Inverse modeling of carbon monoxide fluxes

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An inverse modeling framework is used to estimate global emissions of carbon monoxide (CO). In particular, we intend to estimate the magnitude and variability of biomass burning CO emissions because the source strength of these emissions is highly uncertain, and the interannual variability is large.

Observations from the National Oceanic and Atmospheric Administration Climate Monitoring and Diagnostics Laboratory (NOAA/CMDL) surface network are assimilated using a four-dimensional variational (4DVAR) data assimilation system with the transport model TM5 and its adjoint for 2 years. The biomass burning emissions in the model are not released in the lowest layer of the model, but a vertical distribution is applied and 40% of the emissions is released above 1000 m.

The optimized emissions are validated with a separate set of surface station data and the new version 4 product of the satellite instrument MOPITT. A sensitivity test will be presented in which the biomass burning emissions are released in the surface layer.