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SIMULATION OF RADIATIVE FORCING DUE TO AEROSOLS OVER SOME COUNTIES IN KENYA

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ABSTRACT

The Coupled Ocean and Atmosphere Radiative Transfer (COART) model solved a radiative transfer equation from aerosol optical thickness data derived from Moderate Resolution Imaging Spectroradiometer (MODIS) spanning 2000 to 2015.

The temporal and spatial variation of aerosols optical depth was determined on Giovanni platform. Trajectory modelling was carried out using Hybrid Single Particle Langrangian Model (HYSPLIT). Integrated fluxes were generated from COART model. Counties investigated are Mombasa, Lamu,Nairobi, Kakamega, Bungoma, Nyeri, Meru, Machakos, Turkana, Tranzoia, Baringo, Nakuru, Narok, Kisumu, Kisii, Nyamira and Busia. Simulation of future warming over Kenya was also done using MAGGIC SCENGEN model under two scenarios.

Results of the study revealed that Turkana, ASAL and Maritime Counties had the highest aerosols loading while Kisii County had the lowest aerosols loading respectively and that aerosol loading was highest during the JJA season and that Garrissa County had the highest interannual variability of aerosols. The study revealed that aerosol loading across all Kenyan counties is reducing and that long distance transport and dispersion of aerosols was facilitated by low level winds over Kenya. It was observed that Kisii County had higher radiative forcing estimate due to aerosols while counties in the ASAL, Maritime counties and Turkana County had relatively lower corresponding estimates. It was also noted that forcing due to aerosols over Kenya is reducing and lies in the range of -0.187 to -0.05 w/m^2. SCENGEN Projections gave a warming of 0.17 ^{0}C, 0.45 ^{0}C, and 2.96 ^{0}C by the year 2000, 2015 and 2100 respectively due to aerosols and sulphates induced warming of 0.1 and 0.25 ^{0}C under two scenarios.

KEYWORDS: Aerosols, Radiative Forcing, Warming, Counties, Kenya