How much more information on organic aerosol sources and processes can we extract from aerosol mass spectrometer data by improved statistical analyses?

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The Aerodyne aerosol mass spectrometer (AMS) has long been the main instrument for online characterization of aerosol chemical composition. While it has been proven to very efficiently identify all non-refractory inorganic aerosol species, the organic component has generally only been lumped into "organics". Utilizing statistical approaches, a few types of oxygenated organic species and a few anthropogenic aerosol types can often be separated. However, no large leaps forward have been made over the last decade, and many consider that the utilizable information has already been extracted using these commonly applied tools.

We have recently applied different novel approaches to AMS data measured at a boreal forest site, finding that these statistical methods can both identify new types of organic aerosol components and separate the more common pollution types better. With these new tools, we have been able to characterize the organic aerosol components at our boreal site in much greater detail then what more "standard" methods would allow, identifying also less abundant but intriguing aerosol types, including amines and organic nitrates. We believe our approaches can also help the in-depth characterization of AMS data sets from other regions.