

***OBSERVATIONS OF MARINE STRATOCUMULUS MICROPHYSICS
AND IMPLICATIONS FOR PROCESSES CONTROLLING DROPLET
SPECTRA: RESULTS FROM THE MARINE STRATUS/STRATOCUMULUS
EXPERIMENT (MASE)***

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*For presentation at the
American Geophysical Union Fall Meeting
San Francisco, CA
December 15-17, 2008*

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ABSTRACT

During the Marine Stratus/Stratocumulus Experiment (MASE), cloud and aerosol microphysics were measured in the eastern Pacific off the coast of Northern California onboard Department of Energy Gulfstream-1 in July 2005. Three cases with uniform aerosol concentration and minimal drizzle concentration were examined to study the cloud microphysical behavior. For these three cases, the average droplet number concentration increased with increasing altitude, while the average interstitial aerosol concentration decreased with altitude. The data show enhanced growth of large droplets and spectral broadening in cloud parcels with low liquid water mixing ratio. Three mixing models, including inhomogeneous mixing, entity type entrainment mixing, and circulation mixing proposed in this study, are examined with regard to their influences on cloud microphysics. The observed cloud microphysical behavior is most consistent with the circulation mixing, which describes the mixing between cloud parcels with different lifting condensation levels during their circulations driven by evaporative and radiative cooling. The enhanced growth and spectrum broadening resulting from the circulation mixing reduce cloud albedo at the same liquid water path and facilitate the formation of precipitation embryos.

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