



The global effect of traffic emissions on the chemical state of the atmosphere: Results from QUANTIFY

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Within the EU-project QUANTIFY the effect of emissions from road, aircraft and ship traffic on the chemical composition of the atmosphere was investigated using several different models.

The mean maximum effect of emission reduction of traffic emissions predicted by the models is 4.0 DU and maximizes over the northern subtropical Atlantic. The relative effect amounts to more than 15% in the zonal mean (5.5 ppbv) compared to unperturbed conditions. In the region of maximum column ozone sensitivity the emissions of ship contribute to more than 80% to the boundary layer during northern summer. Over the southern hemisphere troposphere ship emissions contribute to the total ozone perturbation from 60–80% throughout the year (1–1.5 ppbv).

Road emissions have the strongest impact on ozone over the continental boundary layer and the free troposphere. Their impact on the northern hemisphere upper troposphere competes with aircraft emissions over the continents due to vertical transport and convection. Investigating the efficiency of the NO_x perturbation on ozone aircraft emissions have the strongest impact on ozone in the tropopause region.

With regard to the OH budget ship emissions perturb the zonal mean by 10–16% (zonal mean), which can exceed $5 \cdot 10^5$ molecules/cm³. Methane lifetime reduction due to ship traffic is estimated to be on the order of 3.5–4%, road by 1.5% and aircraft around 1%.