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Uncertainty in different precipitation products in the case of two atmospheric river events

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One of the World Climate Research Programme Grand Challenges is to evaluate whether existing observations are enough to underpin the assessment of weather and climate extremes. In this study, we focus on extreme associated with Atmospheric Rivers (ARs). ARs are characterized by intense moisture transport usually from the tropics to the extra-tropics. They can either be beneficial, providing critical water supply, or hazardous, when excessive precipitation accumulation leads to floods. Here, we examine the uncertainty in gridded precipitation products included in the Frequent Rainfall Observations on GridS (FROGS) database during two atmospheric river events in distinct Mediterranean climates: one in California, USA, and another in Portugal. FROGS is composed of gridded daily-precipitation products on a common 1°×1° grid to facilitate intercomparison and assessment exercises. The database includes satellite, ground-based and reanalysis products. Results show that the precipitation products based on satellite data, individually or combined with other products, perform least well in capturing daily precipitation totals over land during both cases studied here. The reanalysis and the gauge-based products show the best agreement with local ground stations. As expected, there is an overall underestimation of precipitation by the different products. For the Portuguese AR, the multi-product ensembles reveal mean absolute percentage errors between -25% and -60%. For the Western US case, the range is from -60% to -100 %.

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