ATS/CIRA Colloquium

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Clouds: Their Effect on Aerosol and Vice-versa

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ATS room 101; Discussion will begin at 3:30pm
Refreshments will be served at 3:00pm in the coffee lounge

Removal of the atmospheric aerosol by hydrometeors (i.e., droplets, rain and snow) is the main process by which the atmosphere is cleansed of particulate matter. Aerosol particles and hydrometeors interact by impaction, by diffusive processes, and when particles function as condensation or ice nuclei. These removal processes influence the aerosol, obviously, and can also indirectly impact the microphysical and macrophysical structure of clouds. This work uses airborne measurements of cloud kinematics, obtained from a dual-beam Doppler cloud radar, airborne measurements of aerosol, and a Lagrangian parcel model to study the removal of aerosol via their interaction with clouds. Two cloud types are considered. First, we analyze data from a summertime marine stratocumulus system and document the scavenging of particles large enough to have served as cloud droplet nuclei in this liquid-only cloud system. Second, we analyze observations from a winter mountain cloud using vertical and horizontal wind velocities derived from the radar. In this case the scavenging process is passive, i.e. the particles attached to hydrometeors by Brownian diffusion. Combining the kinematics with a Lagrangian parcel model leads to interesting results regarding particle removal via Brownian diffusion as well as insight into the spatial distribution of cloud water in mixed-phase mountain cloud systems.