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# Estimating the $NO_x$ produced by lightning from GOME data: A case study

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Lightning is an important natural source of nitrogen oxides, having large impact of ozone concentrations in the remote upper troposphere. Recent estimates of lightning produced $NO_x$ ($LNO_x$) range from about 1-20 Tg [N] per year, reflecting the high uncertainties. Satellite measurements, comprising long time series with global coverage, offer a new and independent approach to the estimation of $LNO_x$ production.

Here we present the analysis of an extreme lightning event on 30 August 2000 over the Gulf of Mexico. Lightning counts from the US National Lightning Detection Network (NLDN) are compared to vertical column densities (VCDs) of $NO_2$derived from the Global Ozone Monitoring Experiment (GOME).

This particular event is unprecedented as the lightning activity coincides perfectly with the GOME measurement both in space and in time: A sequence of $\sim$10 GOME observations shows strongly enhanced $NO_2$ VCDs. In this area about 10000 flashes occurred within one hour before the GOME measurement. Transport calculations reveal that possible convection of anthropogenic emissions can be neglected.

The thunderstorm is active during the GOME overpass and the measurement is thus taken for a totally cloudy scene with a cloud top height of about 10 km. We discuss the effects of different $NO_2$ profile heights on the retrieved VCD and estimate the $LNO_x$ produced in this particular thunderstorm.