Radar network for urban and complex terrain flood monitoring

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Quantitative precipitation estimation (QPE) is a very important application of weather radar systems, to monitor rainfall intensity and total rainfall amount and to further forecast flooding risk. Flooding is one of the most common natural hazards in the world and urban flooding is particularly a potential high-impact disaster. Recently a new quantitative precipitation estimation QPE product has been developed (Wang and Chandrasekar 2011), which is based on an adaptive differential phase (Kdp) estimation. This prototype QPE product has been evaluated extensively using gauge measurements from Oklahoma's MicroNet, including all rainfall events that occurred over the ground gauge network. The validation study is unique in that it demonstrates a radar network's high resolution capabilities for rainfall estimation, both in terms of rainfall rate and spatially distributed hourly accumulation. The cross-validation was conducted at individual rain gauge station for every storm event. The event-wise evaluations demonstrated reliable operation in different storm types. Over the 29 storm events observed from 2007 to 2009, the composite IP1 QPE product has a fairly small bias of 4.26% and a small NSE of 22% for this three year period. The excellent performance of the radar network QPE can be attributed collectively to several sensing factors: better Kdp estimates, measurements close to the ground, and high spatiotemporal resolution of the dataset enabled by the networked sensing operation. The quality of the IP1 experimental QPE product is shown in various aspects.