

Can we estimate the amount of rain water during disastrously large flood events with high resolution?

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In September 2024, a very heavy and severe flood took place in the Upper and Middle Oder River basin - a mountainous area in southwestern Poland. The widespread rainfall lasted for about four days, reaching daily totals over 200 mm in some areas. Due to the necessity for real-time precipitation and runoff forecasts and subsequent analyses, an important issue is how precisely we can measure and estimate precipitation with high temporal and spatial resolution over an orographically diverse area. To answer this question, different measurement techniques were analysed: from rain gauges, weather radar-based, satellite-based, CML-based (non-conventional, currently tested at IMGW for their usefulness in real-time operational applications), and mesoscale numerical model simulations. Both data available in real and near real time, as well as reanalyses available later, were analysed. Various reanalyses based on satellite data (IMERG Final, PDIR-Now) and mesoscale simulations of ERA5 and WRF models were also examined. Data from manual rain gauges (for daily totals) and multi-source estimates (for hourly totals) were used as a reference to evaluate the results. On this basis, the reliability of various techniques for measuring and estimating precipitation was examined.

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