



## Climate change monitoring and its impacts assessment: How can GIS help?

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Several methods for downscaling climate change and climate models exist in literature. The problems often arise as to what values to attach to climatic variables at points other than these nodes. Thus, this study aims at describing and evaluating the relevant Geographical Information System (GIS) procedures as a standard technique to model atmospheric parameters. The general objective of the studies to assess the impacts of climate change on crop productivity at the local level, using data at the level of individual farm units. Such high resolution climatic data are non-existent in the West African setting because of the extremely sparse meteorological station network. Therefore, this study is designed to downscale Hadley GCM dataset of 2.500 latitude by 3.750 longitude grid cells to a cell of 0.010 longitude by 0.010 latitude using GIS. GIS interpolation and downscaling methods were used to assess climate change using Nigeria as a case study. Several GIS interpolation methods were tested: Cokriging; Universal Kriging; Residual Kriging and ordinary Kriging. After many attempts and qualitative and quantitative verifications, the last of these- Ordinary Kriging- was chosen for the map productions. Ordinary Kriging estimates for a rainfall and crop yield distributed variable at any unmonitored location are computed as a weighted average of the known values from a surrounding set of sampled points. Kriging weights are derived from a statistical model of spatial correlation expressed as semivariograms that characterize the spatial dependency and structure in the data. A major strength of the method is that measured spatial dependence in the weather parameter of interest and this is used to produce digital maps. Ordinary Kriging was used to interpolate the point observations from a network of rainfall base stations. The study revealed that GIS interpolation skills are helpful for downscaling spatiotemporal climate data and also useful in forecasting probable period for farming activities.

Key words: Progress in atmospheric modelling, Crop simulation model, GIS Interpolation