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Retrieval and Analysis of Temperature and Important Trace Gases in the Lower Stratosphere as measured by GLORIA during ESSenCe11

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The Gimballed Limb Observer for Radiance Imaging in the Atmosphere (GLORIA) is a new remote sensing instrument combining a Fourier transform infrared spectrometer with a highly flexible gimbal mount. The 2-D detector array measures spectra with a uniquely spatial and spectral resolution. Air masses can be observed from different directions by turning the instrument's line of sight in the gimbal frame.

During December 2011 the instrument flew for the first time on the high flying Russian Geophysica M-55 research plane over Kiruna (Sweden). At that time, there was a very strong and cold polar vortex with several filamentary structures at its boundary and within the operation radius of the aircraft. We retrieved fields of temperature and several important trace gases from measurements obtained during the ESSenCe campaign and compared them to 3-D model calculations of the atmosphere.

We show that there exists filamentary structure of less than 1 km vertical extent, which is only visible due to the high vertical resolution of 300 m provided by GLORIA and is not fully resolved in the comparison data.