

Interactive comment on “Three-dimensional effects in polarization signatures as observed from precipitating clouds by low frequency ground-based microwave radiometers” by A. Battaglia et al.

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In this paper we have primarily focused on polarization signals as observed by ground-based radiometers (i.e. downwelling Stokes vectors) in presence of precipitation. In particular we have evaluated the impact of 3-D structures on TBs and polarization differences in order to explain some 'strange' observations performed almost ten years ago in South Germany (Czekala et al., 2001a). A completely different story is represented by satellite-based observations (like from SSM/I), since they involve up-welling Stokes vector. The presence of the surface (with its emission and scattering properties) makes this situation completely different and more complicate (e.g. sea and

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land surfaces behave differently). Horizontally oriented particles usually tend to produce positive polarization signals. Cases with negative polarization differences (i.e. vertical TBs lower than horizontal TBs) have been reported (see cited papers by Prigent et al.) and explained through electrical processes which tend to vertically align non spherical crystals. Obviously 3D effects can be studied in this situation as well. The reason why we have focused on ground-based observations is that much higher horizontal resolutions are achieved in this case, thus maximizing the 3D effects. Moreover the region of the cloud directly sensed in this configuration (precipitation) typically presents strongly marked 3D structure when convective phenomena are considered. More ground-based observations are certainly necessary but, at the moment, they are not available. A project called ADMIRARI (ADvanced Microwave Radiometer for Rain Identification) is now under final evaluation at the German Science Foundation. If financed, it should provide a rich variety of measurements in rainy conditions from a three-wavelength (10, 21 and 37 GHz) polarized ground-based radiometer.

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