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Optimal scan strategy for fine resolved X-Band radar measurements

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Urban regions exhibit unique characteristics from their rural counterparts or other types of landcover. These urban-specific perturbations are supposed to change the genesis, intensity, movement and evolution of precipitation system initiating within the city or passing across the city. Due to high heterogeneity and complexity of the city environment, studies on precipitation in the urban environment necessitate observations at very high spatial and temporal resolution. X-band radar measurements have been underway to inspect the summer precipitation in the urban environment of Stuttgart, Germany. In order to search the optimal scan strategy for these incoming measurements, a two-month X-band radar measurement campaign has been performed in advance. By varying pulse duration and antenna rotation rate individually, the effect of scanning strategy on the accuracy, reliability and sensitivity of radar data is investigated. Using interlaced scan sequences enables the pseudo-simultantanous observation of precipitation systems from these different scan strategies. Inter-comparison among different interlaced scan strategies is carried out through detailed statistical examinations on the data quality of radar reflectivity along with dual-polarized parameters such as differential reflectivity (ZDR), correlation coefficient (CC) and specific differential phase (KDP). The intercomparison can then provide information on determination of an optimal scan strategy to resolve the inner structure, spatial distribution and temporal evolution of precipitation systems within or surrounding the urban region.