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Distribution of dissolved iron concentration and optical characteristics of DOM in the estuarine water of Yura River

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The materials supplied from terrestrial areas through a river largely affect the biological activity in the estuarine and coastal region. Iron is an essential element for the phytoplankton that supports the primary production of aquatic ecosystems. However, in an aerobic environment, iron forms insoluble hydroxide and thus, biologically available dissolved iron can be limited. Most of the dissolved iron is complexed with dissolved organic matter (DOM). DOM not only influences the transportation process of materials by formation of the metal-organic complexes and absorption and desorption of elements but also influences bioavailability of the trace metals, such as iron. Therefore, it is important to characterize DOM composition as well as clarifying quantitative distribution of DOM. However, little has known about qualitative information on DOM, and the distribution and dynamics of DOM.

In this study, we investigated optical characteristics of DOM and the distribution of dissolved iron in the estuarine region that important as a place for the biological production. This study was conducted as a part of the Kibunka Project, Field Science Education and Research Center, Kyoto University.

The field sampling was conducted in the estuary region of the class A river, Yura river, located in the northern part of Kyoto Prefecture. Six sampling stations were set between the mouth of the river and about 16km upstream. River water at 2 or 3 depths were collected in each station on July 17th, August 19th, November 18th, 2010, and January 21, 2011. Polyethylene bottles were used for water sampling after thoroughly washed with the sample water. Sampled water were then filtered with the acid cleaned glass fiber filter (GF/F, Whatman), treated with HNO₃ conc. for pH adjustment, and refrigerated in the surface contamination control (SCC) polypropylene bottles until iron analysis. The dissolved iron concentration was measured by inductively coupled plasma atomic emission spectrometry (ICP-AES). For DOC analysis, sampled water was filtered with a combusted (450 degree, 4h) glass fiber filter (GF/F). Concentrations of DOC were determined with a total organic carbon analyzer (TOC-V CSH, Shimadzu). Three-dimensional excitation emission matrix (EEM) was measured by using the fluorescent spectrometer (F-7000, Hitachi). After EEM data were standardized by the Raman scatter correction, several peaks are extracted by the Parallel Factor (PARAFAC) analysis.

Keywords: Dissolved Organic Matter, Dissolved iron, EEM-PARAFAC analysis, Water quality, Salt-wedge intrusion