

NOAA: Earth System Science Symposium

Report on Trace Gases in the Troposphere and Air Quality at the Atmospheric Sciences Conference, ESA ESRIN Frascati 08- 12.05.2006

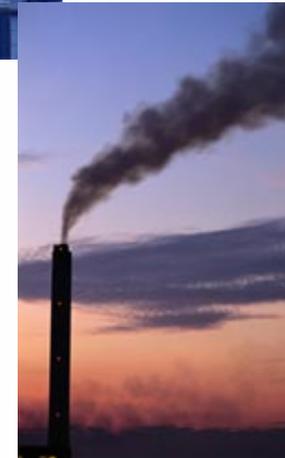
John P. Burrows and Herbert Fischer
IUP/IFE UB and FZK

Contents

- **Comment on Progress**
- **Recommendations**



Google top twenty images of Pollution ...



BAD AIR DAYS

Pollution is blamed for thousands of deaths every year, but the truth is, we don't know what is killing us – cooking, Tube travel, hiking on the South Downs. Are we as much in the dark as in the great smog of 1952? Richard Girling reports. Photograph: Amelia Troubridge



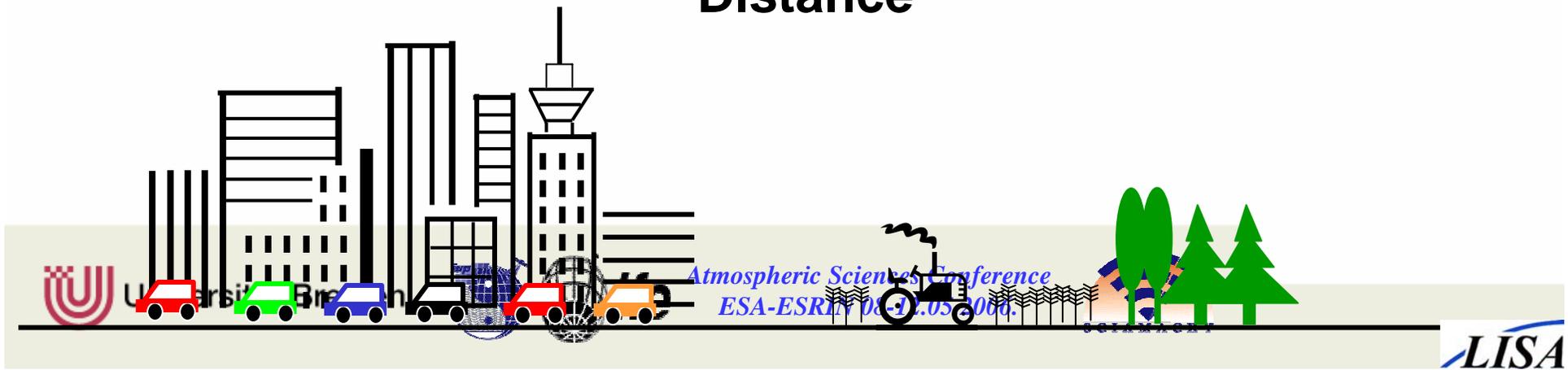
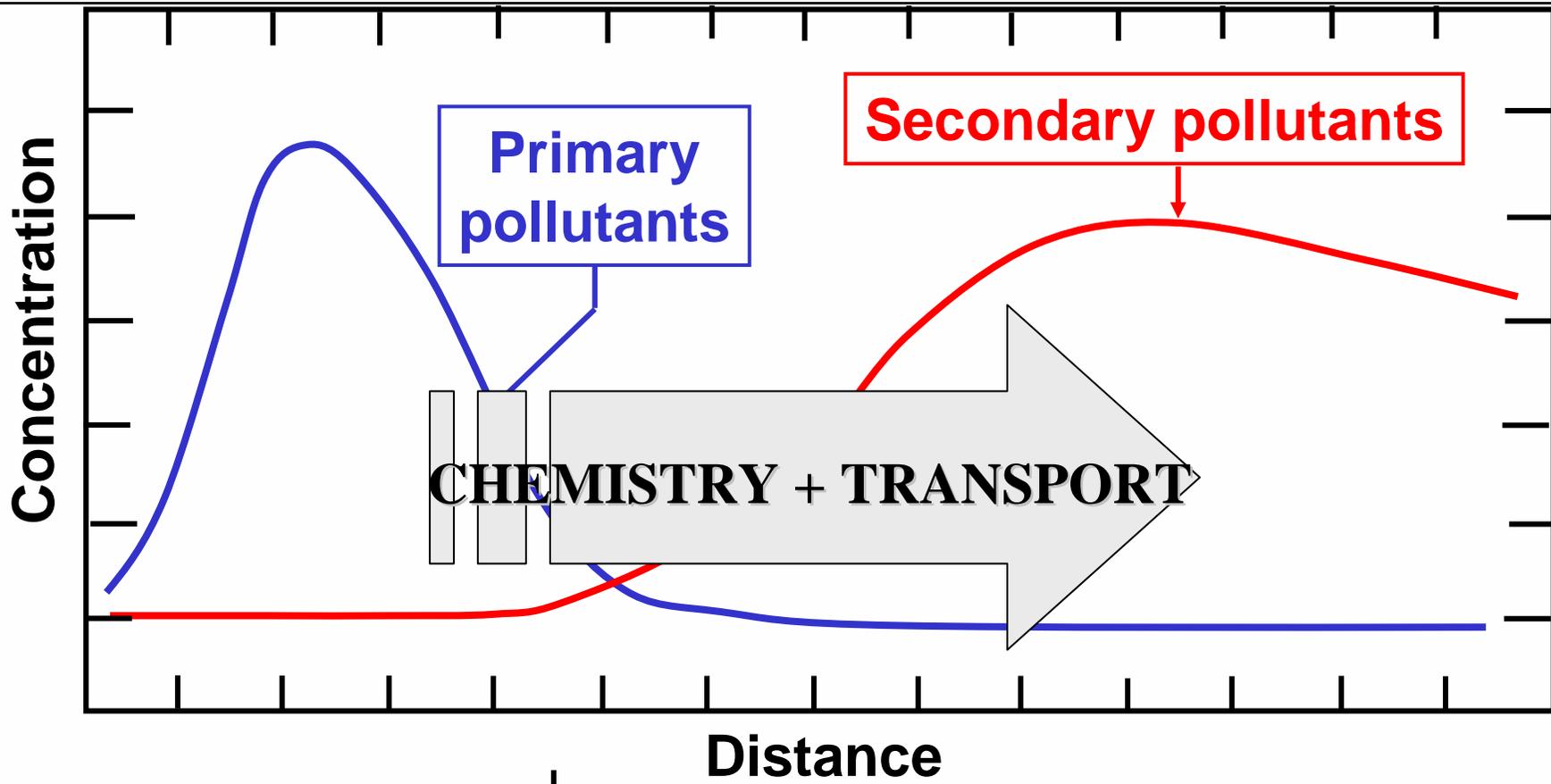
University of Exeter



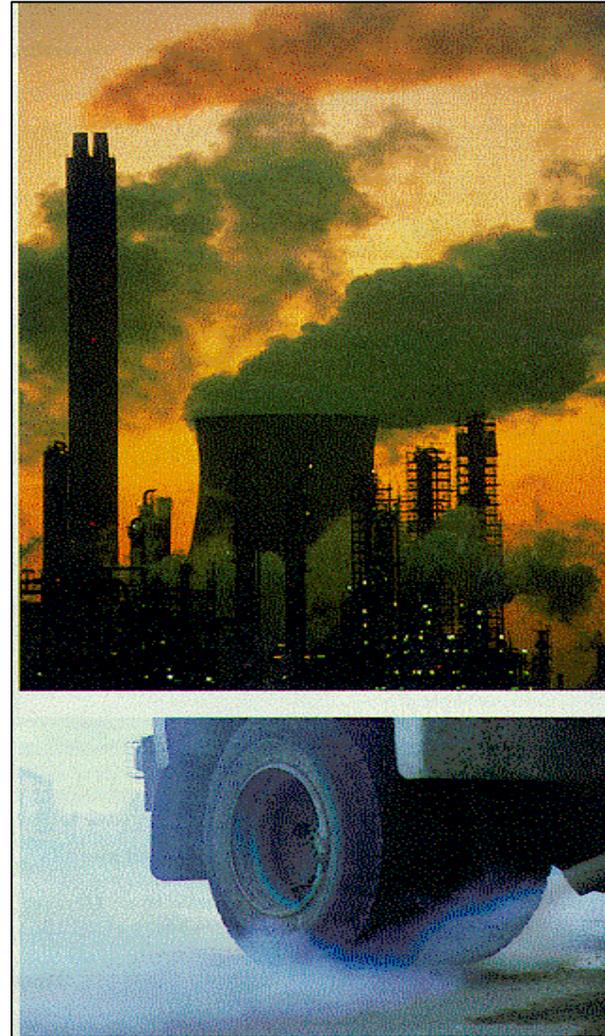
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ESA-ESKIN 08-12.05.2006.

SCIAMACHY



Images of Pollution?



Progress

- **Since the last ESA ENVISAT Atmospheric Chemistry Meeting,**
- **A) Great Progress has been made in the retrieval of data products for Tropospheric Trace gases and aerosol from both nadir and limb sounders on ENVISAT.**
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- **B) Many new data products have been developed.**

Progress

- **Since the last ESA ENVISAT Atmospheric Chemistry Meeting,**
- **C) Important Discoveries have been made using ENVISAT Data**
- **The Distribution of Increase and Decreases of Pollutants in the lower Atmosphere! Changes and Trends!!**
- **Biomass Burning and Lightning on the upper troposphere!**
- **Biogenic emissions!!**
- **The Impact of SPE on the upper atmosphere**
- **Processes for the PSC and the stratospheric ozone.**
- **First efforts on global Stratospheric Tropospheric Exchange**
- **D) Nevertheless further improvement is essential and required!!**
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Progress

- **Reasons for improvement –**
- **i) Improvement of Level 1 calibrations – removal of systematic errors**
- **ii) Some data bases for spectroscopy have been improved (Ozone, nitric acid, glyoxal, PAN and others).**
- **iii) Improved level 1-2 algorithms.**
- **Iv) Scientific Curiosity and Endeavour!**

Progress

- **Human Capacity**
- **There is a large and growing community of scientific and non scientific data users. This community needs to be nurtured – a key European and Global Resouce.**

Recommendations – Equal Priority!

1. Further Improvement of the Spectroscopic (and Scattering) Data Bases is necessary.

- Focus on
 - i) Pollutants: C₂H₆, PAN, CH₃CHO etc.,
 - ii) Weak IR- lines of strongly absorbing species,
 - iii) Spectroscopic parameters between 0.8 - 2.5 micron CO₂, H₂O
 - iv) Liquid water and ice spectroscopic features
 - v) Improved surface spectral reflectance between 0.32 and 2.5 microns.
 - vi) Improved surface emissivities.

Recommendations

2. Calibration and Validation

**A) Calibration of spectrometers is more difficult than FTS
Instrument Degradation needs to be taken into account as
ENVISATages**

**B) An adequate long term validation for the ENVISAT
atmospheric sensors is required. Not yet clear**

Recommendations

3. Data Quality

Continued improvement of the ENVISAT data products quality is required.

This addresses both level 1 and level 2 data products.

The creation of the Quality Working Groups by ESA is welcomed but sufficient support for their activity to be successful is necessary!!

Recommendations

3. Data Quality and Products

Only a fraction of the ENVISAT information in the data has been used.

In order to provide the full return on investment in ENVISAT, the improved support of ESA for the development and enhancement of data products developed within a scientific institutions is necessary and required.

Recommendations

3. Data Quality and Products

This activity of the community needs continued support and stimulation.

Improved Cloud and Aerosol knowledge required for trace gas retrieval.

*Synergetic Data Products need more stimulation
(Calibration and Data Base Issues here)*

An optimal procedure for their ultimate transfer and use into operational software is also required.

Recommendations

4 Data Delivery and Usage

A) Level 0, 1 and level 2

The access to data products at level 0, 1 and 2 has improved but is not yet adequate. However significant further improvement is required (e.g. level 2 data product for MIPAS reduced spectral resolution measurements.)

B) High level data products

Having established good level 1 and 2 data products from ENVISAT, investment in the development of higher level data products is required.

Recommendations

4. Continuity

A) For atmospheric and global climate change research, **continuity** of the current data sets for atmospheric composition.

B) For Trend Change analysis require the same time and location at representative sampling i.e. higher than the variability

C) There appears to be a significant data gap after ENVISAT.

D) ENVISAT is therefore required to achieve a maximum lifetime - A great challenge for ESA

Recommendations

5. Continuity and Future

Continued Exploitation of ENVISAT and Metop

For the chemical composition and in particular Air Quality of the lower troposphere high temporal and spatial resolution are required to have maximum cloud free scenes

Recommendations

5. Continuity and Future

Clouds and frontal systems convection coupled with advection and lightning are however important processes to be understood!!

Response to Global Climate change!

Similarly high spatial resolution sounding of the UT/LS region is required.