



High Resolution Limb Observations of Cirrus Clouds by the CRISTA-NF Experiment

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The Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere - New Frontiers (CRISTA-NF) experiment on board the Russian research aircraft Geophysica measures limb emission spectra with an unprecedented vertical and horizontal resolution in 4-15 micron wavelength region. The IR spectra measured during two field campaigns (SCOUT-O3 and AMMA) have been analysed with respect of cloud occurrence, cloud vertical and horizontal extent, cloud spatial structures and their utilisation for trace gas and cloud parameter retrievals. In addition indicators for ice water content (IWC) and optical thickness of the clouds have been adopted. The overall sensitivity of cloud detection method is excellent. A small amount of IWC=0.01 ppmv is detectable over a large altitude range in the troposphere and even lower values down to a few ppbv are probably detectable around the tropopause. Indication for NAT type cirrus clouds have been explored, whereby no significant signature were found in the spectra. Selected flights will be discussed in comparison to analyses of ECMWF and analyses with the Chemical Lagrangian Model of the Stratosphere (CLaMS). In addition we like to address in more detail the complexity of the limb geometry in respect to cloud observations by bringing together cloud top height information from brightness temperatures of geostationary satellites and modeled ice water content fields by the CLaMS model. The new kind of high resolution limb measurements in the upper troposphere / lower stratosphere region are especially valuable for the design and development of future space borne high resolution limb sounders.