



## **Climatology of Tibetan Plateau vortices in reanalysis data and a high-resolution global climate model**

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The Tibetan Plateau (TP) and the surrounding high mountain ranges constitute an important forcing of the atmospheric circulation over Asia due to their height and extent. Therefore, the TP impacts weather and climate in downstream regions of East Asia, especially precipitation. Mesoscale Tibetan Plateau Vortices (TPVs) are one of the major precipitation-bearing systems on the Tibetan Plateau (TP). A fraction of TPVs moves off the TP to the east and can trigger extreme precipitation in parts of China, e.g. the Szechuan province and the Yangtze River valley. The climatology of TPV occurrence is examined in a high-resolution global climate model and two reanalyses using an objective feature tracking algorithm, identifying relative vorticity maxima at the 500hPa level. The results show that the global climate model is able to simulate TPVs at N512 horizontal resolution (about 25 km grid spacing in midlatitudes) and in general agrees with the reanalyses. Most of the TPVs are generated in the north-western part of the TP. The centre of this main genesis region is small and stable throughout the year. The strength and position of the subtropical westerly jet controls the distance TPVs can travel eastwards and shapes the annual cycle of TPV occurrence. The fact that our global climate model can represent the TPV climatology opens a wide range of options for future model-based research on TPVs.