Remote Estimation of Euphotic Zone Depth for Turbid Inland Waters: A Case Study in Lake Kasumigaura, Japan

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Euphotic zone depth (*Z*eu) is defined as the depth where photosynthetic available radiation (PAR) is 1% of its surface value. It is of great importance in studying water biogeochemical processes. Satellite remote sensing is a powerful technique to monitor *Z*eu, as it can cover large areas at very frequent intervals. Several remote-sensing algorithms for estimating *Z*eu have been developed for oceanic water bodies; however, remote estimation of *Z*eu is still a challenging task for inland waters. In this study, an existing semianalytical algorithm was modified for remotely estimating *Z*eu in turbid inland waters by replacing the original quasi-analytical algorithm (QAA) by QAA_Turbid, an algorithm specially developed for remotely estimating total absorption and backscattering coefficients in turbid waters. Performance of the modified algorithm was evaluated using *in situ* radiometric data collected in Japan’ s Lake Kasumigaura, known to be very turbid. Results showed that yielded acceptable estimation accuracy for *Z*eu (ranging from 1.15 to 2.26 m) with root-mean-square error (RMSE) of 0.12 m, normalized root-mean-square error (NRMS) of 8.01%, and mean normalized bias (MNB) of −1.84%, significantly outperforming the original version as well as three other *Z*eu retrieval algorithms. Application to the satellite images also yielded acceptable performances. These results indicate its great potential for operational estimation of *Z*eu over widespread turbid inland waters from satellite observations.

Keywords: Euphotic zone depth, remote sensing, inland waters

