Submitted Abstract

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Title	Mesoscale Weather Systems In The Tibetan Plateau Region: Precipitation Extremes And Their Connection To The Large-Scale Atmospheric Circulation.
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Abstract

Mesoscale Tibetan Plateau vortices (TPVs) have been identified as major precipitation bearing systems in the Tibetan Plateau (TP) region. TPVs originate over the TP and, while the majority of TPVs remain on the TP throughout their lifetime, a fraction of TPVs (~20%) moves east off the TP into densely populated downstream regions, such as the Sichuan basin and the Yangtze river valley. These moving-off TPVs can pose a risk for people's life and livelihoods, by causing heavy rainfall and subsequent flooding and landslides amplified by the complex terrain.

In this study we analyse how the occurrence and behaviour of TPVs is related to the large-scale circulation with a focus on the position and strength of the subtropical westerly jet, and the roles played by TPVs for precipitation events downstream of the TP.

Results from a case study, using reanalysis and satellite data, show that in July 2008 a TPV triggered the formation of a mesoscale convection system (MCS) as it moved eastward off the TP, leading to heavy precipitation in the Sichuan basin. A set of high-resolution model simulations suggest that the moving-off TPV indeed plays a key role for the initiation of the MCS and the ability of the simulation to capture the observed precipitation in the Sichuan basin.

In a further step we analyse the relationship between heavy precipitation events, MCSs and TPVs on a climatological basis using observations, reanalysis data and regional downscaling. Improved understanding of how the combination of favorable large-scale atmospheric conditions and occurrence of TPVs and MCSs can create and affect heavy/extreme precipitation events on the TP and in its downstream regions might enable us to improve their forecasts and projections in a climate change context.