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CROSS POLARIZATION STUDY AT THE TRMM CHANNELS

Abstract

The tropical Rainfall Measuring Mission (TRMM) Satellite is a novel venture to study the rainfall over the tropics. However, frequency re-use has been envisaged in the TRMM in order to increase the channel capacity. This, on the other hand, undoubtedly has posed limitation in its performance. The rain drop, due to its oblate shape, affects the quality of the output signal. A signal of a particular polarization, after passing through the rain drop gets converted to its orthogonal polarization. Thus, in dual-polarization satellites like the TRMM, the horizontal polarization, after passing through the raindrop, gets converted to its vertical polarization. Similarly, the vertical polarization after passing through the rain drop gets converted to horizontal polarization. Thus, the horizontal receiver receives two horizontally polarized signals, whose parent polarizations are orthogonal to each other. This leads to cross-talk. This phenomenon is known as cross polarization, which is unwanted. In order to adopt counterbalancing mechanism against cross polarization, the link designers require an idea of the amount of degradation of the output signal due to this effect. Undoubtedly, the parameters to be retrieved from dual polarization satellites are likely to be affected due to cross polarization. Thus, it is essential to have a knowledge of the cross polarization in dual polarization satellites. In this paper, the authors aim to estimate the cross polarization at the 10.65, 19.35 and 21.3 GHz channel of the Tropical Microwave Imager (TMI) onboard the TRMM, using the ITU-R method over Salem, a town in the southern peninsula of the Indian subcontinent.