

Assessing Suspended Inorganic Particle Size Distribution by Reflectance Spectroscopy: An Application to the Delta Drain and Front of Pearl River Estuary Waters

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Abstract: Suspended sediments in water environment are always be classified into organic matters and inorganic matters and investigated by remote sensing technology for years, but the detailed information, like grain size of these matters cannot be provided. In this paper, a quick and easy method of sizing suspended particles for inorganic matter dominant water was proposed.

The clay, silt and sand fractions in Pearl River Estuary (PRE) waters were assessed by finding a set of nonnegative solution of linear equations. The reflectance at the water surface can be related to water optical properties as a simple expression of the back-scattering coefficient and the absorption coefficient. Focusing on inorganic matter dominant water, inorganic suspended particles and colored dissolved organic matter (CDOM) were assumed to contribute the absorption coefficient of water. The linear equations were constructed by measured remote-sensing reflectance data and optical properties: (1) In-situ measured remote-sensing reflectance data at the red (600-720nm) spectral region; (2) CDOM absorption can be shaped by Bio-optical model; (3) Inorganic suspended particles absorption and back scattering can be calculated by Mie scattering theory.

The solution of equations was the number of particles according to size. Compared with the result of Xia (2004) [Xia, X.M., Y. Li, H. Yang, C.Y. Wu, T.H. Sing, and H.K. Pong. (October 2004), Observations on the Size and Settling Velocity Distributions of Suspended Sediment in the Pearl River Estuary, China. *Continental Shelf Research* 24(16), 1809], the estimation of PSDs was reliable by temporal and spatial distribution. Moreover, the suspended inorganic particles in delta plain and front of PRE waters were described by volume, the clay content is about 10%~31% in dry season and 26%~65% in wet season; the silt is 75%~89% in dry season and 35%~67% in wet season; the sand is 0.29%~1.37% in dry season and 0.17%~0.5% in wet season.

Keywords—particle size distribution, remote-sensing reflectance, suspended sediments