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Assessment of GPM- IMERG precipitation products over Catalonia at different time resolutions

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Quantitative Precipitation Estimates (QPE) from the Integrated Multisatellite Retrievals for GPM (IMERG) provide crucial information about the spatio-temporal distribution of precipitation in areas with complex orography such as Catalonia (NE Spain). The network of automatic weather stations of the Meteorological Service of Catalonia (XEMA) is used to assess the performance of three IMERG products (Early, Late and Final). The analysis at different time scales, considered three terrain features (valley, flat and ridgetop) and five different categories related to rainfall intensity (light, moderate, intense, very intense, and torrential). During the period 2015-2020, IMERG derived-estimates reproduce well the spatial variability of the precipitation field in the region, although it shows some discrepancies, which become more evident with the reduction of the time scale. Except at sub-daily scales, all three products tend to overestimate by more than 20% records of rain-gauges located in flat areas. The correlation coefficient (r) reflects the improvement of IMERG with increasing time scale with values above 0.7 at annual scale and values just above 0.35 at sub-daily scale. On this scale, rainfall classified as very heavy and torrential showed the poorest results, with significant underestimates higher than 80 %. This weakness of IMERG products is most evident in the IMERG Final, which although providing a reliable reproduction within the interquartile range of the distribution, is not able to detect extremes at different scales. This is related to the inadequate number of Global Precipitation Climatology Centre (GPCC) stations used for calibration. Despite the shortcomings, it can be concluded that IMERG is a valuable tool for the analysis of hydrometeorological processes and useful to complement research in the branches of weather and climate in Catalonia. This research was partly funded by the project "Analysis of Precipitation Processes in the Eastern Ebro Subbasin" (WISE-PreP, RTI2018-098693-B-C32, MINECO/FEDER) and the Water Research Institute (IdRA) of the University of Barcelona.