Estimating lightning produced NO_x from satellite

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Nitrogen oxides (NO_x=NO+NO_2) play an important role in tropospheric chemistry, in particular in catalytic ozone production. Lightning provides a natural source of nitrogen oxides. Recent estimates of lightning produced NO_x (LNO_x) are of the order of 5 Tg [N] per year with still high uncertainties in the range of one order of magnitude.

Satellite sensors like GOME or SCIAMACHY allow the retrieval of tropospheric vertical column densities (TVCDs) of NO_2 on a global scale. Recently, correlations of enhanced NO_2 TVCDs with lightning have been reported.

Here we discuss the potential of satellite measurements of NO_2 for the quantitative estimation of lightning produced NO_x. The sensitivity (AMF) of satellite instruments to lightning NO_x and the impact of additionally required information (e.g. flash rates, NO_x profile, NO_x partitioning, NO_x lifetime, transport) are analyzed in detail.

We present the results of quantitative LNO_x estimates for statistical approaches as well as for some individual case studies, in particular a lightning event in the Gulf of Mexico, coinciding with the GOME measurement in space and time.