

The timescale dependence of the atmospheric moisture budget

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The climatological atmospheric moisture budget is determined from the 1968-2007 NCEP Reanalysis dataset, for all four seasons. In particular, the contribution of moisture transport in different time bands (<10 days, 10-30 days, 30-90 days, and >90 days) is assessed. It is found that while the mean moisture budget is primarily a balance between moisture transport by the mean flow and mean moisture source/sinks, synoptic variability drives about half of the extratropical meridional mean moisture transport, with this transport particularly focused within "atmospheric rivers." Additionally, the contribution to the total budget by transport by climate anomalies is generally weak except along the west coast of North America in winter. However, while transport by the mean flow moves moisture from ocean to land in the Tropics and the summer extratropics, transport by synoptic and climate anomalies serves this role in the winter extratropics. Implications of these results to the simulation of the hydrological cycle in model simulations is also discussed.