

## Documents

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**AREA-BASED RAINFALL RATE MODEL FOR SPECIFIC ATTENUATION IN THE EQUATORIAL REGION**  
(2024) *IJUM Engineering Journal*, 25 (2), pp. 287-298.

DOI: 10.31436/iiumej.v25i2.3279

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### Abstract

The advent of new telecommunication systems with large bandwidths like 5G/6G and satellites operating at higher frequency bands such as Ku, Ka-band, and even Q/V bands, has brought to the forefront the issue of rain attenuation, particularly in equatorial and tropical regions. Many existing models developed to address these inaccuracies in the rainfall rate prediction rely on a single rain gauge measurement, which still can lead to inaccuracy when the model is generalized for a larger area. This research, therefore, is of utmost importance as it aims to develop an area-based rainfall rate model using multiple rain gauges spread across many locations in a specific area. The area of focus for this research is the Klang Valley area, a crucial economic territory that includes the capital city, Kuala Lumpur, in Malaysia. Five rain gauges distributed in Klang Valley were chosen to measure the rainfall rate. The rainfall rate model was then developed based on the data from these five rain gauges. The results indicate that each rain gauge's rainfall rate at R0.01% exceedance level varied greatly from 102 mm/hr to 138 mm/hr and exceeded Malaysia's recommended ITU-R at 100 mm/hr. The new model, presented herein, accounts for the variation of rainfall rate across a larger area, which can provide accurate modeling of specific attenuation and rain attenuation in the equatorial regions, thereby enhancing the reliability of communication systems. © (2024), (International Islamic University Malaysia-IIUM). All rights reserved.

### Author Keywords

Areal rainfall analysis; Equatorial climate dynamics; Rain gauge network; Rainfall rate modeling; Satellite communication attenuation

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**Publisher:** International Islamic University Malaysia-IIUM**ISSN:** 1511788X**Language of Original Document:** English**Abbreviated Source Title:** IIUM Eng. J.

2-s2.0-85199758750

**Document Type:** Article**Publication Stage:** Final**Source:** Scopus