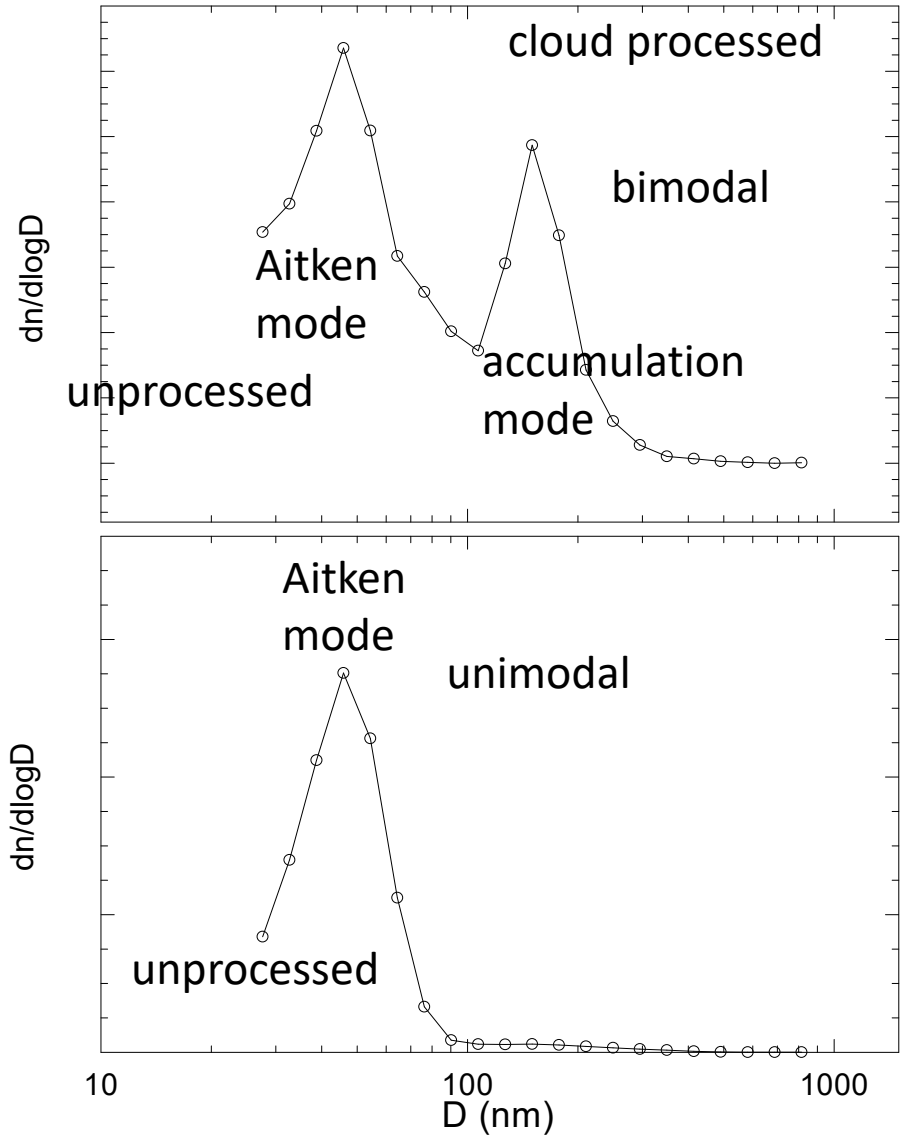

Bimodal 95% of the time

Figure 1. Examples of SMPS spectra at SGP, May 2003

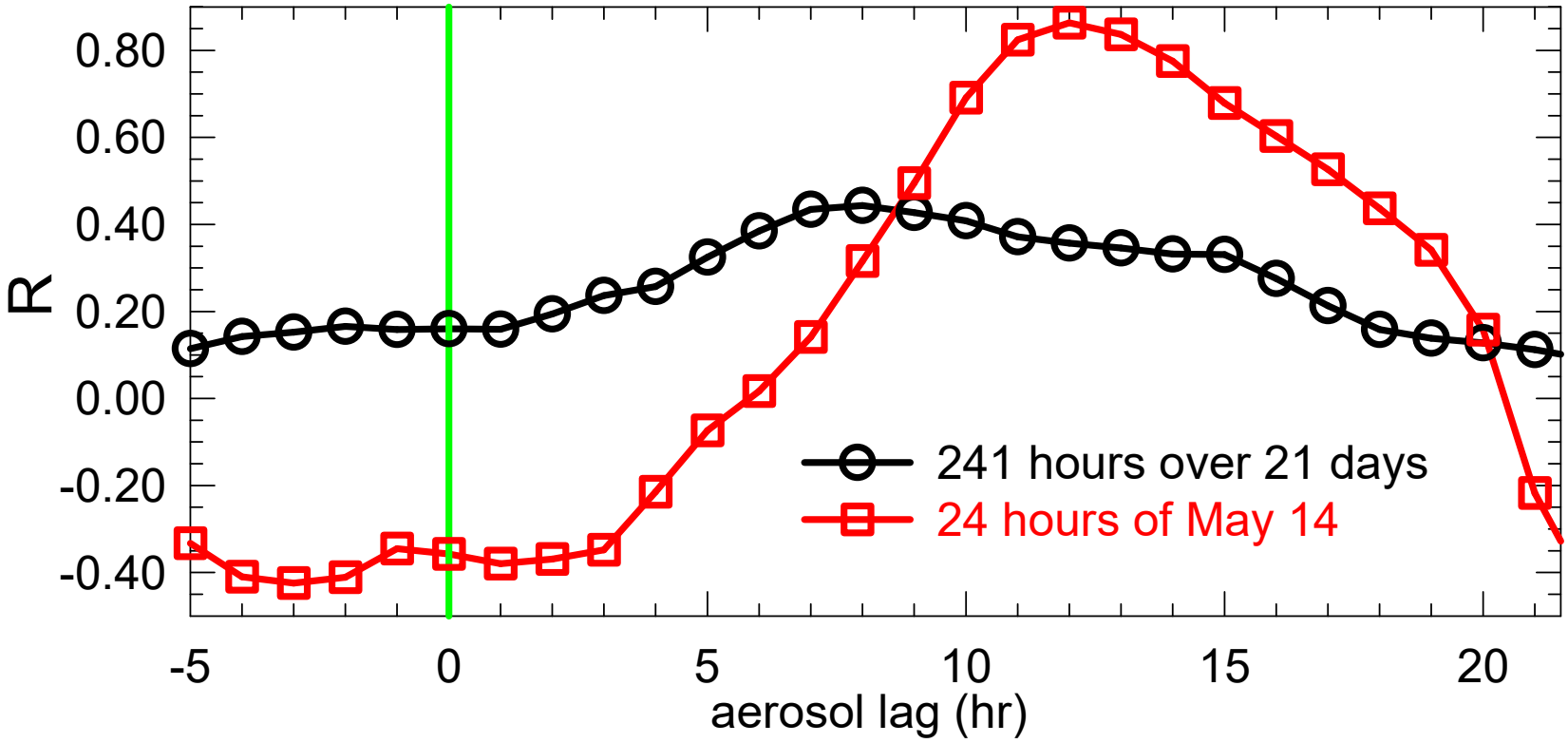

Figure 2. Correlation coefficients (R) between hour averages of surface SMPS aerosol modality (bimodal versus unimodal) with PGN remote measurements of cloud fraction (CF) plotted against time lag of aerosol data from the cloud data at zero hour (green line). Aerosol modality is in terms of the concentration differences between Aitken particles (smaller than Hoppel minima; not cloud-processed; N_u) and accumulation mode particles (larger than Hoppel minima; cloud-processed; N_p). Rs are higher for time lags necessary for the surface aerosol to respond to specific CF mainly by advecting to the surface.

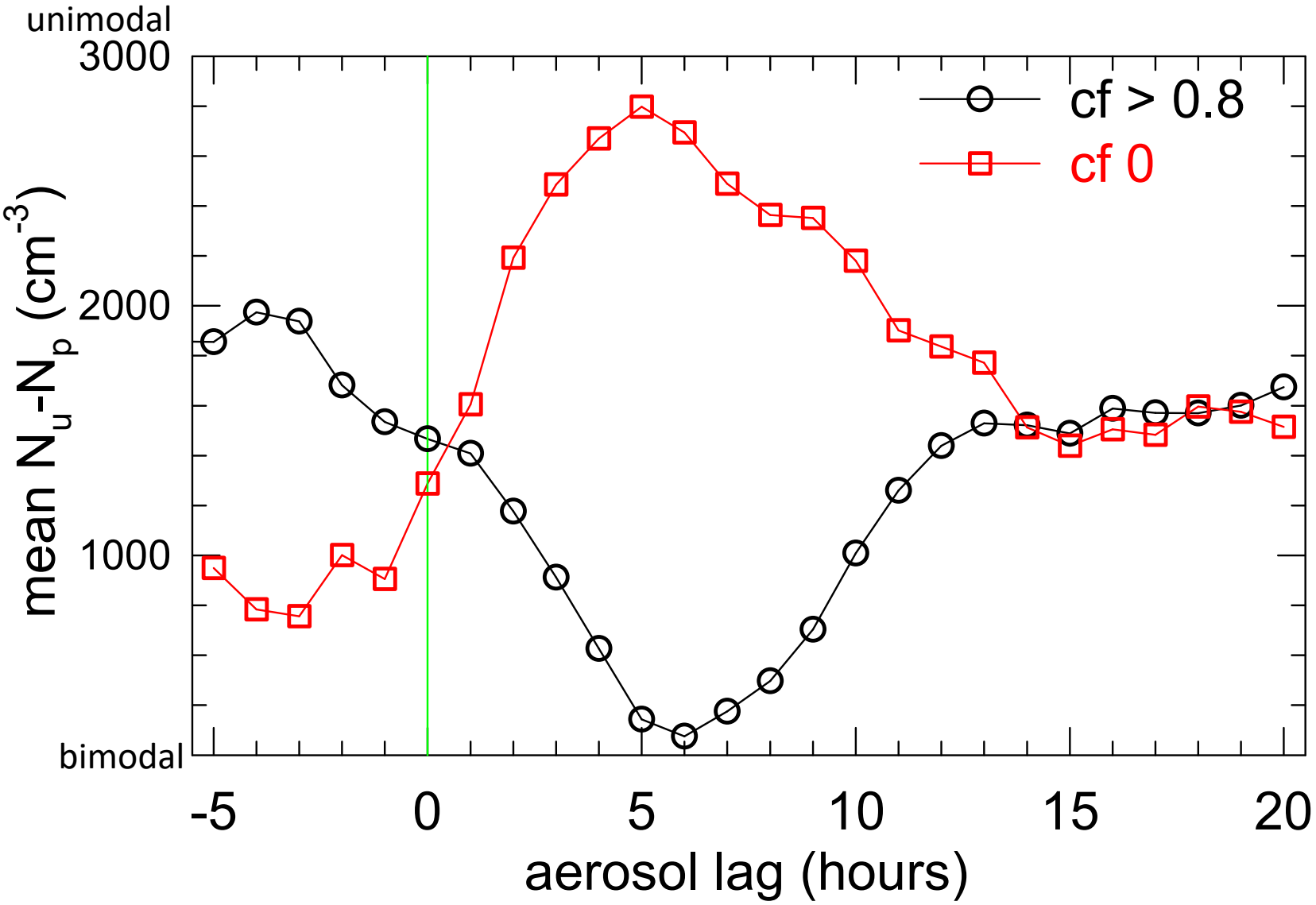

Figure 3. Mean aerosol bimodality (N_u-N_p) lagged response of 234 hours of surface aerosol to extreme cloud fractions (CF). 88 hours of CF > 0.8, 146 hours of zero CF. Lower N_u-N_p is bimodal; higher N_u-N_p is unimodal. Bimodal response to high CF, unimodal response to low CF.

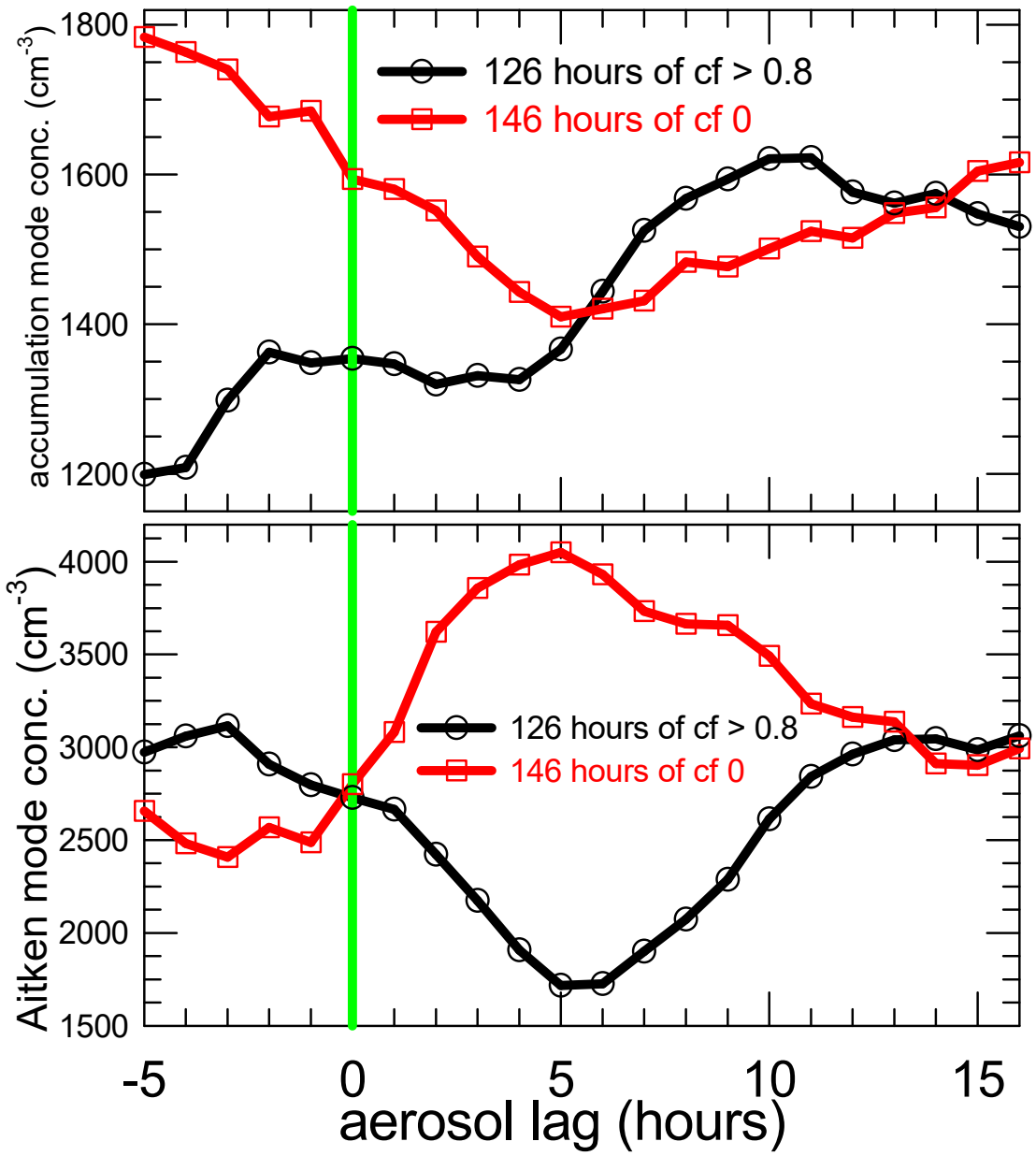

Figure 4. Mean surface particle concentrations within the two aerosol modes as a function of time after the specific ceilometer cloud fractions (CF) have been remotely observed at time zero (green line).

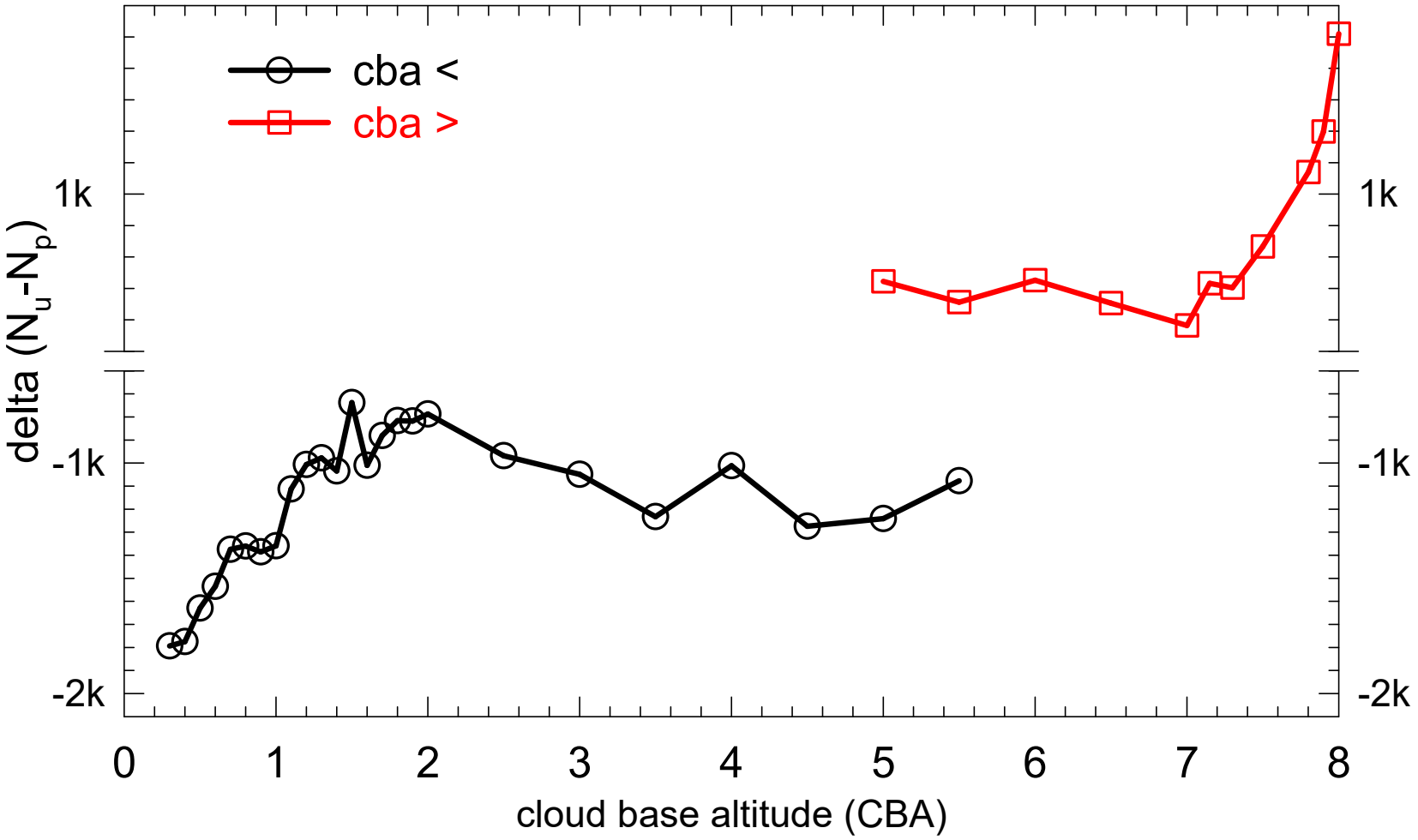

Figure 5. Differences between mean normalized modality $[(N_u-N_p)/(N_u+N_p)]$ at 0 hour from mean normalized at lag hour of minimal normalized (black) for all cases with cloud base altitude (CBA) less than the abscissa designation. This indicates progressively greater bimodality for progressively lower CBA. Red are the differences between mean normalized at 0 hours from mean normalized at lag hour of maximal normalized for all CBA greater than abscissa; this indicates progressively greater unimodality for progressively higher CBA. Lower CBA is similar to higher CF in terms of causing aerosol bimodality. The modality differences so described come from figures such as Fig. 3 for various CBA taking the difference between concentrations at zero hour and at minimum (black) and maximum (red).

There is much more evidence I do not have time to show.

See poster 93 for more.

Our JGRA manuscript has even more evidence that cloud processing made most accumulation mode particles at SGP in May 2003. This agrees with theory: e.g.,

Kerminen, V., and A.S. Wexler, 1995: Growth laws for atmospheric aerosol particles: An examination of the bimodality of the accumulation mode. *Atmos. Environ*., **29,** 3263-3275.

Coalescence and condensation are too slow to make accumulation mode except in polluted environments. Cloud processing does it easily.

We thought some reviewers and readers would think this a trivial exercise.

Instead they do not accept cloud processing.

This opposition makes this publication more imperative.

So have increased our evidence of cloud processing.

Aitkens convert to accumulation by nucleating cloud droplets.
This happens in spite of plentiful accumulation mode particles.
Efforts to understand Aitken to accumulation mode (CCN) without cloud processing are in vain.