Geophysical Research Abstracts,
Vol. 11, EGU2009-8941, 2009
EGU General Assembly 2009


# Future impact of transport emissions on the global atmospheric chemistry

B. Koffi, S. Szopa, and A. Cozic
Laboratoire des Sciences du Climat et de l'Environnement (LSCE), Gif-sur-Yvette, France

Emissions of air pollutants by road, air traffic and international shipping affect air quality and climate. Besides their effect on the ozone concentration and its related radiative forcing, they also affect the OH-concentration, i.e. the oxidizing capacity of the atmosphere. The pollutants are emitted by the three transport sectors into highly different environments. The O3 and OH potential productions induced by each of these sectors thus differ strongly. These transport emissions are expected to show drastic quantitative and geographic changes in the next decades, because of new emission regulations, increasing mobility, as well as demographic and economic growths. In addition to changes in emissions, significant changes in climate parameters such as H2O, temperature, and dynamics are expected to occur in the future global atmosphere. They will affect the oxidation processes and thereby the changes in the atmospheric concentrations induced by transport emissions.
Within the EU-project QUANTIFY (Quantifying the Climate Impact of Global and European Transport Systems) the LMDz-INCA climate-chemistry model was used to estimate the effect of transport emissions on the global atmospheric chemical composition.
In a first step, up-to-date emission datasets were used for the transport and non-transport anthropogenic emissions for present (2000) and future (2050, SRES A1b and B1 scenarios) using 2003 nudged meteorology. A strong reduction of the road emissions and a moderate (B1) to high (A1b) increase of the ship and aircraft emissions are expected by the year 2050. As a consequence, the impact of road emissions on ozone is shown to decrease drastically, whereas aviation would become the major transport sources of tropospheric ozone perturbation at global scale. According to the most likely scenario (A1b), the contribution of all transport modes to the ozone column would increase everywhere, reaching up to 13% in some areas such as Asia.
In a second step of the study, we performed 10-years simulation runs, using 2050 emissions and consistent greenhouses gas concentrations (CO2, CH4, N2O, CFCs) and Sea Surface Temperatures for present (1995-2004) and future (2045-2054, A1b scenario) climates to also account for the climate change impact. This effect is analysed for O3, NOx and OH concentrations, as well as for the change in CH4 lifetime due to 2050 transport emissions and compared with the effect of the emission changes alone.