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Effects of Flood on DOM and Total Dissolved Iron Concentration in Amur River

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DOM is an important indicator for freshwater quality and may complex with metals. It is already found that the water quality was abnormal during or after the flood events in various areas, which may be due to the release and resuspending of sediment in the river and leaching of the soil in the river basin area. And flood are also a major pathway for different dissolved matter, such as DOM, transport into the river system from the flood bed, wetlands, etc., when the flood was subsided. River flood has visibly impact on DOM component and concentration. The concentration and species of DOM and dissolved iron during different floods, including watershed extreme flood event, typhoon-induced flood event, snow-thawed flood event were monitored in Amur River and its biggest tributary Songhua River. Also, some simulation experiments in lab were implemented. The samples were filtered by 0.45μm filter membrane in situ, then analyze the ionic iron (ferrous ion, Ferric ion) by ET7406 Iron Concentration Tester(Lovibond, Germany with Phenanthroline colorimetric method). The total dissolved iron was determined by GBC 906 AAS(Australia) in lab. DOC was analyzed by TOC VCPH, SHIMADZU(Japan). The results showed that DOC ranged 6.63-9.19 mg/L (averaged at 7.68 mg/L) during extreme Songhua-Amur flood event in 2013.The lower molecular weight of organic matter [U+FF08]<10kDa [U+FF09] was the dominant form of DOM, and the lower molecular weight of complex iron was the dominant form of total dissolved iron. The dissolved iron concentrations elevate significantly during different floods. The dissolved iron concentrations were 1.11mg/L(Tongjiang City, the middle reaches of Amur River) and 0.69mg/L(Jiamusi City, the lower Songhua River) during watershed extreme flood event in 2013 summer-fall, 0.25mg/L in the middle reaches of Songhua River(Harbin City) during Typhoon Bolaven-induced flood event in 2012 summer, 0.28mg/L during snow-thawed flood event in 2013. The concentrations both of DOC and the dissolved iron of during the flood period were significantly higher than that at usual time. For example, the dissolved iron concentration was only 0.24 mg/L in 2012 at Tongjiang, Songhua River. TOC were between 2 and 8 mg/L in September,2007 at Haerbin, Songhua River.SUVA254 (ratio of absorbance at wavelength of 254nm, used to indicate the level of aromaticity) and SUVA280 (correlate with the molecular weight of organic matter) had significantly positively relationship (p [U+FF1C] 0.01) with DOC for extreme flood. The simulation experiment immersed river sediment in different concentration solution of humic acid indicates that the dissolved iron concentrations rise from 3.90mg/L to 8.19mg/L when DOC concentrations of soak solution increase from 1mg/L to 40mg/L. DOC of swam wetland may up to 37.73- 45.17 mg/L. The floods improve the hydrological connectivity between rivers and riverside wetlands, which make abundant DOM in riverside and flood plain wetlands flowing into rivers. The increased DOM concentration during flood enhances the complex ability of iron in suspended substance and the solubility and mobility of iron in flood water. Flood is the key process of DOM and dissolved iron transport in Amur River Basin.
Keywords: DOM; Total dissolved iron; Flood; Complex; Amur River