

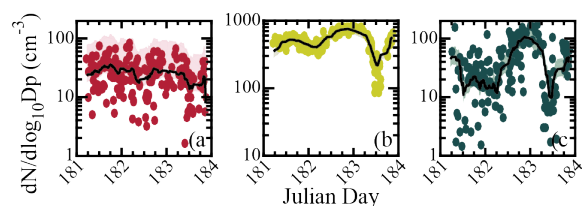
## Aerosol Properties in the Remote North Pacific Boundary Layer

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The impact of anthropogenic aerosol on climate forcing remains uncertain largely due to inadequate representation of the background natural aerosols in climate models. Despite its importance, sources and sinks controlling the marine boundary layer (MBL) aerosol number, size distribution, chemical composition, hygroscopicity, and cloud condensation nuclei (CCN) properties remain poorly constrained.

In this study, aerosol size distribution and hygroscopicity measurements were made aboard the *R/V Hi'ialakai* from 27 June to 3 July 2016 at Station ALOHA (22.45°N, 158°W). Size distributions were predominantly bimodal with an average integrated number concentration of  $197 \pm 98 \text{ cm}^{-3}$ . Hygroscopicity measurements investigated sizes from 50 to 150 nm, the size range which strongly influences MBL clouds and is most relevant to climate issues. Mode  $\kappa$  values for 48, 96, and 144 nm hygroscopicity distributions were  $0.48 \pm 0.16$ ,  $0.45 \pm 0.17$ , and  $0.50 \pm 0.15$ , respectively. To better understand remote MBL aerosol sources, a new technique was developed which decomposed hygroscopicity distributions of externally-mixed aerosols into three (mainly carbonaceous, sulfate-like, and sodium-containing) classes based on the hygroscopic properties of the reference compound, ammonium sulfate. Method results (see Fig. 1) revealed low (5-8% of total) and steady concentrations of sodium-containing particles, while the sulfate-like and mainly carbonaceous aerosol concentrations varied during the cruise. Size distribution and hygroscopicity data, in conjunction with air mass back-trajectory analysis, suggests the aerosol budget in the remote North Pacific MBL may be controlled by aerosol entrainment from the free tropospheric.



**Figure 1:** Temporal trend for (a) sodium-containing, (b) sulfate-like, and (c) mainly carbonaceous classes for 87 nm-108 nm size particles.