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Impact of Soil Moisture Patterns on Convective Systems over the Tibetan Plateau

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The Tibetan Plateau plays an important role in the East Asian monsoon, influencing onset and precipitation intensity through topographical and thermal effects. During the summer months, large mesoscale convective systems (MCS) develop in the late afternoon over the eastern plateau. These systems are often long lived and can travel out of the plateau, bringing heavy rain and flooding to eastern China. Plateau-scale soil moisture distribution has been shown to influence MCS genesis in the eastern plateau during the monsoon season, however the impact of transient surface wetness variability on scales $\sim$10s km has yet to be investigated.

In this study we perform a statistical analysis of satellite imagery to examine the impact of transient soil moisture features on convective systems over the Tibetan Plateau during the monsoon season (May – September). We consider convective initiation and the propagation of mature systems over heterogeneous soil moisture features.

Convective clouds are identified using the Fengyun-2 cloud top temperature product. Fengyun-2 is a series of geostationary satellites that provide hourly data, allowing us to track systems as they evolve. Land surface temperature anomalies are used as a proxy to map pre-storm mesoscale soil moisture patterns.

We show how soil moisture patterns influence the life cycle of convective storms over the Tibetan Plateau. The results suggest that improved representation of land-atmosphere coupling on the plateau within weather and climate models could impact the entire region.