Dynamics of Variation in Vertical Distribution of Radio Refractivity over Akure, South West Nigeria.

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The spatial variation of radio refractivity occurs on both vertical and horizontal planes, and the former significantly influences electromagnetic waves propagation. In this study, two-year archived data of in-situ measurement of pressure, temperature and relative humidity, carried out at the surface, 50-m, 100-m, 150-m and 200-m altitudes in Akure (7.15°N, 5.12°E), using Davis 6162 Vantage Pro 2 weather station was used. The measurement covers 24 hours each day beginning from 00 hours local time (LT) and for a time interval of 30 minutes. Radio refractivity was computed and the dynamics of variation in its vertical distribution was examined. Results show that changes in vertical distribution of water vapour pressure and atmospheric pressure has the most and least significant influences respectively, on the vertical distribution of radio refractivity.

Previous studies in this area focused on profiling and variation in vertical gradient of radio refractivity (A. T. Adediji and M. O. Ajewole, *Progress In Electromagnetics Research C*, Vol. 4, 157-168, 2008), without paying attention to the micro scale factors necessitating such variations. Hence, this work examined the dynamics of variation in vertical profile of radio refractivity by investigating, layer by layer, changes in the vertical distribution of its constituent parameters – temperature, pressure and water vapour pressure. Statistical and trend analyses of each parameter's contribution to the observed net variation was done on both diurnal and seasonal scales across the different heights. The table shows the computed variation of refractivity with pressure, temperature and water vapour pressure at 50m height for year 2010.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pressure	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Temperature	1.51	1.56	1.62	1.63	1.65	1.63	1.61	1.62	1.62	1.63	1.61	1.46
W. V. Pressure	4.16	4.13	4.13	4.16	4.18	4.21	4.24	4.25	4.24	4.21	4.18	4.16



Figures showing the vertical profile of radio refractivity and its constituent parameters.