**A virtual network of ground-based microwave radiometers for monitoring of atmospheric stability and its potential impact in synergy with hyperspectral satellite observations.**

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In our contribution, we show the potential of a network of ground-based MWR to complement observations of future Infrared Sounder (MTG-IRS) and to provide information on atmospheric stability. The last is described in terms of CAPE and Lifted Index. We present a neural network retrieval of CAPE and LI from simulated IRS and MWR measurements based on the COSMO-REA2 reanalysis as truth. To assess the spatial representativeness of observations of a single ground-based MWR and to estimate the required network density the retrieval is applied to a 150*150km reanalysis domain. The impact of a MWR network was investigated in two ways. First, using spatial statistical interpolation, the fields of CAPE/LI retrieved from IRS observations were merged with the CAPE/LI values from MWR. Within this method, the contribution of ground-based network consisting of a varying number of radiometers was shown to be significant under cloudy conditions. The second approach mimics the assimilation of satellite and ground-based observations in the space of retrieved CAPE/LI fields. Assuming the persistence of atmospheric fields for a period of six hours, the CAPE/LI fields calculated from reanalysis were taken as a first guess in an assimilation step. Observations, represented by CAPE/LI fields obtained from satellite and ground-based measurements with +6 hours delay, were assimilated by spatial interpolation. Within this method, the added value of MWR observations is highly dependent on the current weather situation, cloudiness, and the position of MWR. As the next step an observing system experiment is planned and will be performed to show the possible benefit of assimilation of ground-based MWR observations into the regional high-resolution ICON model.