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Transcontinental stratospheric and upper tropospheric measurements with the new GLORIA-Lite instrument

The Gimballed Limb Observer for Radiance Imaging of the Atmosphere (GLORIA) is a cooled limb-imaging Fourier-Transform spectrometer (iFTS) providing mid-infrared spectra with high spectral resolution. A newly developed, compact and uncooled version of GLORIA (called GLORIA-Lite) is significantly smaller and lighter thanks to state-of-the-art infrared sensors, tailored electronics and innovative manufacturing technology. The development of this instrument enabled the first transcontinental balloon flight from northern Sweden via Greenland to Canada, which took place in June 2024. The objectives of observation have been primarily its technical qualification and the provision of a first imaging hyperspectral limb-emission dataset (spectral sampling 0.2 cm-1 in the wavelength range 700-1550 cm-1) from 5 to 40 km altitude as well as the retrieval of key stratospheric and tropospheric species (level-2 data).

In this contribution we will demonstrate the performance of GLORIA-Lite with regard to level-2 data, consisting of retrieved altitude profiles of a variety of trace gases. We will show examples of selected results together with uncertainty estimations, altitude resolution as well as comparisons to atmospheric model simulations.

Topic

Current and past limb and occultation instruments: algorithms, products, validation

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