Jul 1st, 12:00 AM

Impacts of Forest Disturbances on the Carbon Cycle in the Laurentian Plains and Hills of the United States

Jinxun Liu

Shuguang Liu

Linda S. Heath

Thomas R. Loveland

Larry L. Tieszen

Impacts of Forest Disturbances on the Carbon Cycle in the Laurentian Plains and Hills of the United States

Jinxun Liu, Shuguang Liu, Linda S. Heath, Thomas R. Loveland, Larry L. Tieszen
EROS, Sioux Falls, SD, USA.
jxliu@usgs.gov

Abstract: Land cover changes over large areas can be monitored using remote sensing (RS) technology. These changes are one of the key driving forces for ecosystem carbon (C) dynamics. We applied the General Ensemble Biogeochemical Modeling System (GEMS) using a top-down, remote sensing (RS) driven mechanism to estimate forest C fluxes in the Laurentian Plains and Hills ecoregion in the northeastern United States for the period of 1972-2000. Disturbances such as forest stand replacement were detected on 30 randomly-located 10-km by 10-km sampling blocks using Landsat imagery at 60-m resolution. Spatially explicit modeling of carbon dynamics in GEMS was organized using the joint frequency distribution of major controlling variables. Each unique combination of these variables forms a simulation unit. For each forest simulation unit, a Monte Carlo process was used to initialize forest type, forest age, forest biomass, and soil C based on county level Forest Inventory and Analysis (FIA) data and the State Soil Geographic (STATSGO) data. Ensemble simulations were performed for each simulation unit to incorporate input uncertainty into the simulations, providing uncertainty estimates for model outputs. The results include forest ecosystem C budgets, land cover change impacts, and uncertainties of model outputs.

Keywords: carbon budget, land cover change, biogeochemical modeling, uncertainty