Effects of Band Superposition on the Satellite Imagery of Aerosol Optical Depth over West Africa

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Abstract— Estimating the aerosol optical properties over an area has been challenging due to salient factors. Aside the global climate change, the difficulty of estimating the rate of aerosol released into the atmosphere has defied numerous models on aerosol optical properties. One of the reliable remote sensing techniques for investigating aerosol optical depth is the Modern Era Retrospective analysis for Research and Applications (MERRA). The MERRA reanalysis is performed at the native horizontal resolution of 2º/3º longitude by 0.5º latitude, and at 72 levels up to 0.01 hPa. The accuracy of MERRA was investigated-using mathematical experimentation. The spectral resolution of the green spectral band of the MERRA corresponds to four bands (i.e. 1,2,3& 6) on the MODIS. This occurrence affirms the band superposition theorem enacted in this research. This phenomenon is responsible for the inability of satellite or ground sensors to effectively measure the vertical distribution of Aerosol.