Figure 3 shows the analysis of the measurement obtained at a frequency band of 900MHz-960MHz, the observation shows that as the air temperature increases, relative humidity decreases, hence a proportional decrease in UHF path loss while the received signal strength (RSS) shows a proportional increase. Figure 4 shows the curve fit and the corresponding models of the results obtained in figure 4, the fitted curve and the models shows high correlations and significant between the measured variable. Equation 17, 18 and 19 are the models obtained from the fitted curve. Figure 5 and Figure 6 show the responses of some of the Nigeria UHF mobile network signals to variations in the measure weather parameters. A harp increase in RSS was observed as the temperature rises while increase in relative humidity increases the signal path loss. Figure 7 represents the fitted curve of figure 5 and 6, equation 20 and 21 are the models obtained from the fitted curve. Figure8 shows a credible increase in LWDC and UHF specific attenuation (dB/km) relative to increase in tropospheric air temperature and figure 9 represent the corresponding models. Figure 10 shows that increasing air temperature increases the cloud base height and enhances the UHF RSS. It could be observed in figure 11, 12, 13 and 14 that UHF specific attenuation due to LWDC is location [latitude, Longitude] dependent and that Lagos has the highest average UHF attenuation of 0.0195(dB/km) and 0.018 (dB/km) which represent 15.64% and 15.09% of the average annual UHF specific attenuation due to LWDC in year 2012 and 2013 as a result of daily evaporation from the large body of water (Atlantic ocean)

6. Conclusion

All the results obtained show that air temperature, relative humidity and LWDC have significant influence on UHF signal propagation within the troposphere region of southwest Nigeria. The result can be used to develop efficient link margin and budget for the region rather than using existing link margin developed from temperate region data evaluation.

References

[1] Barrios, A. E. (1994) A terrain parabolic equation model for propagation in the troposphere. IEEE Transactions on Antennas and Propagation, vol. 42, no. 1, p. 90-98.

[2] Denis J. Donohue and James R. Kuttler (1997). Modeling Radar Propagation over Terrain. Johns Hopkins APL Technical digests. Vol.18, No.2. Pp. 279-287.

[3] Dissanayake, A., J. Allnutt J and Haidara. F (1997): A prediction model that combines rain attenuation and other propagation impairments along earth-satellite paths. IEEE Trans. Antennas Propagation, 45, 1546-1558.

[4] Guifu Zhang, J. Vivekananda, and Edward Brandes (2001), A method for Estimating Rain Rate and Drop Size Distribution from Polarimetric Radar Measurements. IEEE Transaction on Geoscience and Remote Sensing, Vol. 39, No. 4, April 2001. Pp. 830-841.

[5] He, G. Y, Lu, C.C., Hong, J. C, and Deng, H. (2006) Computation and Measurement of Electromagnetic Scattering, Peking: National Defence Industry press,

[6] Ho C. M, Sue M.K, Bedrossian A. and Sniffing R. W. (2002) Scintillation effects on Radio Wave propagation through Solar Corona.TDA progress report, Jet propulsion Laboratory, California Institute of Technology, Pasadena, CA91109, USA. Pp. 1-4.

[7] Hu Y, Vaughan M, McClain, Behrenfeld M, (2007) Global statistics of water clouds over ocean derived from combined CALIPOS and MODIS measurements. Journal of Atmospheric Chemistry and Physics. Vol.7, Pg. 3353-3359.

[8] ITU-R Recommendations, Geneva (2009) Propagation data and prediction methods required for the design of terrestrial line-of-sight systems, Pp.530-538.

[9] John Seybold (2005): Introduction to RF propagation, first edition, John Wiley $ sons, inc USA.

[10] Karmakar P.K, Maiti M. Bhattacharyya K, Angelis C.F and Machado L.A.T (2011) Rain Attenuation studies in the Microwave Band over southern Latitude. The Pacific Journal of Science and Technology vol.12. No. 2. Pp. 196-205.

[11] Kenneth B, Gianni G, Sandeep K.S (2008): Wireless Sensor Networking for ‘‘Hot’’ Applications: Effects of Temperature on signal strength, Data, collection and Localization Retrieved on 2012/10/04 from http://impact.asu.edu..

[12] Kuttler, J.R, and Dockery, G.D.(1991).Theoretical description of the parabolic approximation/Fourier split-step method of representing electromagnetic propagation in the troposphere. Radio Science, vol. 26, no.2, Pp. 381-393.

[13] Meng, Y. S., Y. H. Lee, and B. C. Ng (2009), The effects of tropical weather on radio wave propagation over foliage channel," IEEE Trans. Veh. Technology. Vol. 58, No. 8.

[14] Mishra R. Ajay (2007) Advanced Cellular Network Planning and Optimization. John Wiley & son Ltd West Sussex, England. ISBN-10 0-470-01471-7. Pp. 49.

[15] Olsen R. L and B. Segal, (1992), New techniques for predicting the multipath fading distribution on VHF/UHF/SHF terrestrial line –of –sight links in Canada. Canadian Journal of Electrical and Computing Engineering, Vol.17, No. 1, Pp. 11-23.

[16] Parsons, J.D. (2000). The Mobile Radio propagation Channel, 2nd edition, Wiley, West Sussex, p.31.

[17] Radha Krishna Rao and Purnachandra Rao (2005). Influence of sea breeze on line-of-sight links, Andhra University Journal of Technology Malaysia. Pp. 89-98.

[18] Waheed-uz-Zaman M. and Yousuf Zai M.A.K (2010) Study the effects of Radio Waves Propagation Under Sea at Pakistan Coastal Zones, Journal of American Science. Pp. 413-418.

[19] Xiaofeng Z, Sixun H (2010): Influence of Sea Surface Roughness on the Electromagnetic Wave Propagation in the Duct Environment, Journal of Radio engineering, Vol.19, No. 4, Pp 601-605.