Geophysical Research Abstracts
Vol. 18, EGU2016-10947, 2016
EGU General Assembly 2016

Water turbidity mapping using Landsat-8 data in Mekong and Bassac Rivers, Vietnam

Va-Khin Lau (1,3), Chi-Farn Chen (1,2), Thanh-Son Nguyen (2), Dao-Nguyen Lam (4), and Cheng-Ru Chen (2)

(1) Department of Civil Engineering, National Central University, Taoyuan 32001, Taiwan;, (2) Center for Space and Remote Sensing Research, National Central University, Taoyuan County 32001, Taiwan; , (3) Institute of Oceanography, Vietnam Academy of Science and Technology, Nha Trang, Vietnam; , (4) Vietnam Southern Satellite Technology Application Center - VNSC - Vietnam Academy of Science and Technology, Ho Chi Minh City, Vietnam;

Turbidity is the cloudiness or haziness measured by the intensity of light scattered through a water sample and turbidity is often used as an indicator of water quality. Traditional studies of water turbidity are often implemented through costly and time-consuming field surveys, and water samples are analyzed in the laboratory. This method can be applied for a small region. However, the method often creates limitation due to the time bias of data collection, interpolation error, and cost when applied to a large region. In recent year, remote sensing technologies have proved the capacity of mapping turbidity or suspended solids by various data sources, including aerial photography, high resolution images (e.g., Spot, Formosat) and medium resolution images (e.g., Landsat), and low resolution images (e.g., MODIS, MERIS, and VIIR). The main of this study is to investigate the applicability of Landsat data for water turbidity mapping in Mekong and Bassac Rivers, Vietnam. The length of these two main rivers is approximately 210 km with the width ranging from 500 m to 5 km. Aerial photos and high resolution images (e.g., IKONOS, QuickView) are good candidates for this water turbidity monitoring purpose. However, it is costly. Low resolution images such as MODIS are relatively coarse, given the width of rivers in some areas smaller than 500 m. The Landsat 8 satellite launched in 2013 provides the multispectral data with seven bands and 30 m resolution, which are deemed suitable for water turbidity monitoring in the study region, and thus used in this study. The data were processed by first converting the digital number of each pixel to radiance. The atmospheric correction using FLAASH model was accordingly applied to generate surface reflectance data. We used the Bayesian model average (BMA) to investigate the relationship between Landsat spectral bands and field survey data, which were collected from 63 sites of 21 transects across the two rivers on 24 January 2015 synchronizing with the Landsat 8 data acquisition time. The survey data were separated into two parts Part-1 (42 samples) was used to model relationship between spectral bands and field data. Part-2 (21 samples) was used for validation of the modeling results. The results indicated that the higher correlations between Landsat bands and water turbidity were respectively observed for bands 1, 2, and 4 (Bayesian Information Criterion - BIC = -34.3 and R^2 = 0.66). The validation results also yielded a close agreement with R^2 of 0.65 and root mean square error (RMSE) of 5.3 NTU. This study demonstrates the possibility of Landsat 8 data for turbidity mapping in the study region, and thus the methods could be useful for water turbidity monitoring in Mekong and Bassac Rivers.