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Effects of humidity on sand and dust storm attenuation predictions based on 14 GHz measurement (Article) [\(Open Access\)](#)

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Abstract

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Several models were proposed to predict the attenuation of microwave signals due to sand and dust storms. Those models were developed based on theoretical assumptions like Rayleigh approximation, Mie equations or numerical methods. This paper presents a comparison between attenuation predicted by three different theoretical models with measured attenuation at 14 GHz. Dielectric constant of dust particles is one of the important parameter in prediction models. This constant is estimated from measured dust samples and is utilized for predictions. All models are found largely underestimating the measurement. Humidity is also monitored and has been observed higher during dust storm. Hence dielectric constants are re-estimated with relative humidity conditions using available conversion model. The prediction has a great impact of humidity and predicted attenuations are found much higher in humid than dry dust condition. However, all models underestimate the measurement even considering 100% of relative humidity. Hence it is recommended to investigate the models by considering humidity and other environmental factors that change during dust storm. © 2020, TELKOMNIKA Telecommunication, Computing, Electronics and Control, All Rights Reserved

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