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Finding sources and sinks of fluorescent dissolved organic matter in a riverine system using parallel factor model

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ABSTRACT

To characterize fluorescent dissolved organic matter (FDOM) in Yeongsan River in Korea, 110 water samples were acquired from March 2008 to November 2009 around the watershed. Excitation emission matrix data of fluorescence was obtained using spectrophotometric analysis and parallel factor (PARAFAC) model was used to characterize FDOM. The spatiotemporal variation and effect on FDOM were studied using an exploratory analysis and analysis of variance (ANOVA). According to the spatial and seasonal characteristics, we used *post hoc* analysis to identify significantly different sites and season. The PARAFAC results identified three most important PARAFAC components explaining 95.32% of total variance of original data-set. Seasons and sites had a significant effect on PARAFAC Components I and II ($p \leq 0.05$), whereas season had a significant effect on Component III ($p \leq 0.05$). There was no significant interaction between seasons and sites for all the three PARAFAC components ($p > 0.05$). For Components I and II, summer season was significantly different from other seasons ($p \leq 0.05$), whereas for Component III, the fall season was significantly different from winter and summer seasons ($p \leq 0.05$). These results indicate that ANOVA and *post hoc* analysis in our study not only confirmed the results of previous studies, but also revealed differences in seasons and sites for identified FDOMs as a new information. The methodology proposed in this paper can be a useful tool for finding sources and sinks of FDOMs in a riverine system influenced by natural organic matter impairment.

Keywords: FDOM; Yeongsan watershed (YSW); PARAFAC; Spatiotemporal analysis; ANOVA test

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