The 36th International Symposium on Remote Sensing of Environment,
11 – 15 May 2015, Berlin, Germany, ISRSE36-133-1

SAR-OPTICAL SYNERGY IN SAVANNA ECOSYSTEM FRACTIONAL VEGETATION COVER MAPPING

V. O. Odipo [a, *], C. Hüttich[b], C. Schmullius[c]

[a] Friedrich Schiller Universität-Jena, Department of Earth Observation, Institut für Geographie, Grietgasse 6, 07743 Jena, Germany – victor.onyango@uni-jena.de
[b] Friedrich Schiller Universität-Jena, Department of Earth Observation, Institut für Geographie, Grietgasse 6, 07743 Jena, Germany – christian.huettich@uni-jena.de
[c] Friedrich Schiller Universität-Jena, Department of Earth Observation, Institut für Geographie, Grietgasse 6, 07743 Jena, Germany – c.schmullius@uni-jena.de

THEME: Forests, Biodiversity and Terrestrial Ecosystems.

KEY WORDS: SAR-optical fusion, Savanna ecosystems, vegetation cover fraction, polarization

ABSTRACT:

The heterogeneity in tropical savanna ecosystem poses a challenge in separation of life forms, an important aspect in assessing biogeochemical interactions, and particularly the role of this biome in global carbon circulation. We evaluate the potential of fusing multi-sensor optical datasets (RapidEye and Landsat) with L-band ALOS PALSAR in mapping South African savanna vegetation structure with regards to seasonal phenological variability between 2009 and 2013. Additionally, the study investigated the effects of SAR polarization, and resolution on the vegetation fractional separability in savanna ecosystem. The vegetation was separated based on spectral characteristics of three life-forms, mainly photosynthetic vegetation (*f*PV), non-photosynthetic vegetation (*f*NPV) and background cover (*f*B) using optical datasets at 6-, and 30 m resolutions. The L-band ALOS PALSAR single (HH) and dual polarization (HH+HV) datasets were processed and resampled to the same resolutions as the optical datasets. Backscatter intensity analysis was then performed based on polarizations, and a logistic regression analysed on the relationship between backscatter and the fractional vegetation covers during dry, wet and a transition between these seasons. A linear relationship exists between the amount *f*PV and backscatter during the transition between dry to wet, and wet seasons. A 86% (p=8.04e-06) fractional discrimination was possible in the wet months of February/March, while it was not possible in the dry months due to absence or low photosynthetic activity in both *f*PV and *f*NPV. On average the horizontal transmit-vertical receive (HV) backscatter showed higher potential for separation of *f*PV from *f*NPV and *f*B with the peak potential during the wet season. The SAR data had an added advantage in capturing data in the cloudy tropical savanna.

* Corresponding author.