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Spatial Interpolation of Aerosol Optical Depth Pollution: Comparison of Methods for the Development of Aerosol Distribution

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Abstract : Air pollution is a growing problem arising from domestic heating, high density of vehicle traffic, electricity production, and expanding commercial and industrial activities, all increasing in parallel with urban population. Monitoring and forecasting of air quality parameters are important due to health impact. One widely available metric of aerosol abundance is the aerosol optical depth (AOD). The AOD is the integrated light extinction coefficient over a vertical atmospheric column of unit cross section, which represents the extent to which the aerosols in that vertical profile prevent the transmission of light by absorption or scattering. Seasonal aerosol optical depth (AOD) values at 550 nm derived from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor onboard NASA's Terra satellites, for the 10 years period of 2000-2010 were used to test 7 different spatial interpolation methods in the present study. The accuracy of estimations was assessed through visual analysis as well as independent validation based on basic statistics, such as root mean square error (RMSE) and correlation coefficient. Based on the RMSE and R values of predictions made using measured values from 2000 to 2010, Radial Basis Functions (RBFs) yielded the best results for spring, summer, and winter and ordinary kriging yielded the best results for fall.

Keywords : aerosol optical depth, MODIS, spatial interpolation techniques, Radial Basis Functions
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