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Abstract

Document Sections

I.

Introduction

II.

Scintillationdata Source

III.

Result and Discussion

IV.

Conclusion

Abstract:

Tropospheric scintillation occur as a result of signal fluctuations in satellite communication systems. Great attention has been giving to scintillation today because of increase in demand of bandwidth at frequency above 10 GHz. However, in West Africa countries few work have been reported in this area. Data from ITU-RP study group 3 data bank was used as input data for the analysis of tropospheric scintillation for seventeen (17) West Africa locations. Monthly and yearly mean of temperature, pressure and relative humidity were used as input parameters. The results revealed that lowest scintillation values were observed for Carpe Verde at 0.118 dB, followed closely by Niger, Mauritania, Senegal and Mali with 0.139 dB, 0.140 dB, 0.151 dB, and 0.152 dB respectively at C-band. While, countries like Ghana, Togo, Benin republic, Ivory Coast and Nigeria has the highest scintillation fade with values 1.575 dB, 1.560 dB, 1.472 dB, 1.453 dB and 1.236 dB respectively. The results also suggest that 100 % fadeout link might occur if a satellite communication system is planned with a low margin of about 1 dB for tropospheric scintillation fade depth at V band in these locations.

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

INSPEC Accession Number: 18376698

DOI: 10.1109/APUSNCURSINRSM.2018.8608261

Publisher: IEEE

Conference Location: Boston, MA, USA

I. Introduction

In modern earth-space communication systems, most importantly at higher frequency bands (both uplink and downlink) tropospheric scintillation phenomena happens to be one of the major signal impairments that effect earth-satellite path [1]–[3] The impact of scintillation on radio wave signal propagation cannot be over emphasized due to its consistent fluctuation in phase and amplitude which affect signal strength [4].

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