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# Application of EEM fluorescence spectroscopy in understanding of the "LIGA" phenomenon in the Bay of Biscay (France)

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Marine mucilage is present in all oceans over the world, and in particular in the Mediterranean Sea and in the Pacific Ocean. Surface water warming and hydrodynamic processes can favor the coalescence of marine mucilage, large marine aggregates representing an ephemeral and extreme habitat for biota. DOM is a heterogeneous, complex mixture of compounds, including extracellular polymeric substances (EPS), with wide ranging chemical properties and it is well known to interact with pollutants and to affect their transport and their fate in aquatic environment. The LIGA French research program focuses on tracing colloidal dissolved organic matter (DOM) sources and cycling in the Bay of Biscay (South Western French coast). This ephemeral phenomenon (called "LIGA" in the South West of France) has been observed more than 750 times since 2010. It presents a great ecological impact on marine ecosystems and has been shown to be concomitant with the development of pathogen organisms.
A one-year intensive survey of fluorescent DOM was undertaken. From April 2013 until May 2014, water samples were monthly collected from the Adour River (main fresh water inputs) and from 2 sites in the Bay of Biscay at 3 depths of the water column (surface water, at the maximum of chlorophyll-a, and deep water). Moreover, intensified samplings took place from the appearance of the phenomenon twice a week during 4 weeks.
UV/visible absorbance and excitation emission matrix (EEM) fluorescence spectroscopy combined with PARAFAC and PCA analyses have been used to characterize colloidal DOM in the Bay of Biscay in order to estimate DOM sources as well as spatial and temporal variability of DOM properties.
The preliminary results, obtained for about 70 samples of this survey, have already highlighted spatial and temporal variations of DOM optical properties and a peculiar fluorescent component (exc300nm/em338nm) was detected while the LIGA phenomenon arises. The appearance of this specific fluorescence signal seems to be correlated with high freshwater and terrestrial DOM inputs combined with physical forcing (flows, swell) as well as a rise in temperature and sunshine.
This work already allowed us to identify different sources of colloidal DOM in the Bay of Biscay and highlighted a specific fingerprint of the LIGA phenomenon.
The combination of EEM fluorescence spectroscopy with PARAFAC and PCA analyses appears thus to be a very powerful tool for the long term monitoring of such a phenomenon and would be very useful for a better understanding of the biogeochemical processes in marine environments and of the marine colloidal DOM ecodynamics.