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CO₂ temporal variability over Mexico City metropolitan area from ground-based FTIR column measurements

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About seventy-five percent of the global carbon dioxide emissions from fossil fuel come from cities. Reducing anthropogenic greenhouse gas emissions, in particular in developing countries, is a major concern for local, national and international policies. Different mitigation strategies are and will be implemented to reduce greenhouse gas emissions, and the evaluation of their success and their perennization depends on the ability to continuously measure and quantify the effects at different spatial and temporal scales.

Using continuous solar absorption Fourier transform Spectroscopy (FTIR) column measurements in both urban and background environments over the Mexico City metropolitan area, together with in situ datasets, we explore the spatial and temporal variability of the CO₂ concentration over the 5 last years in the region. Measurements were performed from three permanent stations equipped with high and low spectral resolution FTIR spectrometers since 2012, 2016 and 2018, respectively, the first is part of the NDACC network while the other two contribute to the COCCON international initiative.

In the frame of the Mexico City's Regional Carbon Impacts (MERCIC-CO₂) project, 4 complementary sites equipped with EM27/Sun instruments were temporarily implemented within the megacity since autumn 2020. In particular, our time series encompass the COVID shutdown in MCMA. In this contribution we present results of the long term measurements in background and urban environment, intercomparison measurements, and preliminary results of the temporary MERCIC-CO₂ stations. In addition we report about the obstacles and opportunities of this intensive measurement campaign.