Traditional and new methods of ARF estimation

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Many observational studies of rainfall show some specific elements of rainfall fields on spatial temporal structure of precipitation. In particular high intensity rainfall is found to cluster in small areas and rainfall intensity decreases with distance from the point of the highest rain intensity.

This is a key isuue in several hydrological problems, e.g. floodplain management and the design of urban drainage systems. In technical applications, many empirical relations are used in order to deduce heavy areal rainfall, when just one rain gauge is available.

In this work, we studied the areal reduction factor (ARF) using radar reflectivity maps collected by the Polar 55C, a C-band Doppler dual polarized coherent weather radar with polarization agility with a 0.9 beamwidth. The ARF values was estimated for areas ranging from 1km2 to 900 km2, return periods from 2 years to 100 years, and durations from 1 minute to 6 hours.

The results obtained in the processing of a significant amount of data by using this technique are compared with some of the most important empirical ARF-area relationships found in the literature.