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IDENTIFICATION OF CHANGES IN A FORESTED AREA USING POLARIMETRIC SAR DATA AT C-BAND

Abstract

Recently, Synthetic Aperture Radar (SAR) systems are widely used, primarily, due to their spatial resolution and potential to collect images during both day and night, independently on the weather conditions. Currently, polarimetric SAR (PolSAR) systems are able to collect images at 4 linear polarizations (HH, HV, VH, and HH) and the phase information associated to these polarizations. Particularly, the RADARSAT-2 polarimetric system has shown potentiality to classify different land covers due to its penetration characteristic. Landcover classification using SAR polarimetric data has received a particular attention and different methodologies have been developed. These methodologies are based on target decomposition theory in order to separate the different components representing the scattering mechanisms. Among different existing polarimetric parameters, it is necessary to identify those that are sensitive to each of the different landcovers presented in the scene. This study presents the selection of the optimal polarimetric parameters form the RADARSAT-2 satellite to identify forested areas. The selection algorithm is based on a genetic algorithm to select the optimal parameters and a neural network to define the object functions. To remove possible redundant information, we implemented a multi-objective function. The site of study is the Calakmul Biosphere Reserve, located in Campeche, Southern Mexico, during 2013 and 2014. Fieldwork was conducted to validate the delineated regions by the classification algorithm. The classification algorithm obtained an overall accuracy of 80% to identify forested areas. The results show that high-incidence images are more suitable to extract forest characteristics. During the dry season, volume scattering reduces its contribution primarily due to the low vegetation water content.