

Studying precipitation distribution along an alpine mountain slope using a MRR and a commercial microwave link

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The rain rate in mountain regions is usually assumed to increase with increasing altitude. Since rain gauge measurements in steep terrain are strongly affected by the pronounced heterogeneity of the wind field, this assumption is still under debate, particularly on small scales of a few kilometers.

A suited tool to study the distribution of rain rates along a mountain slope would be the micro-rain radar (MRR), which provides reflectivity measurements with a range resolution of approximately 100 meters. However, when operating in an inclined orientation, to measure along the mountain slope, the MRR's internal attenuation correction and rain rate retrieval algorithm fail. This is due to the fact that its Doppler-based estimation of the DSD is only valid when measuring vertically. We show that additional data from a commercial microwave link, operating along the same path at the mountain slope, allows to solve the MRR's attenuation correction problem: the microwave link provides a direct measurement of the path integrated attenuation and this information allows to constrain the DSD used in the MRR attenuation correction.

We present details of our experimental setup and shown first results of the derived DSD- and rain rate distribution along a mountain slope in Garmisch-Partenkirchen of around 1000m elevation difference.