

Low-level rainfall monitoring system using microwave attenuation over an urban area

Min-Seong Kim (1), Byung Hyuk Kwon (2), Park-Sa Kim (1), Sang-Jin Kim (2), Kyung-Hun Lee (2), Won-Gi Jo (2), and Kwang-Ho Kim (3)

(1) Pukyong National University, Geo-Science Institute, Busan, Korea, Republic Of (willms@nate.com), (2) Pukyong National University, Department of Atmospheric Sciences, Busan, Korea, Republic Of (bhwon@pknu.ac.kr), (3) Weather Radar Center, Seoul, Korea, Republic Of (goodss777@naver.com)

Rainfall occurrence and low-level rain rates were estimated using eight microwave links of 6–8 GHz traversing the city of Seoul, South Korea. A new algorithm for determining the presence or absence of rainfall from microwave attenuation was validated by rain detectors installed at automatic weather stations, and it was confirmed that microwave attenuation could detect rainfall with an accuracy of greater than 80%. Linear relationships between path averaged rain-induced attenuation and the rainfall rate were found and cross-validated by estimating the rainfall rate at 1-min intervals. The mean bias of the rainfall rate, calculated at a high temporal resolution (1 min) as compared to the rainfall rate from ground rain gauges, was between -3 and 1 mm/h. That's because power resolution of the microwave signals is high (0.01 dBm). The coarse power resolution of the microwave signals may cause rounding errors, notably in low-intensity and long events. The improved accuracy of rainfall detection led to the improved accuracy of attenuation-induced rainfall rate. Hence, it was confirmed that microwave links, used for broadcasting and media communications, can replace rain detectors and provide high resolution rainfall rates in real time.