Minutes of the "Chemical perturbations" meeting
Freie Universitaet Berlin, November 30th 2008

1. Meeting motivation (Jordi Vilà, Robert Vautard, Adolf Ebel)

a) Understanding the relevant physical meteorological processes (atmosphere land interaction, boundary layer dynamics, deep convection, microphysics,…) for air quality modelling. Need of studying interactions between turbulence and chemistry, describing sub-grid scale variability, providing models with parameterized chemical perturbations
b) Transferring knowledge form basic research to applied air quality models.
c) Aiming at improving the description, in deterministic or in statistical terms, of air quality concentrations at scales often smaller than those of existing models is necessary for assessing the impact of air quality on health.

2. Individual presentations

Peter Builtjes:
Stable boundary layers are still poorly represented in air quality models, probably LES not doing it so right in stable boundary layers. Possibility to use wind tunnels to study small scale processes and applied to ait quality.

Olaf Hellmuth:
Interest in link between turbulence, aerosol dynamics and cloud microphysics (e.g., homogeneous/heterogeneous nucleation in multicomponent systems); Modelling of high-order moments (co-variance equation) (e.g., temperature, humidity, acidity); Enhancement (fine-tuning) of high-order turbulence parameterisations by employment of available LES and atmospheric measurements;

J Baldasano: Importance of high resolution emission inventories. Computer capacity is growing very fast

M Sofiev:

M Valari: parameterization sub-grid scale emission variability using a statistical approach.

A Ebel: Chemistry less efficient in finer resolution (heterogeneous mixing related to emission variability and turbulence control). Effects also found in the free troposphere. Differences in ABL and free troposphere behaviour point to different mixing regimes. Advocates box experiments.

Ralph Dlugi: Importance of field observations in showing impacts on modifying photolysis rate by broken clouds, non-linear chemical processes. Fluctuating global and net radiation caused deviations of emission of biogenic hydrocarbons and of Nitrogen compounds from common equilibrium considerations. Fluctuating global and net radiation caused alternating stability conditions in the lower boundary layer and in the canopy atmosphere with influences also on the transfer of trace compounds. . Relevance of in-canopy processes on the influence of turbulent mixing on chemistry.

Stefano Galmarini: Representation to account the emission variability by solving the variance equation (deterministic approach)

3. Definition of actions

3.1 Title of the working group:
Working Group title. Several possibilities:
Physical and chemical variability in air quality
Chemical turbulence and variability
Atmospheric physical-chemical interactions.
Multiscale physico-chemical fluctuation phenomena (in the atmosphere)

3.2 State of the art analysis

During 2008, collect papers and review papers on the subject. Including them on a web page.
Think of a review paper

Themes of the review

- Turbulence and chemistry (mixing, canopy effects,…)
- Gas phase and heterogeneous chemistry (turbulence-cloud physics interactions)
- Field and laboratory experiments
- Model issues (parameterizations, feedback/interaction parameterization, numerics)

3.3 Funding, for travel and workshop

The group can be established as a EURASAP working group.
Support from ACCENT can be a good alternative.
Envisage a COST action. Probably better suited to start it after the review

3.4 Membership

Join the list with the participants in the workshop (Wageningen, October 2007) “On the relevance of surface and boundary layer processes for the exchange of reactive and greenhouse gases”
There should be 40-50 people in the group
All: send Jordi list of potentially concerned persons

3.5 Workshop
Potentially in 2009

3.6 Projects
R Vautard will inquire at the calls on air quality and health (related to exposition events).