

# **Effects of Surface Moisture, Land-Atmosphere Exchanges, and Turbulent Transport on Precipitation over the Rocky Mountains and High Plains**

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The ratio of how much precipitation comes from a local region through evaporation as compared to how much comes from advection into a region is known as a “recycling ratio”. The recycling ratio, effectively, denotes the feedback mechanism between the evaporated moisture and precipitation over a region. In addition to this direct feedback mechanism, indirect effects of surface moisture, land–atmosphere exchanges, and turbulent transport on precipitation, which is extracted from the ambient flow, can be diagnosed from moisture budget. In this study, we elucidate the rôle of soil moisture, parameterizations of surface exchanges, and boundary layers on the diurnal cycle and amounts of precipitation by analyzing moisture budget in regional summer climate simulations over the Rocky Mountains and High Plains.

We also compare simulations using different couplings of surface and boundary layers with common convective closures and explicit microphysics schemes to observations. This allows us to assess their reality. This comparison and the analysis of differences between the simulations allow for quantification of those uncertainties of simulating precipitation in local climates which are due to the incomplete knowledge of surface moisture and inaccuracies in surface and boundary layer parameterizations.