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Hydroclimate variability over the Great Plains in observations, reanalyses, and model simulations

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Interannual variability of Great Plains precipitation in the warm-season months is analyzed using gridded station observations, satellite-based estimates, NCEP and ERA-40 global reanalysis, the recently released North American Regional Reanalysis (NARR), and the half-century long NCAR/CAM3 and NASA/NSIPP AMIP simulations.

Great Plains precipitation variability is represented differently, and only quasi-realistically, in the global reanalyses. NCEP has larger amplitude but less traction with observations in comparison with ERA-40. Model simulations exhibit amplitudes that are closer to the reanalysis mean, but the simulated variability is essentially uncorrelated with observations. The regional atmosphere water-balance is also different: Stationary fluxes provide moisture for Great Plains precipitation variability in ERA-40 and NARR, but not in the NCEP reanalysis and model simulations; evaporation is more important in the latter. The apportioning between local and remote water sources is not without implications for the surface energy budget (and surface temperature) and hydroclimate predictability. Connections with the adjoining ocean basins are examined to foster understanding of moisture transport into the Great Plains.

Our analysis suggests some coolness towards recent claims of the US Great Plains being a "hot spot", i.e., a region of heightened land-atmosphere interaction. Reasons for why state-of-the-art atmosphere-land-surface models vigorously recycle precipitation will be discussed.