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Assessment of Cold-Season Precipitation Estimates Derived from Daily Satellite Precipitation Products over CONUS

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We evaluate the ability of different daily gridded satellite precipitation products (SPPs) to capture cold season precipitation. The satellite precipitation products considered are from the NOAA/Climate Data Record program (CMORPH-CDR, PERSIANN-CDR, GPCP) and from the NASA/Global Precipitation Measurement (IMERG). The evaluation is performed at the daily scale (sub-daily when possible) over CONUS for the period 2007-2018. The daily precipitation measurements at the ground and the atmospheric conditions (temperature, relative humidity) are obtained from the US Climate Reference Network (USCRN). The USCRN network (including associated local networks) is constituted of about 240 stations. Among those USCRN stations, 70 are located above between latitudes 40-60N, and 65 are located above an altitude of 1500m. The USCRN network provides sub-hourly (5-min), hourly, and daily precipitation measurements from shielded gauges in addition to air temperature and wind speed information at 1.5-m. The evaluation is performed by using the usual statistical toolbox; contingency analysis, accuracy, false alarm ratio (FAR), probability of detection (POD), probability of false detection (POFD), Kling–Gupta efficiency (KGE), Pearson's correlation coefficient, biases, correlations, variability ratio, etc. Although, this work focusses on cold precipitation, the performance of each product will be also compared to their respective performance for warm precipitation (seasonal and/or as a function of the corresponding station atmospheric conditions). This long-term evaluation (11-years) could be helpful in quantifying errors and biases of SPPs with respect to cold season precipitation and provide an objective basis for rainfall retrieval algorithm improvement.