

研究报告

小波变换在岷江上游杂古脑流域径流时间序列分析中的应用

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摘要

采用Dmey小波函数对杂古脑(岷江的一个重要流域)水文站41年(1962~2002)的月径流时间序列进行了多尺度分析和周期性分析.结果表明,无论在64月(5.4年)还是在128月(10.7年)的时间尺度上,1962~1978年期间杂古脑流域植被虽然破坏严重,但其径流相对稳定,并略低于多年历史平均;1986~1997年期间径流明显处于上升趋势,表明全球变暖对岷江上游水文动态规律具有重要影响.周期性分析发现,在最近40多年间,杂古脑流域径流出现了多次丰枯交替,次数与时间尺度有关(5年尺度7次,10年尺度3次).这表明在流域尺度上研究土地利用/土地覆盖变化的水文效应时应考虑全球气候变化的影响.

关键词 [小波变换,杂古脑,径流时间序列,尺度](#)

分类号

Application of wavelet transform to monthly runoff time serial analysis in Zagunao watershed,the upper Minjiang River

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Abstract

Runoff is an important component of regional water resources,and its dynamics is to some extent an indicator of water resources dynamics in a region.To know the runoff dynamics and water resources in a region is essential for the sustainable utilization and planning of water resources,and for the research on hydrological response of vegetation change at watershed scale.To disclose the water resources dynamics in Upper Minjiang River,one of the large reaches of Yangze River in southwest China,this paper analyzed the runoff dynamic features of Zagunao watershed,an important watershed in Minjiang River basin.Multi-Resolution Analysis (MRA) and periodicity analysis were conducted with Dmey wavelet function on the monthly runoff data from 1962 to 2002 observed by Zagunao hydrological station,which provided a data-based approximation on the evolution of monthly runoff in Zagunao watershed.It was found that the runoff dynamics in Zagunao watershed was relatively stable during 1962~1978,despite that this period was just in correspondence with the term of intensive deforestation activities in Upper Minjiang River basin.It was also clear that the runoff in Zagunao watershed was increased from 1986 to 1997,which was inconsistent with the commonly accepted viewpoint that the runoff decreased with increasing vegetation cover in forest watershed.However,the increasing trend from 1986~1997 was consistent with the research results in Yichang by Wang Wensheng and with the global warming at global and continent scale,which meant that global climate change plays a big role in runoff dynamics in

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Upper Minjiang River. Periodicity analysis showed that the rich-short water periodicity at the scale of 10 years (120 months) and 5 years (60 months) was 3 and 7 times, respectively, which could provide invaluable information for the eco-hydrological function research of forest landscape in Minjiang river basin and the sustainable utilization of water resources. The results from the case study highlighted that sometimes, it was very necessary to consider the role of global climatic warming in disclosing the hydrological response of land use/cover change at watershed scale, otherwise, it would be difficult to explain some hydrological phenomena.

Key words

[Wavelet transform](#) [Zagunao watershed](#) [Runoff time serial](#) [Scale](#)

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