

赣南马尾松林地表面细小死可燃物含水率预测模型

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摘要: 建立森林地表细小死可燃物(枯落叶、细枯枝、枯草等)含水率预测模型, 可服务预警区域森林火灾引燃的可能性及其潜在火行为。本文基于野外长期定位观测的赣南地区典型植被类型马尾松林地表面细小死可燃物含水率数据, 在不同地形条件和时间段进行气象因子随机森林相对重要性排序和皮尔逊相关性分析, 建立地表细小死可燃物含水率随机森林模型和气象要素回归模型, 并比较不同模型精度指标, 筛选适合赣南地区的森林火灾预测模型。研究结果表明, 赣南地区马尾松林地表面细小死可燃物含水率具有明显变异性, 阴坡含水率显著高于阳坡, 在防火期初期最明显。地表细小死可燃物含水率与各气象要素(温度、相对湿度、风速、光照强度)具有极显著相关性($P < 0.001$); 随机森林模型预测精度高于气象要素回归模型, 阴坡 2 种模型精度均高于阳坡; 具有滞后效应的光照强度因子对地表细小死可燃物含水率影响最大, 影响地表细小死可燃物含水率的关键因素在阳坡是相对湿度、阴坡是风速。具有滞后效应的气象因子对赣南地区马尾松林地表面细小死可燃物含水率有显著影响, 考虑增加这些因素能更好预测地表细小死可燃物含水率变化, 为火险预警提供可靠依据。

Moisture Dynamics and Modeling of Ground Surface Fine Dead Combustibles in *Pinus massoniana* Forest in Southern Jiangxi, China

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Abstract: The moisture content of the surface fine dead combustibles (SFDC, including dead leaves, thin branches, dead grass, needles, etc.) significantly influences forest fire ignition and behavior. Understanding of the SFDC is essential for early warning of forest fire in a region. This study focuses on predicting SFDC in Masson pine forests in southern Jiangxi Province. We conducted long-term field observations of SFDC in Masson pine, a prevalent vegetation type in southern Jiangxi. The study involved a comparative analysis of various predictive models, considering meteorological factors random forest relative importance and Pearson correlation in different terrains and times. SFDC in Masson pine forests shows a notable variability, with higher moisture content on shady slopes co

mpared to sunny slopes, especially at the early time of fire prevention periods. A strong correlation ($P < 0.001$) exists between SFDC and meteorological factors (temperature, humidity, wind speed, sunlight). The random forest model outperformed the meteorological factor regression model in accuracy, particularly on shady slopes. Sunlight, with a lag effect, and air humidity on sunny slopes and wind speed on shady slopes were the most influential factors. Meteorological factors with time lag critically affect SFDC in Masson pine forests. Improved consideration of these factors enhances the prediction accuracy of the moisture content of the SFDC, offering a reliable basis for early warning of fire risk.