



Impact of different IFS microphysics on a warm conveyor belt and the downstream flow evolution

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The influence of small-scale microphysical processes on the large-scale upper-level flow features associated with an extratropical cyclone is investigated with the ECMWF global atmospheric model. A control simulation with the model version operational at ECMWF during 2014/early 2015 and a simulation with new parametrizations of rain autoconversion/accretion, rain evaporation and snow riming operational since May 2015 are compared in detail. In order to investigate the impact of each microphysical process separately, the diabatic heating rate for each microphysical process and its impact on the large-scale dynamics, given by the diabatic modification of potential vorticity (PV), is calculated and compared for the two simulations. The influence on the upper-level ridge building and the downstream flow evolution is investigated. The changes in the microphysical parametrization led to differences in the position of the warm conveyor belt (WCB) outflow. The WCB reaches the upper troposphere with low PV values and shifts the location of the tropopause in a slightly different way in the two simulations. Although these differences are relatively small at the beginning, they are advected downstream, leading to distinct differences in the upper-level PV pattern. These results nicely demonstrate the strong link of atmospheric processes occurring at very different scales and highlight the importance of a correct representation of small-scale microphysical processes for large-scale flow features. Additionally they emphasise the need for detailed microphysical measurements in extratropical cyclones in order to better understand and constrain the microphysical processes in NWP models.