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Optical methods for water pollution characterization

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The management of water resources in a context of climate change, which increases the pressure on clean water availability, requires the development of monitoring tools to assess rapidly the quality of water and to characterize its eventual pollution. For several years now, optical methods have been proposed to monitor, without any reagent, different types of water: freshwater (rivers, lakes, etc.), estuarine water, seawater, groundwater, (polluted or not) as well as reclaimed water (which can be used for irrigation, cleaning, etc.), etc. Spectrophotometry and fluorescence spectroscopy can be combined usefully to characterize rapidly the global dissolved organic matter in water resources. Synchronous fluorescence, where the gap between excitation and emission wavelengths, is maintained constant during excitation wavelength scanning, is of particular interest.

The objectives of the presentation are:

- After a summary of the basic principles of synchronous fluorescence, the selection of the optimal gap between excitation and emission wavelengths will be discussed as well as ways to extract information out of the synchronous fluorescence spectra.
- The combined use of synchronous fluorescence and spectrophotometry will be demonstrated using a large sample database covering large rivers (Seine, Danube, Moselle), headstreams (in mountains and plains), rivers suffering from large anthropogenic, agricultural and/or industrial pollution, reclaimed wastewaters, etc. Fig. 1. presents a subset of the database with synchronous fluorescence spectra collected along the Seine River. The characteristics extracted from the spectra will be discussed in function of classical pollution parameters.

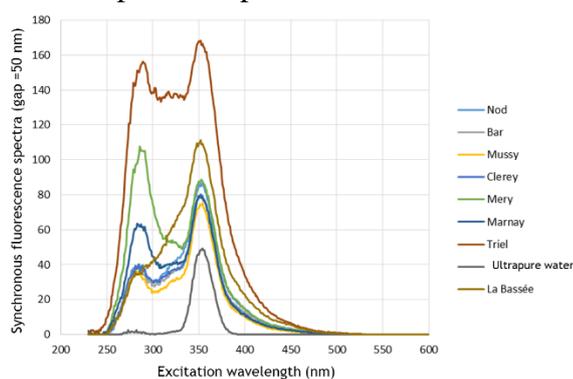


Fig. 1. Examples of synchronous fluorescence spectra collected along the Seine River

KEYWORDS: absorbance; dissolved organic matter; humic substances; spectral deconvolution; synchronous fluorescence