Anions, Cations, and Carbonaceous Aerosols at MLO

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There are very few locations from which to make time-series measurements of free tropospheric aerosols, so MLO's location has a unique value. We have measured inorganic aerosol anions and cations and nitric acid vapor nightly at MLO since 1989. In 2005 we installed equipment to also measure organic and elemental carbon (EC and OC) in FT aerosols at MLO. It has proven more difficult than we expected to measure OC and EC, in part because of a pervasive (and variable) blank that is similar in magnitude to the signal. We have spent more than a year trying a variety of methods for improving our sensitivity and blanking. One of these changes was to improve sensitivity by combining EC and OC into one total carbon (TC) peak, since the EC can at least be estimated from light absorption measurements. We find that TC maximizes in the springtime, just as sulfate, nitrate, and calcium do. This is attributed to Asian outflow. However, the TC concentrations at MLO are considerably smaller than those measured in the FT from aircraft during ACE-Asia, suggesting that chemical transport models might not be underestimating OC as much as Heald et al. (2005) suggest.

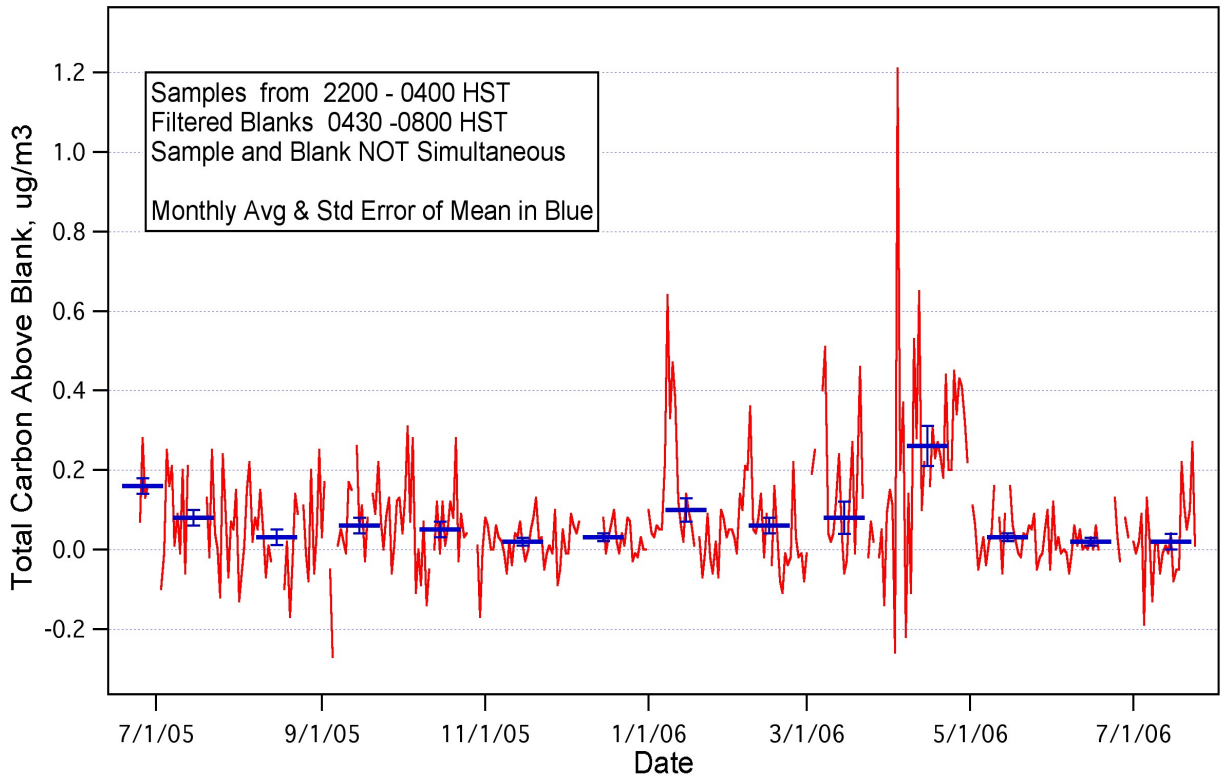

Figure 1. Nightly total carbon concentrations (monthly average and standard error of mean in blue) for one year at Mauna Loa Observatory. Note the peak in total carbon in the spring of 2006 attributed to transport from Asia.

Reference: Heald, C. L., D. J. Jacob, R. J. Park, L. M. Russell, B. J. Huebert, J. H. Seinfeld, H. Liao, and R. J. Weber, 2005: A large organic aerosol source in the free troposphere missing from current models. Geophys. Res. Lett., 32, L18809.