Long-term large scale bias-adjusted precipitation estimates at high spatial and temporal resolution derived from the National Mosaic and Multi-sensor QPE (NMQ/Q2) precipitation reanalysis over CONUS

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The processing of radar-only precipitation via the reanalysis from the National Mosaic and Multi-Sensor Quantitative (NMQ/Q2) based on the WSR-88D Next-generation Radar (Nexrad) network over Continental United States (CONUS) is nearly completed for the period covering from 1998 to 2012. This important milestone constitutes a unique opportunity to study precipitation processes at a 1-km spatial resolution for a 5-min temporal resolution. However, in order to be suitable for hydrological, meteorological and climatological applications, the radar-only product needs to be bias-adjusted and merged with in-situ rain gauge information. Rain gauge networks such as the Hydrometeorological Automated Data System (HADS), the Automated Surface Observing Systems (ASOS), the Climate Reference Network (CRN), and the Global Historical Climatology Network–Daily (GHCN-D) are used to adjust for those biases and to merge with the radar only product to provide a multi-sensor estimate. The challenges related to incorporating non-homogeneous networks over a vast area and for a long term record are enormous. Among the challenges we are facing are the difficulties incorporating differing resolution and quality surface measurements to adjust gridded estimates of precipitation. Another challenge is the type of adjustment technique. We are investigating the kriging method and its variants such as simple kriging (SK), ordinary kriging (OK), and conditional bias-penalized Kriging (CBPK). In addition we are investigating the optimal techniques for estimation – of those we hope to generate estimates of uncertainty for the gridded estimate. In this work the methodology is presented as well as a comparison between the radar-only product and the final bias-adjusted QPE product. The comparison is performed at various time scales from the sub-hourly, to annual. In addition, comparisons over the same period with a suite of lower resolution QPEs derived from ground based radar measurements (Stage IV) and satellite products (TMPA, CMORPH, PERSIANN) are provided in order to give a detailed picture of the improvements and remaining challenges.