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EVALUATION OF DISCREPANCIES IN THE ANTHROPOGENIC NOX EMISSION TRENDS ACROSS EUROPE: SYNERGISTIC USE OF LOTOS-EUROS AND REMOTE SENSING NO_2 TROPOSPHERIC COLUMNS

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ABSTRACT:

In Europe, establishing (long term) trends in pollutant emissions, and concentrations is a key part of evaluating the impact of policies. Traditionally, air pollutant concentrations are monitored using in-situ measurement, while emissions are estimated on annual basis. Unfortunately, in both cases the methodology used are not consistent across Europe. In the past decade, studies using spaceborne instruments have illustrated that the tropospheric column of nitrogen dioxide contains valuable information about its sources, transport and sinks. Consequently, inverse modelling using satellite observations of NO_2 columns to estimate anthropogenic NOx emissions has been extensively used.
Various studies have focused on estimating the trends in NOx emissions using the tropospheric NO_2 columns from OMI measurements, as it reaches global coverage on a daily basis with a $13 \times 24km^2$ footprint at nadir. Across Europe, a significant negative trend of 56% per year in highly industrialized areas was identified. However, since all these studies make use of the same instrument, no information is provided on the impact of the instrument and its overpass time on the derived trends amplitude. In this study, we aim to quantify the discrepancies in the derived trends amplitude and provide significant information on the optimal overpass time to monitor the impact of the mitigation strategies across Europe. To this end, we compare trends in the anthropogenic NOx emissions derived from OMI and GOME-2 observations.
In this presentation, first, the sensitivity of each instrument to relevant emission source sectors across Europe will be shown. The NO_2 column sensitivity to source categories will allow us to better understand the observed trends. Second, the trends derived across Western Europe from OMI and GOME-2 observations will be presented and, the discrepancies will be investigated. Finally, an attempt to reconcile the trend estimates from both instruments across Europe will be presented.

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