3.8 MULTI-RADAR DATA FUSION FOR HIGH-RESOLUTION QPE IN URBAN AREA

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Urban areas are the most sensitive areas to extremes in precipitation, but also offer a slew of problems. Observations of precipitation in urban areas requires high-quality data with accurate temporal-spatial resolution in order for accurate understanding, analysis, and forecast. The Helsinki weather radar network, which consists of three dual-polarized C-band weather radars, is presented. To enable use of the radar network for quantitative precipitation estimation and urban hydrological applications a quality-based data compositing method is developed. Given the urban location of the radars and the objective of observing precipitation at relatively close ranges a number of data quality issues have to be addressed including ground clutter, beam and radome attenuation, beam blockage, and beam broadening and overshooting. The urban location produces a rather challenging environment for ground clutter and beam blockage and the application of even advanced ground clutter filters could cause data loss in regions of interest. Quantitatively precipitation estimations (QPE) especially close to a radar imply that wet radome attenuation as well needs to be accounted for. A self-consistency method was implemented for calibration of reflectivity for the individual radars, as well as being implemented as a filter for spurious specific different phase measurements. It is shown that most of the listed and additional data quality problems can be resolved by using the proposed quality-controlled compositing method. In order to increase the temporal resolution of the composite and to match observations from radars that are operating on non-synchronized scan strategies, an minutely interpolation is performed over the QPE output. A blended dual-polarization rainfall algorithm, that uses a combination of R(ZH) and R(Kdp) relations, is implemented to illustrate an application of the quality controlled composite to QPE. Comparisons to local urban rain gauges shows considerable improvement over the individual radars.