

Synergetic Use of multi-temporal ALOS PALSAR and ENVISAT ASAR data for Topographic/Land Cover Mapping and Monitoring at National Scale in Africa

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Abstract

The use of Synthetic Aperture Radar (SAR) data in large parts of the African countries, in particular for those close to the equator, is often *conditio sine qua non*, simply due to the fact that optical data are severely hampered by clouds, especially during the raining (corresponding to the crop) season.

The objective of this paper is, in primis, to present a methodology – and the corresponding results – for the generation of land cover maps and changes over large areas by using multi-temporal interferometric ALOS PALSAR Fine/Dual Beam data and multi-temporal ENVISAT ASAR Image Mode/Alternating Polarization images. In synthesis, the method is based on data fusion, by considering the key data characteristics and related acquisition modes leading to interferometric, multi-temporal interferometric, and multi-temporal intensity signatures. Furthermore, in order to enhance the discrimination capability between similar (in radiometric, temporal and interferometric terms) targets, geometric descriptors are additionally derived and included in the prior knowledge-based classifier that requires neither user-defined parameters nor reference samples to run. The results clearly show that the synergetic use enables the reliable identification of key land cover types (in particular cropped areas, bare soil areas, forestry, forest clear cut, forest burnt areas, water bodies) and their evolution over time, providing basic information on the land cover status. Finally, it is shown that using the same repeat-pass interferometric ALOS PALSAR data set, a Digital Elevation Model (DEM) with higher quality than the Shuttle Radar Topographic Mission one can be generated in those nearly equatorial – non dense forest – regions.