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Verification of 57-year long California Reanalysis Downscaling at 10km (CaRD10)

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With a purpose of climate change study on regional scale over California, more than 57 years (1948 to present) of dynamically downscaled analysis of NCEP/NCAR Reanalysis is now complete. California Reanalysis Downscaling at 10km (CaRD10) reconstructs the high-spatial resolution / high-temporal scale analysis of atmosphere and land covering the state of California, neighboring states and ocean. The Regional Spectral Model of ECPC at Scripps Institution of Oceanography is run with the Reanalysis as a forcing at 10km horizontal resolution with hourly outputs. The comparison with North American Regional Reanalysis (1979 to present with 32km resolution) shows that geographical patterns of many parameters of the downscaled analysis are reasonable, with much more regional details in CaRD10 than the NARR. As the downscaled fields are purely the product of the regional model driven by the coarse-resolution Reanalysis as a forcing without direct input of observations (except SST), verification of the downscaled analysis with independent observations is important for quality assurance. We present a variety of verifications of basic variables (temperature, precipitation, and winds) over land and ocean with gridded climate data, weather station data, and buoy data on timescales ranging from hourly to decadal. In addition, such verifications are performed for the Reanalysis and the NARR. Overall quality of CaRD10 is as good as the NARR and in some aspects CaRD10 better agrees with observations than the NARR despite the lack of data assimilation. The 57-year analysis of CaRD10 allows us to study interannual variability and long-term trend of climate. CaRD10 suggests that higher elevation areas experience larger winter surface warming and the rainy season has shifted later into spring over the last decades.