

14.6 RAIN ATTENUATION STATISTICS AT KA-BAND ESTIMATED FROM WEATHER RADAR OBSERVATIONS

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This paper presents rain attenuation statistics for satellite-ground transmission links at Ka-band based on 10-year reflectivity observations from a C-band weather radar. The ground receiving station and the radar are both located in Belgium. Only precipitation under the freezing level is considered and the attenuation produced by hail is removed by applying a reflectivity threshold. The radar-derived attenuations are analyzed to investigate the influence of elevation and azimuthal angles on the attenuation statistics. It is shown that the azimuthal dependence is extremely low. In contrast, the exceedance probability for a given attenuation threshold strongly increases with decreasing elevation angles. The total rain attenuations exceeded with 0.1% probability increases from 3 dB at 75° elevation to 12 dB at 10° elevation. Some sensitivity tests have been performed. We show that the sensitivity to the hail reflectivity threshold is very limited. In contrast, our results show that reliable attenuation statistics cannot be obtained without taking carefully into account the height of the freezing level. Monthly averages of the freezing levels allow producing satisfactory results but it is recommended to incorporate freezing level heights with high temporal and spatial resolutions.