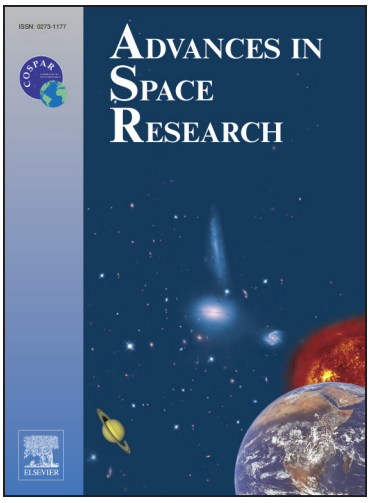

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A modern robust approach to remotely estimate chlorophyll in coastal and inland zones

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Abstract

The chlorophyll concentration of a water body is an important proxy for representing the phytoplankton biomass. Its estimation from multi or hyper-spectral remote sensing data in natural waters is generally achieved by using (i) the waveband ratioing in two or more bands in the blue-green or (ii) by using a combination of the radiance peak position and magnitude in the red-near-infrared (NIR) spectrum. The blue-green ratio algorithms have been extensively used with satellite ocean color data to investigate chlorophyll distributions in open ocean and clear waters and the application of red-NIR algorithms is often restricted to turbid productive water bodies. These issues present the greatest obstacles to our ability to a modern robust method suitable for quantitative assessments of the chlorophyll concentration in a diverse range of water types. The present study is focused to investigate the normalized water-leaving radiance spectra in the visible and NIR region and propose a robust algorithm (Generalized ABI, GABI algorithm) for chlorophyll concentration retrieval based on Algal Bloom index (ABI) which separates phytoplankton signals from other constituents in the water column. The GABI algorithm is validated using independent in-situ data from various regional to global waters and its performance is further evaluated by comparison with the blue-green waveband ratios and red-NIR algorithms. The results revealed that GABI yields significantly more accurate chlorophyll concentrations (with uncertainties less than 13.5 %) and remains more stable in different waters types when compared with the blue-green