

Estimating losses at 40-GHz downlink using nonmeteorological techniques in heavy rain areas

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Abstract

The advancement of satellite communication has arisen tremendously where higher capacity communications systems are needed. Most satellite engineers are shifting to Ka, Q, and V-band upcoming since the low frequencies such as below 10 GHz are already congested. Actual measurement data at millimetre-wave frequencies in tropical regions are minimal. The prediction of rain attenuation at frequencies above 10 GHz is required to determine a reliable fade margin. In this paper, a statistical frequency scaling technique has been developed as an alternative way of estimating rain attenuation. The technique was derived based on the correlation between the attenuation ratio of a higher and lower frequency against the attenuation at a lower frequency. The attenuations from the proposed model were compared to the proposed frequency scaling by International Telecommunication Union-R

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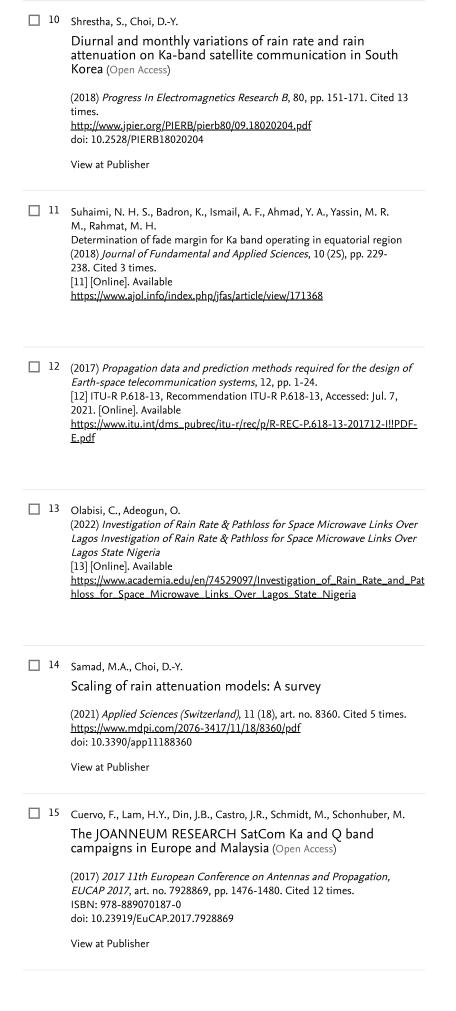
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(ITU-R) as well as the conventional ITU-R rain prediction model. To deliver a reliable model, validation methods have been done using a set of data with different years and locations in tropical regions. A dependent prediction technique with the lowest root mean square error (RMSE) value and error was produced. This technique is beneficial in applying suitable mitigation techniques to moderate rain fade in tropical regions. © This is an open access article under the CC BY-SA license.

	tellite-earth link; Statistical frequency scaling; Tropical regions; V-band
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