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Coupling Photosynthetic Measurements with Biometric Data to Estimate Gross Primary Productivity (GPP) in Mediterranean Pine Forests of Different Post-Fire Age

编号010031105

推送时间20211004

研究领域森林生态

年份2021

类型期刊

语种英语

标题Coupling Photosynthetic Measurements with Biometric Data to Estimate Gross Primary Productivity (GPP) in Mediterranean Pine Forests of Different Post-Fire Age

来源期刊forest

期第311期

发表时间20210916

关键词Pinus brutia; carbon fluxes; leaf area index; light response curve; conifer forests;

摘要

Quantification of forest Gross Primary Productivity (GPP) is important for understanding ecosystem function and designing appropriate carbon mitigation strategies. Coupling forest biometric data with canopy photosynthesis models can provide a means to simulate GPP across different stand ages. In this study we developed a simple framework to integrate biometric and leaf gas-exchange measurements, and to estimate GPP across four Mediterranean pine forests of different post-fire age. We used three different methods to estimate the Leaf Area Index (LAI) of the stands, and monthly gas exchange data to calibrate the photosynthetic light response of the leaves. Upscaling of carbon sequestration at the canopy level was made by implementing a Big Leaf and a Sun/Shade model, using both average and variant (monthly) photosynthetic capacity values. The Big Leaf model simulations systematically underestimated GPP compared to the Sun/Shade model simulations. Our simulations suggest an increasing GPP with age up to a stand maturity stage. The shape of the GPP trend with stand age was not affected by the method used to parameterise the model. At the scale of our study, variability in stand and canopy structure among the study sites seems to be the key determinant of GPP. View Full-Text

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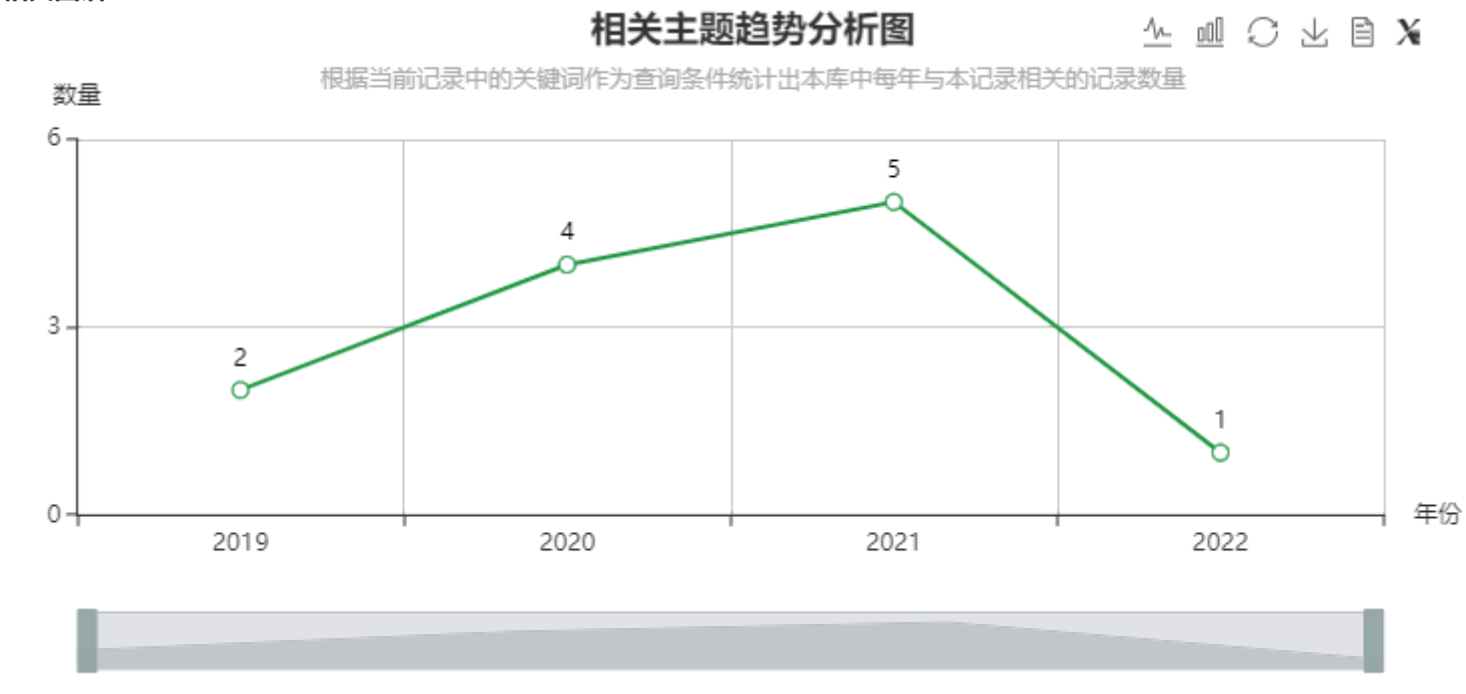
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