

论文

1957—2007年新疆天山山区气候变化对径流的影响

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摘要:

利用天山山区1957—2007年的气温、降水量及径流数据,借助非参数检验、小波变换等方法分析了天山山区气温、降水量及年径流量的变化趋势及多时间尺度相关。结果表明:玛纳斯河与塔里木河源流区年径流量、气温与降水量均呈显著增加趋势;在年代际上,塔里木河源流区气温存在11、18和22 a的主周期,降水量存在10、20与22 a的主周期;玛纳斯河气温在10与22 a处存在明显周期,降水量在20与22 a处周期性明显;同时,两源流区气温和降水量皆存在3~6 a的年际周期变化;塔里木河年径流量、气温和降水量的突变点分别发生在1993、1993和1992年,而玛纳斯河分别在1995、1988与1996年发生显著性突变;两流域源流区年径流量与气候因子存在显著的多时间尺度相关关系。

关键词: 气候学 气候变化 交叉小波 多尺度相关

The Multi-time Scale Analysis on Climate Change and Runoff Processes in the Tianshan Mountains, Xinjiang

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Abstract:

Based on the temperature, precipitation and annual runoff data of the Tianshan Mountains, the paper studied the changing trend and multi-time scale correlation between the annual runoff and climatic factors by using methods of wavelet transform and nonparametric test. The results show that: 1) the increasing trends of the annual runoff, temperature and precipitation are significant in the Manas River Basin and Tarim River Basin; 2) the primary periods of the temperature are respectively 11, 18 and 22 years, that of precipitation are 10, 20 and 22 years on decadal time scale in the headstream areas of the Tarim River Basin; in addition, the temperature of the Manas River Basin holds the periods of 10 and 22 years and the precipitation represents the periodic variation of 20 and 22 years; meanwhile, both temperature and precipitation show the inter-annual periodic variation of 3-6 years in the headstream areas of the Manas River and Tarim River; 3) the abrupt change points of annual runoff, temperature and precipitation occurred respectively in 1993, 1993 and 1992, however, that of the Manas River are significant in 1995, 1988 and 1996; and 4) the multi time scale correlativity is significant between the annual runoff and climatic factors in the headstream areas of the two basins.

Keywords: climatology climate change cross-wavelet multi scale correlation

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