

研究报告

拉格朗日逆分析在森林蒸散模拟中的应用

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摘要

以长白山阔叶红松林为研究对象, 根据Raupach提出的Localized Near Field (LNF) 理论为依据, 耦合垂直速度标准差 $\sigma_w(z)$ 和拉格朗日时间尺度 $T_L(z)$, 建立林冠内水汽源汇强度和平均浓度廓线之间的关系; 利用拉格朗日逆分析法 (inverse Lagrangian dispersion analysis, IL) 提出了通过林冠水汽浓度梯度计算林冠内的水汽源汇强度进而推算森林蒸散的方法. 最终得到的结果与开路涡动相关系统的观测数据比较显示, 对于白天水汽累积通量的模拟精度达到87.3%; IL模拟值高于EC实测值, 大约高出15%~25%; 林冠白天水汽通量远大于夜间, 占日水汽总通量的70%以上. 6~8月的水汽白天累积总通量高于5月和9月.

关键词 [拉格朗日逆分析](#); [森林蒸散](#); [涡动相关](#)

分类号

Application of inverse Lagrangian dispersion analysis in simulating forest evapotranspiration

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Abstract

Based on the localized near field (LNF) theory and coupled with the distribution of vertical velocity standard deviation ($\sigma_w(z)$) and Lagrangian integral time scales ($T_L(z)$) within the canopy proposed by Raupach, the relationship between water vapor source/sink distribution and its mean concentration profile was constructed. The estimation of forest evapotranspiration was also conducted by the inverse Lagrangian dispersion analysis, which can calculate the water vapor source/sink distribution from its mean concentration profile. The calculated forest evapotranspiration was compared with the measured values. It was concluded that the simulated precision of the daily daytime evapotranspiration could reach 87.3%, the calculated results was 15%~25% higher than the measured one, the nighttime evapotranspiration was about 70% of the daily value, and the total monthly evapotranspiration from June to August was higher than that in May and September.

Key words

[Inverse Lagrangian dispersion analysis](#) [Forest evapotranspiration](#) [Eddy covariance method](#)

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