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COMBINATION OF SATELLITE AND ANCILLARY DATA FOR CROP CLASSIFICATION IN WEST AFRICA

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ABSTRACT:

Efficient agricultural monitoring systems rely on accurate and timely information on crop area statistics (GEOSS 2009). In the past thirty years, remote sensing based estimation of crop area statistics have been found to be cost effective and reliable compared to conventional methods (Okhimamhe 2003). Analysis of multi-temporal satellite imagery permits the discrimination of crops, from which the required statistics can be computed (Jewell 1989, De Wit and Clevers 2004, McNairn *et al.* 2009). However, the complexity of cropping systems, different management practices and regional variations in climate often lead to low accuracies when classification is limited to only spectral information (Jensen 1996, Wardlow *et al.* 2007, Peña-Barragán *et al.* 2011). This situation is aggravated in heterogeneous and highly fragmented landscapes such as in West Africa (Cohen and Shoshany 2005, Forkuor *et al.* 2014). Integration of ancillary data such as soil, rainfall, digital elevation model (DEM) and transportation network in the classification process has been noted to improve classification accuracy and the quality of remote sensing derived products (Hutchinson 1982, Kontoes *et al.* 1993, Foody 1995, Ortiz *et al.* 1997, Elumnoh and Shrestha 2000, Foody and Mathur 2004, Ozdogan and Gutman 2008). The relationship between crop types, spectral information, and ancillary data can assist in formulating learning rules that can improve the discrimination of different crop types(Cohen and Shoshany 2002, 2005). Further, the use of ancillary data can aid in selecting the optimal number of training samples for classification (Foody and Mathur 2004). In this study, a knowledge-based classification approach that integrates high spatial resolution satellite data (RapidEye, TerraSAR-X) and three ancillary layers (soil type, DEM and proximity to settlements) is used to map crop types/groups in a rural watershed in West Africa. The overall goal of the research is to investigate how the above mentioned ancillary data can improve crop classification accuracies in the heterogeneous landscape of West Africa.

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