

研究报告

地理信息系统与模型集成技术在林地林木产量和光能利用率估测中的应用

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摘要

利用福建省气象要素观测及山地土壤调查资料, 探讨地理信息系统和数学模型集成技术在区域林地栅格空间林木产量和光能利用率估测中的应用. 结果表明, 区域年均温、降水量和太阳总辐射能与经度、纬度及海拔的2次趋势面分析模型相关性均达极显著水平, 复相关系数为0.692~0.981. 采用地理信息系统与2次趋势面分析及1、2和4次反距离权重插值模型集成技术可分别较准确推算区域太阳总辐射能、年均温和降水量的空间数据, 验证气象站点相应气象要素观测值与模型推算值之间的差异均未达显著水平, t值仅分别为1.29、0.12和0.06. 借助地理信息系统与相关模型集成技术可实现区域林地栅格空间林木产量和光能利用率的估测, 研究区林地林木产量和光能利用率分别为2.32~18.61 $\text{m}^3 \cdot \text{hm}^{-2} \cdot \text{yr}^{-1}$ 和0.11%~0.91%.

关键词 [地理信息系统, 数学模型, 林地, 林木产量, 光能利用率](#)

分类号

Application of GIS and integrated mathematic models on estimating forest land wood productiveness and solar energy use efficiency

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Abstract

Based on the meteorological elements observation and mountain soil survey in Fujian Province, this paper approached the application of geographic information system (GIS) and integrated mathematic models on estimating the grid wood productiveness and solar energy use efficiency (SEUE) of regional forest land. The results showed that there was a significant quadratic correlation of annual mean temperature, precipitation and total solar radiation energy (TSRE) with longitude, latitude and altitude, and their multiple correlation coefficients ranged from 0.692 to 0.981. The regional annual mean TSRE, temperature and precipitation could be well estimated by GIS and integrated models of quadratic tendency curve, and linear, quadratic and quartic inverse distance weighted interpolation. These annual means estimated by the models did not differ greatly from observed data, and the t test values were 1.29, 0.12 and 0.06, respectively. The grid wood productiveness and SEUE of regional forest land in Fujian could also be well estimated with the aid of GIS and integrated models, which ranged from 2.32 $\text{m}^3 \cdot \text{hm}^{-2} \cdot \text{yr}^{-1}$ to 18.61 $\text{m}^3 \cdot \text{hm}^{-2} \cdot \text{yr}^{-1}$ and from 0.11% to 0.91%, respectively.

Key words [GIS](#) [Mathematic model](#) [Forest land](#) [Wood productiveness](#) [Solar energy use efficiency](#)

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