IMPACTS OF LAND USE/LAND COVER CHANGE ON CLIMATE AND FUTURE RESEARCH PRIORITIES

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Human activities have modified the environment for thousands of years. Significant population increase, migration, and accelerated socioeconomic activities have intensified these environmental changes over the last several centuries. The climate impacts of these changes have been found in local, regional, and global trends in modern atmospheric temperature records and other relevant climatic indicators.

An important human influence on atmospheric temperature trends is extensive land use/land cover change (LULCC) and its climate forcing. Studies using both modeled and observed data have documented these impacts (e.g., Chase et al. 2000; Kalnay and Cai 2003; Cai and Kalnay 2004; Trenberth 2004; Vose et al. 2004; Feddema et al. 2005; Christy et al. 2006; Mahmood et al. 2006b; Ezber et al. 2007; Nuñez et al. 2008). Thus, it is essential that we detect LULCCs accurately, at appropriate scales, and in a timely manner so as to better understand their impacts on climate and provide improved prediction of future climate.

The National Research Council (NRC 2005) has recommended the broadening of the climate change issue to include LULCC processes as an important climate forcing. The findings of this report state the following:

> Regional variations in radiative forcing may have important regional and global climatic implications that are not resolved by the concept of global mean radiative forcing. Tropospheric aerosols and landscape changes have particularly heterogeneous forcings. To date, there have been only limited studies of regional radiative forcing and response. Indeed, it is not clear how best to diagnose a regional forcing and response in the observational record; regional forcings can lead to global climate responses, while global forcings can be associated with regional climate responses. Regional diabatic heating can also cause atmospheric teleconnections that influence regional climate thousands of kilometers away from the point of forcing. Improving societally relevant projections of regional climate impacts will require a better understanding of the magnitudes of regional forcings and the associated climate responses.