



## Developing statistical models for estimating *chlorophyll-a* and total suspended solid levels at an estuarine reservoir with nutrient inputs from satellite observations

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### ABSTRACT

Providing high-resolution monitoring data is essential in promoting decision-making activities for surface water quality protection such as scientific modeling and data analysis. In this study, statistical models using multiple linear regression (MLR) were developed to estimate *Chlorophyll-a* (Chl-a) and total suspended solid (TSS) concentrations in a mesotrophic reservoir, the Yeongam Reservoir in Korea, from satellite observations. Two types of satellite data that covered different spectral regions, for wavelengths in 412–865 nm (for the Geostationary Ocean Color Imager) and those in 405–14,385 nm (for the Moderate Resolution Imaging Spectroradiometer), were used as inputs for statistical models, after bias correction. The MLR models for Chl-a and TSS were initially constructed and evaluated with 39 image data-sets obtained during 2011–2014. Subsequently, they compared with their corresponding algorithms that were developed under different environmental settings as well as the CEQUAL-W2 model, a numerical model of reservoir water quality. Sensitivity analysis showed that specific red and near-infrared wavelengths significantly contributed to improve the accuracy of the Chl-a and TSS estimates, respectively, along with those of blue and green bands typically used. The constructed MLR models showed better performance than the simulation model as well as the classical and recent bio-optical algorithms on average. In particular, poor prediction performance for total nitrogen and total phosphorus caused by a lack of adequate input data and description of transport mechanisms appeared to lower the accuracy of the Chl-a and TSS estimates in the simulation model. Therefore, these results demonstrate that statistical models developed from satellite observations can be used to rapidly screen local water quality and to provide high-quality data for reservoir water quality management.

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