ANALYSIS ON WATER INHERENT OPTICAL PROPERTIES IN LIAODONG BAY OF CHINA

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Abstract: Water inherent optical properties, including mainly water spectral aborption coefficient and water backscattering coefficient, are important parameters on ocean color remote sensing and has a key function on the establishment of sedi-analytical model based on remote data. Petroleum pollution substance exist in water body in the form of float oil, disperse oil, emulsification oil and decompose oil etc. Water spectral absorption features must be influenced by them. Emulsification oil and decompose oil, etc in water can be absorbed by suspended particles. It will influence backscattering coefficient through de-pigment particles. This paper presents a study of water inherent optical properties with petroleum pollution.

The field work was made at the rivers located in Panjin city, Liaoning province of CHINA from 21st to 26th May 2008. Spectral absorption coefficient data of yellow substance, De-pigment particles and phytoplankton pigments were measured with the U-3010 spectrophotometer. Concurrent water samples for laboratory measurements of chlorophyll, petroleum pollution, and suspended material were collected. Spectral backscattering coefficient data measured by HydroSca-6 spectral backscattering sensor. The petroleum pollution concentration was analyzed with the infrared spectrophotometer.

Based on the data collected, spectral absorption features of yellow substance, De-pigment particles and phytoplankton pigments in Case II water were analyzed. Moreover, the spectral absorption spectral features of yellow substance and phytoplankton pigments with petroleum pollution was discussed. Finally the influence of petroleum pollution on water spectral absorption features was made certain with the method of algebraic difference. The results showed that (1) In the research region, whether there is petroleum substance or not in water body, the absorb spectral of yellow substance and de-pigment particles all follow e-exponential attenuation trend. And there are two peaks at 440nm and 675nm because of the effect of chlorophyll-a and one peak at 490nm because of the effect of carotenoid of pigments; (2) with the presence of petroleum pollution the spectral absorption coefficient of yellow substance and phytoplankton pigments can also be increased; (3) the spectral absorption feature of petroleum pollution is the same as yellow substance and de-pigment particles , namely they all follow e-exponential attenuation trend. However, it is feasible to distinguish them becase their exponential spectral slope have obvious difference. The research is promising to provide basis on the establishment of bio-optical models using remote sensing data according to the inherent optical properties the water with petroleum pollution.

About the study of water backscattering coefficient, on the basis of the analysis about inherent optical properties data, two kinds of models were established . One is the spectral model of water backscattering coefficient with

petroleum pollution . Another is the relationship model between water backscattering coefficient and suspended particle concentration, including two water status with and without petroleum pollution. The results showed that (1) in the research region, water backscattering coefficient follows gradually attenuation trend from 440 nm ro red band; (2) the averaged index of exponential function is 0.87 for all spectral models in this research; (3) according to the correlative coefficients between backscattering coefficient with phytoplankton , inorganic particles and petroleum pollution, inorganic particles had an dominant effect on water backscattering coefficient; (4) in the water without petroleum pollution, the relationship model was simulated well by logarithm function. However, in the water with petroleum pollution, the relationship model was simulated well by linear function.

Keywords: Suspended particle concentration; petroleum pollution; spectral absorption features ;backscattering coefficient; exponential spectral slope; relationship model