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HELSTOP: A Project Design for the Harmonization and Evaluation of Lower Stratospheric and Tropospheric Ozone Vertical Profiles

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Tropospheric ozone is an important trace gas, as it is both a greenhouse gas and a pollutant detrimental to human health, crop yields and ecosystem productivity. As a highly reactive gas, ozone is an important component of air quality in the lower troposphere at a regional scale but also in the middle and upper troposphere at larger scales. The relative greenhouse effect of ozone is greatest in the upper troposphere (UT) and lower stratosphere (LS), the most climate sensitive region of the atmosphere. Measuring and characterizing the vertical distribution of ozone and understanding the underlying processes are two essential activities in atmospheric research.

Techniques to measure the vertical distribution of ozone in the troposphere and lower stratosphere are the conventional ozonesondes, UV-photometers onboard commercial & research aircraft, Lidars, and FTIR's . However, since more than a decade, ground-based UV-visible spectrometers (e.g. MAXDOAS, PANDORA) and satellite instruments (e.g. OMI, TROPOMI), which are based on the remote sensing technique, play an increasing role in the characterization of tropospheric ozone. Besides clear regional differences, the distribution and trends of ozone in the troposphere and lower stratosphere are not always consistent between the different datasets obtained from the different standard ozone observing techniques . As a matter of fact, measuring the vertical profile of tropospheric and lower stratospheric ozone concentrations from satellites remains very challenging and have to rely on ground-based retrievals of ozone for validation.

Here we will present the project design HELSTOP (Harmonizing and Evaluate Lower Stratospheric and Tropospheric Ozone Profiles) to harmonize and evaluate the data of lower stratospheric and tropospheric ozone profiles obtained from the different ozone measuring techniques. Presently, HELSTOP is submitted as a proposal for a COST action. In HELSTOP we want to bring scientists and engineers belonging to different ozone observation communities together, not only to strengthen, speed up and expand existing activities of harmonization of instruments and datasets within a technique, but also to compare Quality Assurance/Quality Control (QA/QC) procedures, operation best practices, harmonization efforts, and retrieval algorithms between the different ozone measuring techniques. As end objective, HELSTOP aims at providing a harmonized and consistent dataset of vertical ozone profiles in the troposphere and lower stratosphere, retrieved by the different techniques listed above. Together with a data cross-comparison at dedicated sites, HELSTOP will also create the framework for future intercomparisons and assessments.