

Remote Sensing Reflectance in the Near Infrared Derived From SeaWiFS: Implications for River Plume Particle Size Distribution, Atmospheric Correction, and Bio-Optical Algorithms

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Abstract: Remote sensing reflectance (R_{rs}) in the near-infrared (NIR) wavelengths is assumed negligible over open ocean clear waters, a basis for atmospheric correction of remote ocean color sensors such as the Sea-viewing Wide Field-of-view Sensor (SeaWiFS). For turbid river plumes such assumption is no longer valid, and various alternative approaches have been proposed for atmospheric correction. The default option in SeaDAS uses an iterative approach assuming a fixed relationship between R_{rs} at 670, 765, and 865 nm. However, because such relationship depends on the particle size in the plume, its validity needs to be investigated globally. Using SeaWiFS data and nearest-neighboring atmospheric correction, we derive and compare the relationship for several major river plumes including the Mississippi, the Amazon, and the Yangtze (Changjiang). The results are used to validate a spectra-matching optimization approach starting from the top of atmosphere (TOA) at-sensor radiance to take into account of both atmospheric correction and bio-optical inversion. Because reliable values of $R_{rs}(\text{NIR})$ in turbid river plumes are difficult to obtain from in situ measurements due to the self-shading of underwater instruments, such relationships also provide baseline data for correcting the stray-light contamination of above-water R_{rs} measurements, which will further help refine bio-optical algorithms.