Generation of high spatiotemporal resolution from SPOT and MODIS imageries data for rice crop phenology detection

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ABSTRACT: Information on rice crop phenology is important for crop management. It can be obtained by an analysis of the time-series profile of satellite imagery and used for evaluating the growth and mapping the spatial distribution of crops. High-resolution satellite data such as Système Pour l'Observation de la Terre (SPOT) images have advantageous spatial characteristics for describing crop properties. However, the temporal resolution of the SPOT data is low and the data were easily contaminated by clouds. These problems can be overcome by fusing the SPOT imagery with the Moderate Resolution Imaging Spectroradiometer (MODIS) data that have higher temporal resolution. In this study, our attempt is to generate the higher spatiotemporal resolution data from SPOT and MODIS data for rice crop phenology detection in Taiwan. The data were processed using the spatial and temporal adaptive fusion model (STARFM) and the methodology comprises four main steps:(1) constructing the time-series Normalized Difference Vegetation Index (NDVI) data based on STARFM algorithm, (2) filtering noise from the time-series data using the empirical mode decomposition (EMD), (3) detecting rice crop phenology (i.e., sowing, heading, and harvesting dates) by an analysis of the smooth crop time-series profile , and (4) verifying the results using field survey data. The preliminary results confirmed the feasibility of using STARFM and EMD for investigating rice crop phenology in study area. The information of rice crop phenology produced from this study would be useful for studies of rice crop mapping and monitoring in the future.

KEY WORDS: MODIS, phenology, STARFM, EMD