Flood mapping with multitemporal MODIS data

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Flood is one of the most devastating and frequent disasters resulting in loss of human life and serve damage to infrastructure and agricultural production. Flood is phenomenal in the Mekong River Delta (MRD), Vietnam. It annually lasts from July to November. Information on spatiotemporal flood dynamics is thus important for planners to devise successful strategies for flood monitoring and mitigation of its negative effects. The main objective of this study is to develop an approach for weekly mapping flood dynamics with the Moderate Resolution Imaging Spectroradiometer data in MRD using the water fraction model (WFM). The data processed for 2009 comprises three main steps: (1) data pre-processing to construct smooth time series of the difference in the values (DVLE) between land surface water index (LSWI) and enhanced vegetation index (EVI) using the empirical mode decomposition (EMD), (2) flood derivation using WFM, and (3) accuracy assessment. The mapping results were compared with the ground reference data, which were constructed from Envisat Advanced Synthetic Aperture Radar (ASAR) data. As several error sources, including mixed-pixel problems and low-resolution bias between the mapping results and ground reference data, could lower the level of classification accuracy, the comparisons indicated satisfactory results with the overall accuracy of 80.5% and Kappa coefficient of 0.61, respectively. These results were reaffirmed by a close correlation between the MODIS-derived flood area and that of the ground reference map at the provincial level, with the correlation coefficients (R^2) of 0.93. Considering the importance of remote sensing for monitoring floods and mitigating the damage caused by floods to crops and infrastructure, this study eventually leads to the realization of the value of using time-series MODIS DVLE data for weekly flood monitoring in MRD with the aid of EMD and WFM. Such an approach that could provide quantitative information on spatiotemporal flood dynamics for monitoring purposes was completely transferable to other regions in the world.