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## Heavy precipitating events in satellites and rain-gauge products over the Sahel

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The Sahel has experienced an increase in the frequency and intensity of extreme rainfall events over the recent decades. These trends are expected to continue in the future. However the properties of these events have so far received little attention. In the present study, we define a heavy precipitating event (HPE) as the occurrence of daily-mean precipitation exceeding a given percentile (e.g., 99<sup>th</sup> and higher) over a 1°x1° pixel and examine their spatial distribution, intensity, seasonality and interannual variability. We take advantage of an original reference dataset based on a rather high-density rain-gauge network over Burkina Faso (142 stations) to evaluate 22 precipitation gridded datasets often used in the literature, based on rain-gauge-only measurements, satellite measurements, or both. Our reference dataset documents the HPEs over Burkina Faso. The 99<sup>th</sup> percentile identifies events greater than 26 mm d<sup>-1</sup> with a ~2.5 mm confidence interval depending on the number of stations within a 1°x1° pixel. The HPEs occur in phase with the West African monsoon annual cycle, more frequently during the monsoon core season and during wet years. The evaluation of the gridded rainfall products reveals that only two of the datasets, namely the rain-gauge-only based products GPCC-DDv1 and REGENv1, are able to properly reproduce all of the HPE features examined in the present work. A subset of the remaining rainfall products also provide satisfying skills over Burkina Faso, but generally only for a few HPE features examined here. In particular, we notice a general better performance for rainfall products that include rain-gauge data in the calibration process, while estimates using microwave sensor measurements are prone to overestimate the HPE intensity. The agreement among the 22 datasets is also assessed over the entire Sahel region. While the meridional gradient in HPE properties is well captured by the good performance subset, the zonal direction exhibit larger inter-products spread. This advocates for the need to continue similar evaluation with the available rain-gauge network available in West Africa, both to enhance the HPE documentation and understanding at the scale of the region and to help improve the rainfall dataset quality.