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Spatial Variability of Soil Thermal Conductivities within a Horizontal Gas Flaring Site Owaza, Southeast Nigeria

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Abstract: *Knowledge of spatial patterns of soil thermal conductivity is of great importance in agricultural meteorology where problems of heat exchange at the soil surface are encountered. This is significant for the environment, site-specific soil and crop management, as well as soil heat movement through soil profile. The study was conducted to determine the spatial pattern of soil thermal conductivities on 14 sample distance points away from a horizontal gas flaring site using the well-known Campbell (1985) equation model. Geostatistics (kriging) were used to describe the spatial pattern of the predicted soil thermal conductivities from each sample point and depth using ArcGIS version 10.1. From the results, predicted soil thermal conductivity varied from 1.49 $Wm^{-1}K^{-1}$ to 4.89 $Wm^{-1}K^{-1}$, and the standard deviation ranged from 0.05-0.29 at 0-30 cm. The surface and subsurface predictive spatial distribution maps generated showed clear positional similarity across the field with higher thermal values in the direction of flaring site. The geostatistical linear interpolation using kriging clearly conveys rare insight into the way predicted soil thermal conductivity varied within the horizontal gas flare site. The predictive spatial maps could be an effective tool to farmers, soil scientist, engineers and other land users to make informed decisions on appropriate distances away from a horizontal gas flare station for site-specific soil management. It is compelling, to recommend the discontinuity of horizontal gas flaring in the study area in order to avoid the direct thermal pollution on arable soil ecosystem.*

Keywords: *Gas flaring, Spatial variability, Soil thermal conductivity, Kriging, Site-specific soil management*