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Investigating NO₂ processing in power plant plumes from TROPOMI

Steffen Beirle and Thomas Wagner

MPI Chemie Mainz, Satellite remote sensing, Mainz, Germany (steffen.beirle@mpic.de)

The divergence, i.e. the spatial derivative of the horizontal flux, yields the local balance of sources of sinks. Strong positive divergence is observed for (and allows to quantify) NO_x emissions from point sources like power plants. Within the downwind plume, NO₂ changes due to (a) further NO to NO₂ conversion (NO₂ source, positive divergence) and (b) NO₂ reaction with OH (NO₂ sink, negative divergence).

In this study we aim to disentangle and quantify these competing effects based on the divergence of the observed NO₂ flux. We focus on large and isolated power plants where additional sources are negligible. Goal is to determine the time scales for the NO to NO₂ conversion and the NO₂ lifetime for power plant plumes.