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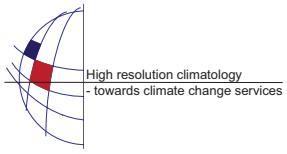

A Comparison Between Kriging, CoKriging and Geographically Weighted Regression Models for Estimating Rainfall over North West of Iran

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Rainfall is the most variable atmospheric factor that its amount varies depending on the geographic location and the general atmospheric condition of the region. In other words, this atmospheric factor involves a lot of spatial and temporal variations. Spatial statistical algorithms are used widely for both the exploration and mapping of environmental variables such as rainfall amount. One limitation of standard approaches to characterization and spatial interpolation is the usual assumption of stationary. Spatial Regression methods, including Geographically Weighted Regression (GWR), can be used alongside geostatistical interpolation methods to estimate the spatial variables when the structure of the process being modelled varies across the study area. The main appeal of GWR is its ability to generate parameter estimates for every regression point by using observations in a given neighborhood. Then the parameter estimates are mapped to highlight spatial variation for every regression point. In this research the Kriging, Cokriging and GWR models were implemented in estimating rainfall amount in north-west of Iran using the data gathered in 260 rain gauge stations during 10 year period. The Kriging and Cokriging with elevation and slope as secondary variables, were implemented for warm and cold seasons with removing trend and using double gaussian function. Also Ordinary Least Square (OLS) model with elevation and slope as independent variables was run. The adjusted R-square was low, in addition the regression model was non-stationary in terms of the Koenker (BP) statistic. GWR model was run using fixed and adaptive kernel type methods and by finding the optimal bandwidth with minimizing AICc and CV Score.
In semivariogram model an anisotropy in northwest-southeast direction was observed which is compatible with the natural condition of the region and the coefficients estimated by GWR model showed that rainfall in warm seasons is affected by the elevation in most stations, in other words the rainfall causing has been changed. The results through the validation process showed that because of goodness of fit of the semivariogram and cross-covariance functions, the accuracy of Cokriging was higher with minor differences than Kriging and GWR models.

Key words: Rainfall, Kriging, Cokriging, Geographically Weighted Regression (GWR)