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Reactive nitrogen in atmospheric emission inventories

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Abstract. Excess reactive Nitrogen (Nr) has become one of the most pressing environmental problems leading to air pollution, acidification and eutrophication of ecosystems, biodiversity impacts, leaching of nitrates into groundwater and global warming. This paper investigates how current inventories cover emissions of Nr to the atmosphere in *Europe*, the *United States of America*, and *China*. The focus is on anthropogenic sources, assessing the state-of-the-art of quantifying emissions of Ammonia (NH₃), Nitrogen Oxides (NO_x) and Nitrous Oxide (N₂O), the different purposes for which inventories are compiled, and to which extent current inventories meet the needs of atmospheric dispersion modelling. The paper concludes with a discussion of uncertainties involved and a brief outlook on emerging trends in the three regions investigated is conducted.

Key issues are substantial differences in the overall magnitude, but as well in the relative sectoral contribution of emissions in the inventories that have been assessed. While these can be explained by the use of different methodologies and underlying data (e.g. emission factors or activity rates), they may lead to quite different results when using the emission datasets to model ambient air quality or the deposition with atmospheric dispersion models. Hence, differences and uncertainties in emission inventories are not merely of academic interest, but can have direct policy implications when the development of policy actions is based on these model results.

The level of uncertainty of emission estimates varies greatly between substances, regions and emission source sectors. This has implications for the direction of future research needs and indicates how existing gaps between modelled and measured concentration or deposition rates could be most efficiently addressed.

The observed current trends in emissions display decreasing NO_x emissions and only slight reductions for NH₃ in both Europe and the US. However, in China projections indicate a steep increase of both.

[Final Revised Paper](#) (PDF, 1920 KB) [Discussion Paper](#) (ACPD)

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