

EGU21-261, updated on 17 Jan 2022

<https://doi.org/10.5194/egusphere-egu21-261>

EGU General Assembly 2021

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MAX-DOAS measurements of NO₂ and HCHO in the city of Kinshasa from 2019-2020

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Recent studies in Kinshasa show how much air pollution is present in this large megalopolis of 13 million inhabitants, with levels even exceeding the recommended values (WHO, 2018).

From May 2017 to November 2019, the University of Kinshasa (UniKin: -4.42°S, 15.31°E) has equipped itself with a low-cost instrument operating in single-axis mode. Studies based on measurements made with this instrument have demonstrated the presence of NO₂ with highest vertical column densities (VCDs) in June, July and August (R. Yombo, 2020). With this low-cost instrument, information such as aerosol and NO₂ profile, which have major impacts on the determination of VCDs could not be obtained, leading to considerable uncertainties in the results obtained.

This work therefore supports the first one as described above, by presenting first results of a new MAX-DOAS (multi-axis differential optical absorption spectroscopy) system built at the IASB, in Belgium, and installed in Kinshasa at the same location in November 2019. We first present the new MAX-DOAS, which is based on compact Avantes spectrometer (280-550 nm, 0.7 nm FWHM), a small computer, and a scanner. We describe the analyses for aerosol extinction, HCHO and NO₂ using FRM4-DOAS. For these two molecules, we compare with model simulations (GEOS-Chem) and satellite observations (OMI, TROPOMI).