

Public Abstract

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Title: CHARACTERIZATION OF DISSOLVED ORGANIC MATTER IN WATER USING FOURIER TRANSFORM INFRARED SPECTROSCOPY AND X-RAY PHOTOELECTRON SPECTROSCOPY: IMPLICATION OF CHEMICAL COMPOSITION AND EFFECTS OF WATER SOURCES

Dissolved organic matter (DOM) is the major form of organic matter in most aquatic environments. DOM influences the physicochemical characteristics of natural aquatic system by acting a carbon and energy source, increasing light attenuation, maintaining pH and affecting the heat balance. The chemical composition of aquatic DOM can provide important information about its sources. Various approaches can be applied for characterize molecular constituents of DOM and investigate the linkage with their natural and artificial sources.

The objective of this research is to characterize DOM features from different sample sites and explore the impact from sources. Water samples were collected from Hinkson Creek upstream and downstream of the City of Columbia, Missouri River, landfill leachate, and wastewater treatment plant (WWTP). Fourier transform infrared spectroscopy (FTIR) and X-ray photoelectron spectroscopy (XPS) were used to identify major chemical compound classes of each sample. Then the characteristics of their sources were demonstrated by comparing those DOM features.

From this study, DOM features in terms of element and functional groups were characterized by FTIR and XPS. Results showed that samples from the city landfills

contained the highest concentration of aromatic and protein-like compounds, while samples from WWTP contained more acids and hydrophilic fraction. It appeared that for freshwaters, the DOM inputs from the surroundings had a significant effect on the DOM chemical composition. The study demonstrated that coupling FTIR with XPS analyses could provide insights into the physicochemical and biogeochemical characteristics of DOM in different aquatic systems, as well as the characteristics of the environments from which the DOMs were derived.