

Remote Sensing of Atmospheric Constituents from Space ACCENT-TROPOSAT-2 (AT2)

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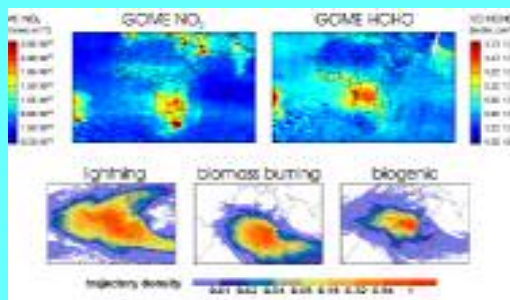
Air Pollution, Satellites and AT2

The second half of the twentieth century was marked by the realisation that air pollution was indeed a global phenomenon and that detailed global information about the amounts and distributions of key atmospheric constituents and parameters is required to assess our current knowledge of the Earth-atmosphere system.

Using remote sensing instrumentation on board orbiting satellites, it is now possible to obtain global information for tropospheric trace substances and air pollutants.

AT2 is an ACCENT integration task addressing the need for global information about trace atmospheric constituents.

AT2 is building upon and improving on the efforts initiated within TROPOSAT, a subproject of EUROTRAC-2, to facilitate the generation of tropospheric data products, to encourage their use for research and to indicate their potential use in the development of environmental policy.

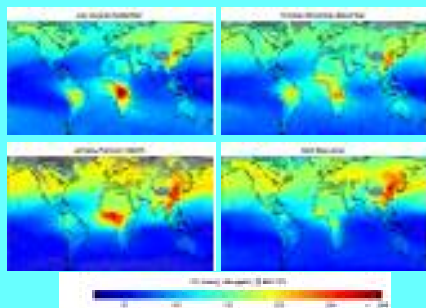


Attribution of NO₂ and HCHO emissions

Tropospheric nitrogen dioxide and formaldehyde fields as retrieved from measurements of the Global Ozone Monitoring Experiment (GOME) compared to modelled trajectory densities for different source contributions.

The GOME images are the average of all September measurements taken from 1996 to 2002, the trajectories are for September 1997.

Julian Arnek, DLR Oberpfaffenhofen and J. Burrows, A. Richter and F. Wittrock, University of Bremen



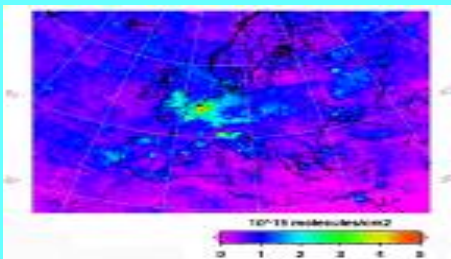
Global CO from MOPITT

These composite images depict the MOPITT CO measurements at an altitude of 850 hPa, averaged over 4 years (March 2000 to February 2004).

In the northern hemisphere, most of the pollution is associated with urban activity, with persistent high values above China and elevated levels over US, Europe and Asia in spring and winter. In the tropics and southern hemisphere, most of the CO is emitted where biomass burning occurs, such as in Africa, Central and South America (following the seasonal shift in the Inter-Tropical Convergence Zone).

The CO pollution plumes emitted locally spread from regional to global scales, depending on meteorological conditions and photochemistry.

Cathy Clerbaux, CNRS, Paris VI.



NO₂ emissions over Europe

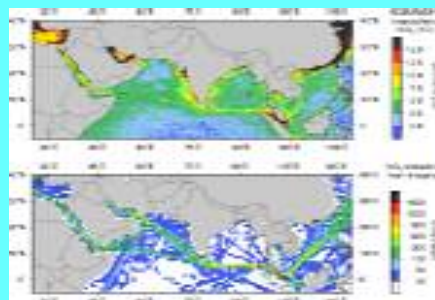
The tropospheric NO₂ column over Europe for June 2004. The NO₂ levels are derived by combining SCIAMACHY observations with chemical analyses of the chemical transport model, ROSE/DLR. One can clearly see the emission hot spots.

Thomas Holzer-Popp, DLR, Oberpfaffenhofen



Validation of satellite data products

Ralf Sussmann, IMK-IFU, Garmisch-Partenkirchen



NO_x signature of shipping in the Middle and Far East

Top: tropospheric NO₂ columns derived from SCIAMACHY data from August 2002 to April 2004.

Bottom: estimated distribution of NO_x emissions by shipping in the same region.

Andreas Richter, Uni-Bremen

AT2 Task Groups

The scientific work of AT2 is divided between three task groups. Each group consists of a number of principal investigators who contribute to the scientific activities of the integration task.

TG1 The development and improvement of algorithms for the retrieval of tropospheric data. The task group is divided into three groups specialising in aerosols, infra-red measurements and UV/Visible measurements.

Leader: Thomas Wagner, Uni-Heidelberg; 35 PIs

TG2 The synergistic use of models and observations to improve our understanding of tropospheric chemistry and dynamics.

Leader: Martin Dameris, DLR, Oberpfaffenhofen; 17 PIs

TG3 The development of validation strategies for tropospheric satellite data products using existing data.

Leader: Ankie Piters, KNMI, de Bilt; 13 PIs

E-learning

There is also a group developing an e-learning module to instruct Masters and Ph.D students in the remote sensing of NO₂.

Leaders: Maria Kanakidou, ECPL-Uni-Crete,

Annette Lodstätter-Weißmayer, Uni-Bremen



Volcanic activity in Iceland

Air traffic was re-routed on November 1, 2004 because of the eruption of the volcano, Grimsvoetn. Large amounts of steam and ash were emitted together with SO₂. Increased SO₂ values are visible close to Grimsvoetn (right volcano symbol) and in the south west near Katla (left volcano symbol).

Data from SCIAMACHY total column SO₂.

Andreas Richter, Uni-Bremen and Thomas Holzer-Popp, DLR, Oberpfaffenhofen

AT2 Meetings and Workshops

June 2004	1st AT2 workshop, Bremen
Dec. 2004	SCIAMACHY validation workshop, Bremen Organiser: Ankie Piters (AT2 supported meeting)
Jan. 2005	2nd AT2 workshop, Bremen
April 2005	SCIAMACHY CO retrieval intercomparison, Utrecht Organiser: Annetieke Gloudemans (AT2 supported)
May 2005	DANDELIONS campaign, Cabauw Organiser: Ellen Brinkma (AT2 supported meeting)
June 2005	3rd AT2 workshop, Oberpfaffenhofen
June 2005	Radiation Transfer Modelling workshop, Heidelberg Organiser: Thomas Wagner (AT2 supported meeting)
Sept. 2005	4th AT2 workshop, Urbino
Forthcoming meetings	
Nov. 2005	Cloud retrieval workshop, Toulouse Organiser: Jean-Louis Brenguier (AT2 supported meeting)
Mar. 2006	3rd Int. DOAS Meeting, Bremen Organiser: Thierry Marbach (AT2 supported meeting)
April 2005	IGACO Data Assimilation, Geneva
June 2006	4th AT2 workshop, Heraklion