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Rainfall monitoring in Sri Lanka employing commercial microwave links

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Microwave backhaul links from cellular communication networks provide a valuable "opportunistic" source of high-resolution space–time rainfall information, complementing traditional in situ measurement devices (rain gauges, disdrometers) and remote sensors (weather radars, satellites). Over the past decade, a growing community of researchers has, in close collaboration with cellular communication companies, developed retrieval algorithms to convert the raw microwave link signals, stored operationally by their network management systems, to hydrometeorologically useful rainfall estimates. Operational meteorological and hydrological services as well as private consulting firms are showing an increased interest in using this complementary source of rainfall information to improve the products and services they provide to end users from different sectors, from water management and weather prediction to agriculture and traffic control. The greatest potential of these opportunistic environmental sensors lies in those geographical areas over the land surface of the Earth with few rain gauges and no weather radars: often mountainous and urban areas, but especially low- to middle-income regions, which are generally in (sub)tropical climates.

Here, the open-source R package RAINLINK is employed to retrieve CML rainfall maps covering the majority of Sri Lanka, a middle-income country having a tropical climate. This is performed for a 3.5-month period based on CML data from on average 1140 link paths. CML rainfall maps are compared locally to hourly and daily rain gauge data, as well as to rainfall maps from the Dual-frequency Precipitation Radar on board the Global Precipitation Measurement Core Observatory satellite. The results confirm the potential of CMLs for real-time tropical rainfall monitoring. This holds a promise for, e.g., ground validation of or merging with satellite precipitation products.