Characterization of Dissolved Organic Matter 3D-Fluorescence Quenching treated by PARAFAC

Huiyu Zhao, Stephane Mounier, Roland Redon, and Cedric Garnier

PROTEE Laboratory, Southen Toulon-Var University BP20132 , 83957 La Garde, France (hzhao@univ-tln.fr)

The dissolved organic matter – metal (DOM-Metal) complexation propriety is accessible by fluorescence quenching (FQ). FQ spectrum can determine the fluorescent DOM composition by parallel factor analysis (PARAFAC) with excitation-emission matrix (EEM). Copper ions [Cu2+] titration onto a reference riverine DOM sample from IHSS (Suwanee River natural organic matter, 1R101N) is done with two titration groups: [DOM]1=3mg/L, initial [Cu]=0.56nM, with titration [Cu2+]1 from 1.68nM to 1.2mM; [DOM]2=18mg/L, initial [Cu]=1.68nM, with titration [Cu2+]1 from 1.68nM to 7.2mM. The pH at 6 and ionic strength at 0.1 have been well controlled in the both groups. Totally 21 Excitation and Emission Matrix (EEM) for each group have been measured by HITACHI 4500 fluorescence spectroscopy and analyzed by PARAFAC, which has extracted 2 fluorescent components from all EEM: C1 (λex=250nm and 290-320nm; λem=420-425nm) and C2 (λex=250-260nm and 345-355nm; λem=470-480nm).

Moreover, this experiment is done at two NOM concentrations range. One in the linear domain for the Berr-Lambert law where fluorescence is supposed to be linear function of the concentration and the other in the inner filter effect domain. The goal of this experiment is to treat at the same time the quenching phenomena and the inner filter effect of the sample by both previous data treatment and PARAFAC decomposition.