Study of Water Quality Parameters of Anzali Wetland Using a Proposed Method of Combining Blind Kriging and Linear Regression

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Abstract

Ordinary Kriging (OK) has been widely used for prediction and spatial distribution study of surface water quality parameters. This method uses a constant mean to capture the trend in the model. In this method, the prediction can be poor if there are strong trends. To overcome this problem, an alternative model called Blind Kriging (BK) was developed. The mean function in BK is polynomial and the unknown mean function parameters are obtained using the Bayesian variable selection technique which requires a lot of calculations. To solve these problems, in the present study, OK was modified based on BK. In the modified method, the polynomial mean function parameters were determined using linear Regression instead of Bayesian inference method. Then, the performance of OK and modified Kriging in the estimation of trophic indices and water quality parameters in Anzali Wetland was evaluated using different statistical criteria (the coefficient of determination, the root mean square error and the mean absolute error). For this purpose, the concentrations of 14 parameters in six sampling points of Anzali Wetland water were analyzed during 2018. Subsequently, the modified and Ordinary Kriging were applied to water parameters and trophic indices. The results showed that the modified Kriging had the best results. In addition, the improvement of the modified Kriging compared to OK is achieved up to 88%. The results of the present study can be useful in the planning of the future monitoring program in Anzali Wetland.

Keywords: Spatial distribution, Anzali Wetland, Regression, Blind Kriging, Ordinary Kriging.