Retrieval Of Shallow Water Depth Around Islands And Reefs In The South China Sea Using Satellite Hyperspectral Data

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Abstract: The South China Sea is the heart of China marine transportation toward Western Pacific and the Indian Ocean, is one of the world's four major marine oil and gas fields, is the largest fishery in China. The South China Sea is vast and has fewer population. In this case, the satellite observation will undoubtedly having a special significance. In particular, the use of satellite hyperspectral data to retrieve the shallow water depth around the islands and reefs in the South China Sea do not depend on regular soundings and have a higher retrieval accuracy and retrieve the bottom reflectance simultaneously. In this study, the Hyperion onboard the EO-1 satellite launched NASA in 2000 and a semi-analytical model and hyperspectral optimization algorithm (HOPE) developed by Z. P. Lee are used to derive the shallow water depth and bottom reflectance in the Nansha Islands sea area. Nine Hyperion L1 data covering twelve islands and reefs are collected between 2007 and 2011. In situ water depth data and nautical chart are collected to validate the retrieved shallow depth around islands and reefs. As an example of Zhongzhou Reef, the average percentage error, the root mean square error and correlation coefficient are 14%, 1.53 and 0.96,respectively in the water depth of 0-15m. They are 15%, 2.68 and 0..93, respectively in the water depth of 0-25m. The average percentage error of water depth retrieval for Zhongye Island, Lutheran reef and sandbar four islands and reefs are 15%, 11%, 17% and 11%, respectively. The results indicate that the semi-analytical model and the HOPE algorithm is valid to retrieve the shallow water depth around islands and reefs in the South China Sea .

Keyword : Nansha Islands; HOPE； Hyperspectral; Water Depth; EO-1/Hyperion;