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First results from the KinAero MAXDOAS instrument

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As part of an ongoing collaboration with the University of Kinshasa (RDC), we have recently developed a compact low-cost MAXDOAS instrument (KinAero) in view of deploying it at Kinshasa for long term monitoring of atmospheric pollutants such as NO_2 and HCHO. We present the KinAero system, which consists in a compact grating spectrometer from the Avantes company coupled by optical fiber to an elevation scanning device operating in one fixed azimuthal direction. The spectral range covers the wavelengths from 290-550 nm with a resolution of 0.7 nm FWHM.

We show characterization results of KinAero from the lab (detector linearity, signal-to-noise, pointing accuracy,...) and assess the overall quality of the NO_2 and O4 slant column measurements based on comparisons with the BIRA-IASB NDACC-certified MAXDOAS instrument in Uccle. Between September and December 2018, KinAero was installed on the ICOS observation tower in Vielsalm (50.31°N, 6°E, 445 m.a.s.l), in a forest area. These measurements were performed as part of the BelAIR-Silva campaign, which provided a good opportunity to test the instrument in the field for a period of several months. The instrument was found to be stable during the full duration of the campaign. Using retrieval tools developed as part of the ESA FRM4DOAS project, we derived time-series of NO_2 and HCHO column and profile measurements, which are applied to comparisons with the TROPOMI/S5P satellite instrument.