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Sentinel-5 Precursor NO_2 and HCHO validation using NDACC and complementary UV-Vis DOAS systems

Gaia Pinardi, Corinne Vigouroux, Bavo Langerock, Martine De Mazière, José Granville, Jean-Christopher Lambert, François Hendrick, and Michel Van Roozendael

Royal Belgian Institute for Space Aeronomy (BIRA-IASB), Chemistry and Physics of Atmospheres, Brussels, Belgium (gaia.pinardi@aeronomie.be)

The NIDFORVal project (S5P NItrogen Dioxide and FORmaldehyde Validation using NDACC and complementary FTIR and UV-Vis DOAS ground-based remote sensing data) is part of the S5PVT and aims at providing an assessment of the quality of two operational S5P products: nitrogen dioxide (NO_2) and formaldehyde (HCHO). Two different and independent ground-based remote sensing techniques are involved: Fourier Transform Infrared (FTIR) and UV-Visible Differential Optical Absorption Spectroscopy (UV-Vis DOAS). These techniques can provide accurate NO_2 total (DirectSun DOAS), stratospheric (ZenithSky DOAS) and tropospheric (Multi Axis (MAX) DOAS) columns, as well as HCHO total columns (FTIR and MAXDOAS).
Within the project, high quality measurements from over 60 ground-based stations and 80 instruments will be gathered from NDACC and complementary networks or recent infrastructures, extending the overall data set to a large range of observation conditions sampling high, mid- and low latitudes, as well as unpolluted, sub-urban and urban polluted sites.

A first phase of the project has been focusing on defining homogenized and characterized FTIR and UV-Vis DOAS recommendations for the analysis of ground-based NO_2 and HCHO data time-series over the whole S5P mission timeline (10/2017-2023). Since the TROPOMI launch in October 2017, ground-based data is being collected for the validation of the S5P products during the commissioning phase E1. Only a subset of ground-based stations is ready for operational data submission in rapid delivery mode, which are used to compare with the available L2 operational dataset, making use of common tools derived from the experience developed in precursor projects (e.g., Multi-TASTE, AC SAF, GECA, NORS) and new S5P-related developments (e.g., HARP tools).

First comparisons of UV-Vis DOAS stations will be reported in this poster, as well as plans for the routine operations phase (E2), with the progressive accumulation of large data sets that will allow for improved statistics, a refined categorization of validation sites and search for patterns or specific behaviors in validation results, analysis of seasonal cycle effects and verification of long-term consistency throughout the mission. FTIR results will be reported in the companion work of Vigouroux et al. in the same session.