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Analysis of the water vapor distribution in the upper troposphere and lower stratosphere with COSMIC radio occultation data

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The upper troposphere and lower stratosphere (UTLS) is a key region for stratosphere-troposphere interactions, where the coupling between chemistry, dynamics and radiation is strong. The water vapor in the UTLS is important for surface climate and the thermal structure of the UTLS. Both tropospheric and stratospheric physical, dynamical and chemical processes influence the distribution of water vapor in the UTLS. We use GPS-RO (Global Positioning System - Radio Occultation) profiles from COSMIC (2006-2014) with a high vertical resolution of 100 m comparable to radiosondes to investigate the distribution and variability of water vapor in the UTLS in detail and hence stratosphere-troposphere exchange. This will be analyzed by looking at synoptic-scale tropospheric cyclones and anticyclones, the stratospheric polar vortex as well as stratospheric sudden warmings. Furthermore, the radiative effects of water vapor on the thermal structure of the UTLS will be estimated by radiative transfer calculations.