



GPM ground validation via commercial cellular networks: an exploratory approach

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The suitability of commercial microwave link networks for ground validation of GPM (Global Precipitation Measurement) data is evaluated here. Two state-of-the-art rainfall products are compared over the land surface of the Netherlands for a period of 7 months, i.e., rainfall maps from commercial cellular communication networks and Integrated Multi-satellite Retrievals for GPM (IMERG).

Commercial microwave link networks are nowadays the core component in telecommunications worldwide. Rainfall rates can be retrieved from measurements of attenuation between transmitting and receiving antennas. If adequately set up, these networks enable rainfall monitoring tens of meters above the ground at high spatiotemporal resolutions (temporal sampling of seconds to tens of minutes, and spatial sampling of hundreds of meters to tens of kilometers). The GPM mission is the successor of TRMM (Tropical Rainfall Measurement Mission). For two years now, IMERG offers rainfall estimates across the globe (180°W - 180°E and 60°N - 60°S) at spatiotemporal resolutions of 0.1° x 0.1° every 30 min. These two data sets are compared against a Dutch gauge-adjusted radar data set, considered to be the ground truth given its accuracy, spatiotemporal resolution and availability.

The suitability of microwave link networks in satellite rainfall evaluation is of special interest, given the independent character of this technique, its high spatiotemporal resolutions and availability. These are valuable assets for water management and modeling of floods, landslides, and weather extremes; especially in places where rain gauge networks are scarce or poorly maintained, or where weather radar networks are too expensive to acquire and/or maintain.