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ACE remote-sensing of NOy in the troposphere: first global distributions

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Reactive nitrogen compounds play an essential role in processes that control the ozone abundance in the low atmosphere. If the abundances of NO_2 in the troposphere are now well monitored from satellite measurements in the UV, there are, however, few measurements on the concentration distributions of other nitrogen oxides such as HNO_3, PAN, N_2O_5 and HNO_4 in the troposphere. Information on these compounds, which constitute the principal reservoirs species for the reactive nitrogen oxides in the lower atmosphere, can potentially be accessed using satellite measurements in the infrared spectral region.

For the purpose of this analysis, we exploit measurements collected by the Atmospheric Chemistry Experiment (ACE), onboard the Canadian SCISAT-1 satellite. The principal instrument of ACE is a Fourier transform infrared spectrometer, which operates in solar occultation and delivers operationally highly-resolved vertical profiles for a series of trace gases, from the middle troposphere to the thermosphere. Its high signal-to-noise performance enables weak absorbing species to be detected. We present in this work retrieval of HNO_3, HNO_4, PAN and N_2O_5. Global distributions of HNO_3 and PAN for the two first years of ACE operation are shown and discussed with regard to the NO_x sources and transport processes.