

Changes of cloud properties with precipitation using satellite and ground-based measurements

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Relationships between clouds and precipitation from a microphysical point of view is needed to research for climate issues due to an increase in interests of aerosol indirect effects. This work tries to show the influence of precipitation on low cloud properties over some characteristic regions such as China and Amazon. Comparisons between the precipitation amount, P (from ground-based gauges), and monthly-averaged cloud properties (optical depths of low-level water clouds, τ_{low} , and "total clouds", τ_{tot} , effective particle radius, r_e , and columnar-integrated droplet number of low-level water clouds, N_c from satellite remote sensing) elucidated the effect of precipitation on low cloud properties and the relationship between precipitation and "total cloud" cover. In general, the relationship between r_e and P was positive, while the relationship between N_c and P was negative. Since low clouds generally produce little precipitation, these relationships may reflect the scavenging of aerosols by precipitation and suggest the aerosol indirect effect of the first kind. The relationship between τ_{tot} and P was positive because the "total clouds" included actual precipitating clouds. Similarities and differences of cloud changes between China and Amazon are discussed in the context of precipitation types and aerosol generation mechanisms.