



## Spectrofluorometric characterization of dissolved organic matter for indication of precursor organic material and aromaticity

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**ABSTRACT:** We studied the fluorescence properties of fulvic acids isolated from streams and rivers receiving predominantly terrestrial sources of organic material and from lakes with microbial sources of organic material. Microbially derived fulvic acids have fluorophores with a more sharply defined emission peak occurring at lower wavelengths than fluorophores in terrestrially derived fulvic acids. We show that the ratio of the emission intensity at a wavelength of 450 nm to that at 500 nm, obtained with an excitation of 370 nm, can serve as a simple index to distinguish sources of isolated aquatic fulvic acids. In our study, this index has a value of ~1.9 for microbially derived fulvic acids and a value of ~1.4 for terrestrially derived fulvic acids. Fulvic acids isolated from four large rivers in the United States have fluorescence index values of 1.4-1.5, consistent with predominantly terrestrial sources. For fulvic acid samples isolated from a river, lakes, and groundwaters in a forested watershed, the fluorescence index varied in a manner suggesting different sources for the seepage and streamfed lakes. Furthermore, we identified these distinctive fluorophores in filtered whole water samples from lakes in a desert oasis in Antarctica and in filtered whole water samples collected during snowmelt from a Rocky Mountain stream. The fluorescence index measurement in filtered whole water samples in field studies may augment the interpretation of dissolved organic carbon sources for understanding carbon cycling in aquatic ecosystems.

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