

P R O M O T E

P R O T O C O L M O N I T O R I N G

F O R T H E G E M E S S E R V I C E E L E M E N T

A T M O S P H E R E



Background

- PROMOTE Stage 1: Consolidation 2004 – 2006
- PROMOTE Stage 2: Scaling-up Kick-off July 2006
- Transition from Stage1 to Stage 2
 - ◆ Geographic extensions of Stage 1 services
 - ◆ Increased the number of service themes and products
 - ❖ 31 Partners (with planned CCN)
 - ◆ Larger User-base via extensions
 - ❖ 56 Service Level Agreements (SLAs)

Portfolio Themes

- Stratospheric Ozone and Surface UV Radiation
- Air Quality
- Greenhouse and Reactive Gases

Stratospheric Ozone and Surface UV Radiation Service

➤ Products

- ◆ **Global ozone columns** (record, NRT, forecasts) and **profile** (record)
- ◆ **Global Surface UV** Radiation record
- ◆ On-demand **personalized sunburn-time information**

➤ Applications

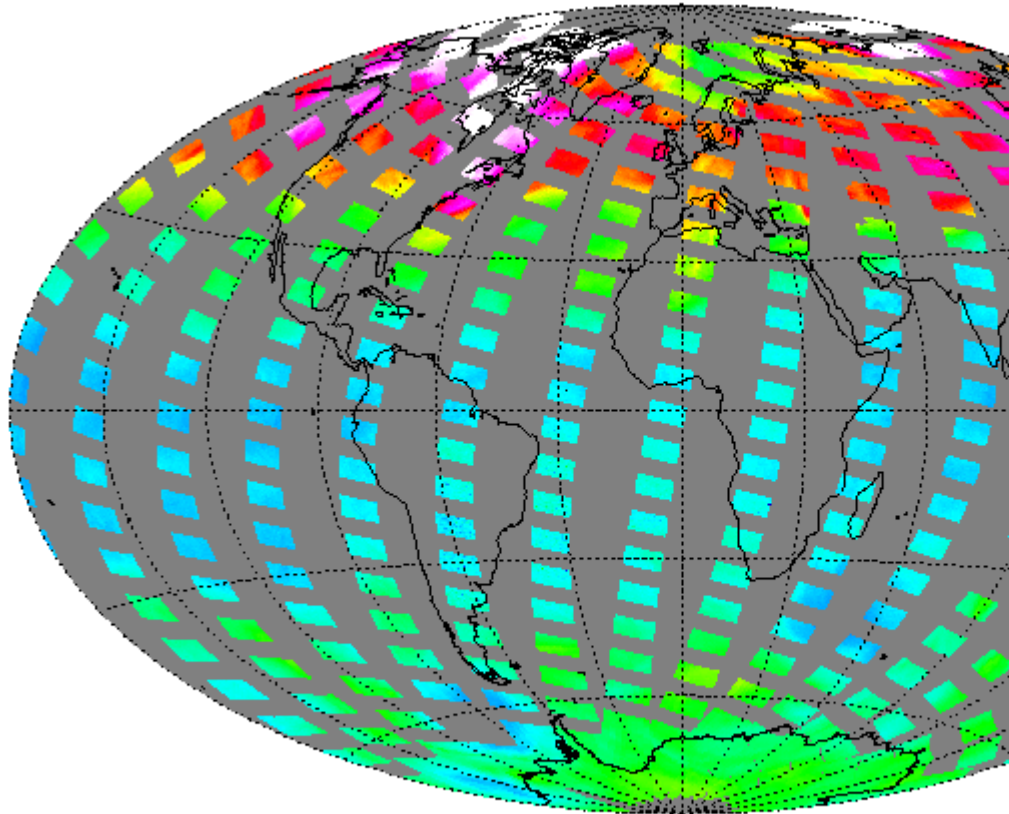
- ◆ Monitoring of the recovery of the stratospheric ozone layer
- ◆ Improvements in weather forecasting
- ◆ Health of European Citizens regarding skin cancer

➤ Users (11 SLAs)

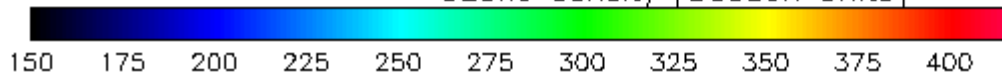
- ◆ Full range of users: international, national, local, citizens



Sciamachy total ozone 06-03-2007

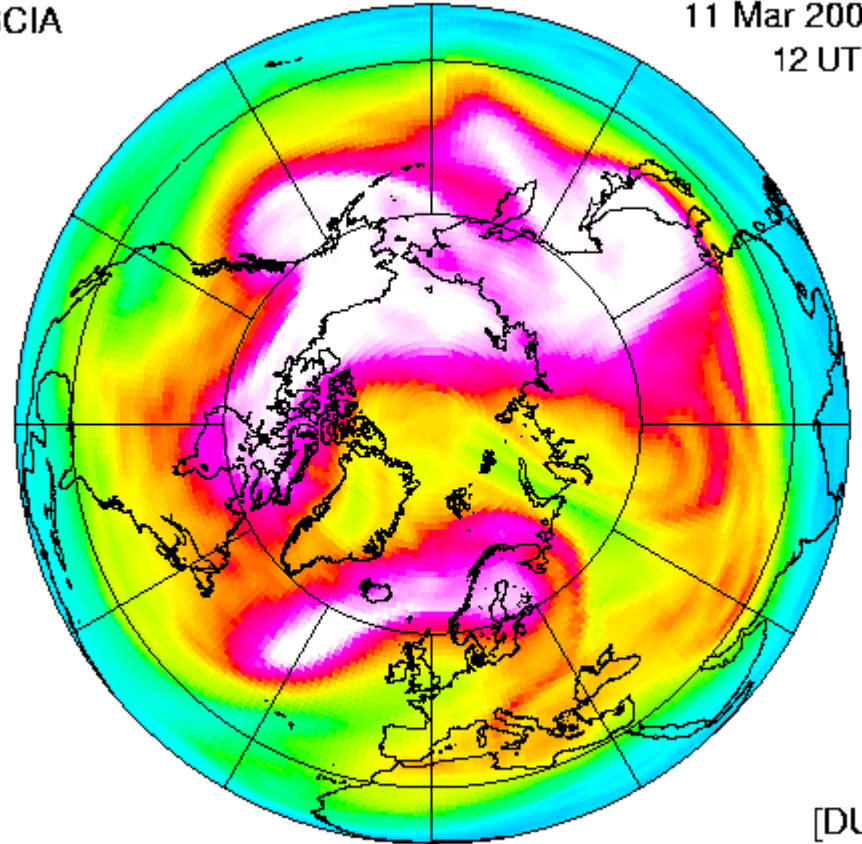


Ozone density [Dobson Units]



KNMI / ESA
SCIA

Forecast total ozone (D+6)
11 Mar 2007
12 UTC



[DU]



Feedback on Ozone & UV

- ECMWF has evaluated use of near-real-time total ozone service → determined that forecasts were enhanced
 - ◆ Adoption in operational weather forecasting to member states
 - ◆ Improvements could be possible via ozone profile information
 - ❖ New service in Stage 2 will be evaluated
- WMO has included PROMOTE ozone information in its 2006 'Antarctic Ozone Hole Bulletins'
- In general, ozone and UV services are very positively evaluated

Air Quality Service

➤ Products

- ◆ **Global Air Quality records**
- ◆ **European-scale Air Quality analyses and forecasts** (daily)
- ◆ **Local-scale Air Quality forecasts, assessments, and scenarios**
- ◆ **Particulate Matter:** desert dust, volcanic ash, pollen, ground-level PM

➤ Applications

- ◆ monitoring of levels and changes in global pollutant levels
- ◆ improvement and optimization of climate change models
- ◆ assessments of European and national air quality
- ◆ minimization of health impacts to European citizens, especially those with heart or respiratory illnesses

➤ Users (40+ SLAs)

Feedback on Air Quality

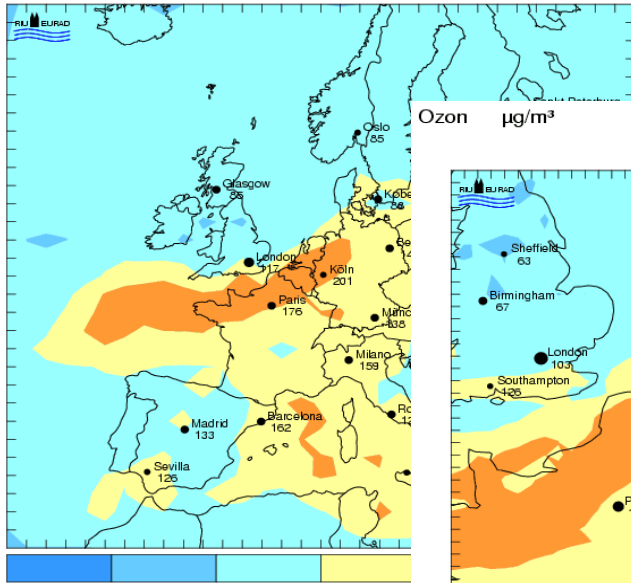
- Greater London local air quality
 - ◆ Stage 1: 1 Borough was interested and evaluated the service
 - ◆ Stage 2: 20+ Burroughs are now using the service

AQ forecast in Different Domains

Ozon $\mu\text{g}/\text{m}^3$

Level 1

06.09.2004 Tages Maximum

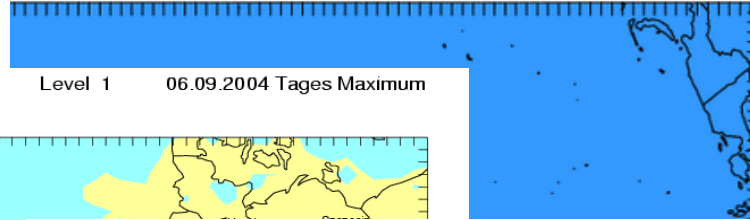


VISAO

33 65 120 1

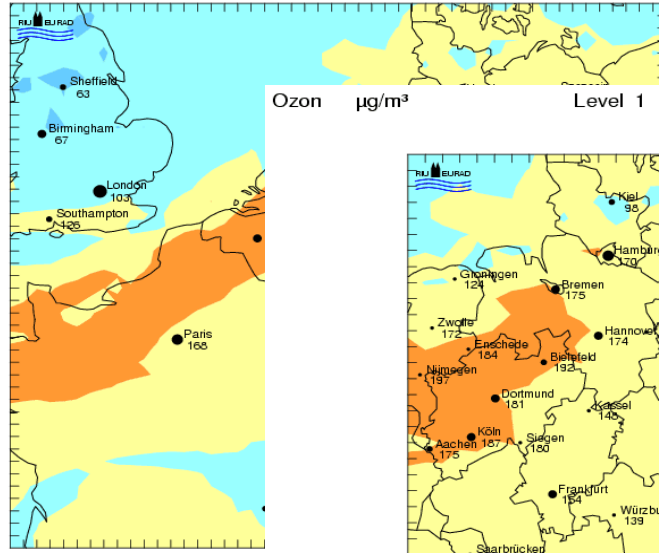
Level 1

09.03.2005 Tagesmittelwert



Level 1 06.09.2004 Tages Maximum

Ozon $\mu\text{g}/\text{m}^3$



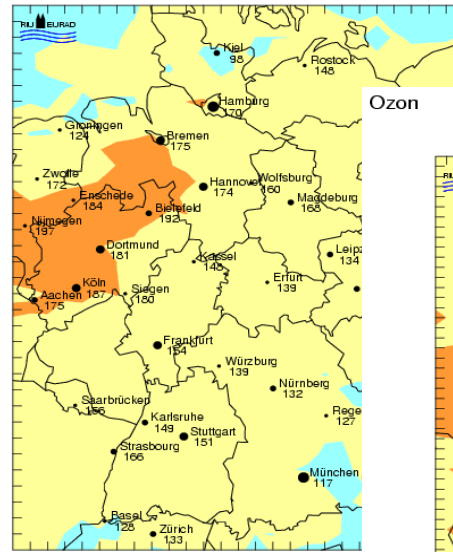
VISAO

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Ozon $\mu\text{g}/\text{m}^3$

Level 1

06.09.2004 Tages Maximum

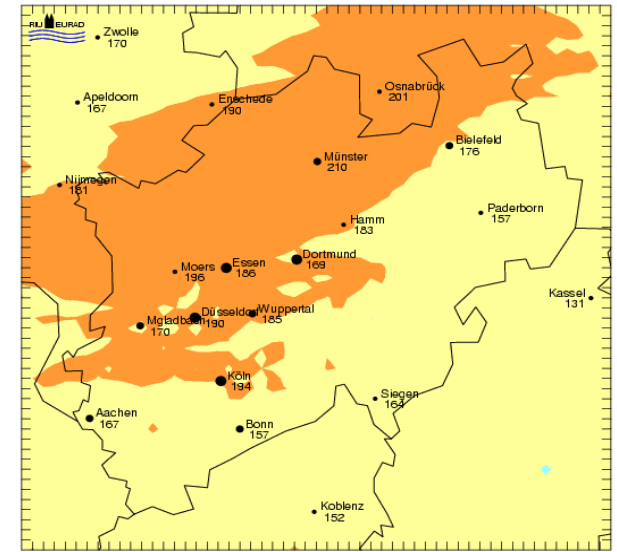


33 65 120 180

Ozon $\mu\text{g}/\text{m}^3$

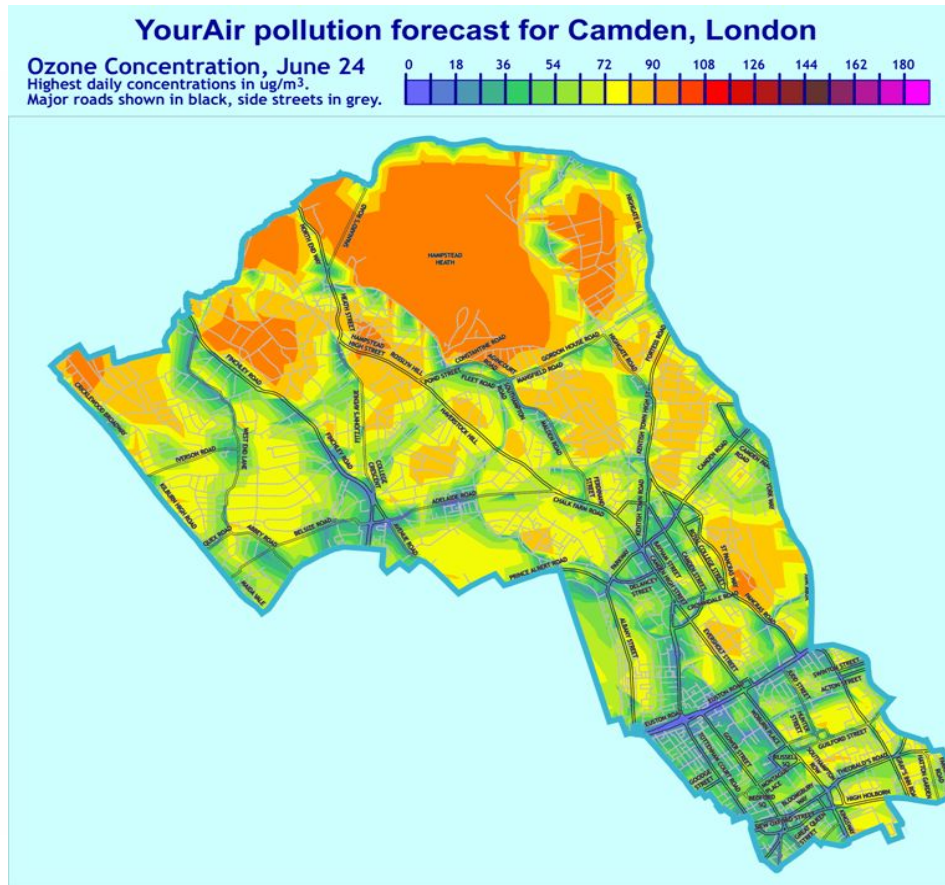
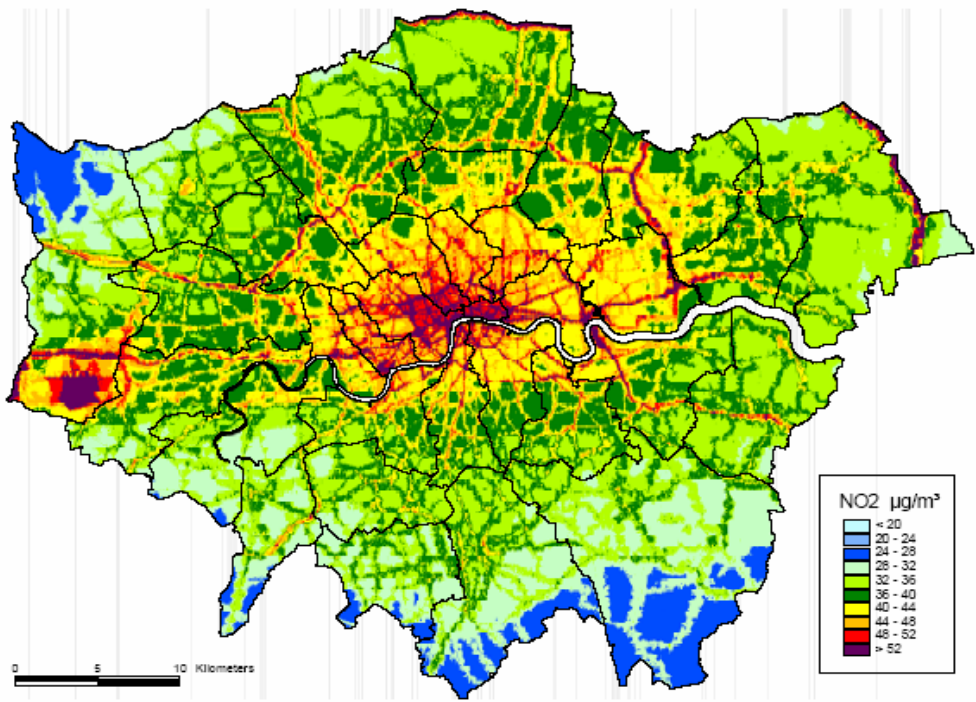
Level 1

06.09.2004 Tages Maximum



33 65 120 180 240

Example: Local Air Quality forecasts



Feedback on Air Quality

- Current satellites do not have the required spatial and temporal coverage to really serve the AQ user community for their routine reporting obligations
- Further development of data-assimilation techniques to better exploit satellite capabilities in order to support policies
- Sustainability and improvement of *in situ* Air Quality networks and emission inventories is crucial
- AQ monitoring by satellites is not legally mandated, users are beginning to use them for assessment studies

Greenhouse and Reactive Gas Service

➤ Products

- ◆ Global **methane & carbon dioxide** records from satellite data
 - ❖ Partially delivered records with extensions in years 2 & 3
- ◆ Records of **stratospheric methane & water vapor**
- ◆ **Volcanic activity** indicator via detection of high levels of **sulfur dioxide**

➤ Applications

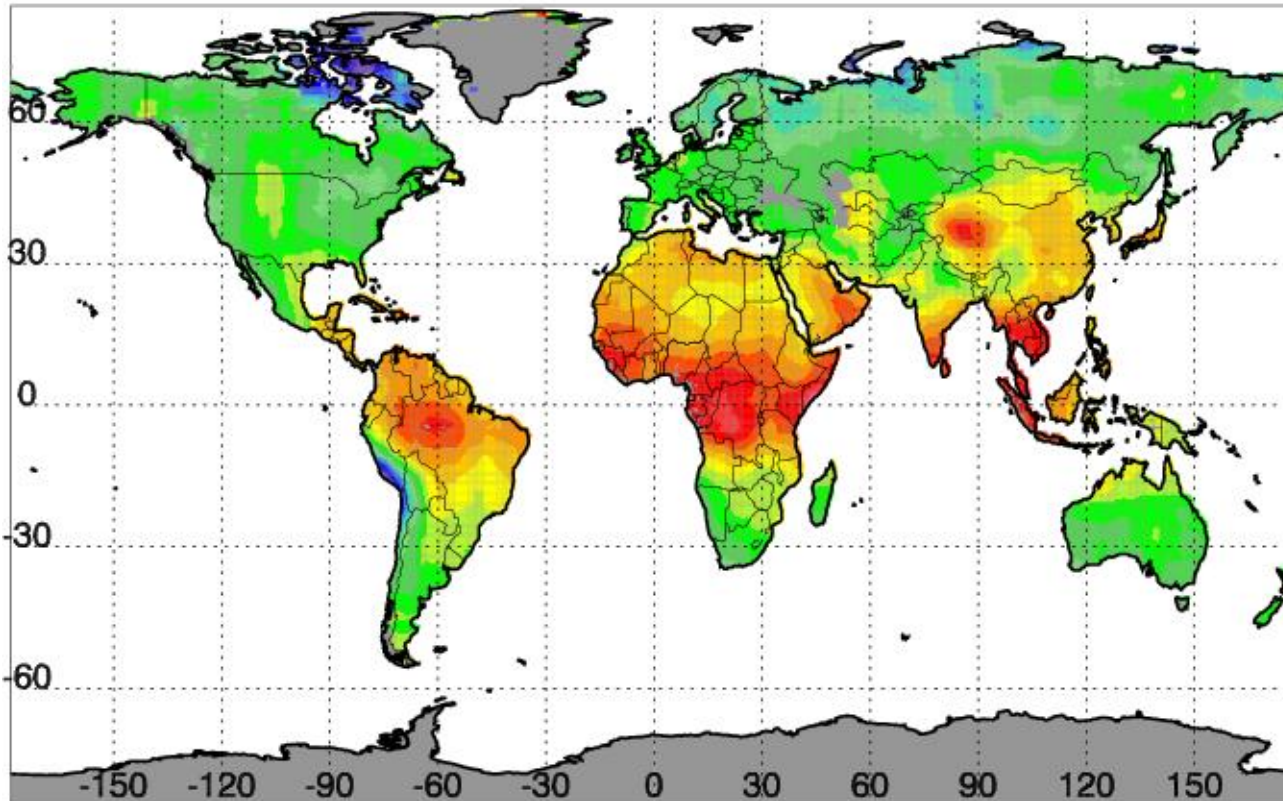
- ◆ Inputs to and optimizations of Climate Change models
- ◆ Source and sink apportionment for Greenhouse Gases
- ◆ Commercial aviation

➤ Users (5 SLAs)

- ◆ typically research users using retrieved values for assimilation into models



Carbon dioxide SCIAMACHY 2005



Oliver.Schneising / Michael.Buchwitz@iup.physik.uni-bremen.de / WFMDv1.0

XCO2 [ppmv]



358

361

364

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Feedback on Greenhouse & Reactive Gases

- Global GHG data sets such as these are unavailable elsewhere
 - ◆ input for inversion models looking at source and sink apportionment
- Further R&D important for improvement of algorithms crucial for meeting user accuracy requirements

PROMOTE Portfolio Sustainability

- Operational considerations
 - ◆ Heavy dependency on **satellites**
 - ❖ ENVISAT, METOP, MSG
 - ❖ Sentinels 3, 4, 5 are needed
 - ◆ **In-situ data** is required as input to models and for validation

- Financial considerations
 - ◆ limited pure commercial viability foreseen
 - ❖ possible niches for financial support in local services & commercial aviation
 - ◆ looking towards FP7 and GMES Atmosphere Service Implementation
 - ❖ minimal/no time gap between GSE and FP7

User Conclusions

- Constant feedback loop between providers and users is crucial in order to assure product utility
- Open data access critical to achieve acceptance of GMES services in a larger user community
- User community in the atmospheric theme still fragmented
 - ◆ Communities include: Meteorological, Environmental, in situ, satellite, research, policy...
- Users are generally positive
 - ◆ adequate resources for appropriate engagement must be ensured