Observations of Cirrus Clouds with GLORIA during the WISE Campaign: Methods and First Results.

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Cirrus clouds in General Circulations Models (GCMs) are cause of uncertainties that affect the results of climate projections. These uncertainties arise from the fact that the effect of cirrus clouds, especially thin clouds close to the tropopause, is not yet well understood and thus not well represented. The radiative impact of cirrus clouds depends on parameters such as the altitude, optical thickness, ice water content (IWC) or size distribution.

This study presents a method for the detection of clouds using the data obtained by the Gimballed Limb Observer for Radiance Imaging of the Atmosphere (GLORIA) on the German HALO research aircraft during the WISE campaign in September/October 2017. GLORIA is an infrared limb sounder that offers excellent spectral and spatial resolution. The instrument is suited for the detection and characterization of clouds, especially for optically and vertically thin cirrus clouds. The detection method is based in the use of color ratios in the IR spectrum, first introduced by Spang et al. (2001), and combines it with the extinction coefficient. The extinction coefficient is retrieved with the radiative transfer model JURASSIC2 (JUelich Rapid Spectral SImulation Code V2).

After the detection, the clouds are characterized with respect to: vertical extension, distance to the tropopause and IWC. For further analysis, we perform an initial comparison between observations and the microphysical model calculations with CLaMS-Ice model (Chemical LAgrangian Model of the Stratosphere) using meteorological analysis and reanalysis data from the European Centre for Medium-Range Weather Forecasts.