



The influence of rainfall spatial variability on areal reduction factors

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The ratio between point and areal precipitation, called the Areal Reduction Factor (ARF), has been identified to vary significantly depending on a variety of factors. Here, we highlight the influence of internal spatial variability of storms on the ARF value. For this, we employ a storm identification algorithm on the radar composite data to identify a total of 54,758 elliptically-shaped extreme storms over the six-year study period. Then, we investigate the relationship between the various storm characteristics to their ARF value. Our findings are as follow: First, we confirm a widely-accepted notion that ARF generally increases with the duration, and it is inversely related to the storm area. Second, we discover that spatial variability within storm, e.g., the coefficient of variation of radar image pixel rainfall values, is a very strong predictor of the ARF value along with area and duration. Last, the difference of ARF values between storms that have elliptical shapes and those that are circular over the same area is about 20 % on average. These findings inform that the current design framework of areal rainfall estimation will be improved by incorporating the information on the rainfall spatial variability and storm shape.