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Insights into organic aerosols in urban, rural, and remote atmospheres based on Aerosol Mass Spectrometry

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Insights into the characteristics, sources and processes of atmospheric organic aerosols will be discussed based on mass spectral analysis of more than 30 highly time-resolved organic aerosol datasets acquired using the Aerodyne Aerosol Mass Spectrometer (AMS). These datasets were sampled from 12 urban locations, plus 11 rural and remote sites representative of high elevation, forested, pristine, and continentally-influenced-marine atmospheres. Most of the sites are located in the Northern Hemisphere's mid-latitudes. The mass concentrations, size distributions, mass spectra, temporal, spatial, and seasonal variations of hydrocarbon-like and oxygenated organic aerosols (HOA and OOA, respectively) will be presented and compared among various locations.

HOA represents a significant fraction of the organic aerosol in cities, although OOA is present in similar or larger concentrations. There is strong evidence linking OOA with SOA in some studies. Organic aerosols at rural and remote locations are almost always dominated by oxygenated compounds with HOA typically account for 20% or less of the total OA mass. The HOA mass concentrations estimated from the AMS mass spectra are comparable to the POA concentrations estimated based on urban primary emission ratios. This observation suggests that urban combustion-related POA makes a small contribution to atmospheric OA mass loading on a global scale, and that oxidation of POA is not a major source of OOA. Rural and remote OOA appear to be a mixture of a highly oxidized organic component with mass spectrum similar to fulvic acid and a less oxidized component that appears to be associated with biogenic sources. Correlations between the concentrations of less oxygenated OA and biogenic

SOA tracers from GC-MS analysis will be presented. In addition, comparison of the degree of oxidation of atmospheric OOA to chamber SOA will be made based on AMS mass spectra.