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On The Convective Precipitation Contribution during Vb-events

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Recent studies have focused on the relationship between global warming and extreme precipitation events. It is consensed that the risk of flooding is increasing due to global warming, since warmer air temperatures accommodates more moisture content according to Clausius-Clapyeron relation. One of the major flood sources is known as Vb cyclones, i.e. cyclones travelling through the Mediterranean then moving northwards on the eastern flank of the Alps towards central Europe. In this study, a special focus is shed on the convection process during major Vb events. Using a convection tracking method (Purr et al. 2021) and mid-tropospheric vertical velocity and vorticity method (Poujol et al.2019) on convective-permitting simulations (3km resolution) driven by ERA5 reanalysis data, the results show that at least one third of the total amount of rainfall is produced by convection. Moreover, the diurnal cycle is found to contribute to enhancing the convective fraction, as the surface becomes warm in the afternoon, setting up suitable conditions for convection to occur. Both methods show similar patterns and comparable amplitudes. The added value of using such a computationally expensive simulation is also investigated, by comparing the results from the convection-permitting simulations to a lower resolution (11 km) downscaling with parameterized convection. Using Poujol et al. (2019) method, the the results do not show a completely accurate rainfall enhancement due to the diurnal cycle; however a comparable fraction due to convection during a Vb event is identified.

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