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A recently developed spatial analytical tool, Geographically Weighted Regression (GWR) was used to deal with spatial nonstationarity in modeling the crop residue yield potential for North Central region of the USA. Average of daily mean temperature and total precipitation of crop growing season were the explanatory variables. In this study, Moran's I and Geary's C were used to test the spatial autocorrelation of OLS and GWR residuals. The explanatory power of the models was assessed by approximate likelihood ratio test. Furthermore, the test of spatial heterogeneity of the GWR parameters was conducted by using data sets with small and large samples. Test of spatial autocorrelation of residuals revealed that the OLS residuals had higher degrees of spatial autocorrelation than the GWR residuals indicating that GWR mitigated the spatial autocorrelation of residuals. Results of the approximate likelihood ratio test showed that GWR models performed better than the OLS models suggesting that the OLS relationship was not constant across the space of interest. More importantly, it was demonstrated that the data set would have to be large enough for the individual parameters of GWR models to be spatially heterogeneous. (Received September 10, 2013)