

Radar and Optical Data Integration for Vegetation and Other Land Cover Mapping

Barry Haack

Department of Geography, MSN 1E2,
George Mason University, Fairfax, VA 22030

ABSTRACT

Radar is of increasing interest to the remote sensing community because these data, particularly from spaceborne platforms, have only recently become more easily and systematically available. One of the difficulties with current spaceborne radar is that it is only single wavelength and single polarization limiting its utility for many processing strategies and applications. This study explored several techniques to increase mapping capabilities with spaceborne radar.

Two general radar processing procedures were examined. First, the number of radar bands were expanded by multiband analysis and use of texture measures to create new bands. Secondly, various spatial aspects of the data were examined including speckle suppression, texture window size and post-classification filtering.

This study also evaluated the advantages of combining traditional spaceborne optical data from the visible and infrared wavelengths with the longer wavelengths of radar. Different integration strategies including number of sensor bands, weighting of bands and principle components were explored.

Several East African landscapes including areas of settlements, natural vegetation, and agriculture were examined. For these study sites, multisensor data sets were digitally integrated with training and truth information derived from field visits.

The primary methodology was standard image processing spectral signature extraction and application of a statistical decision rule to classify the surface features. The relative accuracy of the classifications were established by comparison to ground truth information.

These results show both the ability to improve radar mapping as an independent sensor and the potential of optical/radar merger for mapping basic land use/cover patterns. Given the range of landscapes examined, the results of this study should have wide applicability. An important observation is that there are no consistent strategies for using radar and sensor integration that will provide the best results. As with optical data, the most productive processing strategies may be somewhat site and data specific.