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Improving regional flux estimates of trace greenhouse gases in Germany

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There is a need to improve regional flux estimates of the important greenhouse gases: CH_4 and N_2O, which have considerably uncertain temporal and spatial variability. Furthermore, there is growing evidence that CH_4 emissions could be increasing due to climate changes in the high-northern latitudes, and for increasing anthropogenic emissions of N_2O due to fertilizer use on croplands.

We first assess current flux estimates of CH_4 and N_2O from IER and EDGAR inventories for Europe (and from one process-based model for N_2O) by comparison with high frequency *in-situ* concentration data from the Ochsenkopf tall tower (50˚01'N, 11˚48', 1022 masl). This comparison employs a Lagrangian-type transport model, STILT, which resolves meso-scale atmospheric transport using ECMWF meteorological data. Secondly, we investigate the use of hourly atmospheric concentration data in conjunction with STILT to derive improved spatial and temporal estimates of CH_4 and N_2O fluxes via an inversion technique. Such meso-scale inversions studies are also important to quantify and validate estimates of trace gas fluxes derived from scaling up smaller scale flux and process studies.