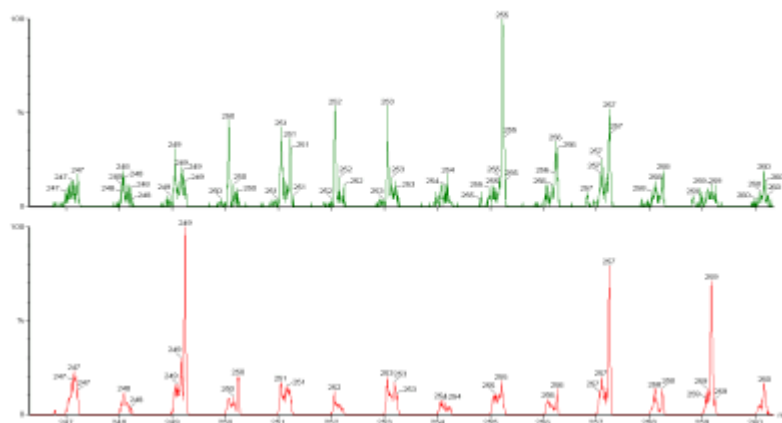


Study of Humic Acid Structure Using Advanced Mass Spectrometric Techniques

Molecular-level structural information to elucidate the structure of humic substances has recently become available through use of advanced mass spectrometric methods. Electrospray Ionization coupled to Quadrupole Time of Flight mass spectrometry (ESI-QTOF MS) can be used to highlight specific differences in the molecular structure of diverse humic substances (see article by Kramer et al., 2001). This is illustrated below in the mass spectra of two humic acids that have widely differing compositions. The Armadale humic acid is derived from a hardwood forest soil expected to be rich in fatty acid-type aliphatic structures, while the diluvial, Japan sample has been shown to be dominated by highly oxygenated aromatic compounds. Specific examples of these differences can be seen in the partial mass spectra below:

Diluvial, Japan HA



Armadale HA

The most recent work being done on this project involves the use Fourier Transform Ion Cyclotron Resonance mass spectrometry (FT-ICR MS) to identify many specific structures in the mass spectra of highly aromatic humic acids (see papers by Kujawinski et al., 2002a,b). These aromatic humic acids have been the central focus of this study up to this point, but many other samples from many sites are being studied, including dissolved organic matter from streams, rivers, and the oceans. The goal is to eventually identify the types of compounds commonly found in humic substances without the use of invasive methods that rely on partial decomposition of the structural entities.