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## 基于植被光合有效辐射资料研究中国地区植被大气反馈作用

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Investigations of vegetation-atmosphere feedback in China using satellite-based FPAR data

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摘要

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**摘要** 本文采用中国地区基于卫星观测的植被光合有效辐射资料(FPAR)和月平均气候数据(1982—2000年)来分析中国区域陆面植被与气温、降水的反馈作用.通过计算和分析超前滞后相关系数和反馈系数发现:春、夏季FPAR超前气温一个月相关系数在全国大部分地区为负值,反映出植被生长旺盛,可以降低局地气温.春、秋两季气温与FPAR的同期相关系数较大.夏季降水超前FPAR一个月的正相关性反映出夏季降水对于植被生长存在促进作用.在中国长江流域以南区域,植被对于气温的反馈系数为一致正值,可达 $0.5\text{ }^{\circ}\text{C}(0.1\text{ FPAR})^{-1}$ ;在 $30^{\circ}\text{ N}$ 以北区域显示出一致的负反馈,可达 $-0.42\text{ }^{\circ}\text{C}(0.1\text{ FPAR})^{-1}$ . FPAR对降水全年反馈系数全国区域平均可达 $-2.12\text{ cm month}^{-1}(0.1\text{ FPAR})^{-1}$ .不同植被类型、不同季节的植被反馈效应也存在差异.植被反馈系数可以用来验证动态植被模式计算的植被大气反馈作用.

**关键词** 植被光合有效辐射, 植被大气相互作用, 相关性与去相关时间, 反馈系数

**Abstract:** Satellite-based fraction of PAR (Photosynthetically Active Radiation) absorbed by vegetation canopy and monthly climatology data (1982—2000) are used to investigate possible feedbacks between surface air temperature, precipitation and vegetation. The results show that correlation in spring and summer with FPAR leading temperature for one month is negative in most regions of China, which may indicate the more prosper the vegetation is, the more positive influence the vegetation may have on lowering local temperature. The instantaneous correlation between temperature and FPAR is more promising in spring and autumn. The positive correlation with summer precipitation leading FPAR for one month shows the possible positive impact of precipitation on vegetation. The feedback parameter between FPAR and temperature is all positive on the south of Yangtze River Basin (up to  $0.5\text{ }^{\circ}\text{C}(0.1\text{ FPAR})^{-1}$ ) and is negative on the north of  $30^{\circ}\text{ N}$  latitude (up to  $-0.42\text{ }^{\circ}\text{C}(0.1\text{ FPAR})^{-1}$ ). The spatial distribution of feedback parameter between FPAR and precipitation is not homogeneous. The feedback parameter is also varying with different vegetation types and different seasons. The feedback parameters should be a nice basis of vegetation-atmosphere feedback for dynamic vegetation model validation.

**Keywords** FPAR, Vegetation-atmosphere feedback, Correlation coefficient and decorrelation time, Feedback parameter

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