

A Free Tropospheric Observatory on the West Coast of the United States: The Mt. Bachelor, Oregon, Observatory

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Since 1997, our group has focused on the transport of global and Asian air pollutants and their influence on air quality in the United States. Our past work has utilized low elevation surface sites, as well as several aircraft to detect plumes of Asian pollutants that are transported to the US. Most of the transport occurs in the free troposphere. As a result of the need to have more continuous and long-term observations at fixed site, in 2004 we began observations at a mountain top location in central Oregon at 2.7 km above sea level; the Mt. Bachelor Observatory (MBO). With almost 3 years of data, the site has proven to be extremely valuable for detecting and understanding the chemistry and transport of Asian pollutants, including CO, O₃, PAN, aerosols and mercury. In the first 2 years of observations we have focused on identifying the local meteorological environment and identification of free tropospheric air at this site. To do this, we have compared the MBO data, especially water vapor, to sounding data from Medford and Salem Oregon and ozonesonde data from Trinidad Head. Our analysis indicates that the site experiences free tropospheric air approximately 50% of the time. Some of the scientific results we have obtained from our observations at MBO include:

- 1) Identification of over a dozen plumes with significant concentrations of Asian pollutants;
- 2) Identification of a set of tracers using CO, Hg, O₃ and σ_{sp} (aerosol scattering at 550 nm) that can be used to identify Asian, US and biomass burning plumes at MBO (Jaffe et al. 2005; Weiss-Penzias et al., 2006; 2007)
- 3) Identification of significant concentrations of gaseous Hg(II) compounds in free tropospheric air (Swartzendruber et al., 2006).

Because of predictions for substantial increases in emissions from Asia, we believe it is important to maintain long term observations at the Mt. Bachelor Observatory. In this presentation I will give an overview of the first 3 years of results, with an emphasis on the identification of free tropospheric air at the site and some of our most significant results to date.



Figure 1. View of Mt. Bachelor, Oregon, in winter.