

Factor analysis and classification of dissolved iron concentrations of Japanese rivers

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Recent studies showed that dissolved iron transported through rivers may be an important source of iron in oceans. In cold and sub-cold regions, it has been found that wetlands which form reductive condition and accumulate un-decomposed organic materials are the main source of dissolved iron. However, it is unknown whether these findings can be applicable to watersheds in temperate regions such as Japan. Thus, in our study, we conducted statistical analysis to extract main factors governing dissolved iron concentrations of 408 points in Japanese 45 Rivers ranked as primary rivers and to classify them into several groups. We executed multiple regression analysis using climate conditions (annual precipitation and annual average temperature), topographical conditions (slope), geological types (5 categories), soil types (12 categories), and landcover types (10 categories) as explanatory variables of dissolved iron concentrations. The minimum parameter set providing the best fitted regression line was selected according to AIC values. In addition, for the classification of rivers, combined use of principal component analysis and cluster analysis was applied.

Result of multiple regression analysis reveals that while soil types such as gley soil, peat soil, and grayish lowland soils have a positive effect on dissolved iron concentration, landcover types such as building and golf course, soil type such as brownish lowland soil, and annual average temperature have a negative effects. Through multiple regression analysis, we succeeded to extract factors consistent with previous studies. Moreover, temperature and golf course are newly extracted but reasonable factors. By using extracted factors, we attempted to classify rivers into several groups and construct dissolved iron production curves. We need validation of obtained curves through applying them to regions with various geographical conditions.

Keywords: dissolved iron, landuse change, multivariate statistics