



Trends of anthropogenic CO₂ and NO₂ emissions derived from the satellite instrument SCIAMACHY

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Global CO₂ emission inventories are currently mainly based on bottom-up estimates. These rely, e.g., on reported fossil fuel consumptions and fuel types. The associated uncertainties propagate into CO₂-to-NO_x emission ratios being an important measure for pollution monitoring and into biospheric carbon fluxes derived with inverse models. Co-located simultaneous SCIAMACHY satellite retrievals of XCO₂ and NO₂ from the years 2003-2011 are used as input for a top-down estimate of emission and emission ratio trends. In East Asia, the analysis reveals an increasing trend ($4.2 \pm 0.9\%/a$) of the CO₂-to-NO_x emission ratio. This results from a large positive trend of CO₂ emissions ($9.8 \pm 0.7\%/a$) primarily driven by the growing Chinese economy exceeding the positive trend of NO_x emissions ($5.8 \pm 0.3\%/a$). The results confirm that the newly installed and renewed technology (power plants, transportation, etc.) is significantly cleaner in terms of NO_x emissions. In North America and Europe negative CO₂ trends balance similarly large negative NO₂ trends so that no significant trends of the emission ratios are observed.