VEGEATION HEIGHT, BIOMASS AND CARBON MAPPED IN THE CONTERMINOUS UNITED STATES FROM OPTICAL AND INSAR SATELLITE AND FOREST INVENTORY DATA

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SUMMARY

One of the goals of the North American Carbon Program (NACP) is to develop a quantitative scientific basis for regional- to continental-scale carbon accounting to reduce uncertainties about the carbon cycle component of the climate system. In support of this goal, the National Biomass and Carbon Dataset 2000 (NBCD 2000), a high-resolution, ecoregional database of circa-2000 vegetation canopy height, above ground biomass, and carbon stocks for the conterminous U.S., has been completed. Area-based estimates of terrestrial biomass and carbon are best captured when biophysical measures of both horizontal and vertical vegetation structure are obtained ([1]-[7]). Given the complementary nature and quasi-synchronous data acquisition of the InSAR 2000 Shuttle Radar Topography Mission (SRTM), the Landsat-based 2001 National Land Cover Database (NLCD), and data sets from the national LANDFIRE project, this project exploits the synergy afforded by the fusion of these high-resolution, spatially explicit data sources. Whereas the thematic layers of the NLCD and LANDFIRE projects were suitable for characterizing horizontal structure (i.e., cover type, canopy density, etc.), the SRTM acquisition, in conjunction with the National Elevation Dataset (NED) provided information relating to the vertical structure, i.e., primarily height. To produce maps of canopy height and aboveground biomass from these remotely sensed data sources, field reference data obtained from the USDA Forest Service – Forest Inventory and Analysis (FIA) network of sample plots were used to develop tree-based regression models for use in height and biomass predictions. The NBCD 2000 project followed the

same ecoregional mapping zone approach employed by the NLCD and LANDFIRE projects. For each of the 66 ecoregional mapping zones comprising the conterminous U.S., high-resolution (30 m) raster maps of canopy height and aboveground biomass together with error estimates are now available online (http://whrc.org/NBCD). This paper discusses the results of Carbon estimation in the conterminous United States through various comparison methods including bootstrapped determination of correlation coefficients between estimated and FIA measurement data, and map evaluation at the plot level, county level, state level, and a hexagonal grid appropriate for statistical significance in the FIA data. Results show a very good correlation and spatial congruence of the maps showing the hectare scale estimates of vegetation height, aboveground biomass, and associated carbon in the could successfully be mapped.

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