Study of precipitation by cellular networks with focus on heavy rainfall events

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We will demonstrate how a severe rainfall storm is analyzed with high-resolution (1 minute time interval) data from a cellular network. New insight into the dynamics of precipitation is given by the new source of data and compared to classical understanding based on raingauges and radar.

Global spread of wireless networks brings a great opportunity for their use in environmental studies. Weather, atmospheric conditions and constituents cause propagation impairments on radio links. As such, wireless communication systems provide built-in monitoring capabilities, and can be considered as a widespread distributed, high-resolution atmospheric observation network, operating in real time, with minimum supervision and with almost no additional cost. Here, we demonstrate how standard measurements of the received signal level, made in a cellular network, provide reliable measurements for surface rainfall. We compare the estimated rainfall intensity with the radar and rain gauge measurements. The skill of our method (correlation with rain gauges) is 0.86 for 15-min interval rain intensity and 0.9 for hourly interval, versus 0.85 and 0.81 respectively for radar, when evaluated from the maximal value over a 3X7 km^2 area.