

GC51G-1093

Spectral Angle Mapping Multitemporal Approach in SPOT VEGETATION Time-Series to Detect Sugarcane Areas in São Paulo State, Southeastern Brazil

Daniel Gomes, Luiz E. Vicente, Edlene Garçon, Gustavo B. Silva, Ricardo G. Andrade, Fabio E. Torresan
Embrapa Satellite Monitoring, Campinas, Brazil

Increased global demand for biofuels means a huge expansion of new types of farming, especially for ethanol production. In tropical regions, sugarcane constitutes one of the main sources of ethanol and the basis of a new renewable energy matrix which is supported by large investments. In Brazil, the state of São Paulo is responsible for producing approximately 60% of the national sugarcane yield. Remote sensing appears as a useful tool to monitor and map sugarcane and its expansion areas. In this context, the aim of this work was to detect sugarcane areas using NDVI time series. SPOT-Vegetation S-10 NDVI data extracted from red (0.61 - 0.69 μm) and NIR (0.78 - 0.89 μm) bands from January 2004 to December 2010 were stacked, and some class samples were selected to perform Spectral Angle Mapper (SAM) classification. The endmembers classes chosen were: sugarcane, pasture and forest, with five samples for each class. The samples mean spectra of each class were used as reference spectra in SAM algorithm. Then, sugarcane area mapping was performed using the SAM rule images color composite of sugarcane (red), forest (green) and pasture (blue) classes. The results were influenced by the image's low spatial resolution (1.1 x 1.1 km per pixel), since SAM is very sensitive to the spectral mixture within pixels. Thus, class discrimination could only be determined by checking the spectral behavior of all classes simultaneously, with a color composite image. SAM similarity for the three classes was high throughout the whole image, nonetheless some nuances helped in the identification of sugarcane areas. Areas with high values of sugarcane and the lowest values of pasture coincided with areas of very intense sugarcane occupation mapped by INPE's CANASAT project. Pasture discrimination was not well performed, once this land-use class appears in very fragmented areas mixed with short-cycle crop areas. In general, extensive sugarcane areas were correctly detected using this methodology, which appears as a feasible technique for agricultural mapping.