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Rainfall estimation using a high-resolution X-band radar

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High-resolution X-band weather radars offer great potential for rainfall estimation for hydrological applications, in particular in urbanized areas. A new, highly sophisticated X-band weather radar (IDRA) is currently being developed by IRCTR and will soon be installed on top of the 213 m meteorological tower at the Cabauw Experimental Site for Atmospheric Research (CESAR). CESAR is the national atmospheric remote sensing facility of The Netherlands, located approximately 25 km southwest of the city of Utrecht. In order to investigate the potential of X-band radar for rainfall estimation for the climatic conditions encountered in The Netherlands, we are currently analyzing a large dataset of rainfall events that was collected during the 1990s using the high-resolution X-band weather surveillance radar SOLIDAR. This radar had a range resolution of 120 m and an angular resolution of 1.875 deg after preprocessing and was located on top of the 96 m electrical engineering building of Delft University of Technology. The radar operated at a single elevation (typically 1.7 deg) and produced a reflectivity map once every 16 s. We present analyses for several rainfall events, focusing in particular on ground clutter identification, attenuation correction and radar-raingauge comparison. In future work we anticipate using this dataset to investigate the sampling uncertainties associated with operational C-band weather radars and the planned spaceborne Global Precipitation Measurement (GPM) mission.