Plinius Conference Abstracts,
Vol. 11, Plinius11-159, 2009
11th Plinius Conference on Mediterranean Storms
© Author(s) 2009

Path-average rainfall estimation using attenuation measurements: combining microwave and optical links

R. Uijlenhoet and H. Leijnse

Wageningen University, Hydrology and Quantitative Water Management, Wageningen, Netherlands
(Remko.Uijlenhoet@wur.nl, +31 317 485760)

On previous occasions we have demonstrated the potential and limitations of single microwave and optical links as path-average rain gauges. In this presentation we investigate the potential of combined microwave and optical attenuation measurements for improved path-average rainfall monitoring through theoretical analyses and numerical experiments. We show theoretically that path-average rain rate can in principle be retrieved from the specific attenuations at microwave and optical wavelengths through a double power-law relation, of which the exponents are independent and the coefficient is only weakly dependent on the raindrop size distribution. Our calculations indicate further that the main gain of adding an optical link to an existing microwave link is in reducing the root-mean-square-error of the retrieved rain rate, particularly for microwave frequencies below 35 GHz.