Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03070, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03070
EGU General Assembly 2008

The Influence of spatial Interpolation Methods for Climate Variables on Runoff and Nitrate Fate

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Climate variables like precipitation, temperature or humidity are usually measured at individual points. For ecohydrological modelling these variables are needed on sub-basin basis, which requires spatial interpolation. Depending on the climate network density, different interpolation methods yield results of different quality.

The presented study analyses the influence of the interpolation method on the quality of modelling results for discharge and nitrate concentration in rivers. Study area is the upper part of the Leine catchment ($\sim$1000 km^2) in Northern Germany, which has a good network density. Six climate variables measured on a daily basis (precipitation, minimum temperature, maximum temperature, solar radiation, relative humidity, wind speed) are interpolated from 100%, 50%, and 20% of the available stations using the four different interpolation methods nearest neighbour, inverse distance, ordinary Kriging, and external drift Kriging. Initially, the spatially interpolated climate data from 100% of the stations are used to calibrate and validate the hydrology and nitrate transport of the catchment. For each of the twelve combinations of network density and interpolation method, the performance is assessed over the same time period. The ecohydrological model SWAT is employed for the calculations on a daily timestep. The simulated discharge and nitrate concentration time series are compared to measured data.