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Evaluation of the spatiotemporal representation of the GPM satellite precipitation products over diverse climatic regions in Ireland

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In response to recent major flood events in Ireland, the authorities have prioritised the development of a national flood forecasting model for use as a tool in flood risk management. Accurate flood predictions by this model require high resolution spatiotemporal rainfall data. One source for this type of data is the remote sensing estimated precipitation provided by the Global Precipitation Measurement (GPM) satellite. The GPM has ability to detect and estimate all forms of precipitation using a range of advanced instruments, including Microwave and Radar technologies. This study evaluates the accuracy of detecting the large rainfall events which occurred in Ireland during the period 2014-2021 by three Integrated Multi-satellite Retrievals for GPM (IMERG) precipitation products (i) early run ; (ii) late run; and (iii) final run. The satellite estimates of these events have been assessed using five statistical indices applied to various temporal scales; hourly, daily, and monthly. The results showed that, for satellite detection, all of the three IMERG products had an acceptable detection accuracy of the large rainfall events. In particular, the calibrated product – final run product – outperformed the other near-real-time products in terms of estimation error and bias. Overall, the results indicate that IMERG satellite precipitation products can be used with confidence to detect large events over high latitude areas such as Ireland. Besides, they have a high potential for coupling with in-situ data to improve the accuracy of the integrated flood forecasting model.