CATCHMENT-SCALE ANALYSIS OF DOM DIFFUSION IN FUJI RIVER BASIN BY MOLECULAR SIZE DISTRIBUTION PATTERNS

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ABSTRACT

The purpose of this research is making the profiles of the dissolved organic matter (DOM) in environmental water by the simple analysis of molecular size distribution patterns and evaluating the characteristics of DOM. The moleculer size distribution of humic substances in environmental water and its relations with degradability of DOM has been examined in the past research and it was consequently found to be an effective method to trace the fate of 'humic like' substances because of its stability throughout the hydrological process. In this study, moleculer size distribution of DOM was measured by the method of high pressure size exclusion chromatography (HPSEC) for the water samples of Fuji River basin and the change in the pattern of each chromatogram were analyzed in detail. Reproducibility and linearity between concentration and detection sensitivity were confirmed by using humic acid and lignine as standard reagents in advance. HPSEC chromatogram of the environmental sample was divided vertically at the bottom of the chromatogram into four fractions (f1.f4) in order of higher molecular size and the ratio of each fraction areas was adapted to further analysis of DOM diffusion in the natural water system. As a result the higher molecular size in ratio of fraction area, more frequently detected in upper stream. Since the chromatogram pattern of f1 was strongly similar with that of humic acid and lignine, it was supposed that the forest soil was the important source of high moleculer size constituents. The next, Euclid distance between two points was calculated with the ratio of fraction area as variable and dissimilarity was estimated by the score obtained from the technique of the multivariate analysis. The residential area was located in the middle of Fuji River and the degree of pollution often increased either in the middle or estuary. Dissimilarity between estuary and other points decreased with the distance from estuary except for the residential area which showed lower score in dissimilarity. Strong similarity between estuary and residential area was occasionally suppressed at the point where the blanch through non-polluted area flowed into. Similarity increased among the region in which the retention time of water body was comparatively long. Similarity was supposed to be influenced by the type of land use and water system. Accordingly profiling patterns of molecular size distribution is possibly effective tool to analyze the mechanism of diffuse pollution of DOM in natural water environment.

KEYWORDS: DOM, HPSEC, molecular size distribution patterns