



Stokes-Vector Analysis of Polarimetric Weather Radar Echoes

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Weather radars, generally employed in weather services today, commonly use ‘Hybrid Polarisation Bases’ for recording polarimetric returns. In such measurements, the target is illuminated by polarisations bearing equal power along vertical and horizontal polarisations, though with an arbitrary relative phase. The ensuing echoes are received simultaneously in horizontally and vertically polarised receive-channels. In this contribution, we shall develop a Stokes-Vector representation of such data and put it to test using C-Band radar data obtained from the German Weather Service (DWD). The so obtained Stokes vectors will be examined for their potential application in the following contexts: 1. characterising and identifying diverse radar targets, 2. discriminating between random, quasi-random, and coherent targets, and 3. clutter identification and suppression.

These investigations will focus particularly in characterising and identifying echoes from wind-parks and rain clouds. In doing so, we shall also consider the estimation of the degree of polarisation as a quantity of interest in polarimetric weather radar analysis.