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论文

遥感数据结合**Biome-BGC**模型估算黄淮海地区生态系统生产力

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摘要:

植被净生态系统生产力(NEP)和净第一性生产力(NPP)作为表征植被活动的关键变量,在全球变化研究及区域生态环境评价中起着很重要的作用。Biome-BGC是一个模拟生态系统植被和土壤中的能量、水、碳、氮的流动和存储的生物地球化学循环模型。论文利用2004年时间序列MODIS LAI遥感产品和气象数据,对黄淮海地区的NEP和NPP进行了模拟估算,由于Biome-BGC模型没有农作物生理生态参数,农作物模拟通过修改草地生理生态参数,并在增加施肥、灌溉和收割代码基础上实现。结果表明,2004年黄淮海地区NEP、NPP呈现南部大于北部的空间分布特征;不同植被类型平均NEP和NPP大小顺序分别为:混交林>落叶阔叶林>常绿针叶林>农作物>灌木>草地、混交林>农作物>落叶阔叶林>常绿针叶林>灌木>草地;与观测数据、MODIS NPP产品和统计数据进行对比,表明Biome-BGC模型可较好用于区域植被生产力的模拟,农作物模拟结果与统计数据的决定系数达到0.612 3,且模拟得到的黄淮海地区农作物NPP比MODIS NPP产品更接近统计值。

关键词:　净生态系统生产力　净初级生产力　Biome-BGC模型　MODIS LAI　黄淮海地区

Estimation of the Net Ecosystem Productivity in Huang-Huai Hai Region Combining with Biome-BGC Model and Remote Sensing Data

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Abstract:

As two key variables to represent vegetation activities, the Net Ecosystem Production(NEP) and the Net Primary Productivity(NPP)played important roles in the study of global change and regional ecological environment evaluation. Biome-BGC was a biogeochemical cycles model, which could simulate the storage and fluxes of water, carbon and nitrogen within the vegetation and soil components of a terrestrial ecosystem. In this paper, in use of the series of MODIS LAI product and the meteorological data in 2004, we simulated the NEP and NPP in the Huang-Huai-Hai Region. Since there was no crop eco-physiological parameters in the Biome-BGC model, we simulated the crop by modifying the grass eco-physiological parameters, and adding the code of fertilizers, irrigation and harvest.The simulated results showed that the NEP and NPP were greater in the southern part of the region.The respective order of average NEP and NPP of different vegetation types was as follows: mixed forest, deciduous broadleaf forest, evergreen needleleaf forest, crop, shrub and grassland; and mixed forest, crop,deciduous broadleaf forest, evergreen needleleaf forest, shrub and grassland.Compared to the observation data, MODIS NPP product and the statistical data, we found that Biome-BGC model successfully simulated the regional vegetation productivity, and the coefficient of determination between the simulated NPP of crop and the statistical data had reached 0.6123. In addition, the simulated result of crop NPP in the Huang-Huai-Hai Region was closer to the statistical data than the MODIS NPP product.

Keywords: net ecosystem productivity　net primary productivity　Biome-BGC model　MODIS LAI　Huang-Huai-Hai Region

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