



Estimation of Storm Centered Areal Reduction Factor Using Radar Precipitation Data

Jongho Kim (1), Jaehyeon Lee (2), and Dongkyun Kim (3)

(1) Department of Civil and Environmental Engineering, Sejong University, Seoul, Korea, (2) Department of Civil Engineering, Hongik University, Seoul, Korea, (3) Department of Civil Engineering, Hongik University, Seoul, Korea (kim.dongkyun@hongik.ac.kr)

We estimated the Areal Reduction Factor (ARF) based on the radar rainfall data observed in Korea for the period 6 years between 2007 and 2012. For this, we identified 26,977 storms with elliptical shape of which central rainfall value exceeds 5-year rainfall using an optimization algorithm. The storms have various durations (1-, 3-, 6-, 12-, 24-, and 72-hours) and areas (10, 30, 80, 150, 250, 380, 530, 700, 900, 1250, 2000, 4000, and 8000 km²). Then, we calculated the ARF values (average rainfall inside the identified storm divided by its central value) for each of the 26,977 storms. Based on this database, we tried to identify the factors influencing the ARF values. We found that the spatial variability of rainfall inside storms can highly affect the ARF values. First, the ARF did not show positive correlation with duration in some cases, especially when there is heavy rain in limited areas. Second, as the spatial variability of rainfall within a storm increases, the ARF value decreased. Last, the difference in ARF values between elliptical storms and circular storms is only ~8% on average. However, more careful attention needs to be paid to the design purpose, because the distribution has a long tail to the left and quite a few storms (~26%) still have smaller ARF values than average.

Acknowledgement

This work is supported by the Korea Agency for Infrastructure Technology Advancement (KAIA) grant funded by the Ministry of Land, Infrastructure and Transport (Grant 18AWMP-B127555-02).