Everglades Wetland Classification using object-based approach with Terra-SAR and RapidEye satellite data

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ABSTRACT:
The Everglades are the largest natural region of tropical and subtropical wilderness included in the list of World Heritage. Over the past century, the Everglades wetlands have been threatened by severe environmental stresses induced global climate change, severe population growth, land proclamation and urbanization. There is a high need to monitor the ecosystem changes with recognition of its ecological functions as well as economic importance. For this purpose, detailed assessment of the vegetation distribution is very useful. In this study, we examined the capability of remotely sensed Synthetic Aperture Radar (SAR) observations for vegetation classification of tropical and subtropical wetland areas. The TerraSAR-X quadruple polarimetric (quad-pol) synthetic aperture radar (PolSAR) data were processed using the Hong & Wdowinski four-component decomposition, which accounts for double bounce scattering in cross polarization signal. The calculated decomposition map characterizes the wetland vegetation according to the four scattering mechanisms (single, co- and cross-pol double, and volume scattering). The X-band TerraSAR-X signal has a high sensitivity to distinguish between vegetation types, in particular, the distribution of mangroves along the tidal channels. We also used a high-resolution multispectral optical Rapid-Eye image to compare statistics and classification results with SAR observations.

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