地球科学进展 2009, 24(7) 748- DOI: ISSN: 1001-8166 CN: 62-1091/P

遥感反演与估算

基于LIDAR数据的森林参数反演方法研究

何祺胜[1,2,3];陈尔学[3];曹春香[1*];刘清旺[3],庞 勇[3]

1.北京师范大学/中国科学院遥感应用研究所遥感科学国家重点实验室，北京 100101;
2.中国科学院研究生院，北京 100049;3.中国林业科学研究院资源信息研究所， 林业遥感与信息技术重点开放性实验室，北京 100091

摘要：

森林结构参数诸如林分平均高、平均冠幅、平均胸径、林分密度、地上生物量等的空间分布对于森林可持续经营管理具有重要意义。以黑河流域祁连山大野口典型森林区为研究区，采用高密度LIDAR小脚印点云数据，在进行单木结构参数提取的基础上，按20 m×20 m大小的网格进行了小区域森林参数反演研究。首先由LIDAR点云数据生成冠层高度模型（Canopy Height Model，CHM），从CHM中估测单株木结构参数树的位置、树高、冠幅。然后采用多元逐步回归分析法建立样地（20 m×20 m）尺度上LIDAR估测的平均树高、冠幅等与实测森林参数（林分平均高、林分算数平均高、平均冠幅、平均胸径、林分密度、地上生物量）之间的关系。结果表明，林分平均高、林分算术平均高、地上生物量的估测方程精度较高， R 2均大于0.7，平均冠幅、平均胸径、林分密度的估测方程 R 2均大于0.5，根据建立的方程得到了森林参数的空间分布图。高密度LIDAR数据可以得到较高精度的森林参数空间分布图，对于森林可持续经营管理以及林相图的更新等具有重要意义，同时对小流域森林水文科学的研究具有重要的应用价值。

关键词： LIDAR;森林参数反演;黑河流域大野口

A Study of Forest Parameters Mapping Technique Using Airborne LIDAR Data

HE Qisheng 1,2,3 , CHEN Erxue 3, CAO Chunxiang 1, LIU Qingwang 3, PANG Yong 3

1.State Key Laboratory of Remote Sensing Science, Jointly Sponsored by the Institute of Remote Sensing Applications of Chinese Academy of Sciences and Beijing Normal University, Beijing 100101, China; 2.Graduate University of Chinese Academy of Sciences，Beijing 100049, China; 3.Research Institute of Forest Resource Information Techniques, State Laboratory for Forest Remote Sensing and Information Techniques, Chinese Academy of Forestry, Beijing 100091, China

Abstract:

Estimating spatial forest stand variables such as mean height, mean crown diameter, mean diameter breast height DBH, tree density and aboveground biomass is important for sustainable forest management. This study aimed to estimate forest stand variables in coniferous tree species of Picea crassifolia stand in the Qilian Mountain, western China from single tree detection using small footprint airborne LIDAR data. Based on the LIDAR data, a canopy height model (CHM) was firstly computed as the difference between tree canopy hits and the LIDAR terrain elevation values. In this study, a double tangents crowns recognition algorithm was used to extract single tree location, height and crown polygon.

Stepwise multiple regression models were used to develop equations relating LIDAR derived parameters, such as tree height, stand density and crown width, with observed forest parameters for each sample plot. The precision of equation for estimating mean stand height, tree density and aboveground biomass is high, with R 2 bigger than 0.7 . These results showed that the LIDAR data was useful for forest stand variables. Finally, the spatial forest stand variables maps were established using the stepwise multiple regression equations. The results showed that high density LIDAR data could be used to get forest variables distribution maps with relatively high precision, which was of important practical significance for sustainable forest management and update of forest form map, and for forest hydrological science research in small basin.

Keywords: LIDAR Forest parameters estimation Dayekou area in the Heihe River Basin.

收稿日期 2009-05-20 修回日期 2009-07-07 网络版发布日期 2009-07-10

DOI:

基金项目:

国家重点基础研究发展计划项目“陆表生态环境要素主被动协同反演理论与方法”（编号：2007CB714404）;中国科学院西部行动计划（二期）项目“黑河流域遥感—地面观测同步试验与综合模拟平台建设”（编号：KZCX2 XB2 09）资助.

通讯作者: 曹春香(1964)，女，内蒙古呼和浩特人，研究员，主要从事森林遥感与公共卫生领域空间信息技术应用研究. [WT6HZ]E mail:[WT6BZ]cao413@irsa.ac.cn

作者简介: 何祺胜(1981)，男，山东定陶县人，博士研究生，主要从事森林定量遥感研究.E-mail:heqis111@gmail.com

作者Email:

参考文献：

本刊中的类似文章
