Abstract No: 828 ***Climate and Environment***

RAINFALL INTENSITY ESTIMATION USING THE ATTENUATION OF MICROWAVE RADIATION

C.P.N. Rajapakshe* and J.P. Liyanage

Department of Physics, Faculty of Science, University of Peradeniya, Sri Lanka
**cpn.here@gmail.com*

Rain-induced attenuation of electromagnetic (EM) radiation is closely related to the physical characteristics of rain (rainfall rate, droplet size, droplet shape). Therefore, an alternative method of retrieving rainfall information can be developed by using received signal level data of microwave links used in commercial cellular communication networks. The availability of large number of such microwave links provides ideal conditions to use this method to study the variations of rain, both spatially and temporally over a large geographical region. EM radiation propagating through the atmosphere is attenuated by both scattering and absorption. The amount of signal drop per unit length, known as the optical extinction (Σ $dB \cdot km^{-1}$), can be determined using the extinction efficiency $Q_T(D)$, and the Drop Size Distribution (DSD) N(D). *Mie* Scattering law can be used to obtain $Q_T(D)$, and the DSD can be assumed to be a *Gamma* distribution with three parameters. The relationship between the rainfall rate R and optical extinction Σ is considered to be a power law dependence of Σ on R, with two parameters depending on DSD parameters. In this investigation, optical extinction Σ values were retrieved using the received signal levels of Microwave transmission links. Computational methods were used in order to determine the possible ranges for DSD parameters using the previous studies which were conducted in tropical countries. The approximated ranges of DSD parameters were used to determine the relationship between Σ and R. The proposed theoretical model reasonably agrees with the actual data. However, since the rain-induced attenuation of Microwave radiation is closely related to the DSD, a detailed study of DSD is required (including the seasonal changes) in order to determine the most acceptable DSD parameters. Alternatively, previously used theoretical and experimental methods conducted for mid-latitude countries can be adapted with suitable modifications for local atmospheric conditions to determine the real time rainfall intensities using the rain-induced attenuation of Microwave links of commercial cellular communication networks.