Abstracts

Measurements of Earth-Space Attenuation at 230 GHz

G.T. Wrixon and R.W. McMillan. "Measurements of Earth-Space Attenuation at 230 GHz." 1978 Transactions on Microwave Theory and Techniques 26.6 (Jun. 1978 [T-MTT]): 434-439.

Measurements of attenuation at 230 GHz through the total atmosphere due to the presence of oxygen and water vapor molecules, clouds, and rain are presented and discussed. The measurements were carried out using a specially designed superhetrodyne receiver mounted on a sun tracker. Simultaneons measurements were also carried out at 13 GHz. For a measuring site close to sea level at Holmdel, NJ, the "clear-sky" zenith attenuation was found to be given by A (dB) = 0.35 rho, where rho was the measured ground water vapor density in g/m^3. When the ground temperature was below about 7°C, most cloud and overcast gave < 0.5 -dB attenuation whereas with a ground temperature greater than 13°C, cloud attenuation was 8-10 times greater. Calculations of zenith attenuation in the 230-GHz atmospheric window were also made using the Gross analytic line shape, Schulze-Tolbert empirical line shape, and an empirically modified Gross line shape. These calculations were based on determinations of water vapor density and temperature made at the measurement site, and on radiosonde measurements made at a distance of 80 km away. Measured and calculated results are graphically compared. It is concluded that either the modified Gross line shape or the Schulze-Tolbert line shape gives conservative estimates of zenith attenuation at 230 GHz for clear days, while the Gross line shape gives fair agreement with measured results.

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