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Remote estimation of phytoplankton pigments in Manwan and Xiaowan Reservoirs, Upper Mekong

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As the 'upstream superpower' within the region, China shares at least 19 international rivers with neighbor countries. Mekong River, the 12th longest river in the world, is one of international rivers that originate from the Tibetan Plateau and flow through Southeast Asia. Apart from the role in water energy and food security, Mekong River is the home to the second largest biodiversity, only after Amazon Basin. However, the deteriorating water quality has drawn increasing worldwide attention. In particular, the built hydropower dams have reduced the water flow and accelerated the accumulation of nutrient and pollutants in the reservoirs, with the consequence of water eutrophication. For example, dinoflagellate bloom was reported in Manwan Reservior, with chlorophyll a (Chla) concentrations of 0.0139 – 0.4847 mg/L. In this study, an approach based on Empirical Orthogonal Function (EOF) analysis was used to estimate the concentrations of Chla using the MODerate resolution Imaging Spectroradiometer (MODIS) data in two reservoirs in the upper Mekong, Manwan and Xiaowan Reservoirs. The results had unbiased root mean square error (URMS) uncertainties of <60% for Chl a. In addition, the results indicate an increase in surface algal coverage, frequency, and duration. Information on the abundance and distribution of phytoplankton is important for the water quality management in the reservoir and the downstream. Remote sensing phytoplankton mapping provides a valuable tool for reservoir and river water quality management.