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Comparative analysis of TMPA and IMERG precipitation datasets in the arid environment of El-Qaa Plain, Sinai

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The replenishment of aquifers depends mainly on precipitation rates, which is of vital importance for determining water budgets in arid and semi-arid regions. El-Qaa Plain in Sinai Peninsula is such a region which experiences a constant population growth. The local water budget equilibrium is negatively affected by relatively frequent light rain events. This study compares the performance of two sets of satellite-based data of precipitation and in situ rainfall measurements. The dates selected refer to rainfall events between 2015 and 2018. For this purpose, 0.1° and 0.25° spatial resolution TMPA (TRMM Multi-satellite Precipitation Analysis) and IMERG (Integrated Multi-satellite Retrievals for GPM) data were retrieved and analyzed, employing appropriate statistical metrics. The best-performing data set was determined as the data source capable to most accurately bridge gaps in the limited rain gauge records, embracing both frequent light-intensity rain events and rarer heavy-intensity events. With light-intensity events the corresponding satellite-based data sets differ the least and correlate more, while the greatest differences and weakest correlations are noted for the heavy-intensity events. The satellite-based records best match those of the rain gauges during light-intensity events, when compared to the heaviest ones. IMERG data exhibit a superior performance than TMPA, in all rainfall intensities.