

PROMOTE

Protocol Monitoring for the GMES Service

Element on Atmosphere

An ESA-funded project

Eleni Paliouras

on behalf of the PROMOTE Team



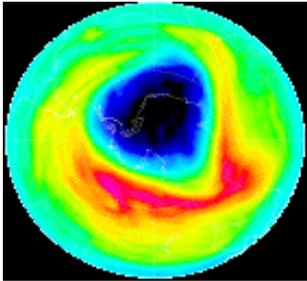
GMES: Global Monitoring for Environment and Security

- **1 of the ESA contributions is the GMES Service Element (GSE) Programme**
 - ◆ target operationalization of information services
 - ◆ respond directly to the needs of users

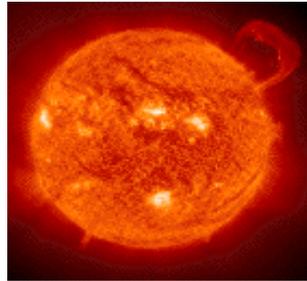
- **PROMOTE: 2004 – 2009**
 - ◆ the GSE project dealing with the atmosphere
 - ◆ consortium now at 28 partners involved in service provision
 - ◆ most services operational and freely available at www.gse-promote.org



5 themes based on user requirements and maturity of satellite and ground-based observations



Ozone



UV



Air Quality



Climate Study
Support



Aviation
Support

Targeted User Communities

- Health Organizations
- Environmental Organizations
- Meteorological Service Organizations
- Convention and Policy Entities
- Atmospheric Science Community
- Individual Citizens

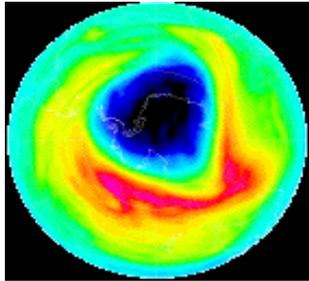


User Focus in GSEs

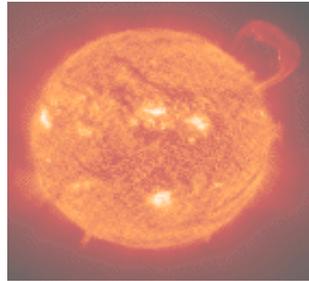
- All services provided in GSE projects must have formally named user organisations as recipients
 - ◆ Providers have defined obligations for service delivery
 - ◆ Users obligated to provide formal evaluations each year
 - ◆ ESA funding dependent, year-to-year, on user evaluation

- ➔ Services open to anyone





Ozone



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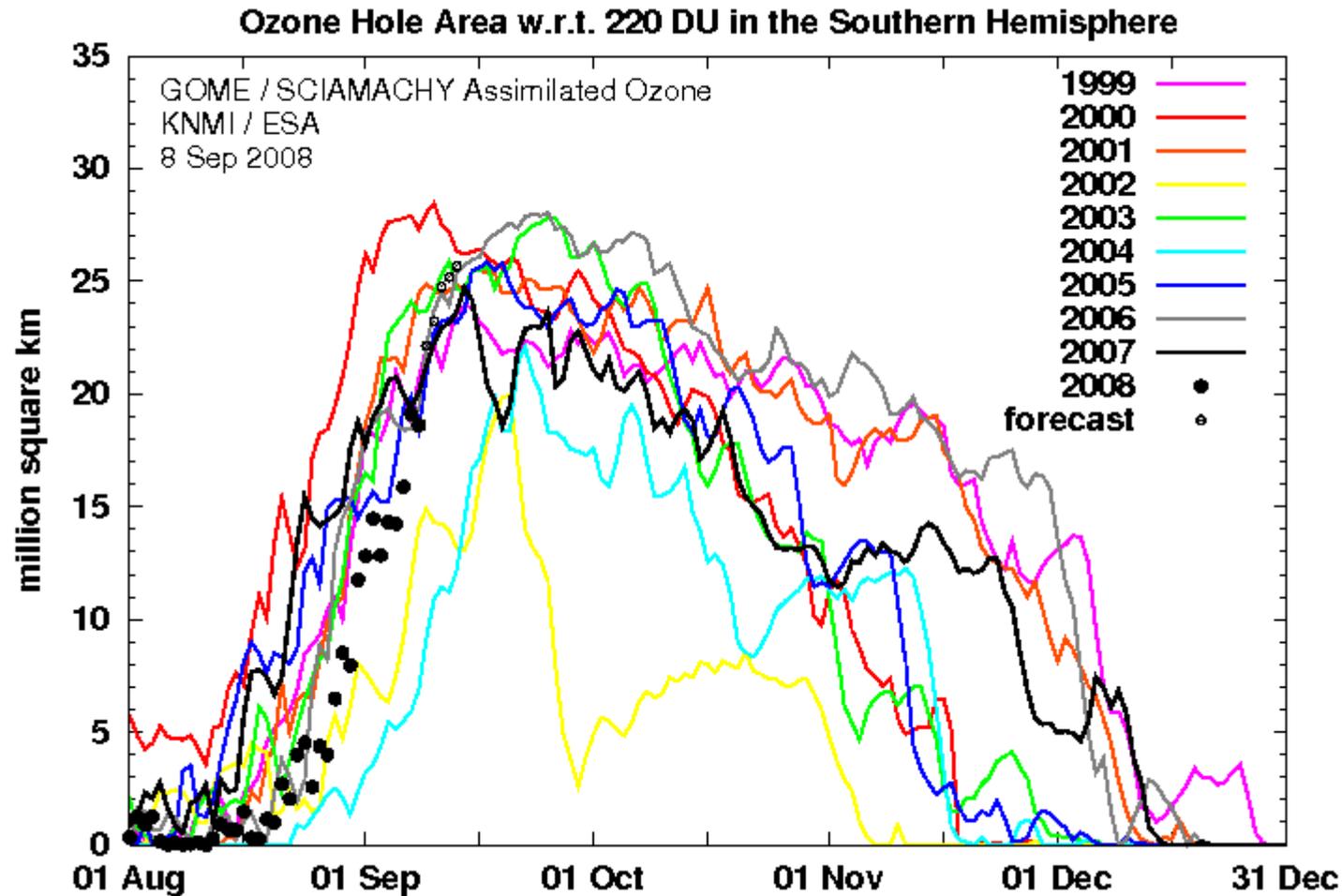
Ozone Services

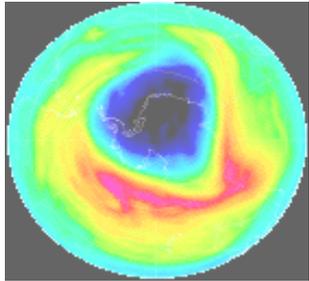
- Global products related to stratospheric ozone
 - ◆ Total ozone observations in near-real time
 - ◆ 9-day forecasts of total ozone
 - ◆ Total ozone record (1979 – present)
 - ◆ Ozone profile record (1992 – present)

- Users and applications
 - ◆ Environmental Organizations: RIVM for UV services
 - ◆ Meteorological Service Organizations: ECMWF for improvement of medium range weather forecast
 - ◆ Convention and Policy Entities: WMO for monitoring recovery of the stratospheric ozone layer
 - ◆ Atmospheric Science Community: SPARC-CCMVal for evaluation of chemistry-climate models

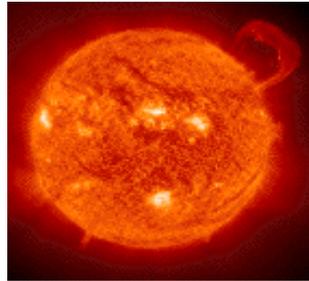


Ozone Hole Monitoring





Ozone



UV



Air Quality



Climate Study
Support



Aviation
Support



UV Services

- Products related to surface UV radiation
 - ◆ Global UV index records
 - ◆ Customized UV information for Greenland
 - ◆ On-demand personalized UV information for Europe

- Users and applications
 - ◆ Health Organizations:
 - ❖ German Association of Dermatologists for building patient awareness and
 - ❖ Authorities in Italy in Greenland for supporting outdoor worker safety
 - ◆ Environmental Organizations in Spain and Italy
 - ◆ Convention and Policy Entities: University of Manchester on behalf of WMO for monitoring trends in levels of surface UV radiation
 - ◆ Individual Citizens via Internet and Tourist Agencies in Spain and Italy to provide information to avoid sunburn

UV Information Service

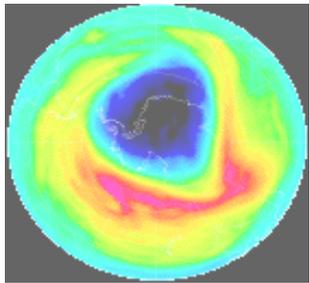
➤ Personalized location-based services

- ◆ Individual sunburn time, UV index, recommended sun protection factor
- ◆ via internet or mobile phone... any time, any place in Europe

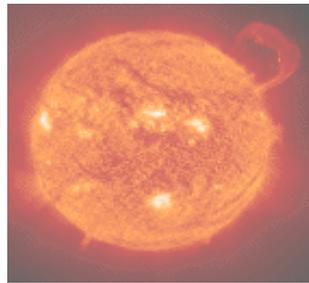
➤ German dermatologic association

“UV-Check... gives [us] a modern and timely dermatological tool contributing to skin cancer prevention.”





Ozone



UV



Air Quality



Climate Study
Support



Aviation
Support



Air Quality Services

➤ Products

- ◆ **Global and European Air Quality records**
- ◆ **European-scale Air Quality** analyses and forecasts (daily)
- ◆ **Local/urban-scale Air Quality** forecasts and assessments
- ◆ **Desert dust awareness** (regional)
- ◆ **Pollen** (regional → European)
- ◆ **Satellite-based ground-level PM** (regional and European)

➤ User applications

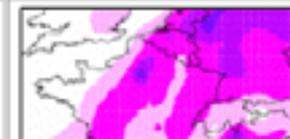
- ◆ Monitoring of levels and changes in atmospheric pollutants
- ◆ Assessments and monitoring of European and national air quality
- ◆ Scenario assessments
- ◆ Minimization of health impacts to European citizens



Integrated European Air Quality Ensemble



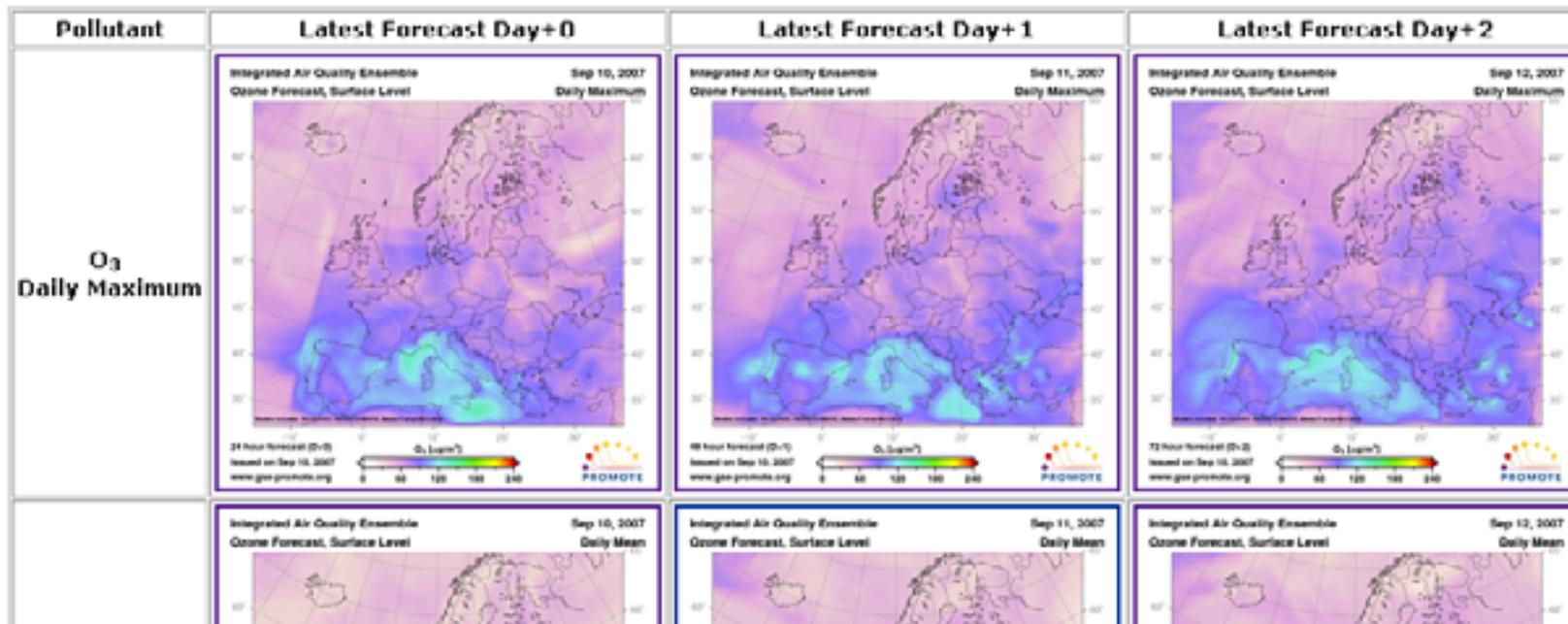
Integrated Air Quality platform



Integrated air quality platform

This service provides forecasts and analyzed maps of air pollutants concentration throughout Europe. Ground level concentrations of ozone, nitrogen dioxide and particulate matter simulated by numerical models with a near 50km*50km resolution are available. The results are issued from several chemistry-transport models widely validated. The final products result from an ensemble approach allowing to get the best modelling result from a combination of different models. Up to two days forecasts are provided. The so-called analyzed maps are issued from simulations, corrected assimilating in-situ observations. They are daily available using near-real time measurement data. Daily updates will be envisaged.

Latest Forecasts (preliminary results)



Services

Ozone

UV

Air Quality

GHG-Aerosol

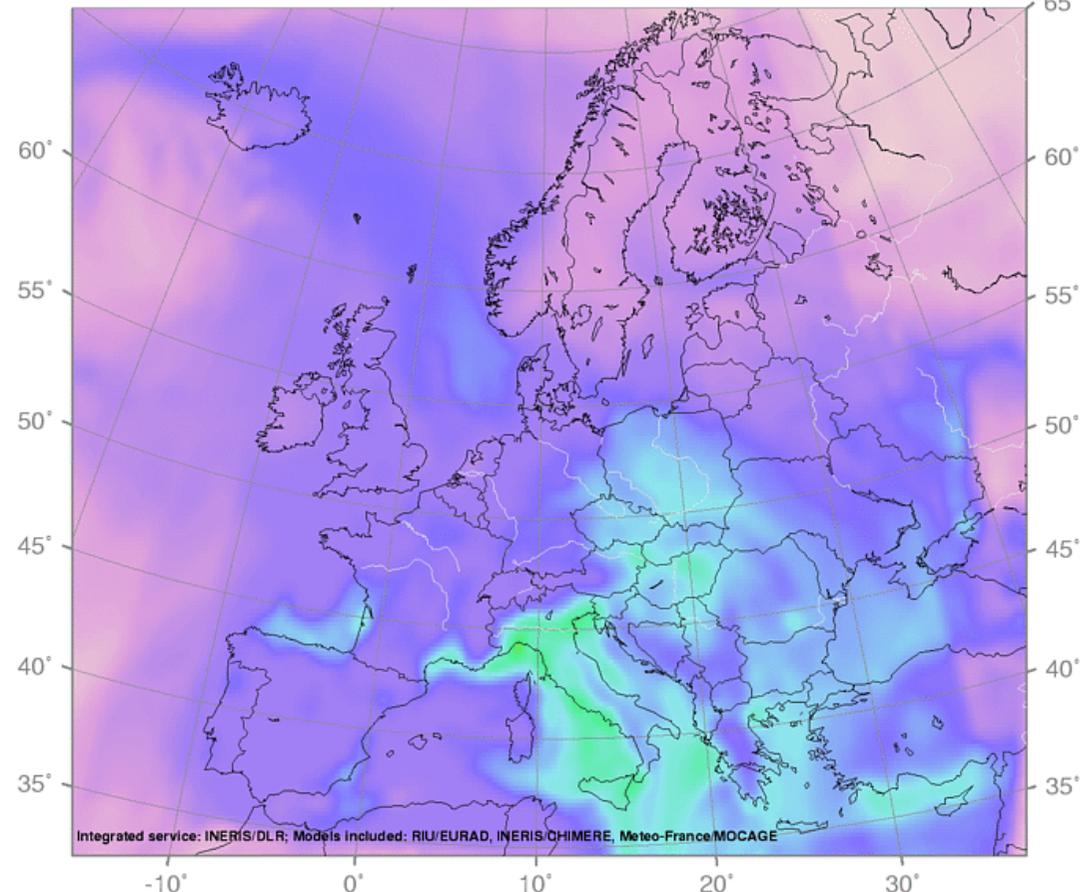
Special



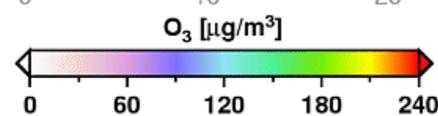
Integrated European Air Quality Forecast

Integrated Air Quality Ensemble
Ozone Forecast, Surface Level

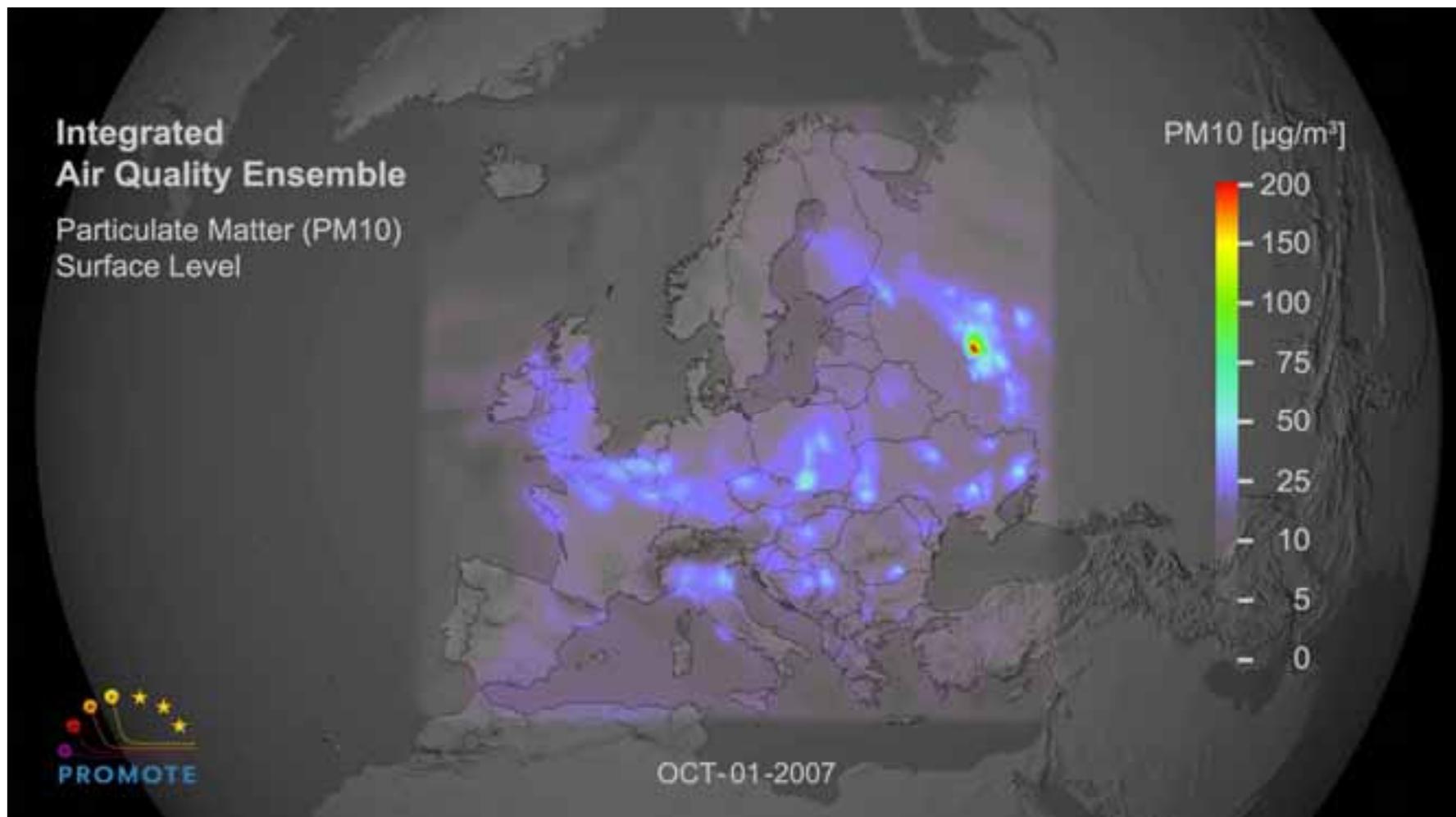
Sep 10, 2008
Daily Maximum



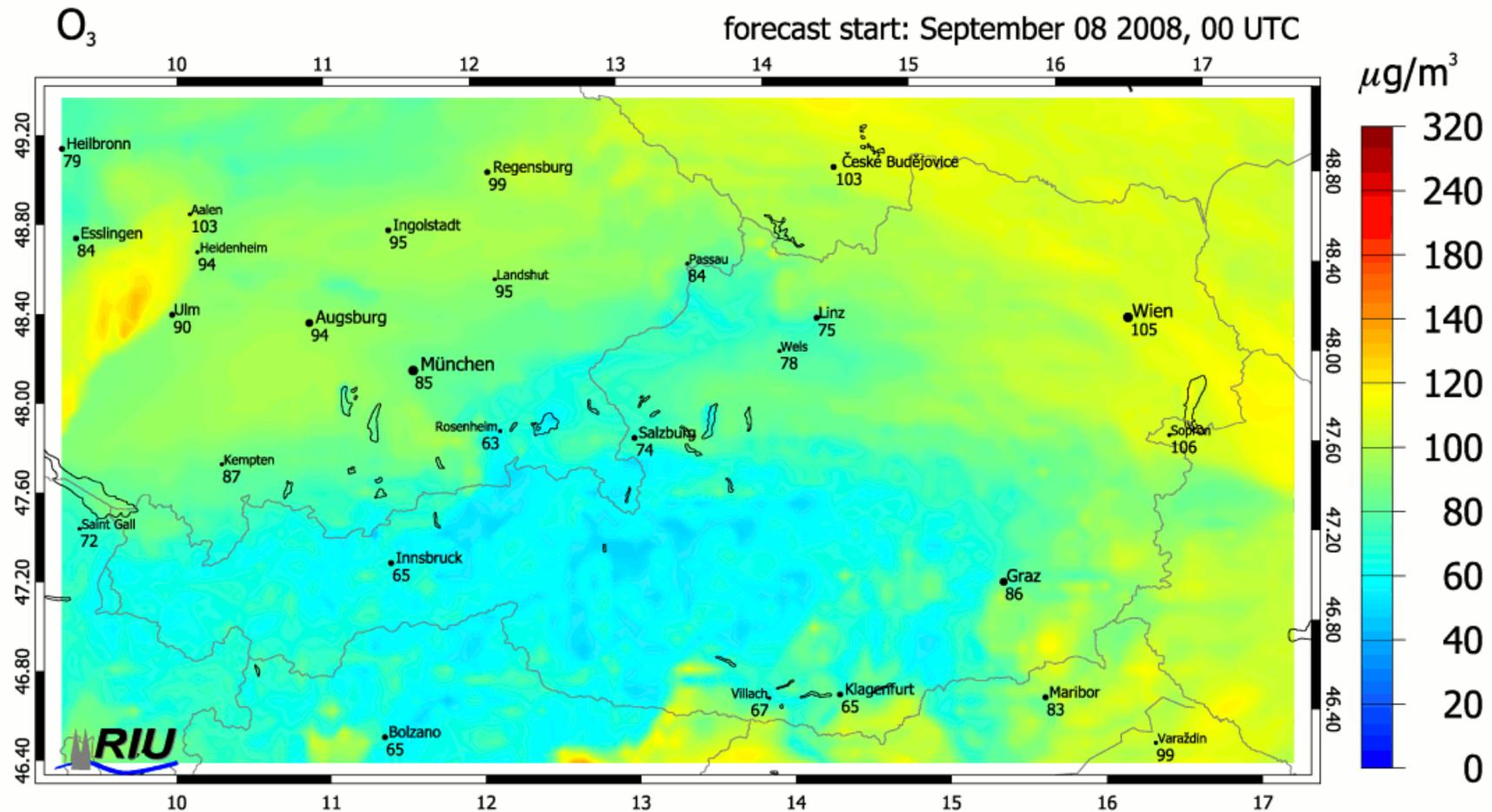
72 hour forecast (D+2)
issued on Sep 08, 2008
www.gse-promote.org



European AQ „episode“ in 2007



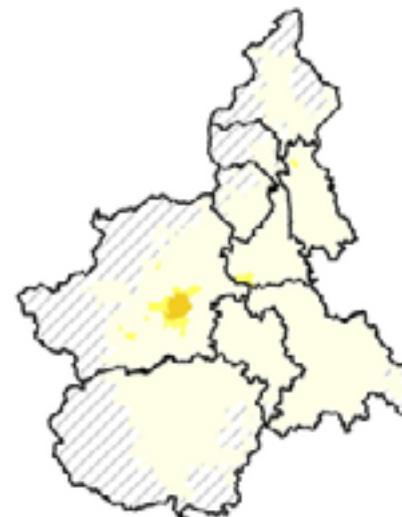
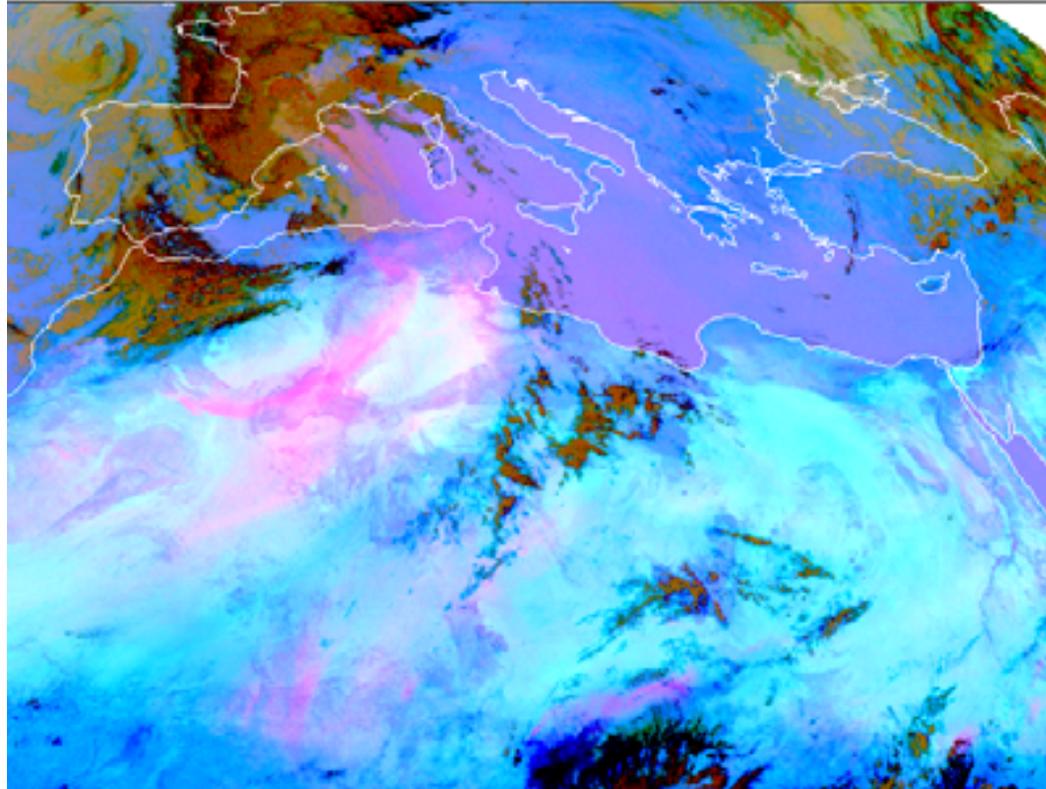
Regional Air Quality Forecast



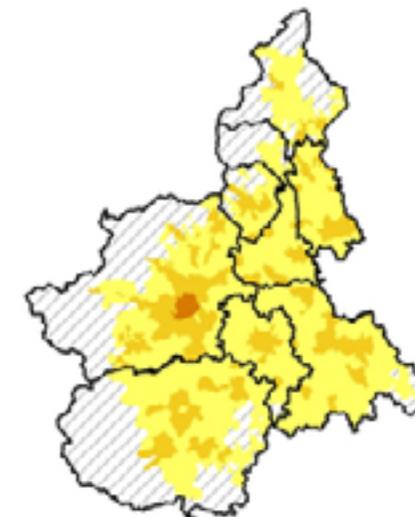
daily maximum, September 10 2008 (D+2), surface level

Desert Dust Detection – Explaining PM10 Exceedences

MSG BTD RGB (IR12.0-IR10.8, IR10.8-IR8.7, IR10.8) 2008-05-27 10:30 UTC



Stime PM10 del 26-05-2008



Stime PM10 del 27-05-2008

*Interpolated PM10 concentrations
derived from regional AQ network
Yellow < 20 µg/m³, Orange < 75 µg/m³*

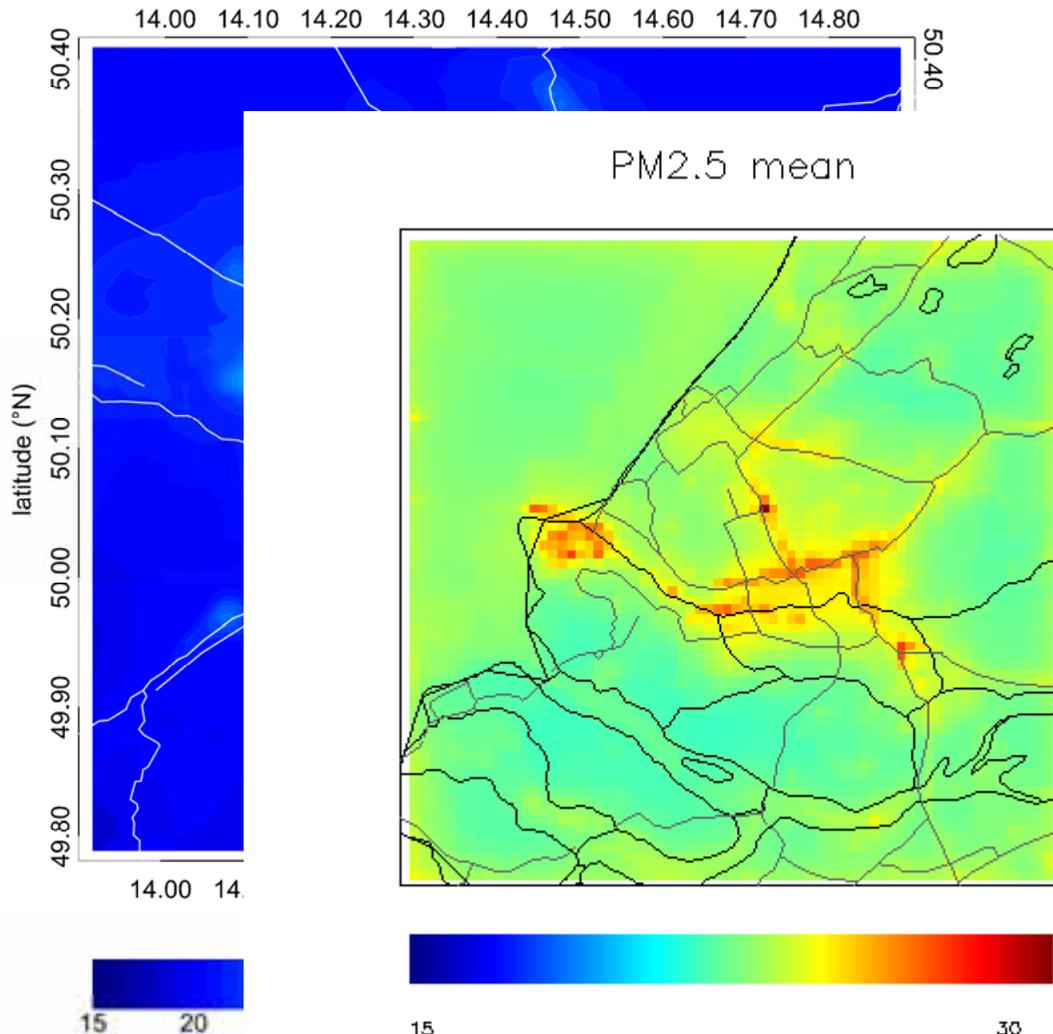
source: Roberto Cremonini, Regional Environment Agency, Piemonte, Italy

UN/Austria/ESA Symposium, Graz, 09 September 2008



Local Air Quality Assessment

ANNUAL MEAN PM₁₀ CONCENTRATION FOR PRAGUE (2005)



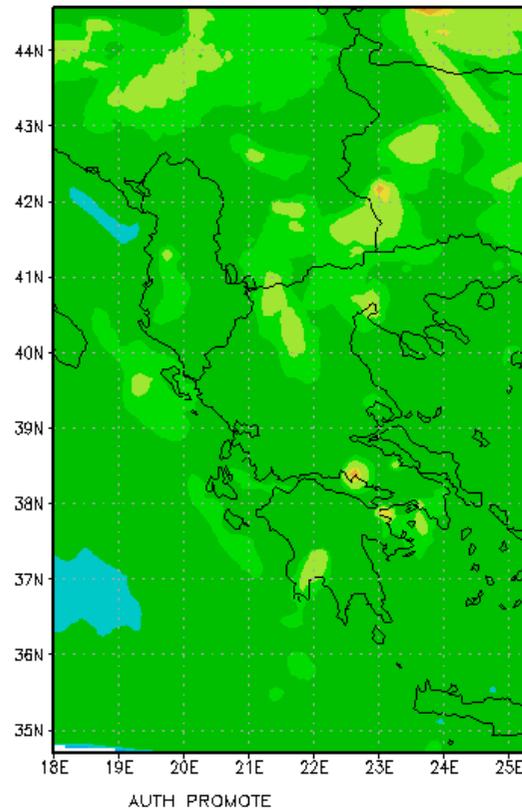
“PM2.5/secondary aerosol is a new area for us and this is the first time that we have an assessment that allows us to identify what comes from our own area, what is imported, what is the contribution of ships, what our the direct and in direct sources and what will be our best options.”

Sef van den Elshout,
Environmental Protection Agency Rijnmond



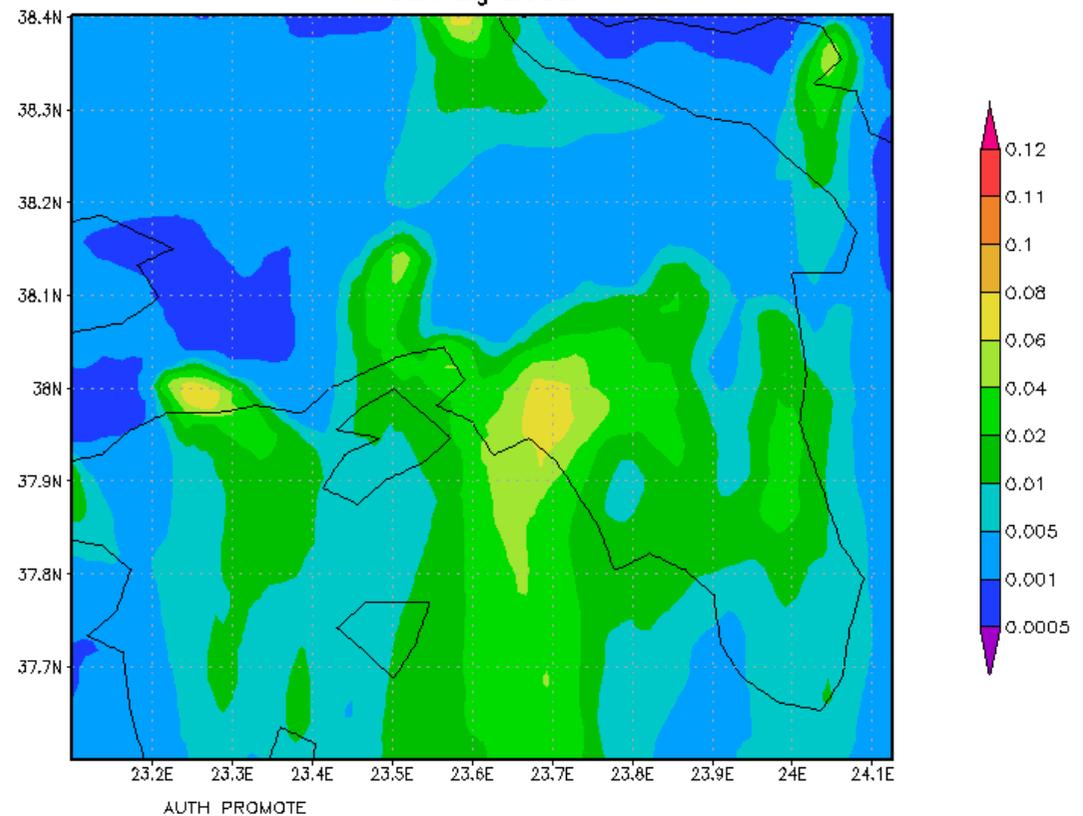
Regional & local (Athens) AQ Forecasting

S02 Daily Maximum (ppm)
05.Aug.2008



GrADS: COLA/IGES

NO2 Daily Maximum (ppm)
05.Aug.2008



GrADS: COLA/IGES

Regional & local (Athens) comments

- Greek Ministry of Environment, Physical Planning and Public Works

*“The service is a very important work which serves the needs of MINENV. The data derived from this service is important for the **development of short-term air pollution reduction strategies**, as well as for **assessing the success of past emission reduction measures** and for **informing the public** about the expected air pollution levels.”*



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Yourair air pollution forecasts and alerts for **airTEXT**

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forecasts | log in | how it works | health advice | news & views

Monday January 14th, 2008
Central London: **LOW** air pollution expected everywhere. forecast issued, 7am Monday
airTEXT will alert you by SMS, voicemail or email if elevated pollution is expected in your part of London.
Sign up now, it's free!
Get the forecast

Central London
Total Pollution
Last Monday

Calendar
Search for postcode:
search

The air pollution level is shown by the colour of the map underneath the roads, not the colour of the roads themselves.

powered by

This project is an ESA PROMOTE service in co-operation with 25 London agencies and authorities.

airTEXT

- Free air pollution alert and health advice service for people vulnerable to air pollution:
 - ◆ Asthma
 - ◆ Emphysema, bronchitis (COPD)
 - ◆ Heart disease and angina
- Alerts sent by:
 - ◆ SMS (text message)
 - ◆ Voice message to home landline phones
 - ◆ E-mail



FREE service from your council

Heart or breathing problems?
Air pollution can harm your health. airTEXT alerts can help reduce the effects of pollution on you or someone you look after.

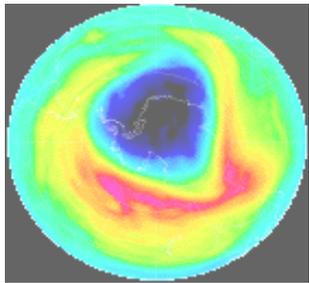
These FREE alerts come straight to your home phone, mobile or by email on days of elevated air pollution

SIGN UP NOW FOR FREE!
at www.airtext.info

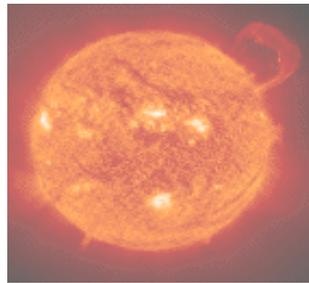
airTEXT **CERC** **PROMOTE**

FREE service from your council





Ozone



UV



Air Quality



**Climate Study
Support**



**Aviation
Support**

Support to Climate Studies and Aviation Control Services

➤ Products

- ◆ Global methane, carbon dioxide and water vapor records from satellite data
- ◆ Global aerosol optical depth and speciation records
- ◆ Volcanic activity warnings and trajectory analysis

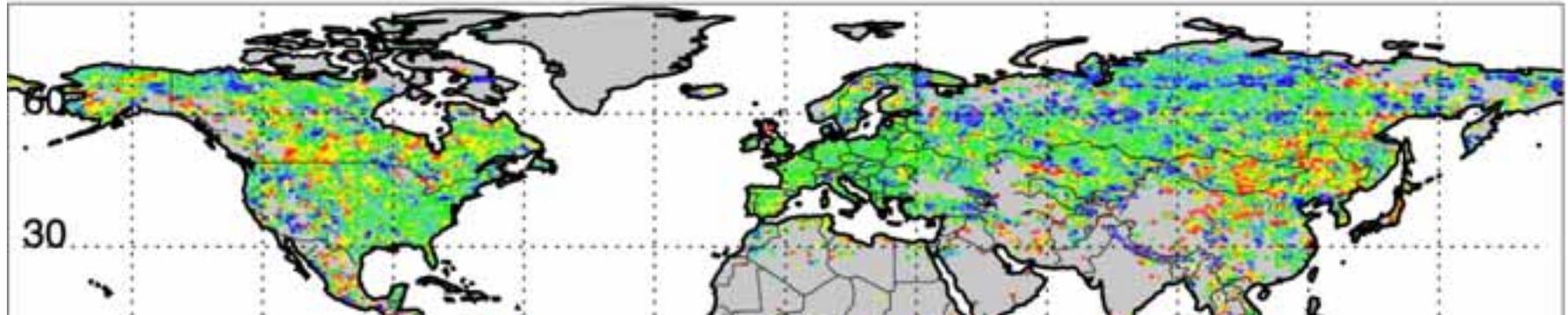
➤ User applications

- ◆ Convention and Policy Entities will receive data sets which indicate source and sink apportionment for Greenhouse Gases
- ◆ Atmospheric Science Community receives data sets which serve as input to, and allow optimizations of. Climate Change models
- ◆ Individual Citizens are served via avoidance by aviation of hazardous volcanic activity

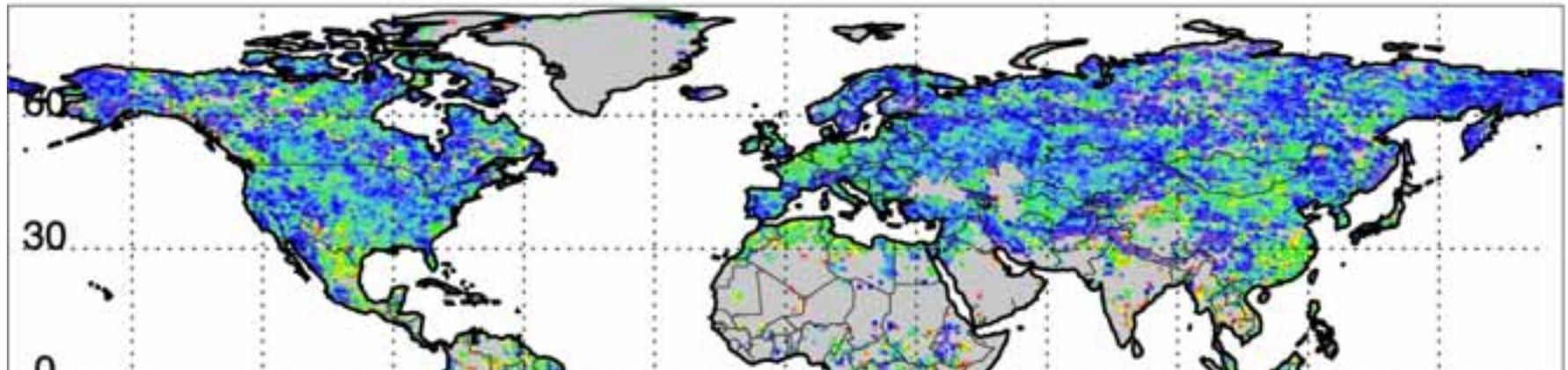


Greenhouse Gases – CO₂ Seasonal Means

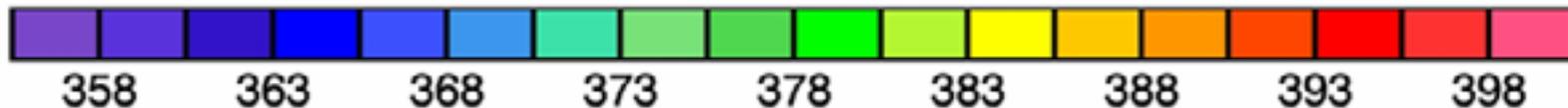
Carbon dioxide SCIAMACHY AMJ 2003



Carbon dioxide SCIAMACHY JAS 2003

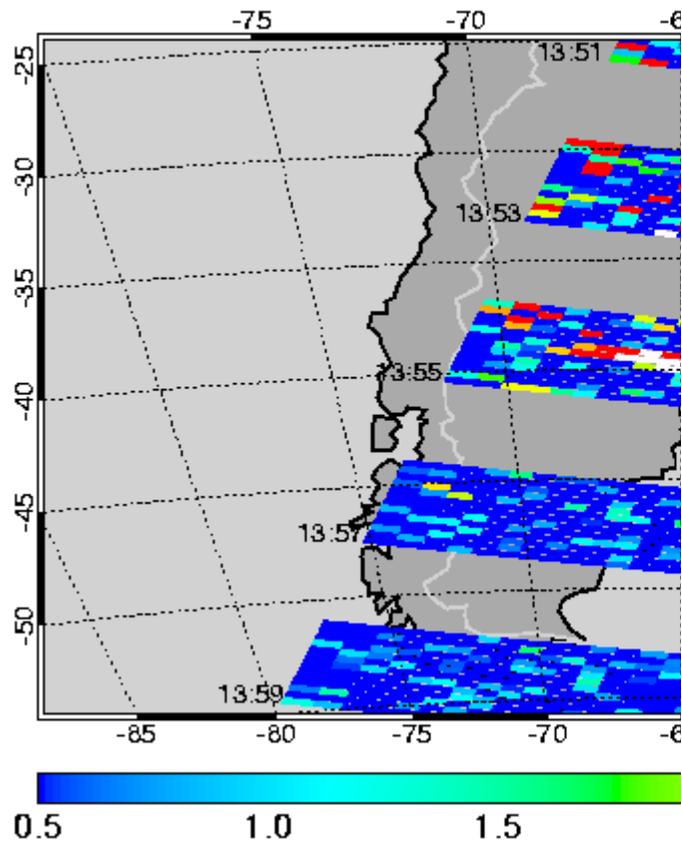


XCO₂ [ppm]

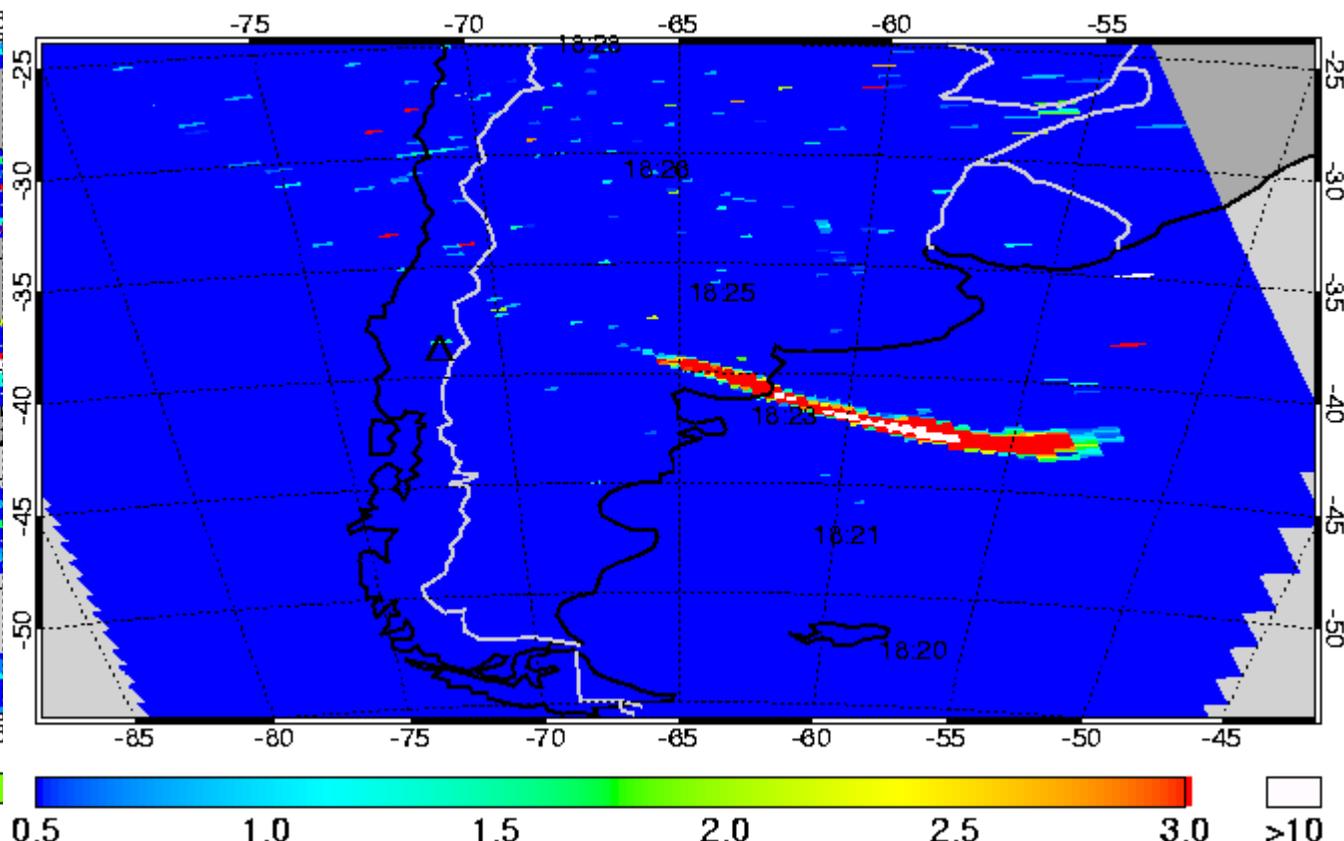


Support To Aviation Control Service

SO2 vertical column [DU]
SCIAMACHY – BIRA-IASB/DLR/ESA



SO2 vertical column [DU]
OMI – KNMI/BIRA-IASB/NASA



2 January 2008

Summary

- PROMOTE successfully addressing a well-represented segment of the European community with services related to the atmosphere
 - ◆ Health Organisations
 - ❖ UV and Air Quality information
 - ◆ Environmental Organisations
 - ❖ Air Quality, UV and pollution information, Aviation Support
 - ◆ Meteorological Service Organisations
 - ❖ Stratospheric ozone, air quality and pollution, Aviation Support
 - ◆ Convention and Policy Entities
 - ❖ Greenhouse Gas, Stratospheric ozone, Air Quality
 - ◆ Atmospheric Science Community
 - ❖ Greenhouse Gas, Stratospheric ozone, Air Quality
 - ◆ Individual Citizens
 - ❖ Sunburn (UV) and Air Quality Information



Future of PROMOTE Services

- Specialized/local Air Quality services
 - ◆ Proposal being prepared for a recent European Commission call for proposals
- Global Ozone and European-scale air quality services
 - ◆ European Commission 7th Framework Program Project: MACC
 - ❖ Combines aspects of PROMOTE and an EC project called GEMS
 - ❖ Under negotiation and should begin in mid-2009

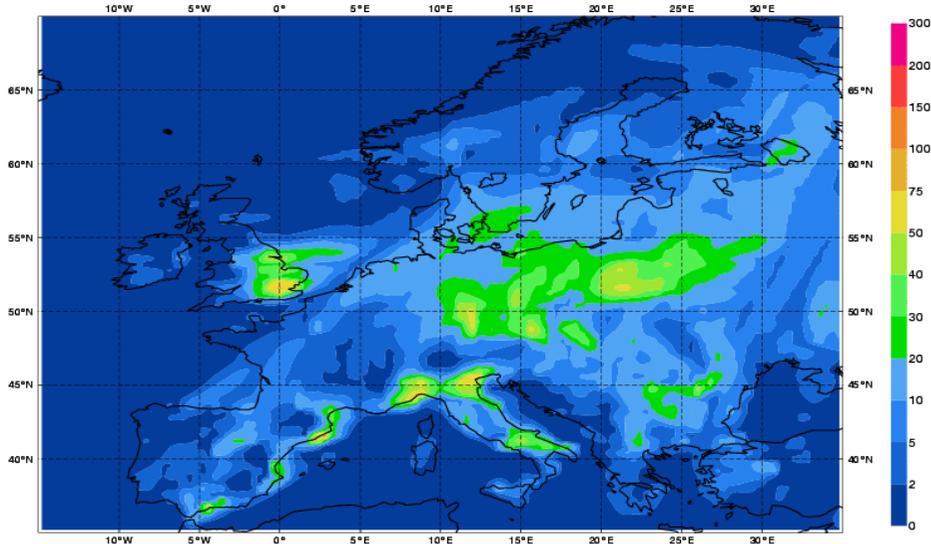


**Monitoring Atmospheric
Composition and Climate**



Daily regional AQ forecasts from GEMS

Friday 11 January 2008 00UTC GEMS-RAQ Forecast t+000 VT: Friday 11 January 2008 00UTC
 Model: EURAD-IM Height level: Surface Parameter: Nitrogen dioxide [$\mu\text{g}/\text{m}^3$]

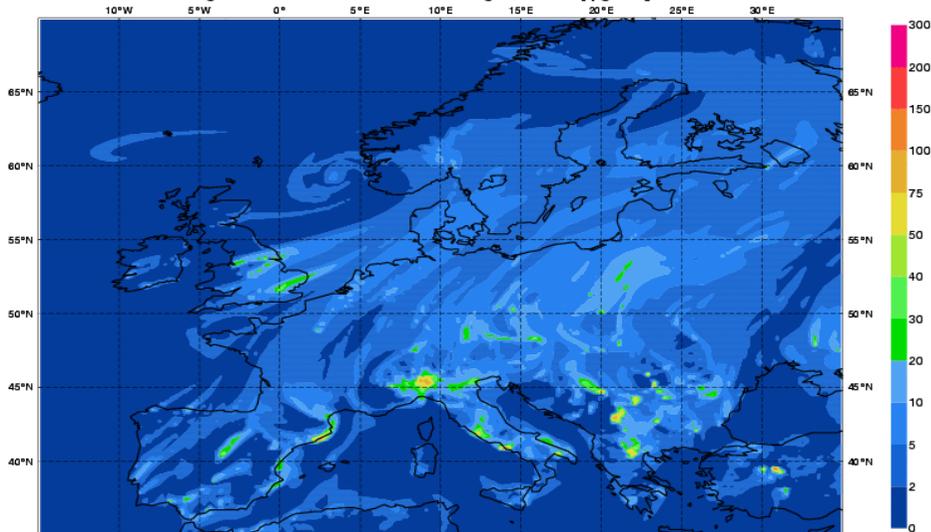


-  CAC
-  EURAD
-  REMO
-  CHIMERE
-  MOCAGE
-  MMS-CAMx
-  BOLCHEM
-  EMEP
-  SILAM
-  MATCH
-  NAME-AQ

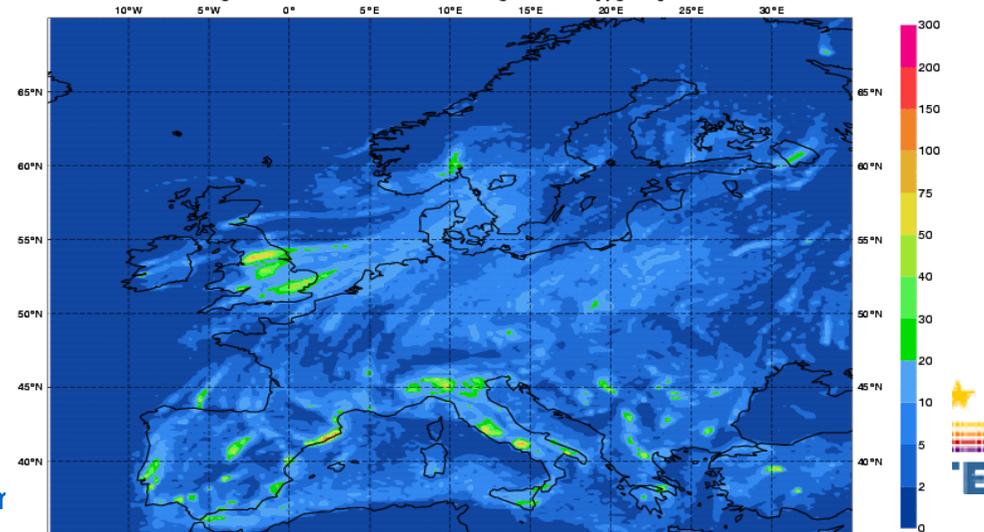
3-day forecasts of surface NO_2 from 00UTC, 11/01/2008



Friday 11 January 2008 00UTC GEMS-RAQ Forecast t+000 VT: Friday 11 January 2008 00UTC
 Model: MOCAGE Height level: Surface Parameter: Nitrogen dioxide [$\mu\text{g}/\text{m}^3$]



Friday 11 January 2008 00UTC GEMS-RAQ Forecast t+000 VT: Friday 11 January 2008 00UTC
 Model: NAME-AQ Height level: Surface Parameter: Nitrogen dioxide [$\mu\text{g}/\text{m}^3$]



**Thank you for
your attention!**

www.gse-promote.org

