EXTREME RAINFALL IN TAIWAN: A RAIN GAUGE AND LINEAR MODEL INVESTIGATION

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ABSTRACT

With complex topography and a moisture-rich environment, the island of Taiwan is frequently affected by a variety of extreme and heavy rainfall events. While it is clear that the presence of both complex terrain and synoptic forcing are important, the multi-scale dynamic and thermodynamic processes that are responsible for the events are less clear. For this reason, here we further investigate extreme events based on historical observed rain gauge records (2000-2013) and the Linear Theory model for Orographic Precipitation (LTOP) model.

In this study, specific extreme rainfall events have been selected and sorted based on their convective system types (Tropical cyclones, Mei-Yu Fronts, Monsoonal Flow and others), followed by an in-depth comparison of the simulated and observed rainfall patterns. It is shown that the LTOP model has the ability to capture the observed spatial distributions of rainfall, but not extreme rainfall accumulations. In addition, we use the precipitation intensity-duration framework to further examine the role of terrain in generating the extreme rainfall events. We find that tropical cyclones and Mei-Yu fronts tend to have a stronger orographic signature than other types of heavy rainfall events. In the future, this research will be expanded using datasets collected in Taiwan during the upcoming 2022 field campaign, Prediction of Rainfall Extremes Campaign In the Pacific (PRECIP).

Keywords: Rain gauge, linear model, heavy rain, orographic precipitation, intensity-duration framework, rainfall event sorting