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Comparison of water vapor and cloud macrophysical properties derived from satellite sensors and from airborne remote sensing instruments on HALO

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The representation of clouds is one of the largest sources of uncertainty in climate and weather model predictions. On a global scale, atmospheric water vapor and cloud macrophysical properties like size distribution and liquid water path (LWP) can be observed with the help of satellites, which, however, miss small-scale features due to the coarse spatial resolution. Measurements with a finer resolution can be performed on airborne remote sensing platforms, such as the novel German High Altitude and LOng (HALO) range research aircraft. Within the NARVAL (Next- generation Aircraft Remote sensing for VALidation studies) campaign, HALO was equipped with a remote sensing suite consisting of a 26 channel passive microwave radiometer (22183 GHz), cloud radar (36 GHz), water vapor lidar, spectrometer and drop sondes. The first part of the campaign (NARVAL-South in December 2013) investigated cumulus clouds in the trade wind region, while the second part (NARVAL-North in January 2014) focused on post frontal convection over the Northern Atlantic.
Within this presentation, the integrated water vapor and the LWP derived from the aircraft measurements collected during the NARVAL-South campaign will be compared to those obtained from satelite observations. The amount of missed LWP, due to the coarser resolution of the satellite observations, is investigated. Furthermore, due to the high spatial resolution of the HAMP microwave radiometer (<1km), combined LWP and cloud size horizontal distribution are derived to give guidelines for the development of parameterization for atmospheric models.