

Aircraft measurements of aerosol-cloud interactions

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1. Importance of aerosol ? cloud interactions

By serving as cloud condensation nuclei and ice nuclei, aerosols affect cloud droplet number concentrations and phase of cloud particles. These cloud microphysical changes cause cloud albedo changes and cloud adjustments (fast cloud response), such as changes in cloud liquid water path and/or cloud fraction. However, there are large uncertainties in estimations of these aerosol ? cloud interactions

2. Aircraft measurements

Satellite measurements can provide global view of the aerosol ? cloud interactions, however, quantities retrieved from satellite measurements are limited. Several artifacts are also known. Although aircraft measurements are limited in space and time, they can provide critical information to study aerosol ? cloud interactions, namely, aerosol and cloud droplet number size distributions. In fact, aircraft measurements have been intensively made over off the coast of California, Peru, and West Africa, tropical Pacific, Indian ocean, and Arctic ocean. Aircraft measurements act as a driving force to study aerosol ? cloud interactions.

3. Aircraft measurements in Asia

Aerosol concentrations in Asia are highest level in the world and they can potentially affect clouds forming over the Western Pacific. However, a number of aircraft measurements is limited. In this paper, results from aircraft measurements made over the Western Pacific during the A-FORCE-2009 and 2013S campaigns are shown. Future science of aerosol ? cloud interactions using aircraft is also discussed.

Keywords: aerosol, cloud, aircraft measurement, Asia