



Discrimination rice cropping systems using multi-temporal Proba-V data in the Mekong Delta, Vietnam

Nguyen-Thanh Son, Chi-Farn Chen, Cheng-Ru Chen, Ly-Yu Chang, Shou-Hao Chiang, and Khin-Va Lau
Center for Space and Remote Sensing Research, National Central University, Jhongli District, Taoyuan City, Taiwan
(ntsonait@hotmail.com)

Rice is considered a main source of livelihoods for several billions of people worldwide and plays an important role in the economy of many Asian countries. More than just a food source, rice production is regarded as one of the most important components to maintaining political stability and is also a national subject of economic policy due to domestic food consumption and grain exports. Vietnam is globally one of the largest rice producers and suppliers with more than 80% of the exported rice amount produced from the Mekong River Delta. This delta is one of the three deltas in the world most vulnerable to the climate change, causing the potential loss of rice yields. Thus, spatiotemporal information of rice cropping systems is important for agricultural management to ensure food security and rice grain exports. Coarse resolution satellite data such as MODIS demonstrates the applicability for rice mapping at a large scale. However, the use of MODIS data for such a monitoring purpose still reveals a challenging task due to mixed-pixel issues. The Proba-V satellite launched on 7 May 2013 is a potential candidate for this monitoring purpose because the data include four spectral bands (blue, red, near-infrared and mid-infrared) with a swath of 2,285 km with a spatial resolution of 100 m and temporal resolution of 5 days. This study aimed to investigate the applicability of multi-temporal Proba-V data for mapping rice cropping systems in Mekong Delta River, South Vietnam. The data were processed for 2014–2015 rice cropping seasons, following three main steps: (1) construction of smooth time-series NDVI data, (2) classification of rice cropping systems using crop phenological metrics, and (3) accuracy assessment of the mapping results. The results indicated that the smooth time-series NDVI profiles characterized the temporal spectral responses of rice fields through different growing stages of rice plant, which was critically important for understanding rice crop phenology and developing an algorithm for rice crop mapping. The classification results achieved from the classification of smooth time-series NDVI data using phenological metrics were compared with ground reference data yielded satisfactory results with the overall accuracy and Kappa coefficient higher than 85% and 0.7, respectively. These results were also reaffirmed by a close relationship with the government's rice area statistics. This study leads to a realization of the potential application of Proba-V data for rice cropping systems monitoring in the study region using crop phenology approach.