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研究报告

采伐干扰对帽儿山地区天然次生林土壤表层温度空间异质性的影响

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摘要 研究了不同强度采伐干扰对土壤表层（3～5 cm）温度空间异质性和空间格局的影响. 在帽儿山地区天然次生林内，设置3块不同强度采伐干扰处理样地：A（对照）、B（按基面积的50%随机采伐）和C（皆伐），分别布设不同空间距离（0.5～56 m)的取样点160、154和154个，比较了干扰以后2年内春季和夏季（共4次）土壤表层温度的空间异质性和空间格局特征. 结果表明，森林采伐后, 土壤表层平均温度显著增加（相差0.6～4.2 ℃, $P<0.001$），与干扰强度存在一定程度正相关，温度波动范围加大. 采伐干扰导致土壤表层温度空间异质性程度和变异尺度增加，并随干扰强度加大而增大，小尺度上的空间异质性也出现增加现象，但土壤温度空间变异尺度主要体现在＜20 m范围内，空间异质性组成受干扰影响较小. 经Kriging法对土壤表层温度空间格局模拟, 发现采伐干扰样地土壤表层温度的空间格局强度较对照林地大，温度等值线密集，其差异春季比夏季明显. 采伐干扰样地的年际间相同季节土壤表层温度格局较相似，而对照样地则呈较均匀的分布格局.

关键词 土壤温度 采伐 空间异质性 空间格局 地统计学 天然次生林

分类号

Effects of cutting intensity on spatial heterogeneity of topsoil temperature in secondary forest in Maoershan region of Heilongjian Province

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Abstract

This paper studied the effects of different cutting intensity on the spatial heterogeneity of topsoil (3～5 cm) temperature in the secondary forest in Maoershan region of Heilongjiang Province. Three treatments were installed, *i.e.*, no cutting (treatment A), 50% of randomly cutting (treatment B), and clear cutting (treatment C). Based on the requirements of geostatistic analysis, there were 160, 154 and 154 sampling points with a spatial distance of 0.5～56 m in the treatments A, B and C, respectively. Topsoil temperature was measured by thermometer in spring and summer during the two years after cutting, and the spatial heterogeneity of the temperature was analyzed by semivariogram and Kriging arithmetic. The results showed that after cutting, the mean value of topsoil temperature had an increase of 0.6～4.2 ℃ ($P<0.001$), and correlated positively with cutting intensity. The spatial heterogeneity and variation degree of topsoil temperature also increased with the increasing intensity of cutting. As for the small scale spatial heterogeneity of topsoil temperature, it was also increased after cutting, but the scale was mainly within the range of <20 m and the composition of spatial heterogeneity was slightly affected. The comparison of Kriging maps suggested that in treatments B and C, the spatial pattern strength of topsoil temperature was enhanced, and the difference between treatments B and C and treatment A was larger in spring than in summer. In treatments B and C, topsoil temperature fluctuated and had similar distribution patterns in the same seasons; while in treatment A, the temperature had a relatively even distribution within the year.

Key words Soil temperature Cutting Spatial heterogeneity Geostatistics Secondary forest

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