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Modelling constraints on the emission inventory and on vertical dispersion for CO and SO_2 in the Mexico City Metropolitan Area using Solar FTIR and zenith sky UV spectroscopy

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Abstract. Emissions of air pollutants in and around urban areas lead to negative health impacts on the population. To estimate these impacts, it is important to know the sources and transport mechanisms of the pollutants accurately. Mexico City has a large urban fleet in a topographically constrained basin leading to high levels of carbon monoxide (CO). Large point sources of sulfur dioxide (SO_2) surrounding the basin lead to episodes with high concentrations. An Eulerian grid model (CAMx) and a particle trajectory model (FLEXPART) are used to evaluate the estimates of CO and SO_2 in the current emission inventory using mesoscale meteorological simulations from MM5. Vertical column measurements of CO are used to constrain the total amount of emitted CO in the model and to identify the most appropriate vertical dispersion scheme. Zenith sky UV spectroscopy is used to estimate the emissions of SO_2 from a large power plant and the Popocatépetl volcano. Results suggest that the models are able to identify correctly large point sources and that both the power plant and the volcano impact the MCMA. Modelled concentrations of CO based on the current emission inventory match observations suggesting that the current total emissions estimate is correct. Possible adjustments to the spatial and temporal distribution can be inferred from model results. Accurate source and dispersion modelling provides feedback for development of the emission inventory, verification of transport processes in air quality models and guidance for policy decisions.

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