Effect of spatial heterogeneity of rainfall on areal reduction factors

DONGKYUN KIM[*1], JONGHO KIM[3], JAEHYEON LEE[2]

[1]*Hongik University,* [2]*University of Florida,* [3]*University of Ulsan*

(a) Purpose of study or research hypothesis
The proportion between point and areal precipitation, called the Areal Reduction Factor (ARF), has been figured out to vary considerably depending on various factors. Here, we focus on the effect of spatial variability of rainstorms on the ARF value.

(b) Key issue(s) or problem(s) addressed
ARF has been identified to vary significantly depending on various factors, with some factors remaining to be unrecognized.

(c) Methodology or approach used
We employ a rainstorm identification algorithm on the radar composite data to extract a total of 54,758 elliptically-shaped extreme storms over the six-year study period. Then, we analyze the relationship between the various storm characteristics and their ARF values.

(d) Results or conclusions derived from the project
Our findings are as follow: First, we confirm a widely-accepted concept that ARF generally increases with the duration, and it is inversely proportional 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.

(e) Implications of the project relevant to congress themes
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.