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Advanced exploitation of ground-based Fourier transform infrared observations for tropospheric studies over Europe: achievements of the UFTIR project

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Solar absorption measurements using Fourier transform infrared (FTIR) spectrometry carry information about the atmospheric abundances of many constituents, including information about their vertical distributions in the troposphere and the stratosphere. Such observations have regularly been made since many years as a contribution to the NDSC (Network for the Detection of Stratospheric Change). They are the only ground-based remote sensing observations available nowadays that carry information about key atmospheric trace species in the free troposphere, among which the most important greenhouse gases.

The European UFTIR project (Time series of Upper Free Troposphere observations from a European ground-based FTIR network, http://www.nilu.no/uftir) has focused on maximizing the information content of FTIR long-term monitoring data of some

direct and indirect greenhouse gases (CH_4, N_2O, O_3,HCFC-22, and CO and C_2H_6, respectively). The UFTIR network includes six NDSC stations in Western Europe, covering the polar to subtropical regions. At several stations of the network, the observations span more than a decade. Existing spectral time series have been reanalyzed according to a common optimized retrieval strategy, in order to derive distinct tropospheric and stratospheric abundances of the abovementioned target gases. A bootstrap resampling method has been implemented to evaluate trends of the tropospheric and total burdens of the target gases, including their uncertainties. In parallel, simulations of the target time series have been made with the Oslo CTM2 model: comparisons between the model results and the observations provide valuable information to improve the model, and in particular, to optimize emission estimates that are used as inputs to the model simulations, and to explain the observed trends.

The final results of the project will be presented, and ways to proceed will be discussed.