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Hourly Variation of Gaseous Attenuation in Tropical Station

Publisher: IEEE

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Results and Discussion

IV.

Abstract:

Attenuation by water vapor and oxygen is one of the major reasons electromagnetic waves in some frequency bands get degraded. It is of key importance to study, understand and mitigate these effects as much as possible. In this work, hourly attenuation due to water vapor also known as wet attenuation as well as attenuation due to oxygen, known as dry attenuation in decibel per kilometer was calculated for the Ka, Ku and V frequency bands. The International Telecommunications Union-676 model was used to calculate these values using 60 seconds integration time measured values of Pressure, Temperature and Relative humidity. These parameters were obtained from the Covenant University Davis-Pro Automatic weather station installed in Ota, Nigeria. The computed results between April and December 2012 are hereby presented.

Published in: 2018 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting

Date of Conference: 8-13 July 2018

Date Added to IEEE Xplore: 14 January 2019

ISBN Information:

ISSN Information:

INSPEC Accession Number: 18376838

DOI: 10.1109/APUSNCURSINRSM.2018.8609300

Publisher: IEEE

Conference Location: Boston, MA, USA

I. Introduction

Gaseous attenuation of microwaves has been a major source for concern for radio communication applications and this phenomenon is based on the molecular absorption of electromagnetic energy by atmospheric gases [1]–[5]. At specific wavelengths known as resonant wavelengths, energy is transferred from the incident wave to the atmospheric gases. This as a result reduces the energy level of the radiation and thereby increases that of the gas. At equilibrium, the gas loses the energy gained from the wave as heat and then returns to its initial energy state [6]. The transference of energy from the incident wave to the gas is as a result of the magnetic dipole moment of the molecules of the attenuating gases [7].

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