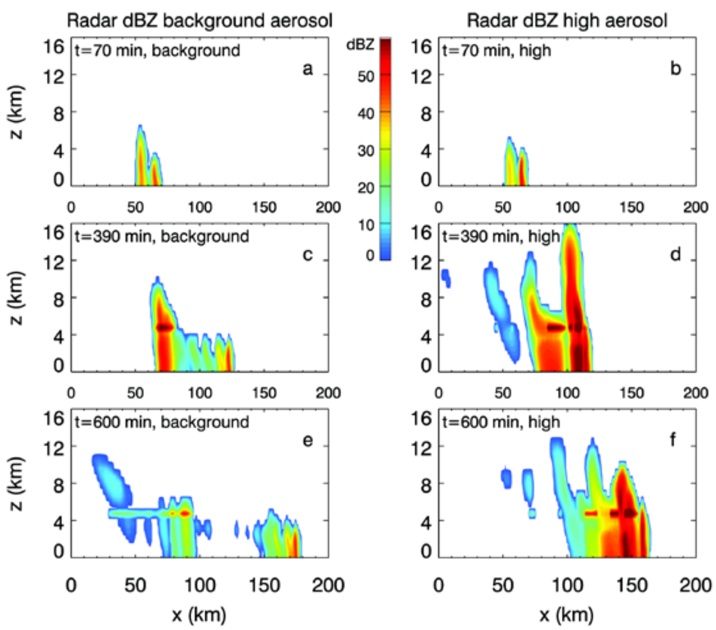
Li, X., W.-K. Tao, H. Masunaga, G. Gu, and X. Zeng, 2013: Aerosol effects on cumulus congestus population over the tropical Pacific: A cloud-resolving modeling study. *J. Meteor. Soc. Japan*, **91,** 817-833. http://dx.doi.org/10.2151/jmsj.2013-607



← Figure 1: Simulated Radar reflectivity for marine background aerosol (left column) and high aerosol (10xbackground, right column) at t=70, 390, and 600 minutes, respectively, for the same TOGA COARE sounding. The background aerosol produces mainly congestus, whereas the high aerosol produces deep convection.

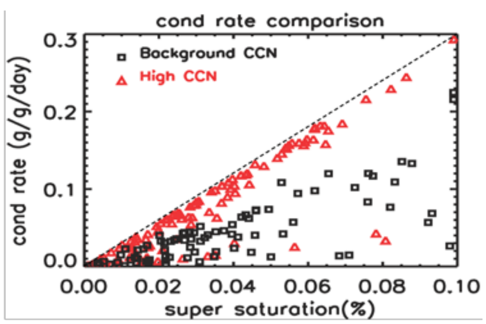


Figure 2: The main mechanism for model sensitivity is the reduced latent heat release in clean background condition. The black squares represent in-cloud super-saturations vs. condensation rates for the background case at each grid point. The red triangles represent high aerosol case. The dashed line indicates the saturation adjustment assumption used in many bulk microphysical schemes, which assumes that all vapor above supersaturation condenses.

- A cloud-resolving model with spectral bin microphysical scheme shows that low aerosol concentration in background marine condition during TOGA-COARE experiment is conducive to the formation of cumulus congestus.
- Over the tropical oceans, where the low-level water vapor is abundant, the CAPE is relatively low, and a ubiquitous weak stable level exists near 0°C level, the small differences in latent heat release caused by aerosol-cloud-precipitation interactions can result in cloud population shift from congestus dominant to deep convection dominant.
- Considering the importance of congestus in tropical dynamics and MJO lifecycle, we proposed a hypothesis that aerosol-cloud-precipitation interactions in an ultra-clean marine environment may serve as an important damping mechanism for tropical convection.