A Hierchcial Bayesian Model for Spatio-Temporal Water Quality Modeling in a Changing Climate in South Korea

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Contaminants that cause water pollution are generated from large areas and flow into rivers. It becomes difficult to obtain an accurate prediction of water quality due to the large spatio-temporal variability in a changing climate which in turn leads to considerable uncertainty in the estimation of water quality. Water quality over South Korea highly depends on hydrometeorological conditions due to distinct seasonality. In this context, we explored the use of hydrometeorological variables (i.e., precipitation and temperature) and the autocorrelation structure of water quality parameters in the water quality prediction model within a Bayesian modeling framework. More specifically, we analyzed explored the interdependencies and correlations between hydrometeorological factors and the water quality parameters for the Mangyeong River basin, and built a hierarchical Bayesian regression model for the TN and TP which are main water quality parameters in South Korea. The result shows that the proposed modeling framework can capture the key aspects of the water quality parameters in terms of seasonality and their uncertainty.

KEYWORDS: Hierarchical Bayesian Model, Meteorological factors, Water Quality prediction

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