



TRANSPORT AND TRANSFORMATION OF POLLUTANTS ACCENT - T&TP

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Barnsdale-2: Understanding and Quantifying the Atmospheric Nitrogen Cycle Extracts from the recommendations

Group 1: Global Atmospheric Cycle

(Paul Monks and Matt Evans)

- More observations of nitrogen species under varied conditions are urgently needed to test mechanisms and models.
- Field observations (static and vertical) of N₂O₅, NO₃ and HONO are needed to test model predictions.
- Observations of reactive halogen species under varying conditions would allow an evaluation of the impact of halogen chemistry on NO_x concentrations.
- Sub-grid scale issues should be investigated to allow their implementation into global models of the atmospheric cycling of N.
- Transport of stable species through the boundary layer need much further work.
- The emission and deposition of ammonia should be considered as a single process within models.
- Detailed process studies of the removal of organic NO_y from the atmosphere are needed.
- Coupled biosphere and atmosphere models are needed to fully understand the impact of anthropogenically emitted nitrogen

Group 2: Uncertainties in chemical processing

(Tony Cox and Dave Johnson)

- Further laboratory studies of the kinetics and mechanisms of the reactions of various RO₂ with NO; the reactions of NO₃ with various alkenes and the reactions of OH with various RONO₂ species are needed.
- Structure property relationships for saturation vapour pressures of organic nitrogen-containing species (particularly alkyl and peroxyacyl nitrates) are needed.
- Studies of the conversion of NO₂ to HONO on surfaces would be instructive.

Group 3: Surface Atmosphere Exchange

(David Fowler and Jennifer Muller)

Key research areas

- Surface – atmosphere exchange of HONO and HNO₃
- Dynamic models over agricultural surfaces.
- NO process model (emission from soil).
- NO and N₂O detection by satellites.
- New land-atmosphere exchange schemes in models.
- Aerosol vertical profiles.

g. The full report is published as ACCENT report 3/2006

Chemical transformations of NO_y species in the atmosphere. Those reactions involving the direct interaction with organic chemical processes are shown in blue (from Mike Jenkin)



T&TP aims and activities

The aim of ACCENT Transport & Transformation of Pollutants (T&TP) is to bring together the European community of researchers concerned with atmospheric chemistry, in order to pinpoint the current problems of understanding and to foster research work aimed at resolving the principal difficulties, so that the models used for analysis and forecasting on global, regional and local scales are more precise and reliable.

The main activity is the organisation of the annual **Barnsdale Expert Meetings** to consider areas of research concern and make recommendations for future work.

T&TP also offers support to other meetings and workshops which are considered to support its aims



Proposed reaction pathways and branching ratios in the CH₃C(O)O₂ + HO₂ reaction (presented by Mike Jenkin)



Barnsdale-3: Volatile Organic Compounds In the Polluted Atmosphere Extracts from the recommendations

Group 1: Emissions of VOC

(Jürgen Kesselmeier and Nicola Blake)

- The accuracy and precision of the inventories requires drastic improvement.
- Adequate characterisation of VOC variability is crucial.
- All major plant species should be included in estimates for biological VOC.
- Speciation of VOC needs improvement in models.
- Data gaps (tropics, Africa etc.) need filling.
- Quality control of VOC measurements needs improvement.
- Long term ground and diurnal satellite measurements need support.

Group 2: Uncertainties in processing of VOC

(Ron Cohen and John Wenger)

- VOC and SOA should be considered together when modelling.
- Simplification within models should be soundly grounded and be future safe.
- A comprehensive updated database for kinetic and mechanistic information is required.
- Theoretical approaches should be further developed to facilitate the prediction of rate and physical parameters.

Group 3: Secondary Organic Aerosol

(Maria Kanakidou and Rainer Volkamer)

- Field experiments to test the relationships between biogenic VOC and SOA should be encouraged.
- Laboratory studies to test VOC oxidation mechanisms and multi-phase chemistry leading SOA are needed.
- Optical, chemical and hygroscopic properties of SOA and the precursors needs much work.
- Modelling efforts to test novel ideas are needed.
- Expansion of the representations of SOA in current models is required.
- Comparison of model parameterisations of SOA and precursors is needed.

The full report is published as ACCENT report 4/2007



Recent T&TP Workshops and Meetings

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| Sept. 2005 | GLOREAM workshop (T&TP supported) |
| Oct. 2005 * | Understanding and quantifying the atmospheric nitrogen cycle |
| April 2006 | Chemical Data Assimilation in Atmospheric Forecast and Re-analysis Models; (ACCENT/WMO Expert Workshop in support of IGACO) |
| June 2006 | Air Quality in Eastern Europe |
| Sept. 2006 | GLOREAM workshop (T&TP supported) |
| Nov. 2006 * | VOC in the Polluted Atmosphere |
| Jan. 2007 | Integrated ocean - atmosphere measurements in the tropical Atlantic (T&TP supported) |

Forthcoming T&TP workshops

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| Nov. 2007 * | Impact of Climate Change on Air Quality |
| Nov. 2007 | GLOREAM workshop (T&TP supported) |

* Barnsdale Meetings, supported by the ACCENT groups: aerosols, access to emissions, access to laboratory data, AT2, BIAFLUX and modelling.

[http://www.accent-network.org/portal/joint-research-programme/transport-and-transformation-\(tandtp\)](http://www.accent-network.org/portal/joint-research-programme/transport-and-transformation-(tandtp))

