Validation of GOES-R ABI Flood and Standing Water Algorithm

NOAA Satellite Science Week
Kansas City, MO
April 30 – May 4, 2012

Rui Zhang[1], Donglian Sun[1], Yunyue Yu[2]

[1]Department of Geography and Geoinformation Science, College of Science, George Mason University. Fairfax, VA, 22030, USA
[2]NOAA/NESDIS Center for Satellite Application and Research, Camp Spring, MD 20748, USA

Validation is an important task in the development of satellite remote sensing products. Strategies for validation vary depending on the nature of the products. In this study, the validation process of the flood and standing water (FSW) product for the Geostationary Operational Environmental Satellite - R series (GOES-R) is presented. A major challenge in the validation of the FSW product is the lack of ground truth flood maps and similar reference products from other satellite systems and other sources. To overcome this limitation, a two-level validation scheme for the FSW product is developed using the Moderate-resolution Imaging Spectroradiometer (MODIS) data as a proxy. In the first level, gauging station data collected by the U.S. Geological Survey (USGS) are employed as ground truth flood point information on local scales to verify the effectiveness of the proposed algorithm for flood detection. Gauging station data collected during 34 flood cases that occurred in 2010 and 2011 in the continental US are validated and assessed according to the rate of correct detection. Results showed 79.71% flooding gauging stations were accurately detected from MODIS images by the proposed FSW algorithm. In the second level of validation, a classification plus human interpretation-based hybrid flood area validation is performed. Flood detection accuracies for three major flood events are evaluated. FSW results detected using the proposed algorithm are compared to the interpreted reference flood maps, which are generated from a supervised support vector machine (SVM) classification followed by human interpretation and further editing. Confusion matrices are employed as the accuracy measurement for the second level of the validation. Commission errors and omission errors of flood pixels for all three tested cases are significantly lower than 40% false classification rate, which is the accuracy requirement of the product in specification. The running time of the algorithm has been evaluated as well in validations. The validation results suggest that the employed FSW algorithm is capable of producing flood and standing water maps in an operational environment, and it meets the required accuracy and execution time of the product.