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CLOUD PARTICLE SHATTER WHEN SAMPLING FROM AIRCRAFT

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Aircraft based measurements of aerosol particles near clouds is of interest since regions of cloud outflow have been found to be active zones for new particle formation (Hegg et al., 1990; Perry and Hobbs, 1994). This mechanism of particle production was observed extensively during the Southern Hemisphere Marine Aerosol Characterization Experiment (ACE-1) and appears to be a primary source for new particles in the remote marine troposphere (Clarke et al., 1996). However, when sampling near clouds, shatter of cloud droplets can generate large numbers of small particles. To understand nucleation in regions of cloud outflow, one must be able to identify these spurious droplet shatter events.

During ACE-1 a large suite of aerosol instrumentation was deployed on the NCAR C-130 aircraft. Particle measurements were made from both an isokinetic community aerosol inlet (C.A.I.) and a simple anisokinetic inlet. In warm air ($T > 0^{\circ}C$), both sampling inlets generated particles by droplet shatter, although shattering of droplets was much more extensive in the anisokinetic inlet. In cold air ($T < -20^{\circ}C$), particle shatter was still observed, however, fewer shatter particles were produced. In all cases, shatter particles were detected over a wide size range, even down to ~3 nm diameter. These shatter events were well correlated with cloud water/ice concentrations derived from wing mounted FSSP probes (PMS, Boulder CO).

In this paper, factors influencing particle production in aerosol sampling inlets due to cloud particle shatter will be explored.

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