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Simulation of leaf area index and biomass at landscape scale

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The method for simulating the temporal and spatial distribution patterns of leaf area index (LAI) and biomass at landscape scale using remote sensing images and surface data was discussed in this paper. The procedure was: (1) annual maximum normalized difference vegetation index (NDVI) over the landscape was calculated from TM images; (2) the relationship model between NDVI and LAI was built and annual maximum LAI over the landscape was simulated; (3) the relationship models between LAI and biomass were built and annual branch, stem, root and maximum leaf biomass over the landscape were simulated; (4) spatial distribution patterns of leaf biomass and LAI in different periods all the year round were obtained. The simulation was based on spatial analysis module GRID in ArcInfo software. The method is also a kind of scaling method from patch scale to landscape scale. A case study of Changbai Mountain Nature Reserve was dissertated. Analysis and primary validation were carried out to the simulated LAI and biomass for the major vegetation types in the Changbai Mountain in 1995.

Simulation of leaf area index and biomass at landscape scale ZHANG Na¹, YU Guirui², YU Zhenliang³, ZHAO Shidong² (1. Department of Earth Science, Graduate School, CAS, Beijing 100039, China; 2. Inst. of Geographic Sciences and Natural Resources Research, CAS, Beijing 100101, China; 3. National Natural Science Foundation of China, Beijing 100085, China) Leaf area index (LAI) and biomass are important variables to calculate net primary productivity (NPP) at patch scale, and can be derived from field measurement. However, it is often very difficult to measure LAI and biomass at larger scale such as landscape or regional scale. Therefore, it is very necessary to calculate these variables by indirect methods. The method for simulating LAI and biomass at landscape scale is discussed in this paper. The method is based on Landsat Thematic Mapper (TM) images and LAI and biomass measurements at patch scale. 1 Materials and method 1.1 General situations of study area 1.2 Data obtaining and processing 1.2.1 Method for processing Landsat TM image 1.2.2 Method for obtaining sample plot data 1.3 Leaf area index simulation 1.3.1 Maximum leaf area index simulation 1.3.2 Seasonal variation of leaf area index simulation 1.4 Biomass simulation 2 Results and analysis 2.1 Temporal and spatial distribution and validation of leaf area index 2.1.1 Temporal and spatial distribution of leaf area index 2.1.2 Validation of leaf area index 2.2 Temporal and spatial distribution and validation of biomass 2.2.1 Temporal distribution of leaf biomass 2.2.2 Spatial distribution of biomass 2.2.3 Validation of biomass 3 Discussion 4 Summary

关键词: Landscape scale; leaf area index; biomass; remote sensing; field measurement