

A Simple Reclassification Method for Correcting Uncertainty in Land Use/Land Cover Data Sets Used with Land Surface Models

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Abstract—With increasing computational resources, environmental models are run at finer grid spacing to resolve the land surface characteristics. The land use/land cover (LULC) data sets input into land surface models are used to assign various default parameters from a look-up tables. The objective of this study is to assess the potential uncertainty in the LULC data and to present a reclassification method for improving the accuracy of LULC data sets. The study focuses on the Southern Great Plains and specifically the Walnut River Watershed in southeastern Kansas, USA. The uncertainty analysis is conducted using two data sets: The National Land Cover Dataset 1992 (NLCD 92) and the Gap Analysis Program (GAP) data set, and a reclassification logic tree. A comparison of these data sets showed that they do not agree for approximately 27% of the watershed. Moreover, an accuracy assessment of these two data sets indicated that neither had an overall accuracy as high as 80%. Using the relationships between land-surface characteristics and LULC, a reclassification of the watershed was conducted using a logical model. This model iteratively reclassified the uncertain pixels according to their surface characteristics. The model utilized normalized difference vegetation index (NDVI) measurements during April and July 2003, elevation, and slope. The reclassification yielded a revised LULC dataset that was substantially improved. The overall accuracy of the revised data set was nearly 93%. The study results suggest: (i) as models adopt finer grid spacings, the uncertainty in the LULC data will become significant; (ii) assimilating NDVI into the land-surface models can reduce the uncertainty due to LULC assignment; (iii) the standard LULC data sets must be used with caution when the focus is on local scale; and (iv) reclassification is a valuable means of improving the accuracy of LULC data sets prior to applying them to local issues or phenomena.

Key words: Land use, land cover, land surface modeling, NDVI, land-surface characteristics, surface heterogeneity.

1. Introduction

An accurate description of land-surface characteristics is important to a wide array of applications. Some examples include managing natural resources (LIU *et al.*, 2005) and local development (YANG and LO, 2002), understanding the relationship

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