



Small changes in phosphorus additions alter the aromaticity of Chromophoric dissolved organic matter (CDOM) in lakewater

Emma Rochelle-Newall, Lydie Blottière, and Colombe Consortium
IRD, UMR IIEES-Paris, France (emma.rochelle-newall@ird.fr)

Although the impacts of eutrophication on freshwater biodiversity are relatively well known, how eutrophication impacts the quality of dissolved organic carbon (DOC) is less known, despite its importance for microbial nutrition. Chromophoric dissolved organic matter (CDOM) is the fraction of the bulk DOC pool that absorbs light and shifts in the absorption and fluorescence of this component indicate an alteration in the quality of the DOC present. Here we looked at the impact of small phosphorus additions on CDOM absorption and fluorescence in a series of 16, newly constructed and filled, experimental lakes (Plateforme Planaqua, UMS CEREEP, France). Eight of the lakes received small additions (+ 100 μM) of phosphorus during late spring and summer 2015. We show that there was a distinct seasonal pattern to DOC and to all measured CDOM parameters, regardless of nutrient status. We also show that despite a lack of significant difference between the lakes in terms of DOC concentrations, there were striking differences in the carbon-normalised CDOM parameters. For example, we observed a significant increase in the carbon normalized absorption at 254 nm (SUVA₂₅₄) in the lakes with addition of P, this was also the case for fluorescence (ex350/em450) normalized to carbon concentration. These changes were also accompanied by shifts in the relative intensities of the components in the fluorescence excitation-emission matrices (EEM). We propose that even small shifts in phosphorus availability can induce strong shifts in carbon quality and that this may well have repercussions up the food web should this more aromatic CDOM prove to be less bioavailable. These results also imply that the brownification observed in lakes in northern Europe may also be partially due to small shifts in nutrient concentrations combined with increased carbon and suspended solids imports from the surrounding catchments.