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The Impact of Clouds on Radiation Over Ocean and Land using DOE ARM Measurements and Retrievals

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DOE ARM SGP (36.61^{0}N, 97.49^{0}W) and GRW/ENA (39.09^{0}N, 28.03^{0}W) sites locate almost the same latitude zone but have completely different background conditions, such as surface albedo, water vapor sources, aerosol types, and cloud microphysical properties, therefore it is necessary to investigate how these cloud properties and different backgrounds impact on the surface radiation budget over these two sites.
Preliminary results show that stronger seasonal and diurnal variations for most of cloud macro- and micro-properties at SGP than at ENA. Especially for low-level clouds, liquid water content (LWC), liquid water path (LWP), and effective radius (Re) have similar seasonal variations but much smaller amplitude than other variables (cloud fractions, cloud heights, cloud temperature, cloud optical depth) over two sites. The bimodal distributions of cloud fractions (CF) show over both sites. At ENA, The low peak is stronger than 2nd peak, and the 2nd peak also appears at much lower altitude compared to the 2nd peak over SGP. At SGP, the 2nd peak is stronger than the 1st peak, especially during summer, which indicates more frequent convective system at SGP than at ENA. The shortwave cloud radiative effect (CRE) under allsky conditions at ENA is 16 Wm-2 cooler than at SGP due to 19% more cloud fractions annually. Other cloud types, their CREs are comparable, independent of their CFs, or due to compensate effect of higher CF and lower cloud optical depth (COD) for low clouds. For the longwave CREs, Higher LW CREs under allsky and total clouds at ENA are due to higher cloud fraction, For the net CREs, there is a compensate effect of negative SW and positive LW CREs, so the net CREs are close to each other under allsky conditions.