

NDVI时间序列谐波分析与地表物候信息获取

Phenologies from harmonics analysis of AVHRR NDVI time series

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中文摘要:

植被指数具有明显的季节节律, NDVI时间序列分析可以获取地表植被物候信息, 但已有的AVHRR NDVI数据产品仍然存在高噪声, 需要进一步校正。在考虑农业植被季节变化特征的基础上, 基于先验知识对NDVI时间序列数据傅立叶校正算法进行了改进。利用1992年旬最大值合成1 km NOAA-AVHRR NDVI数据, 使用该方法对河北省南部地区几种不同植被类型的NDVI数据进行校正, 结果显示: 改进的傅立叶谐波校正算法能更好地反映农业植被NDVI季节变化节律, 且对自然植被同样适用。对校正后的NDVI 时间序列数据进行谐波分析表明: 谐波的特征值(谐波余项、振幅和位相)与地表植被动态之间存在相关性, 谐波余项表征NDVI 时间序列的均值, 谐波振幅表征NDVI年内波动幅度大小, 不同谐波的位相可以表征NDVI 季节变化的时间特征, 利用这些参数可以获取地表植被物候信息, 并可用于土地覆被和土地利用分类研究以及全球变化研究。

英文摘要:

The parameters from the Fourier harmonics analysis based on discrete Fourier transform(DFT) algorithm concisely summarize the development signals of annual or biannual vegetations embedded in time-series of AVHRR NDVI data. In this paper, as the characteristics of agricultural vegetation dynamics is different from that of natural vegetation, the adjustment algorithm of NDVI time series for natural vegetation developed by Sellers et al.(1996) was modified. Then, the authors applied and evaluated the DFT using the adjusted 10 days composited Pathfinder NDVI data(1992) in the southern Hebei Province, China. The results show the modified algorithm can be used to reconstruct the NDVI time series either for agricultural vegetation or natural vegetation. The pollution of cloud and the abnormal values in NDVI time series can be successfully removed with the modified algorithm, the harmonics wave can reconstruct a new NDVI time series which providing a basis for linking the analysis results to basic vegetation types according to their characteristic phenologies. The mean NDVI indicated overall productivity, allowing the differentiation of unproductive, moderately productive, and highly productive areas. The amplitude of harmonics indicated the variability of productivity over the year. The phase of the first harmonics summarized the timing of green-up for annual natural vegetation. The first two phases of the third harmonics show the time of highly growth period of biannual agricultural vegetation. The point analysis provides the foundation for the regional analysis. The results from harmonics analysis of NDVI time series could be used to land cover classification and crop type identification.

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