Integration of commercial microwave link measurements and operational weather radar data to improve operational rainfall products

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Microwave links from commercial cellular communication networks have recently been suggested to be highly suitable for the estimation of path-averaged rainfall. The high density of these existing networks over a large part of the continents (i.e. approximately 12,000 links with an average length of 3-4 km, in The Netherlands, which has a surface area of approximately 35,000 km²) make these measurements potentially a valuable addition to existing operational weather radars. Because of the different measurement principles and scales and locations of the measurement volumes, each of these instruments will have some advantages over the other. This fact can be used to improve the rainfall product resulting from using only one type of measurement. Here, we analyse the performance of integrated weather radar and commercial microwave link network data.

High-resolution X-band radar data will be used to simulate attenuation experienced by microwave link signals and reflections measured by operational weather radar data over a small area. The rainfall fields resulting from integrating the two data types are compared to the "true" rainfall field and to that resulting from using a single data source. Larger-scale simulations of the performance of the proposed method on a nation-wide microwave link network will be carried out using operational C-band weather radar data. In these simulations the dependence of the performance of the method on the density of the network will be examined.