Fluorescent properties of dissolved organic matter in the Sanjiang Plain

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The Sanjiang Plain is located at Heilongjiang in the northeastern China and is about 50,000 $km^2$of alluvial area between Amur River, Songhuajiang River, Wusuli River. There are a number of low moor with no inflow river. Precipitation is 500-600 mm annually and major resource of wetland in this area. In rainy season of June to August, dissolved organic matter (DOM) flows out from wetland to river due to the flood of wetland. Wetland has been cultivated rapidly since 1950s. The effects of decrease in wetland on ecosystem were observed so that new cultivation was prohibited from 1998. The decrease in wetland area leads to degradation of soil organic matter, and may affect characteristics and transport of DOM. Humic substances comprises a large percentage of DOM in natural waters, and have persistent feature. The structural properties vary with their production process and species of degraded plants. Humic substances, therefore, may be used to study transport of DOM and relationships between land use and DOM properties. The purpose of this study was to characterize humic substances in several types of natural water and compare their feature with land use.

We collected water samples from underground, river, and channel at Sanjiang Plain in May, July, October 2006 and January 2007. We also collected water samples from wetland, underground, river, channel, and paddy at small area in June 2007 because we investigate relationships between land use and characteristics of DOM. Water samples were filtered through GF/F filter and kept under freezing until analysis. Three-dimensional excitation emission matrix (3D EEM) spectra of natural water samples were measured by HITACHI F-4500 spectrofluorometer. The spectra were recorded from 200-500 nm in excitation and 250-550 nm in emission at the photoelectron multiplier voltage of 700V. A relative fluorescence intensity (unit is QSU) is 10 of fluorescence intensity of $10*10^{-3}$ mg/l quinine sulfate solution at excitation/emission: 345/450 nm.

Four fluorescence peaks were obtained on 3D EEM spectra in all natural water samples collected in June 2007. Humic-like peaks were detected at Ex/Em: 315-335/405-435 nm (Peak A) and Ex/Em: 240-265/410-440nm (Peak B). Tryptophan-like peaks were detected at Ex/Em: 275-285/335-350 nm (Peak C) and Ex/Em: 225-235/335-345 nm (Peak D). Each peak position of humic-like materials varies up to 30 nm between ground water and wetland water. Tryptophan-like peaks were within a range of 15 nm. Relative fluorescence intensities of humic-like materials in ground waters were 1/5-1/2 lower than the wetland, river, channel, and paddy samples. Ground water is water resource of paddy in this area. It is suggested that humic-like materials are loaded from paddy field and/or catchment stored ground water before the water supply to paddy field.