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High-resolution limb-observations of water vapour and clouds in the UT/LS region in comparison to the CLaMS model

R. Spang (1), G. Günther (1), B. Trieu (2) and M. Riese (1)

(1) ICG I, Research Centre Jülich, Germany, (2) Department of Physics, University of Wuppertal, Germany

Despite the great importance of several trace constituents (especially water vapour and clouds) in the UT/LS region for the climate system, the distribution of these quantities is far from being well understood. This is a result of the existing lack of global observations with sufficiently high vertical and horizontal resolution. The Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere (CRISTA) instrument made a number of snapshots of the UT/LS during its two Space Shuttle missions (STS 66 and STS 85) and demonstrated the potential of the IR limb viewing technique to provide information on several trace constituents and subvisible cirrus clouds (SVC) with comparably high spatial resolution. The presentation gives an overview of CRISTA water vapour and cirrus observations in the UT/LS in comparison with corresponding ECMWF data and modelled ice water content by the CLaMS model (Chemical Lagrangian Model of the Stratosphere). The model is currently adapted for investigation of the tropopause region. Transport simulations are based on trajectory calculations driven by ECMWF. A novel formulation of mixing is implemented, where the intensity of mixing is driven by the wind shear. For CRISTA-2, simulations between 300 K and 450 K were started three month before the observation. The initialisation of water vapour was taken from ECMWF data, although the ECMWF values are somewhat higher than the CRISTA observations. Ice particles were formed at a fixed super-saturation threshold (e.g. 110%) by a simple model parameterisation of cirrus cloud formation, including sedimentation and evaporation of the particles. Transport of moisture from the tropical troposphere into the extra-tropical lowermost stratosphere as well as the modelled cirrus cloud locations will be compared to the CRISTA measurements.