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Lifetime of anthropogenic NOx: Transport modelling and satellite data

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To determine the lifetime of NOx is an important step for estimating the source strengths of NOx emissions by satellite data. In addition, the lifetime is the limiting factor for how far NOx emissions can be transported away from their sources. Therefore we compared results from the Lagrangian particle dispersion model FLEXPART with GOME and SCIAMACHY data downwind of strongly polluted areas in Asia, America and Europe. Three different approaches were chosen: First, FLEXPART was started with a high-resolution emission inventory for North America, to compare the results with satellite observations over the downwind Atlantic Ocean. Second, we started simulations at concentrated point sources (isolated pollution hot spots), and third we released NOx tracer at light pollution sources, serving as an alternative proxy for the distribution of anthropogenic emissions. Each FLEXPART run was repeated 11 times with tracers of fixed lifetimes ranging from 2h up to 48h. By fitting the model with satellite data, we found lifetimes subject to the source region from 2h up to 12h.