CCN Measurements in and Above the Boundary Layer

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Concentration of particles which nucleate condensation at a specified supersaturation:
The CCN Activation Spectrum
General Comments about our CCN Measurements

1. Shattering of droplets and drops produces a large positive bias of concentration.

2. CCN concentration at large supersaturation (S) should not exceed the particle concentration measured with a condensation particle counter.

3. Consistency expected between CCN concentration at S=0.15% and the PCASP-measured aerosol concentration (the total of particles larger than ~ 0.11 μm).

4. CCN activation spectrum, and vertical air motion, are the starting point for describing cloud droplet formation.
VOCALS Results from RF05, a 20° S Crossover Flight

Supersaturation, %

Cumulative Conc., cm⁻³

CCN fit: C = 201, k = 0.23
CPC Average ± σ

Supersaturation, %

Cumulative Conc., cm⁻³

CCN fit: C = 374, k = 0.30
CPC Average ± σ
Ten C-130 Flights

10 minute flight sections
500 ft above the sea
1000 ft above cloud top

Sea Surface

Above Cloud

Longitude, °

CCN @ 0.4%, cm⁻³

Longitude, °
Poorly understood new particle formation phenomenon above cloud top

Sounding from RF07 (one of the POC missions)