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On the Use of Measurements from a Commercial Microwave Link for Evaluation of Flash Floods in Arid Regions

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Flash flood warning in deserts is a challenging task, and local rain bursts are of high significance. In the last decade, commercial microwave telecommunication links have been shown to be a valuable tool for near ground rainfall estimations. Dense networks are used for highly accurate rainfall estimates, while isolated links, typical in rural areas, can detect the existence of near-ground rainfall. However, the induced attenuation of the signal integrates the rainfall along a line, therefore high local rain intensities are smoothed. A novel method is hereby proposed, one that uses the integration of measurements from an isolated long microwave link with measurements from weather radar to identify potential conditions for flash floods. In particular, we suggest using radar measurements to indicate the rain variability (spottiness) along a 16 km long link, crossing Wadi Ze'elim catchment (245 km^2), using kurtosis as a spottiness index. Quantitative ground level rainfall measurements are then provided by the link. When compared with analyzed discharge, inverse kurtosis-rain rate relation is associated with flash flood responses in the catchment, an ephemeral Wadi located in the Dead Sea.