

## Current Aerosol Research at CMDL

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CMDL conducts aerosol research at fixed surface stations and from aircraft in order to

- characterize mean values, variabilities, and trends of climate-forcing properties of different types of aerosols, and
- understand the factors that control these properties.

CMDL's measurements also provide ground-truth for satellite measurements and global models, as well as key aerosol parameters for global-scale models.

Long-term records of the number concentration and light-scattering properties of atmospheric aerosols are available at all four of CMDL's baseline stations, starting in the mid-1970s. These records demonstrate that long-range transport of polluted air has a large influence on aerosols at the northern hemispheric baseline stations (Barrow and Mauna Loa). In contrast, anthropogenic influences are not obvious in the long-term record from the southern hemispheric stations (Samoa and South Pole). In the past decade, the emphasis of CMDL's aerosol research program has shifted from remote baseline sites to regionally-representative sites that are within and downwind of areas with major pollution sources, in order to obtain measurements of greater utility for evaluation of aerosol radiative forcing of climate. Along with this change of emphasis to regions where the largest aerosol forcings were thought to occur came an expansion of the aerosol measurements to include chemical composition and additional radiative properties.

The long-term measurements at baseline and regional sites are complemented by shorter-duration measurements at a variety of urban, rural, and remote sites. The short-term studies, at sites such as Mexico City, Boulder, northwestern Washington State, and the remote Indian Ocean, reveal regional differences in aerosol radiative properties that are as great as any of the temporal differences seen in the long-term records. Consequently, CMDL's aerosol research program now includes a transportable sampling system that is deployed in different regions for one year before moving on to another region. This system is currently operating on Cheju Island in the Korea Strait, to characterize aerosols flowing out over the Pacific Ocean from sources in eastern Asia.

The third component of CMDL's aerosol research program is airborne measurements. Short-term aircraft-based research campaigns have been a long-standing component of CMDL's aerosol program. These campaigns allow evaluation of spatial variations in aerosol properties, but are too short to obtain a statistically-representative description of vertical variations in aerosol properties. Over the past year, nearly 150 vertical profiles of aerosol radiative properties have been obtained over a regional site in northern Oklahoma. The results indicate that the ground-based measurements adequately represent the statistical distributions of aerosol properties in the lower few kilometers over the site, but that vertical layering results in a low correlation between column-averaged properties and surface properties on any given day.