1.52 A HYDROMETEOR CLASSIFICATION ALGORITHM FOR THE UK C-BAND WEATHER RADAR NETWORK

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The UK Met Office completed the upgrade of its C-band weather radar network to dual-polarisation capability in early 2018. Ongoing improvements to the in-house processing software, Radarnet IV, have recently included new algorithms designed to extract the benefit from the supply of polarimetric data. The latest of these developments is a hydrometeor classification algorithm, currently designed to distinguish between seven different classes of hydrometeor: rain, drizzle, wet snow, dry snow, hail, graupel, and ice crystals.

The core of the algorithm is a fuzzy logic scheme, which combines the likelihood of a given hydrometeor type based on both the polarimetric variable signatures and the atmospheric temperature profile (though a classification can also be made using either of these data sources individually). The likelihoods associated with the polarimetric data are calculated using bivariate membership functions many of which are borrowed from the operational Météo France algorithm (Al-Sakka et al., 2013). The temperature-based likelihoods are calculated using NWP model wet-bulb freezing level (WBFL) information to define a bright band region – here the radar beam power profile is integrated to determine the fractional power returned from each region associated with the bright band. A novel approach is also introduced here by allowing the WBFL to be perturbed in order to account for errors in the model, or small scale fluctuations from the model in the observed data. The polarimetric- and temperature-based membership values are combined multiplicatively to calculate the final likelihood for each hydrometeor type, and a tier-based method is employed to ensure the maximum number of classifications is made by using likelihood values based on reduced variable sets where the full variable set returns values of zero.

Case studies are presented which highlight the strengths and current limitations based on subjective qualitative analysis - of the algorithm in a variety of meteorological situations, and using both Plan Position Indicator (PPI) and Range-Height Indicator (RHI) type-datasets. Possible improvements, verification methods, as well as future requirements of the algorithm are also discussed prior to its scheduled operational release later in 2018.