



Precipitation Type Specific Radar Reflectivity-rain Rate Relationships for Warsaw, Poland

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Abstract

Implementation of weather radar precipitation estimates into hydrology, especially urban hydrology practice in Poland, requires the introduction of more precise radar reflectivity *versus* rain rate (Z-R) relationships accounting for drop size distribution (DSD) specific for different precipitation phases. We explored the development of precipitation type dependent Z-R relationship on the basis of approximately two years of DSD recordings at high temporal resolution of ten seconds. We divided the recorded data into four separate precipitation-type groups: rain, snow, rain-with-snow, and hail. The Z-R relationships for rain and rain-with-snow showed a strong resemblance to the well-known Marshall-Palmer Z-R power-type relationship for rain. In the case of snowfall, we found that both the multiplication factor and the exponent coefficients in the Z-R formula have smaller values than for rain. In contrast, for hail precipitation these parameters are higher than for rain, especially the multiplication factor.

Key words: Z-R relations, laser disdrometer, hydrometeor types, dual polarization radar.