



*Supplement of*

**Measurement report: Cloud condensation nuclei activity and its variation with organic oxidation level and volatility observed during an aerosol life cycle intensive operational period (ALC-IOP)**

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## **Instrumentations in ALC-IOP**

The particle number size distribution was measured from July 2<sup>nd</sup> to August 15<sup>th</sup>, 2011, with a scanning mobility aerosol sizer system (SMPS) built by BNL. The BNL-SMPS system was constituted of a <sup>85</sup>Kr neutralizer (Model 3077A, TSI Inc), a DMA (Model 3080, TSI Inc.) and a CPC (Model 3771, TSI, Inc.) Every 120 seconds, the instrument measured particles in a size range of 10–610 nm (in mobility size) divided into 60 size bins. The aerosol size distribution was derived by inverting the particle concentration measured by the CPC using a routine described in Collins et al. [2002], which explicitly accounts for multiply charged particles.

The size-resolved CCN (SR-CCN) spectrum was also measured in ALC-IOP. From July 2<sup>nd</sup> to July 31<sup>st</sup>, 2011 the SR-CCN directly sampled the ambient air, and from August 1<sup>st</sup> to August 15<sup>th</sup>, 2011, the SR-CCN was sampling after thermal denuder. The longitudinal temperature gradients of the CCN counter was stepped through 4, 4.5, 5.5, 6.5, 8, 10, 12, 18 °C in every 80 mins , which were corresponding to supersaturations of 0.12%, 0.15%, 0.20%, 0.25%, 0.32%, 0.41%, 0.50% and 0.79%, respectively. In addition to size-resolved CCN activated fraction, total CCN concentration was measured using a second DMT CCN counter operated at a flow rate of 0.3 L min<sup>-1</sup>, and longitudinal temperature gradients of 4.3, 4.8, 5.5, 6.5, 7.9, 10, and 12 °C, which corresponded to supersaturations 0.11%, 0.13%, 0.17%, 0.23%, 0.32%, 0.40% and 0.48%, respectively. The temperature gradient was stepped through the eight values every 32 minutes.

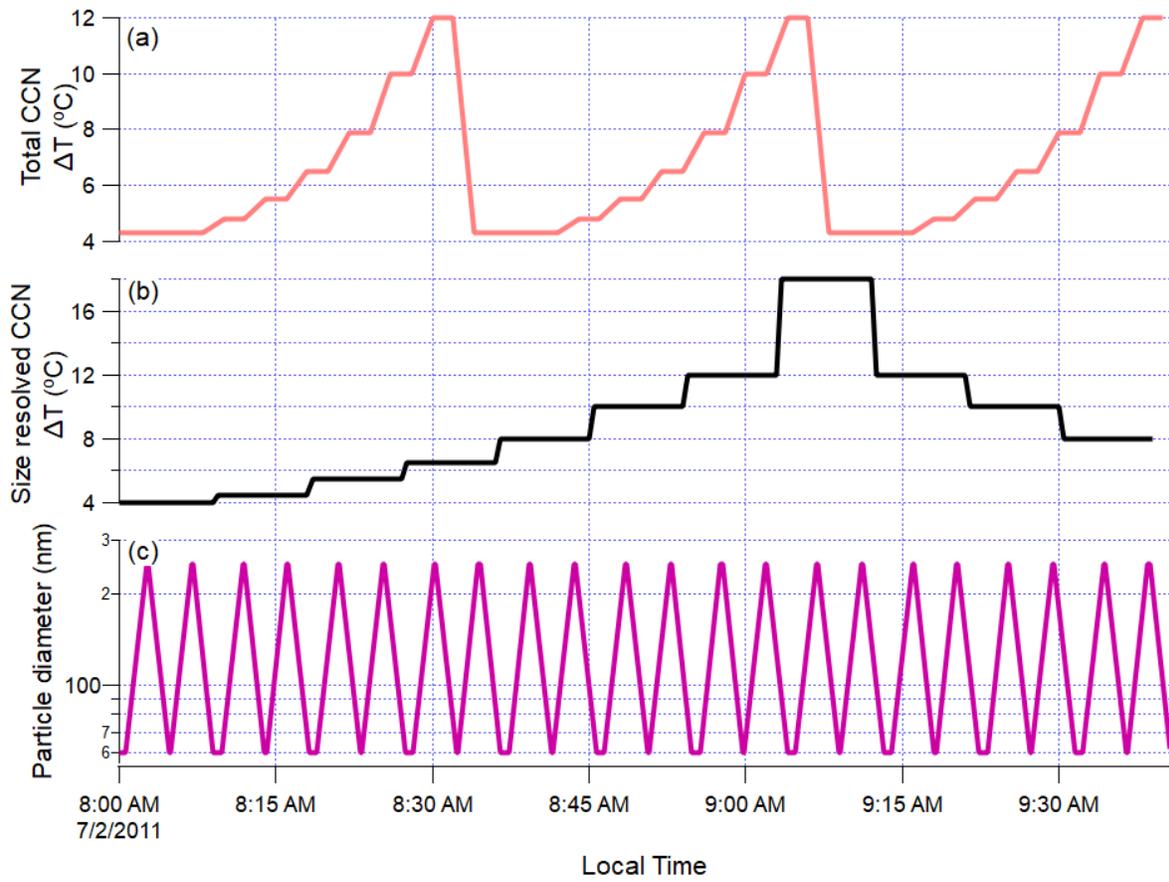


Figure S1. An example of measurement sequence for (a) temperature gradient of the CCN counter for total CCN concentration measurements, (b) the size-resolved CCN temperature gradient, and (c) the particle diameter classified by DMA for the size-resolved CCN measurements.

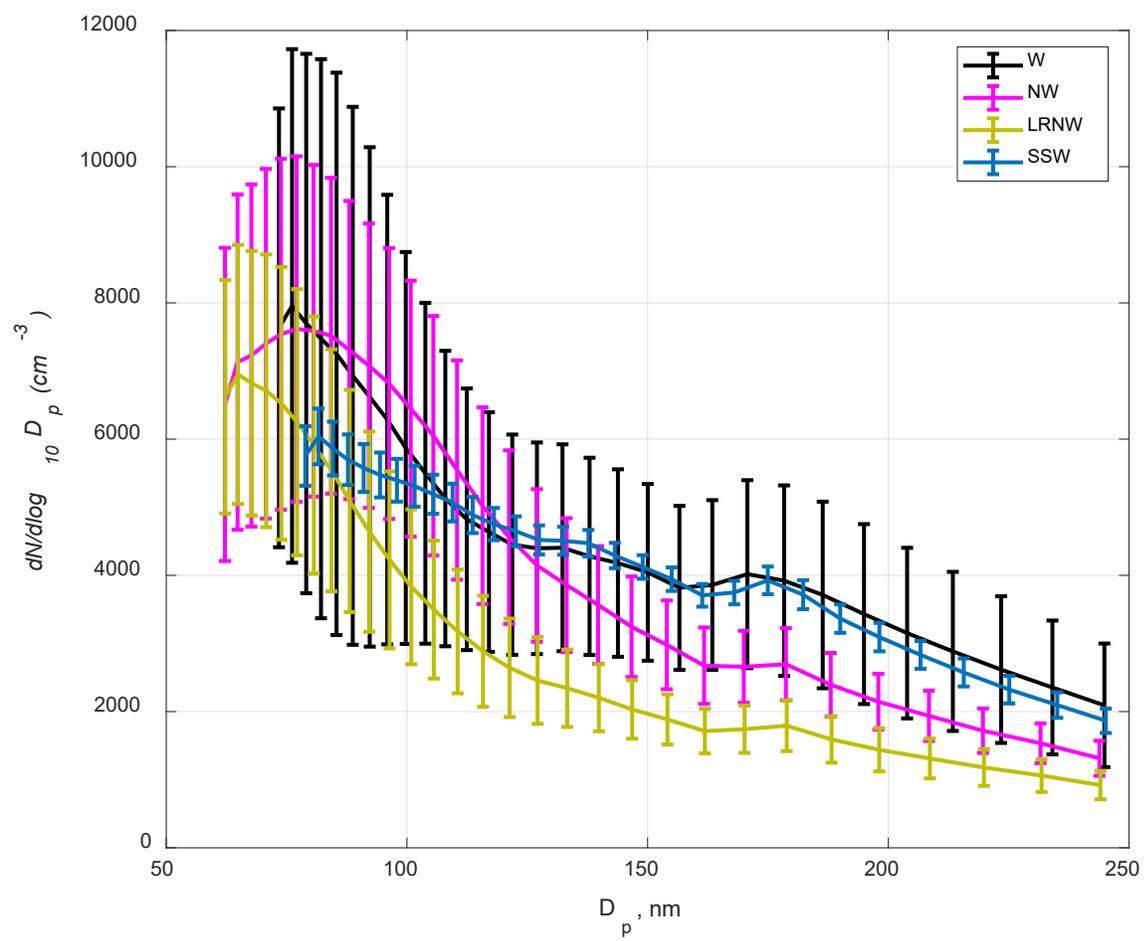


Figure S2. The averaged aerosol size distribution from SR-CCN setup for four clusters: LRNW, NW, SSW, and W.