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前植物生产层

基于GIS的降水多元回归模型在黑河干流山区的应用

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摘要： 结合GIS和统计学方法，利用21个站点气象数据和DEM（基于5个因子：高程、坡度、坡向、经度和纬度）在黑河干流山区构建一种多元非线性回归模型，用以模拟研究区降水量空间分布，并分析了全年、湿季和干季3种情景及3种不同空间分辨率数据相互耦合下的雨量变化。结果表明，该模型可解释研究区74.5%的年降水空间变异，对湿季降水量解释效果要好于全年和干季两种情景；100 m分辨率下的3种降水模型效果均为最好；降水量空间分布不均匀，100 m分辨率下，由西北部不足200 mm增加至东南部700 mm左右，降水量分界线呈西北-东南走向；500 m分辨率的降水量分界呈带状，有一定程度上移；1 000 m分辨率的降水量分布误差大。本研究采用的建模方法有较强移植性，可在其他山区开发类似模型，利用其模拟结果进行更深入的研究，今后在建模中加入空间化的风速变量有可能进一步提高模型精度。

关键词： 降水量 多元回归模型 GIS 黑河干流山区

An application of multivariate regression model to predict precipitation based on GIS in the Heihe river basin

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Abstract: Based on precipitation data collecting at 21 stations from 1971 to 2000 and five topographic factors (altitude, slope, aspect, longitude and latitude) acquiring from three different resolution digital elevation model (DEM), the multivariate regression analysis, combined with GIS, was used to develop a precipitation prediction model for the Heihe river basin. The results of this study showed that the multivariate regression model explained 74.5% of the spatial variability of precipitation over the whole year, and this model had better explanation precipitation for wet season (May September) than the whole year and dry season. Precipitation during dry season was difficult to simulate owing to little rainfall and a different synoptic system. The 100 m resolution model in the three periods were better than other resolution model to explain the precipitation because the spatial distribution of precipitation was uneven. The 100 m resolution model predicted that the precipitation increased from below 200 at the north west regions to 700 mm at south east regions, indicating that a precipitation line exit was observed from northeast to southwest. The 500 m resolution model predicted that the rainfall was ribbon boundaries with a certain degree shift. The 1 000 m resolution model predicted rainfall distribution with a big error. The model established in this study could be potentially applied to other mountains; however, improving the model accuracy was necessary in the future.

Keywords: precipitation multivariate regression model GIS Heihe river basin

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