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MSWEP V2 global 3-hourly 0.1° precipitation: methodology and quantitative assessment

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We present Multi-Source Weighted-Ensemble Precipitation (MSWEP) V2, a gridded precipitation (P) dataset spanning 1979–2016. MSWEP V2 is unique in several aspects: (i) fully global coverage; (ii) high spatial (0.1°) and temporal (3 hourly) resolution; (iii) optimal merging of P estimates based on gauges (WorldClim, GHCN-D, GSOD, GPCC, and others), satellites (CMORPH, GridSat, GSMaP, and TMPA 3B42RT), and reanalyses (ERA-Interim and JRA-55); (iv) distributional bias corrections, mainly to improve the P frequency; (v) correction of systematic terrestrial P biases using streamflow observations from 13 762 stations across the globe; (vi) incorporation of daily (rather than monthly) gauge observations from 66 993 gauges worldwide; and (vii) correction for regional differences in gauge reporting times. Compared to other state-of-the-art P datasets, MSWEP V2 exhibits more realistic spatial patterns in mean, magnitude, and frequency. Long-term mean P estimates for the global, land, and ocean domains based on MSWEP V2 are 955, 781, and 1025 mm y^{-1}, respectively. Comparison with other P datasets suggest that those consistently underestimate P amounts in mountain regions. Using MSWEP V2, P was estimated to occur 15.5 %, 12.3 %, and 16.9 % of the time on average for the global, land, and ocean domains, respectively. MSWEP V2 provides unique opportunities to explore spatio-temporal variations in P, improve our understanding of hydrological processes and their parameterization, and enhance hydrological model performance across the full range of scales, from local to catchment to global. The dataset is available via www.gloh2o.org.