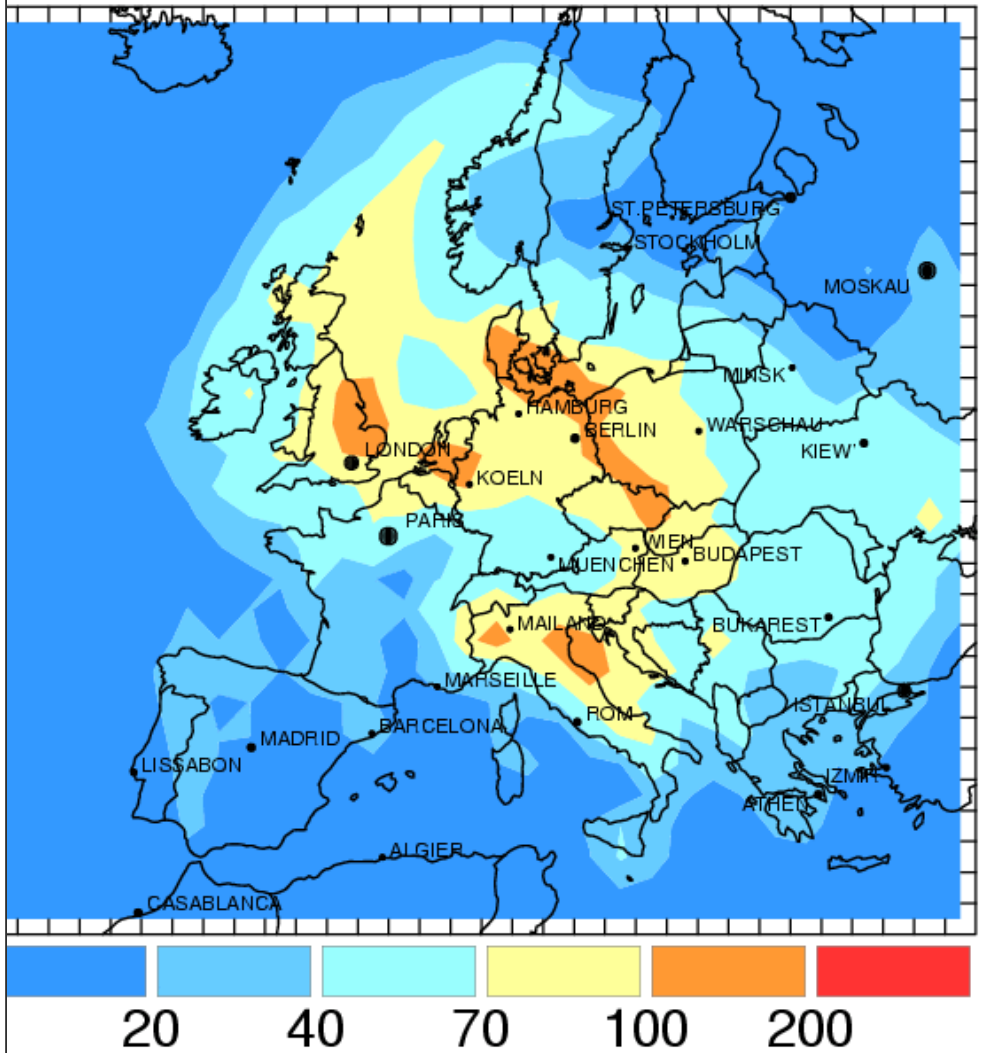
Abw



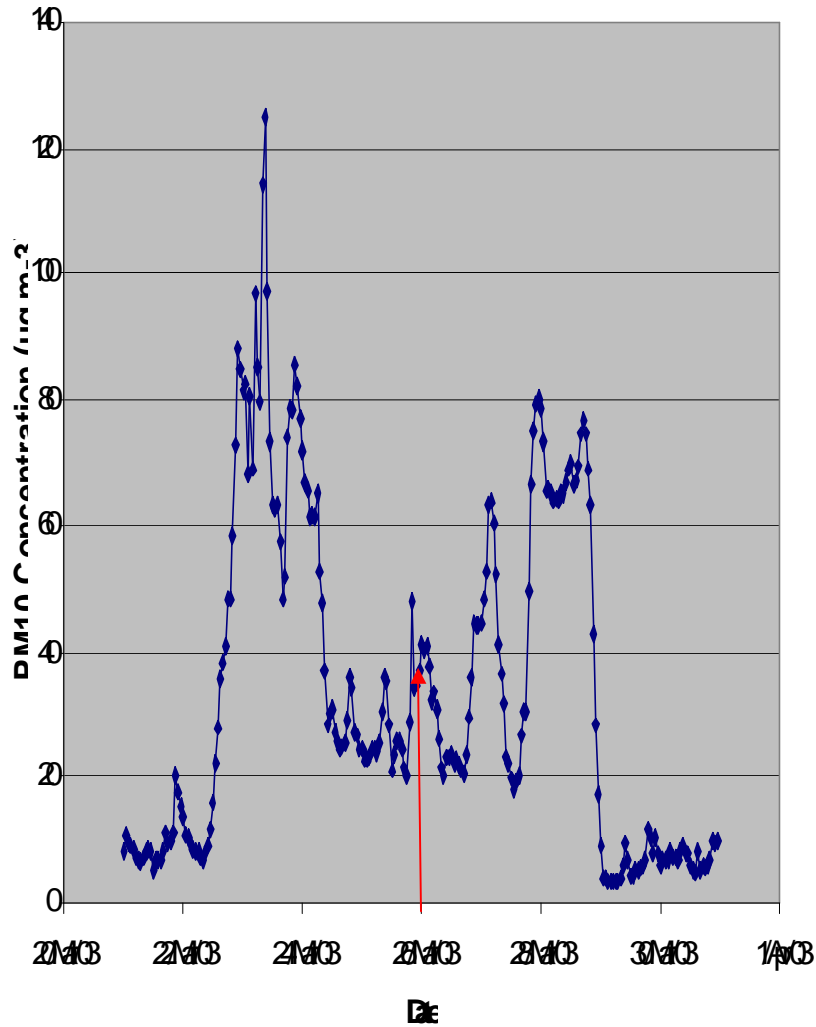
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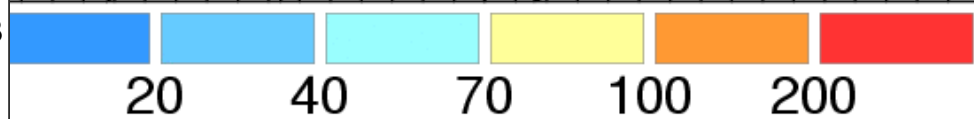
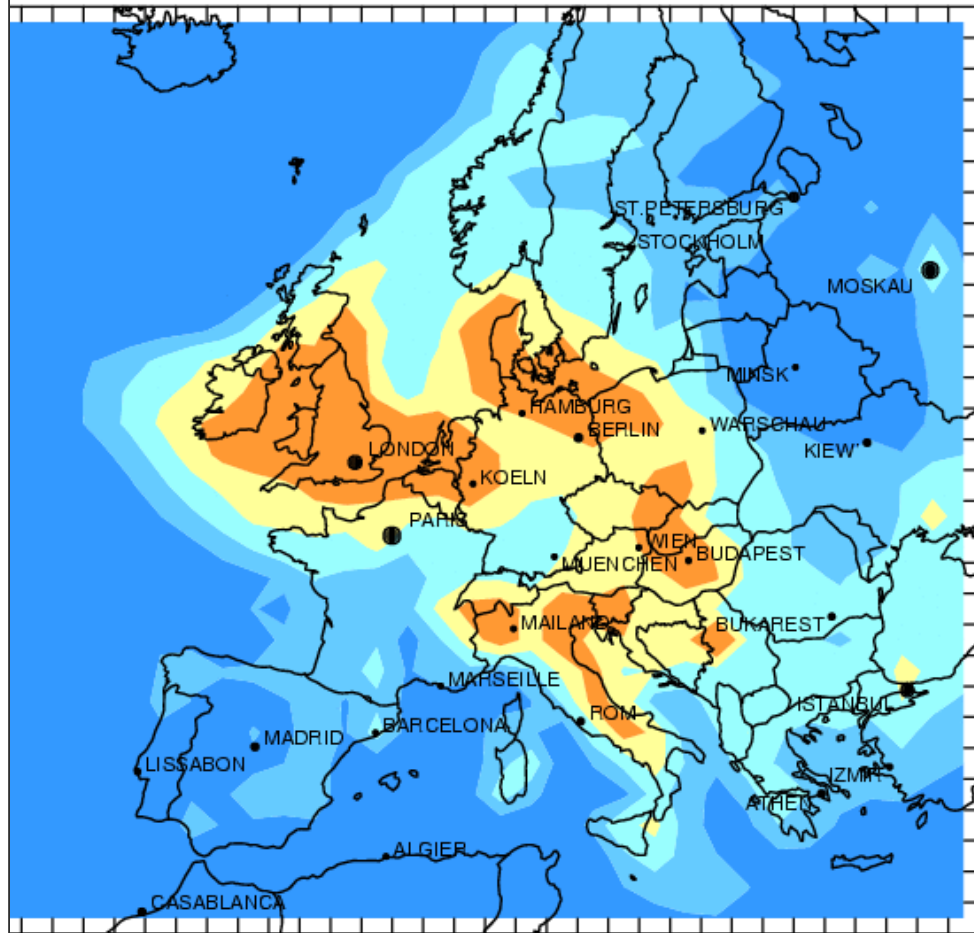
bodennahes PM10 [$\mu\text{g}/\text{m}^3$]
Vorhersage Datum 25. 03. 2003 Max 1h F+ 48



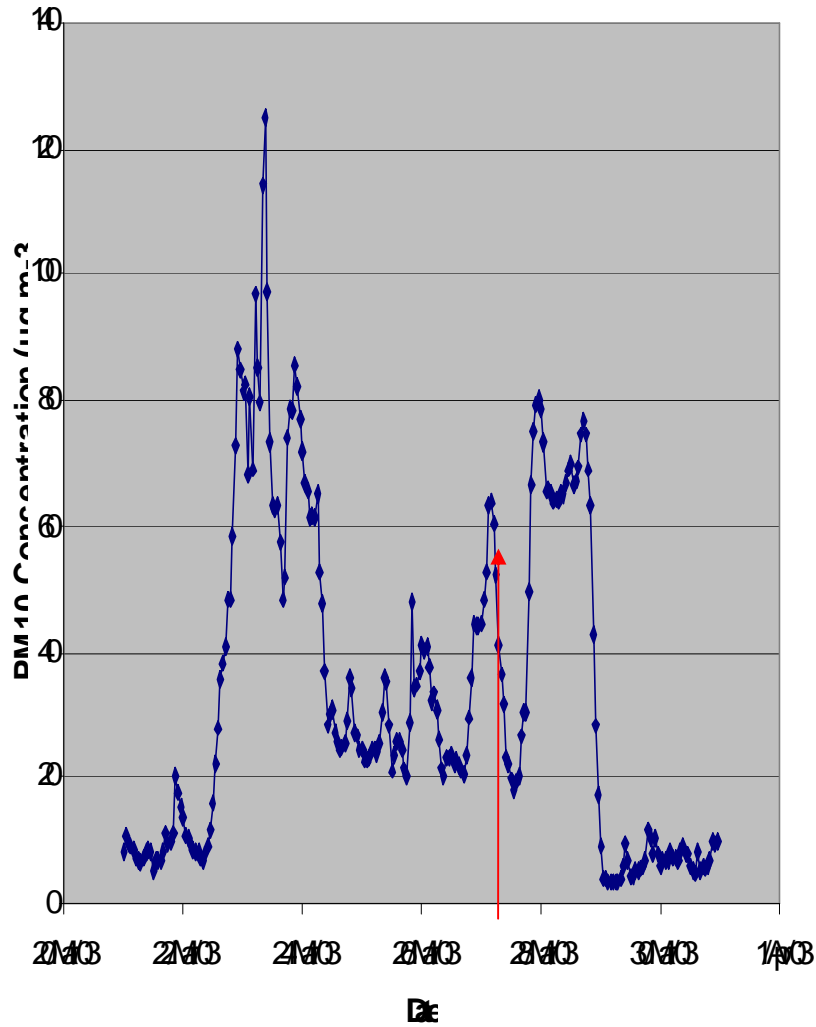
Abs



bodennahe PM10 [$\mu\text{g}/\text{m}^3$]
Vorhersage Datum 26.03.2003 Max 1h F+ 24

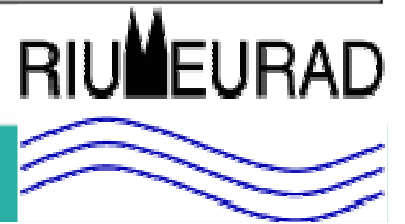
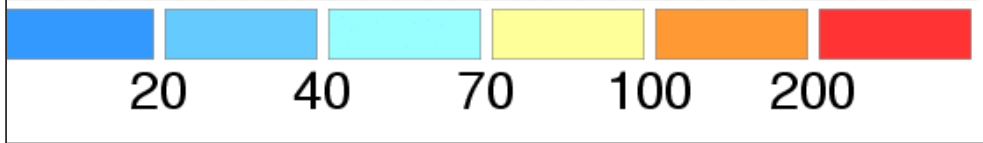
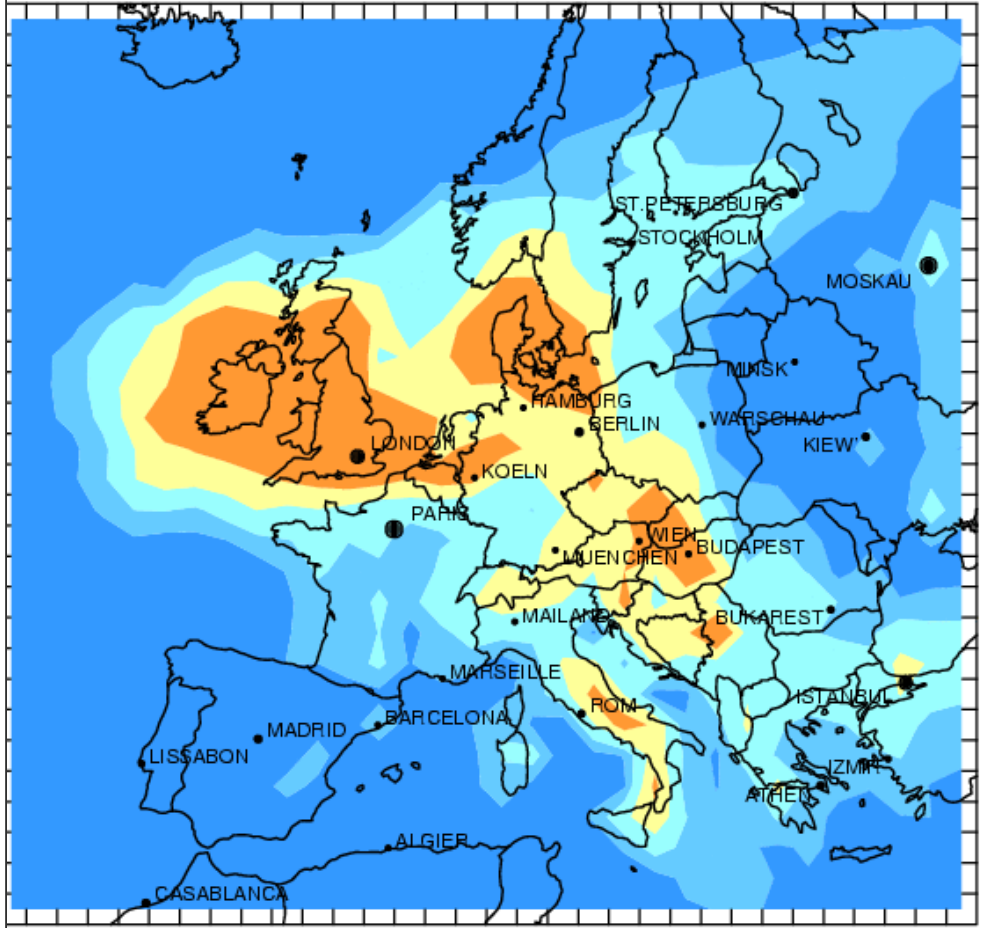


Aten

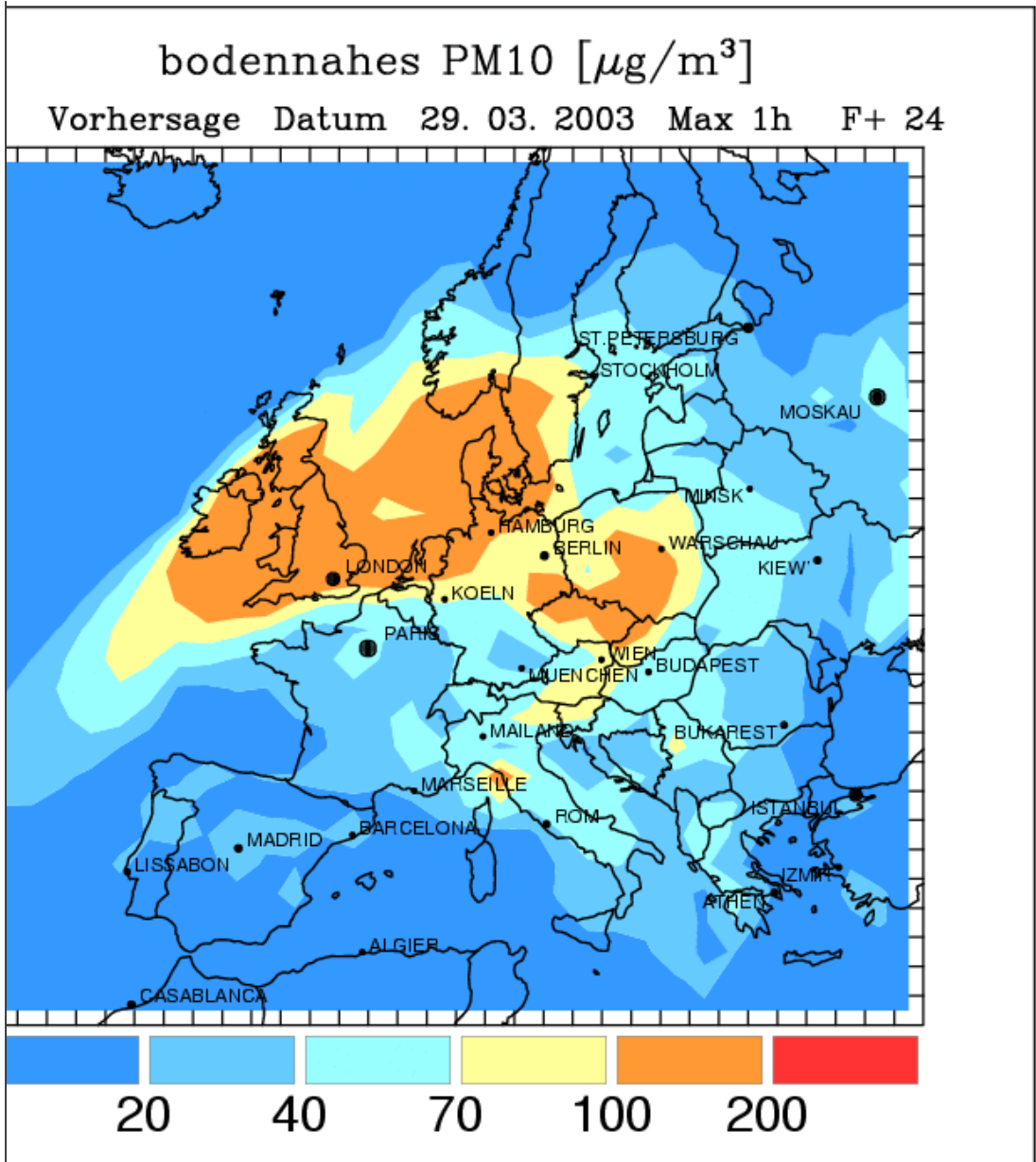
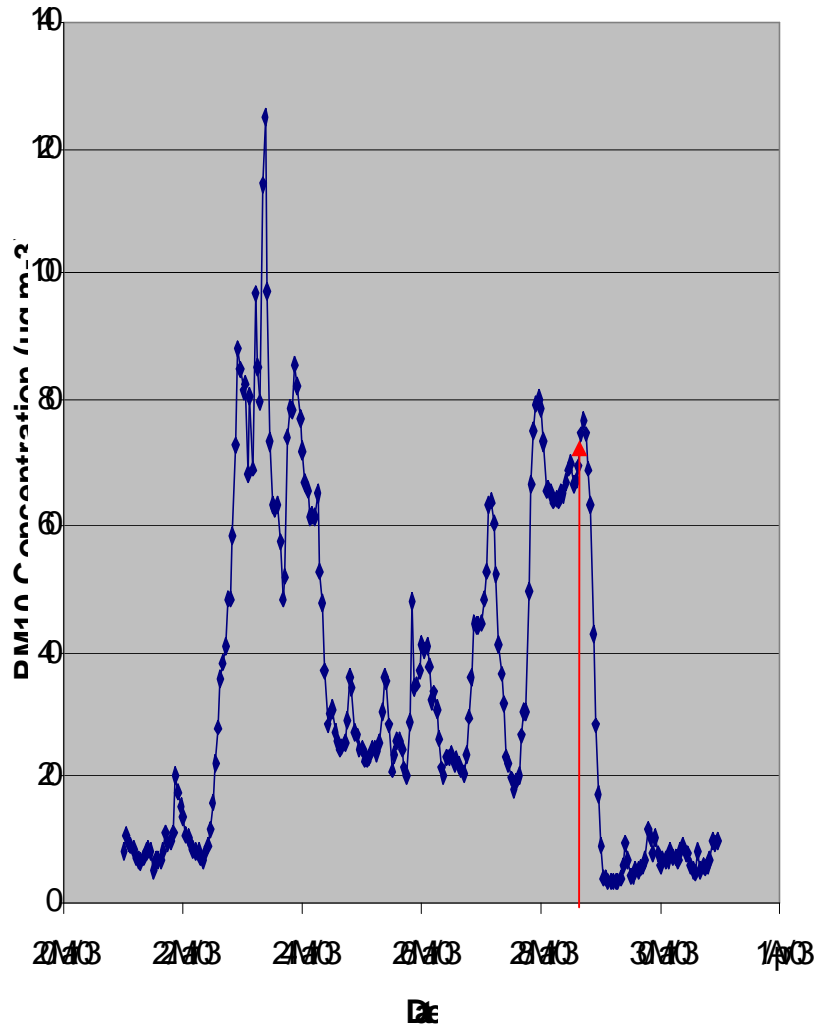


bodennahes PM10 [$\mu\text{g}/\text{m}^3$]

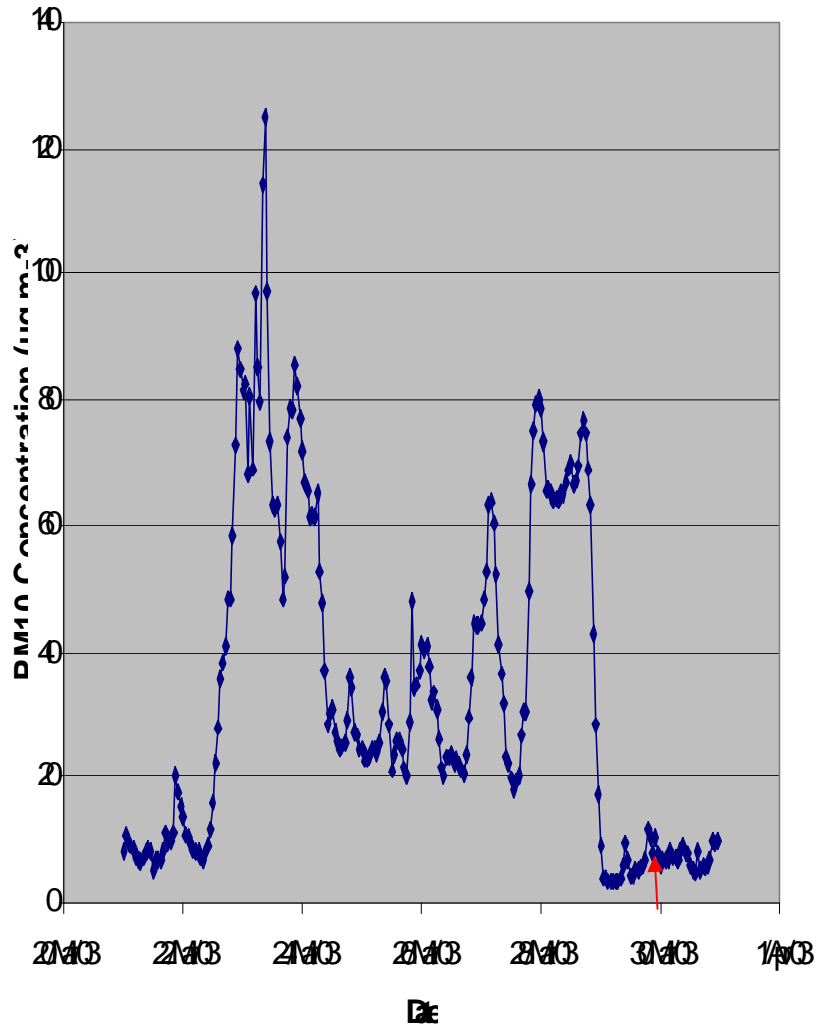
Vorhersage Datum 27. 03. 2003 Max 1h F+ 48



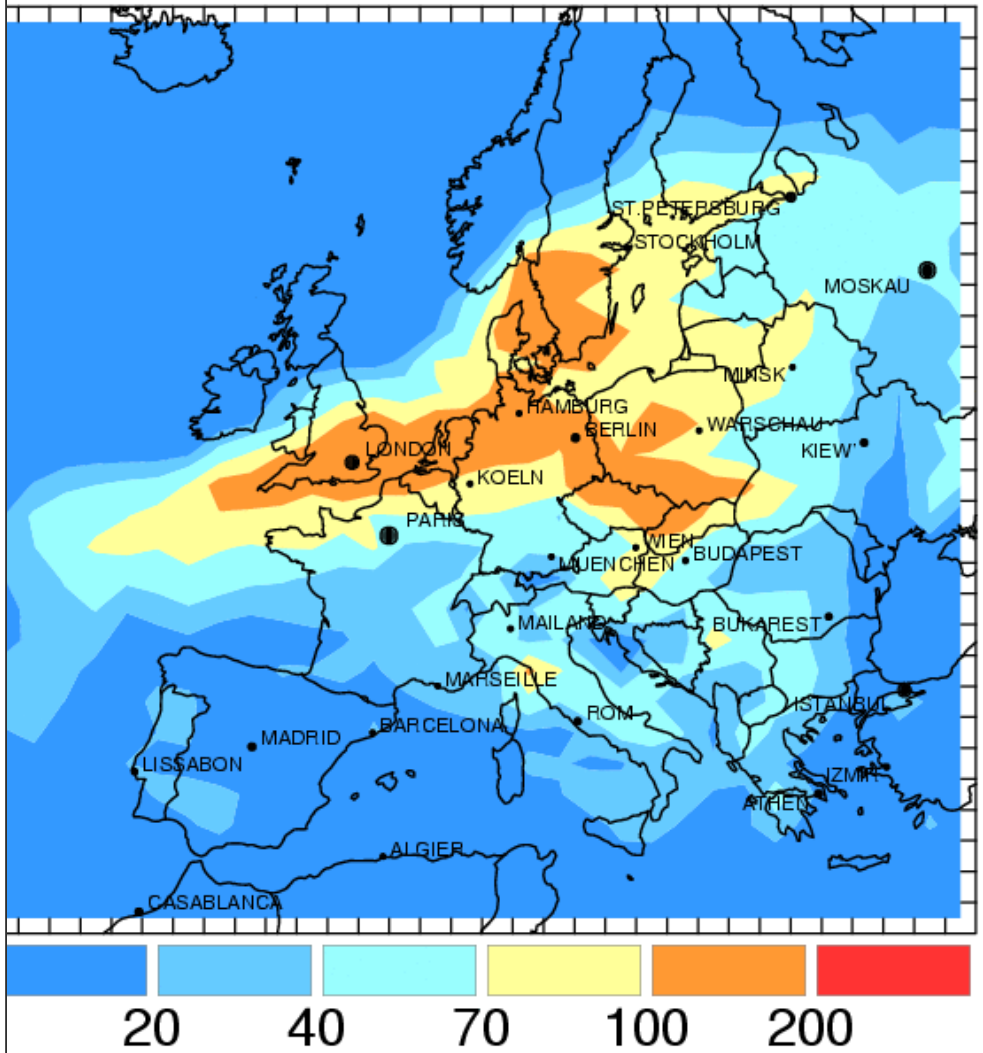
Abw



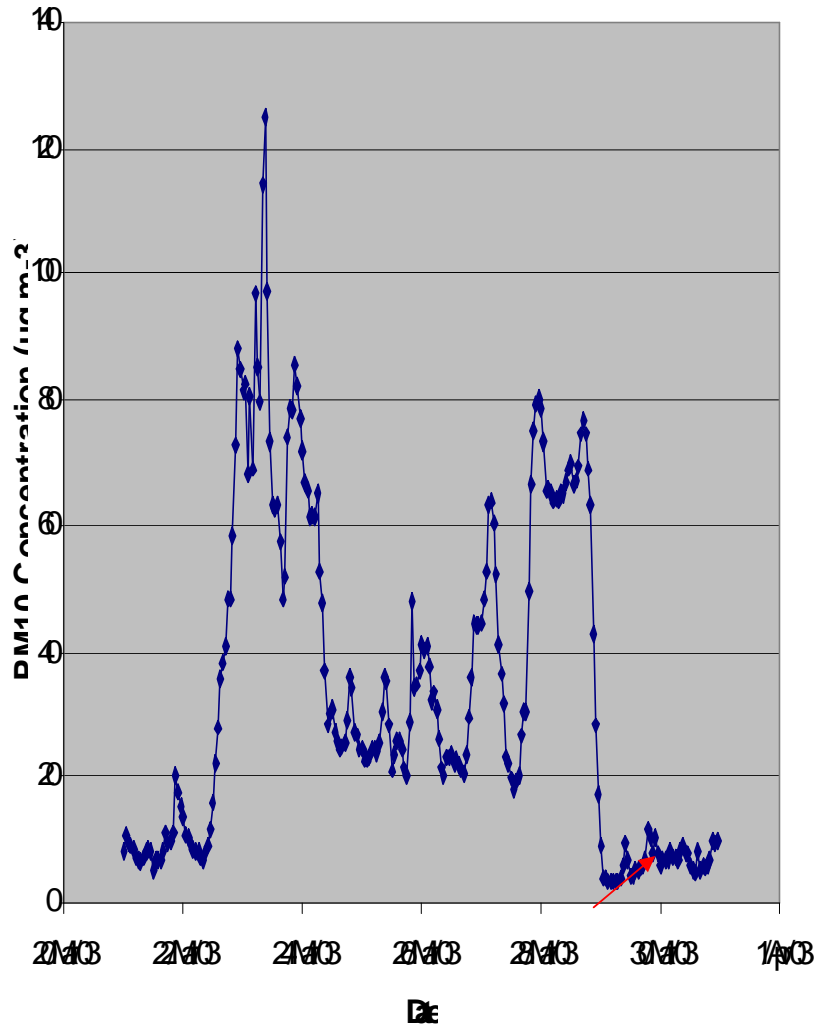
Abw



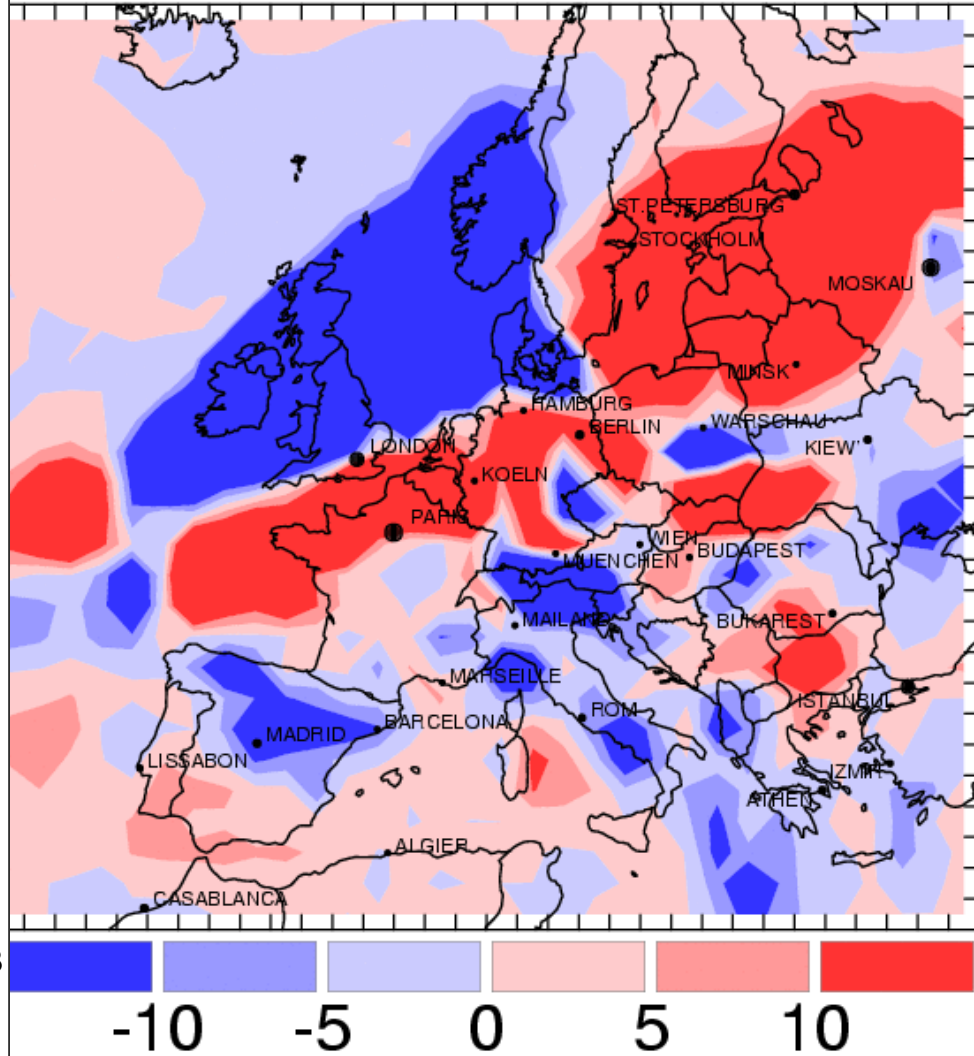
bodennahe PM10 [$\mu\text{g}/\text{m}^3$]
Vorhersage Datum 30. 03. 2003 Max 1h F+ 48



Abw

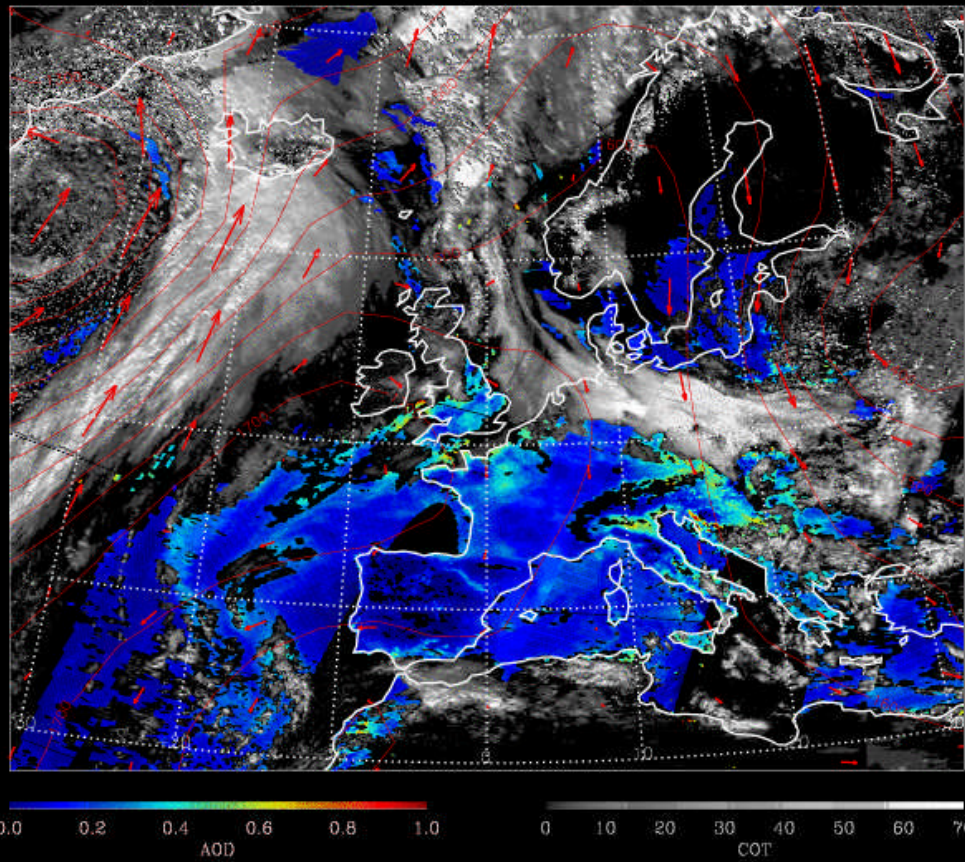


Tendenz bodennahes PM10 [$\mu\text{g}/\text{m}^3$]
Vorhersage Datum 29. 03. 2003 Max 1h F+ 48



Integration of satellite data

MODIS (Terra) Aerosol Optical Depth 2003 03 20



- NASA
LaRC

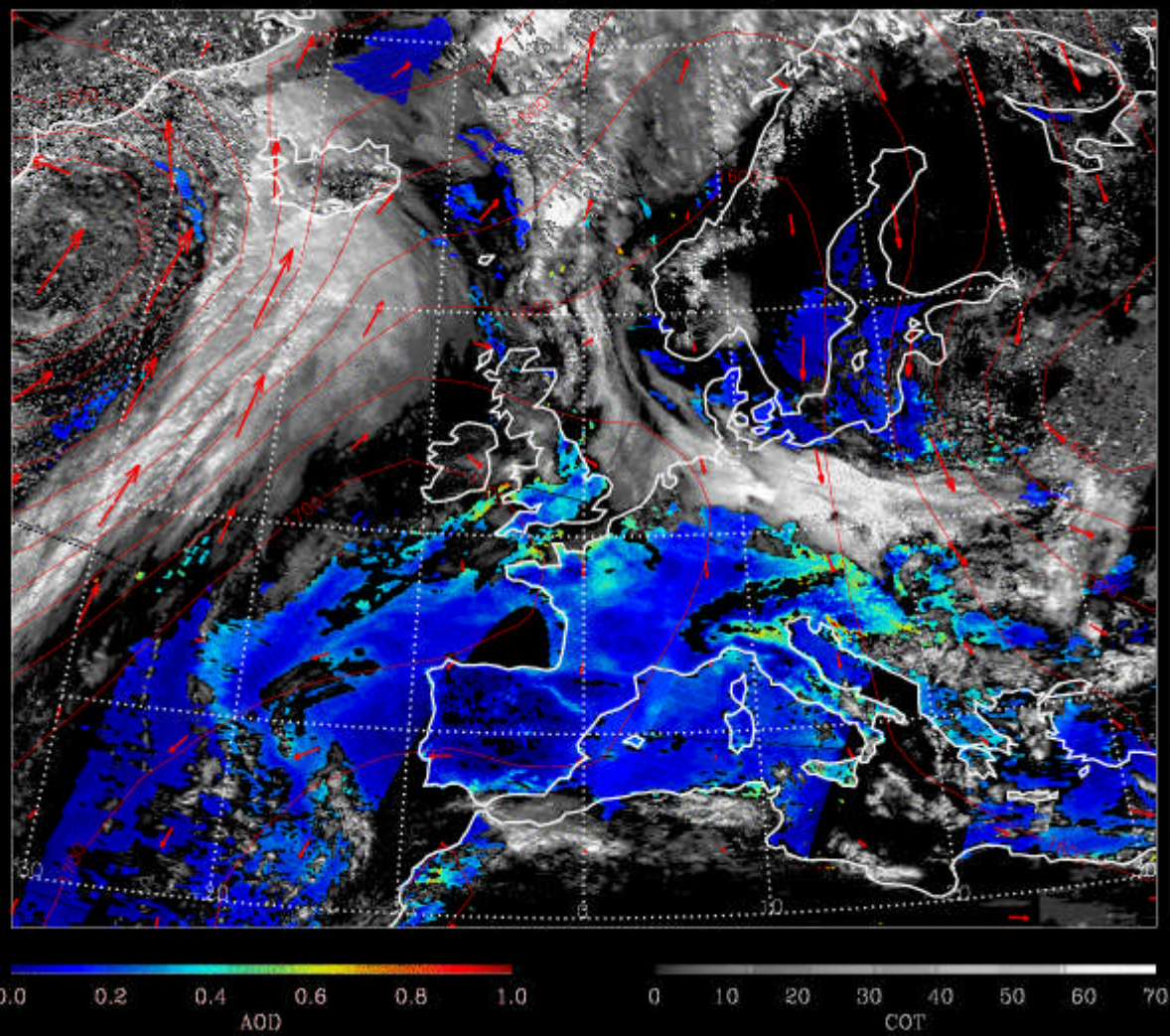
- IDEA

- ESE

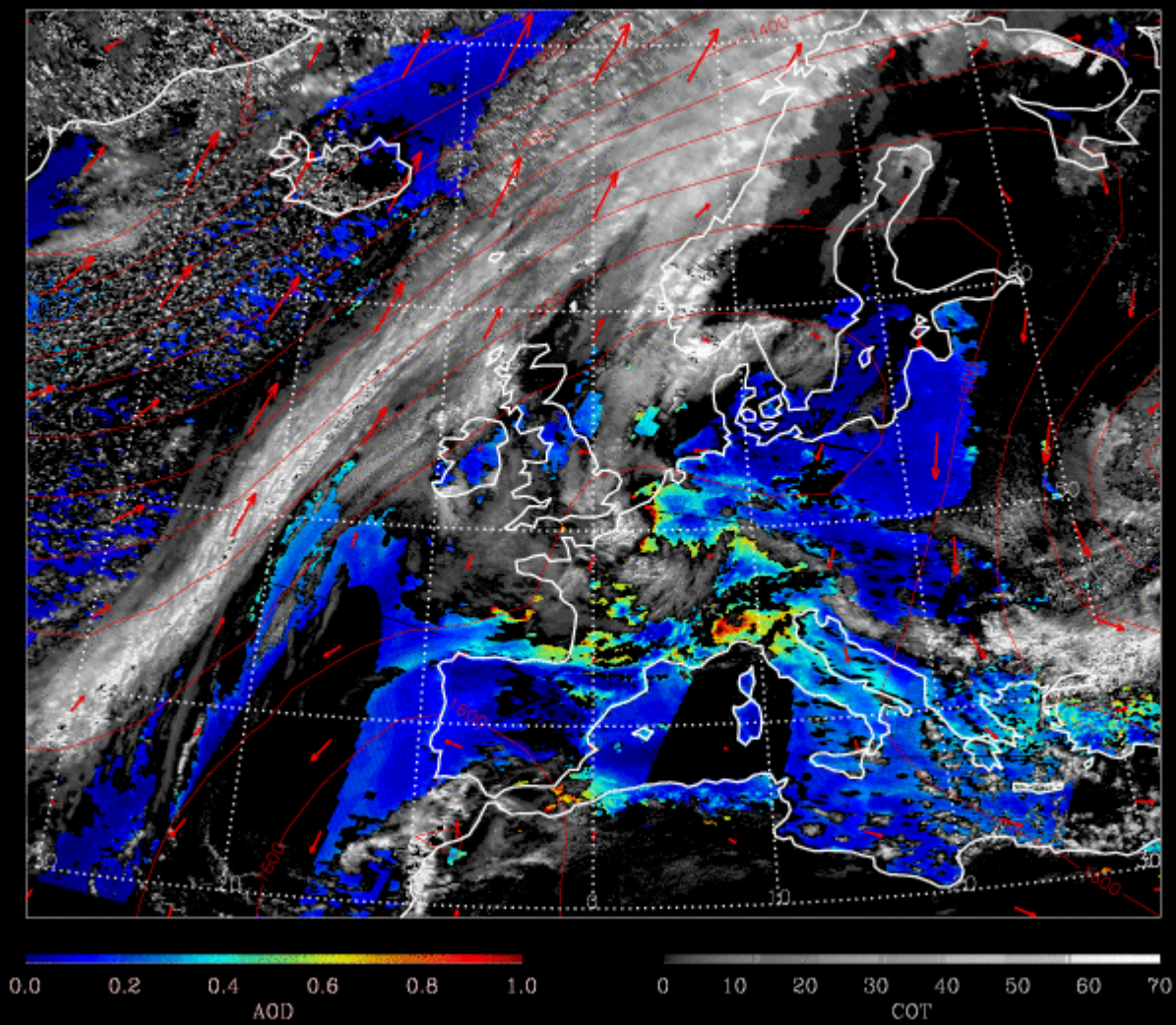
- Brad
Pierce



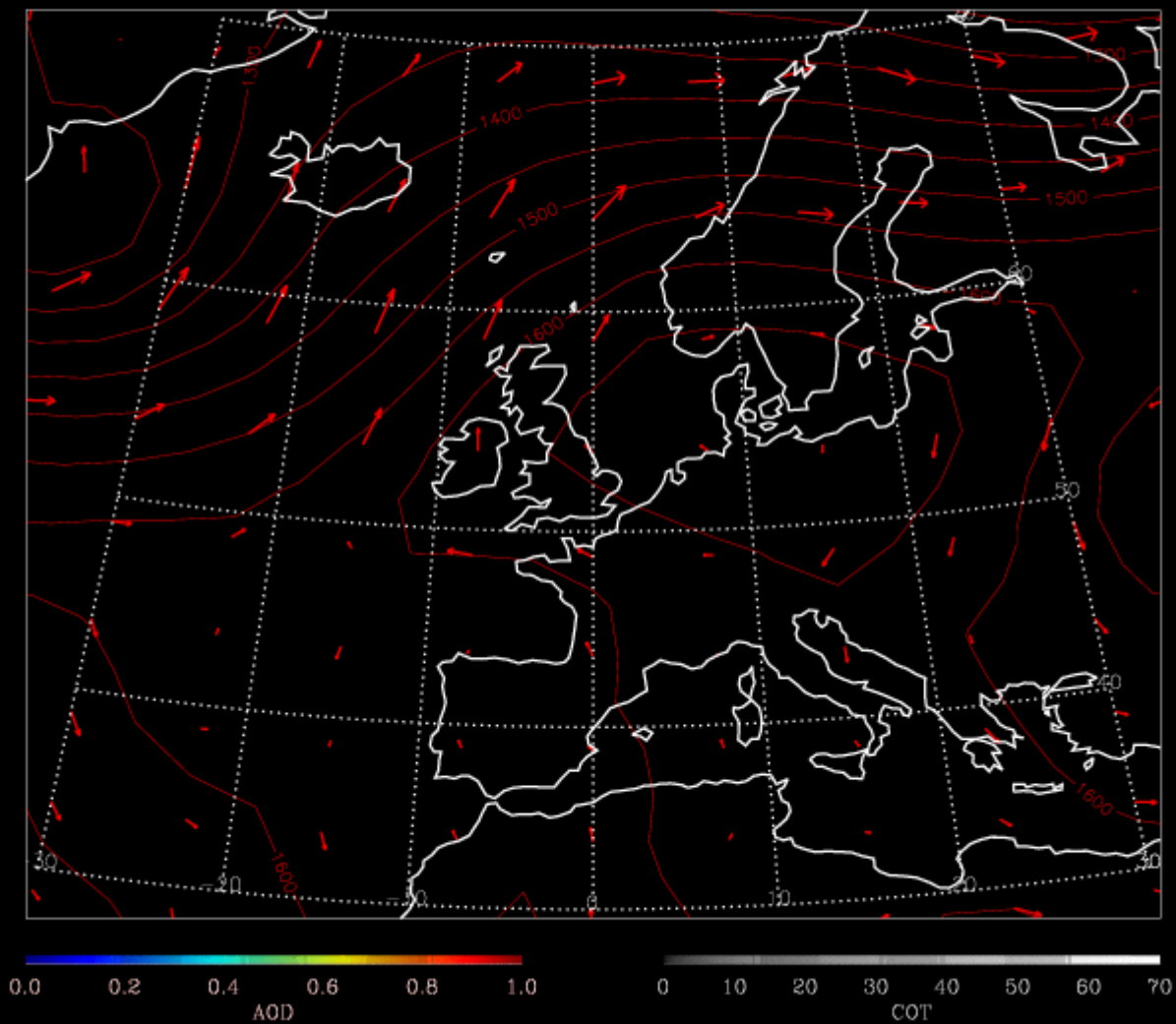
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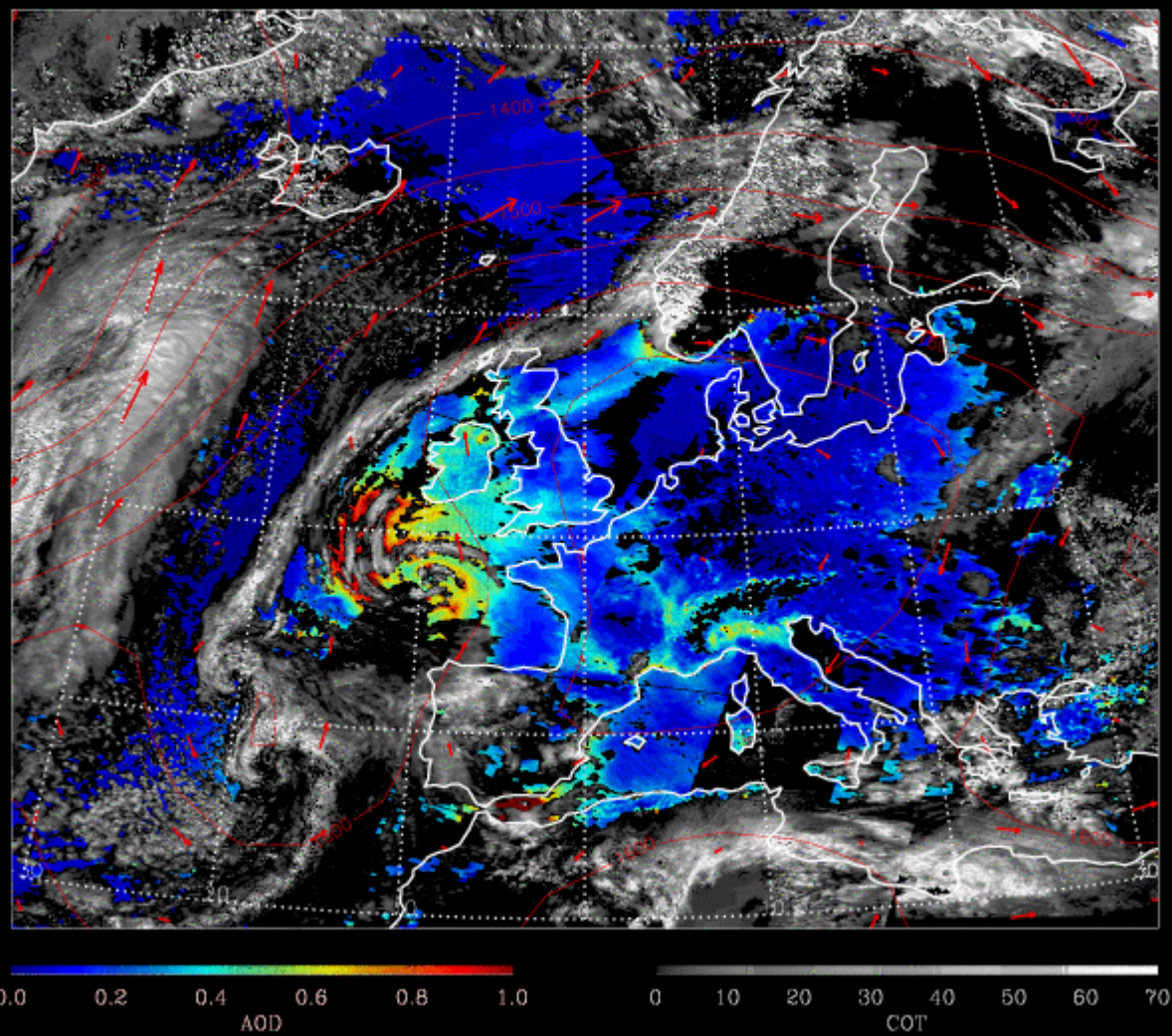
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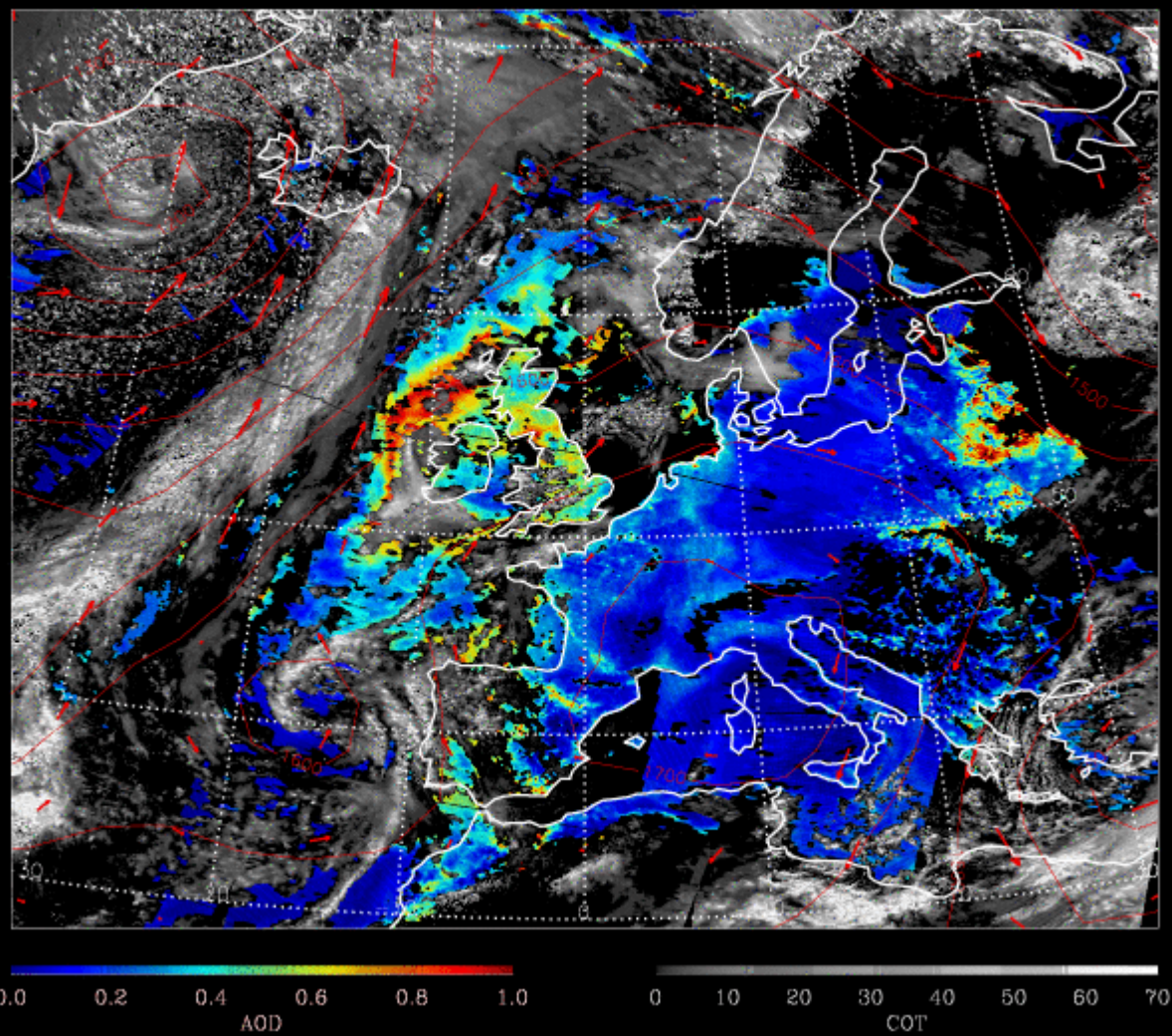
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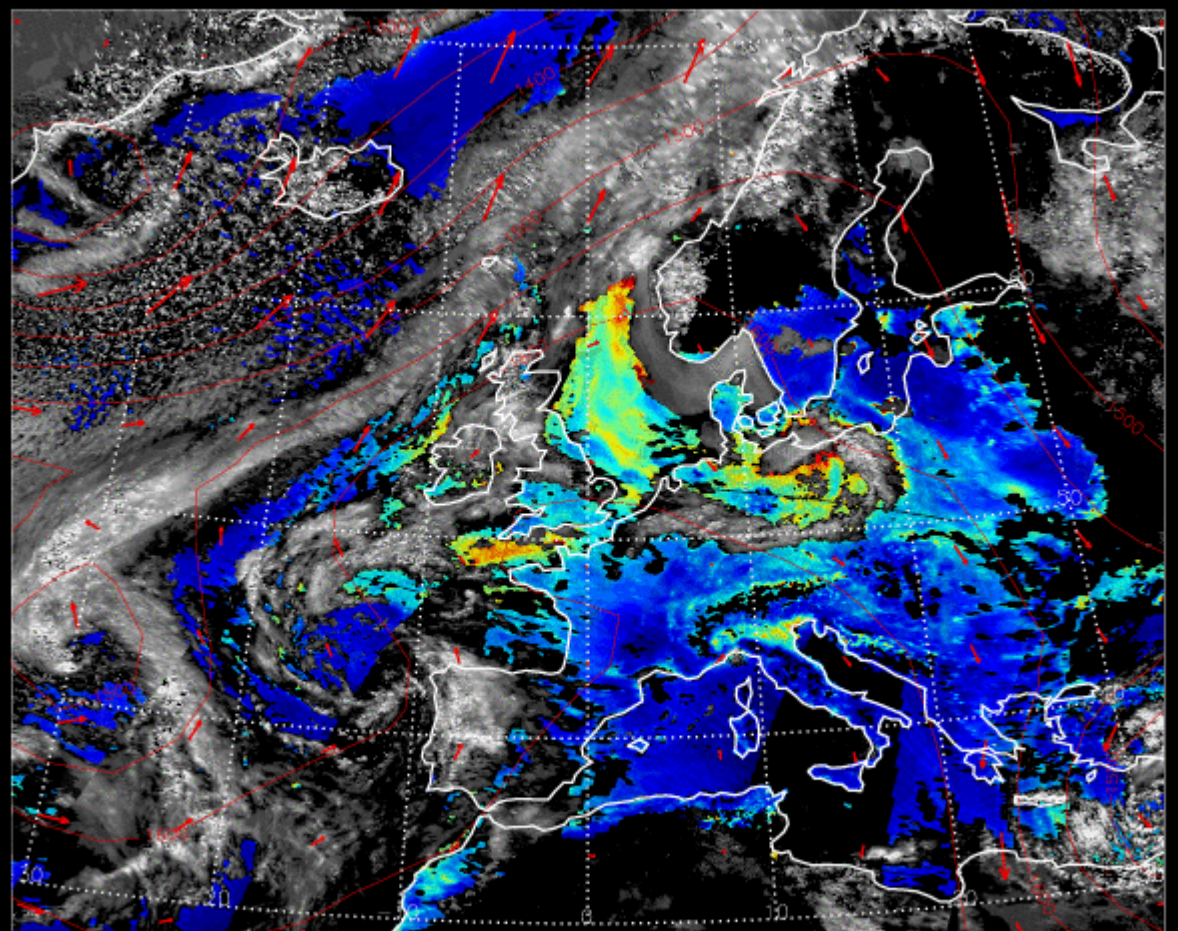
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MODIS (Terra) Aerosol Optical Depth 2003 03 24

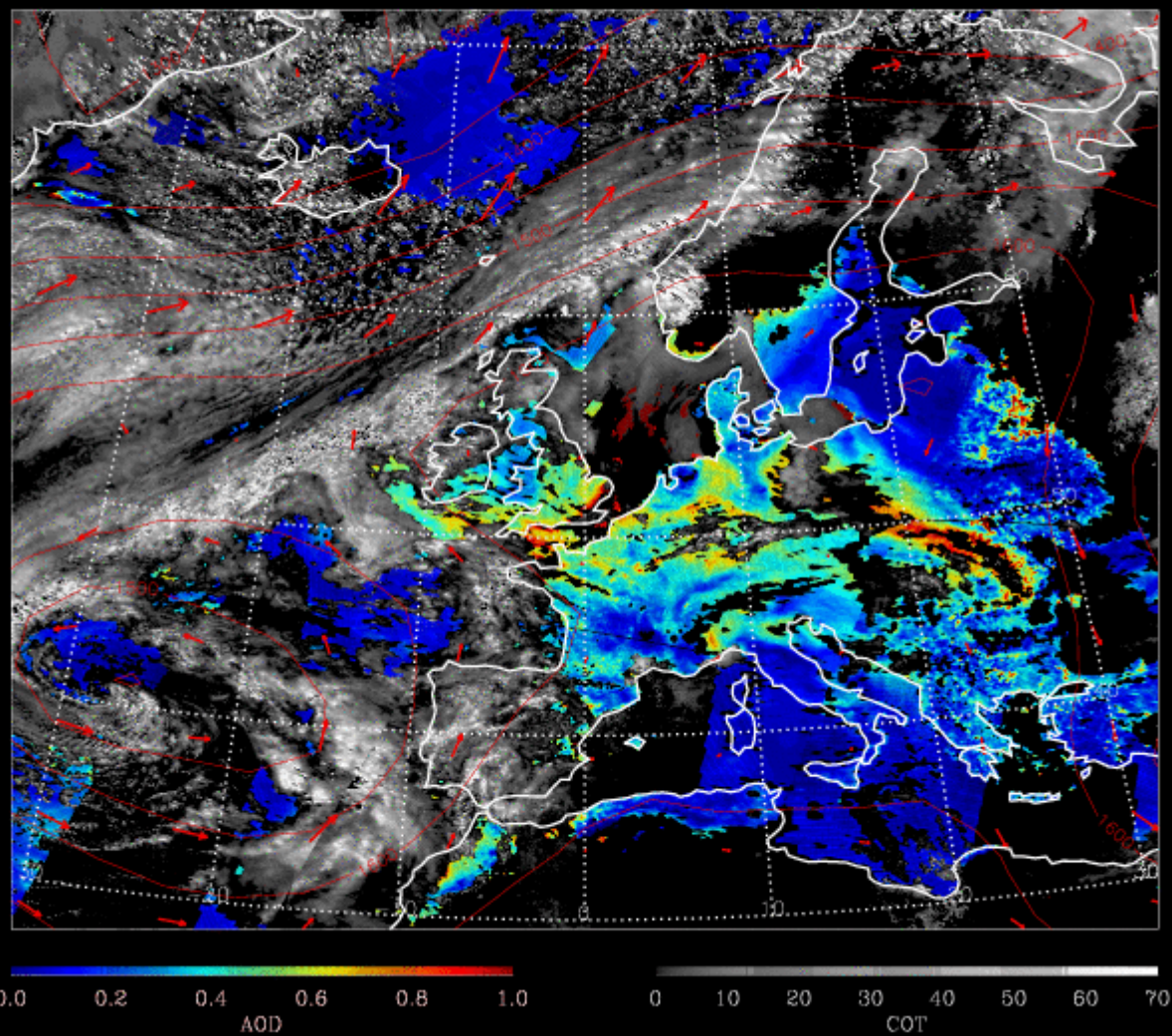


MODIS (Terra) Aerosol Optical Depth 2003 03 25

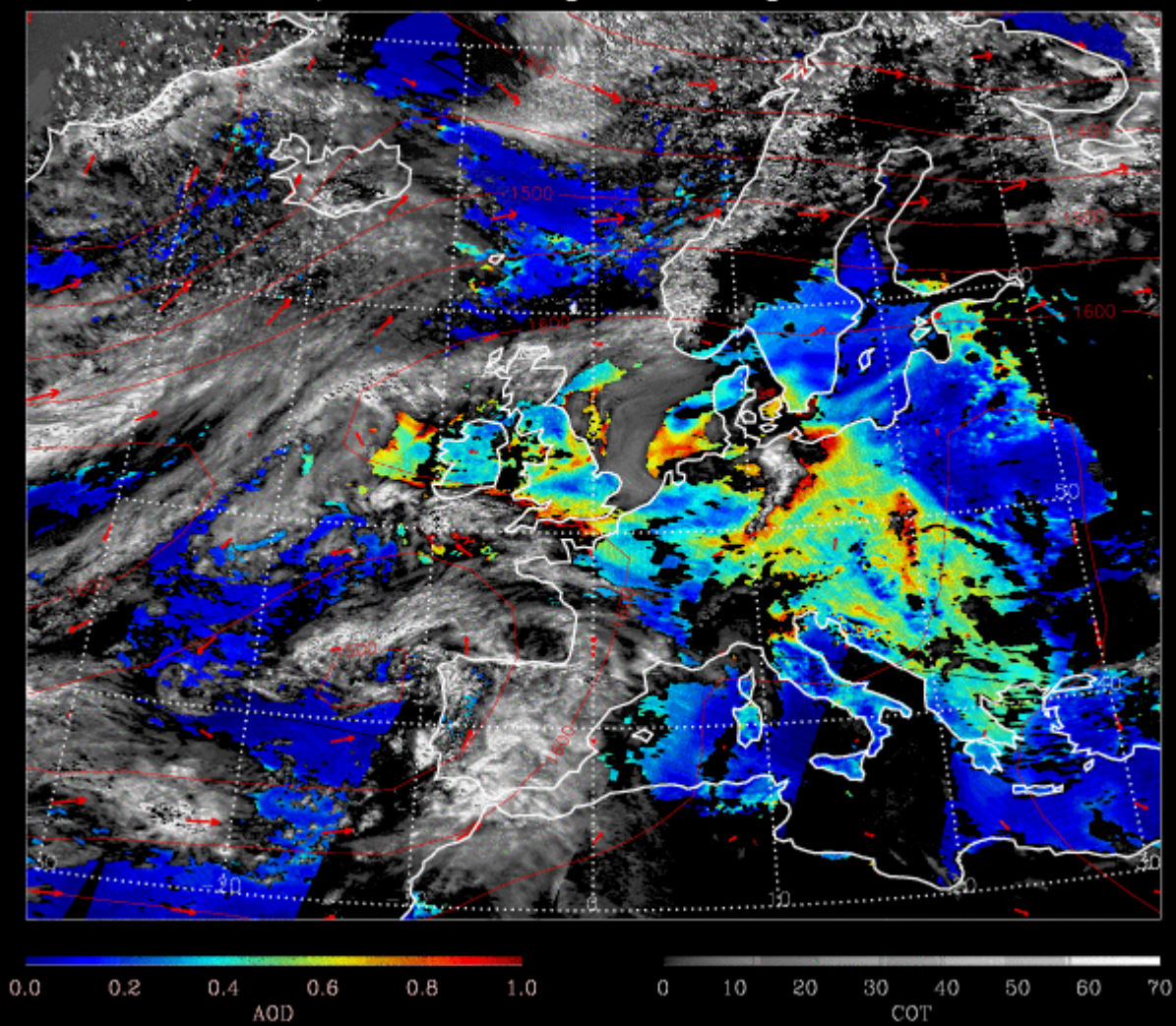


0.0 0.2 0.4 0.6 0.8 1.0 0 10 20 30 40 50 60 70
AOD COT

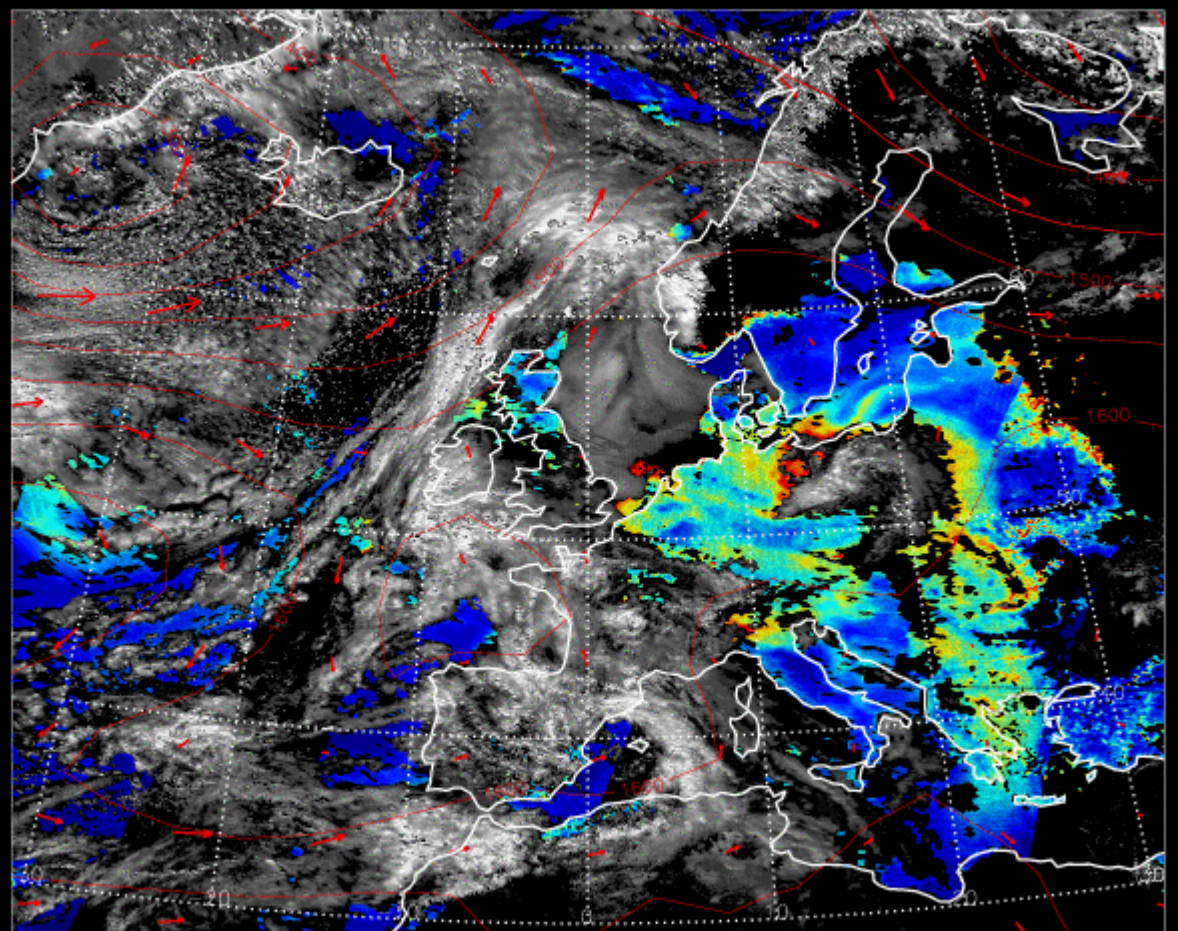
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MODIS (Terra) Aerosol Optical Depth 2003 03 27



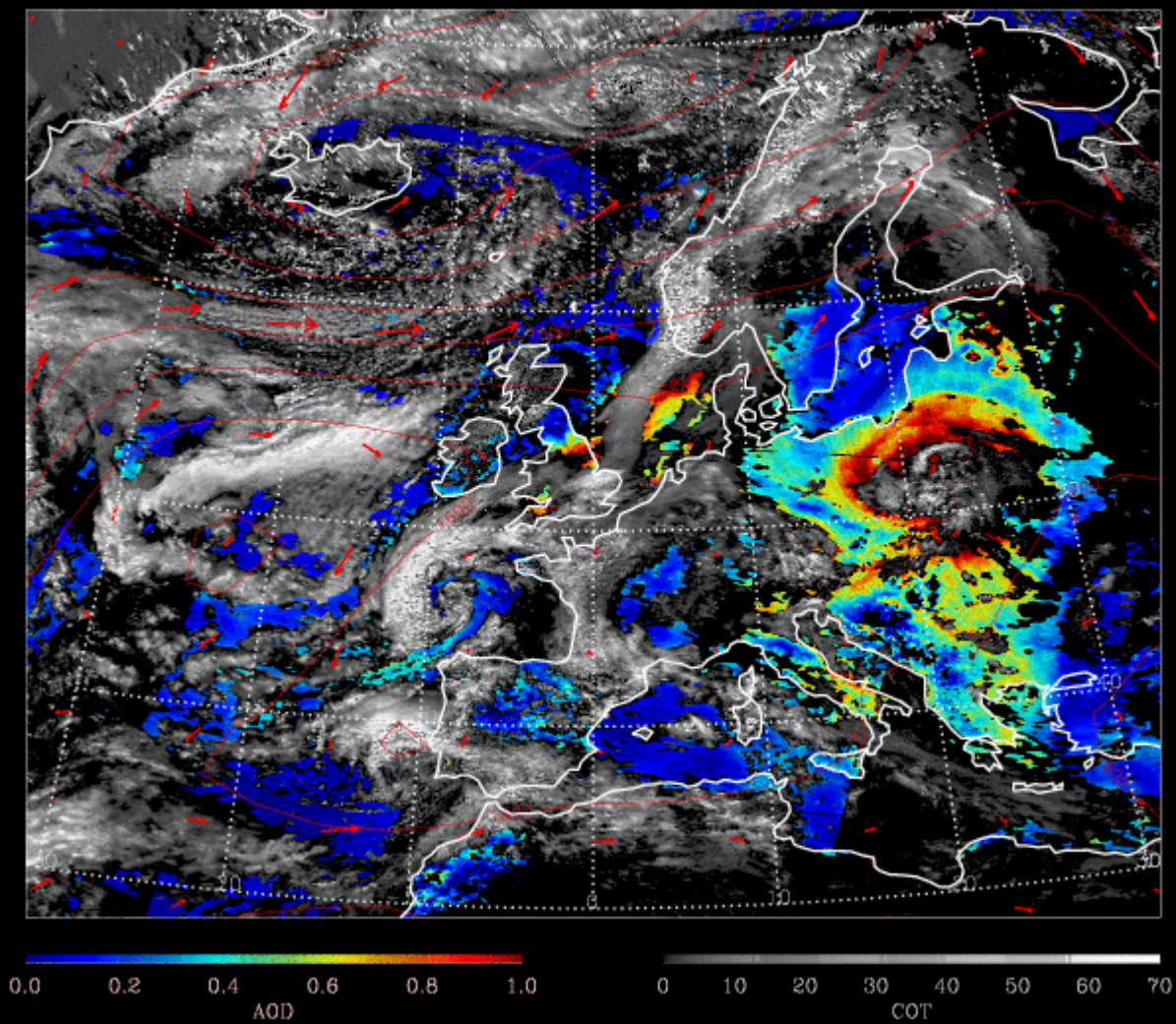
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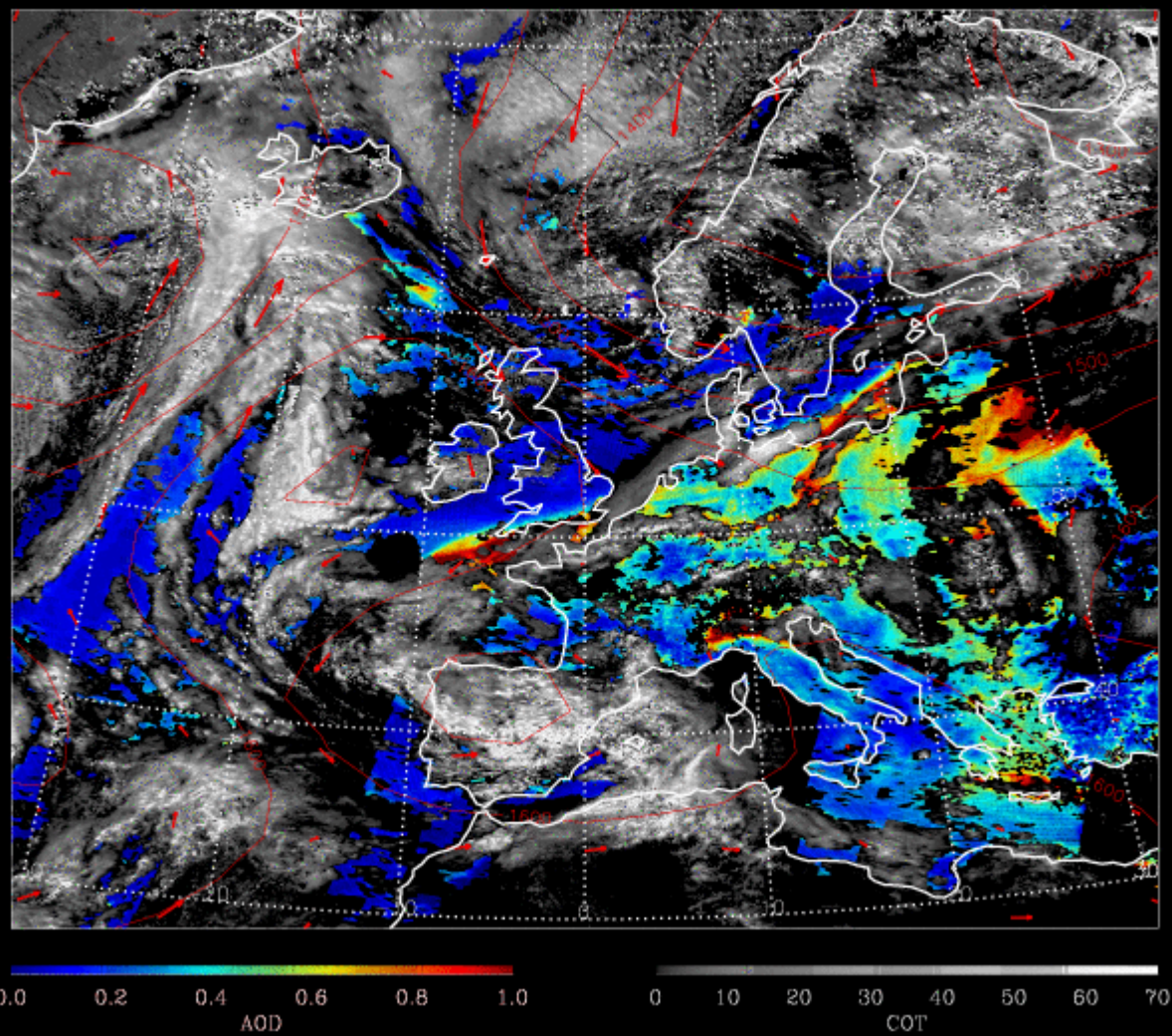
0.0 0.2 0.4 0.6 0.8 1.0
AOD

0 10 20 30 40 50 60 70
COT

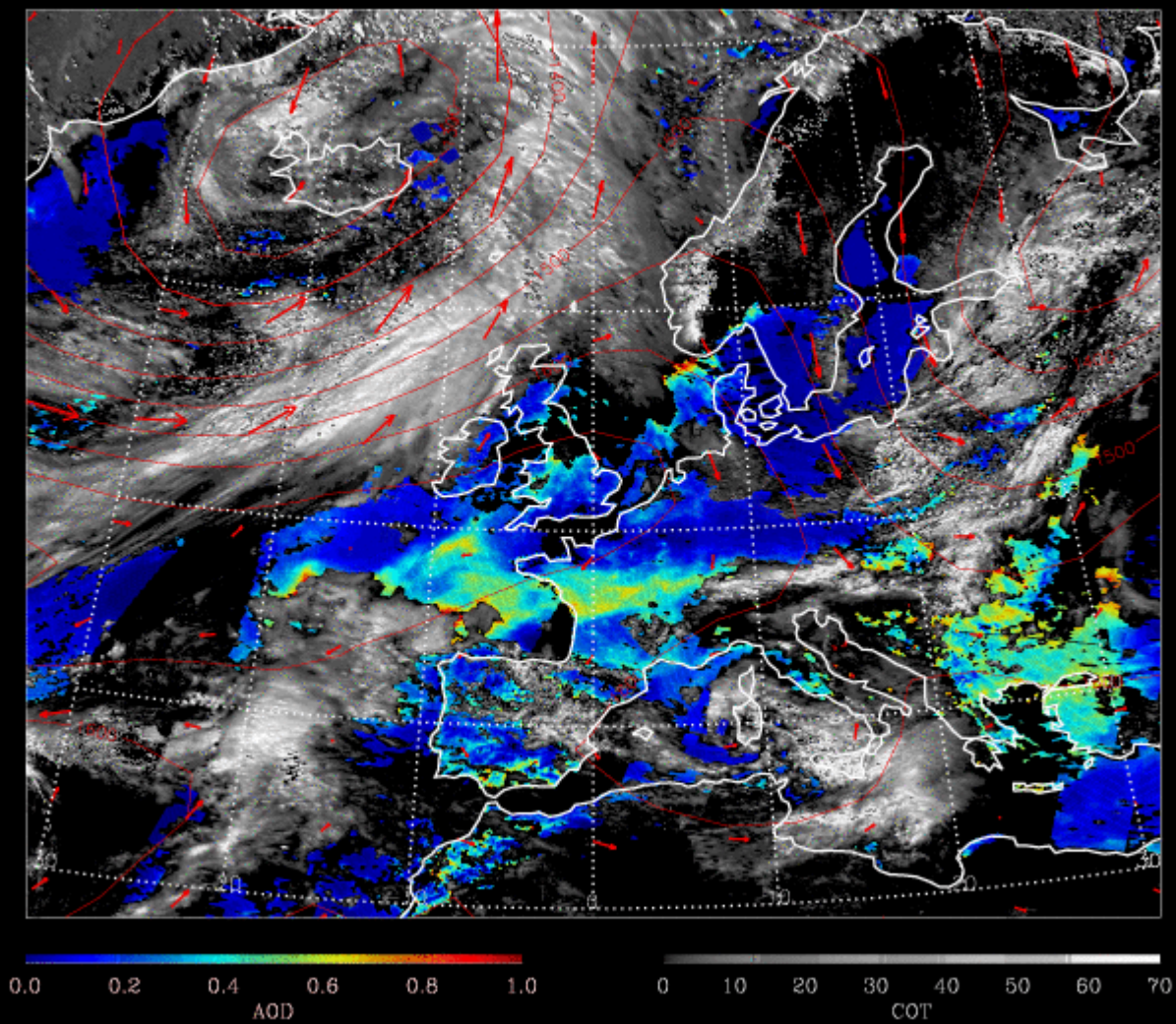
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MODIS (Terra) Aerosol Optical Depth 2003 03 30

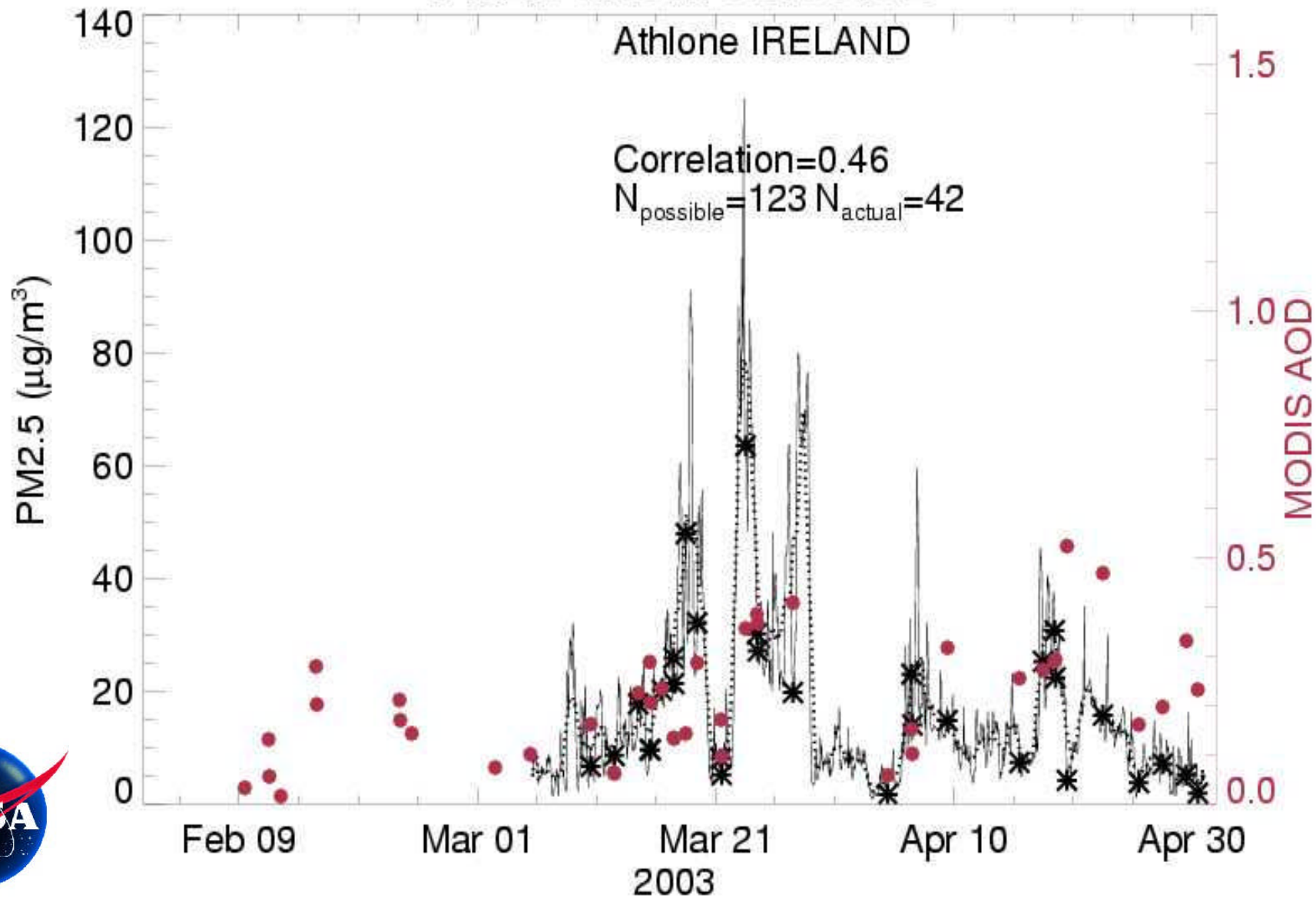


MODIS (Terra) Aerosol Optical Depth 2003 03 31



Time Series: Athlone

PM2.5 and MODIS AOD



Future work...

- Analysis of transboundary episodes in 2003
- Detailed plan for joint Ireland/UK health study



Thank-you all...

Contact: b.kelly@epa.ie