# 5-year Verification of Radar-derived Surface Precipitation Type

*Ben Pickering[1,2,3], Ryan Neely III[1,3], Steven Best[2]

1. ICAS, University of Leeds, 2. UK Met Office, 3. NCAS

A radar-derived, surface precipitation type algorithm is compared with multiple in-situ surface observations.

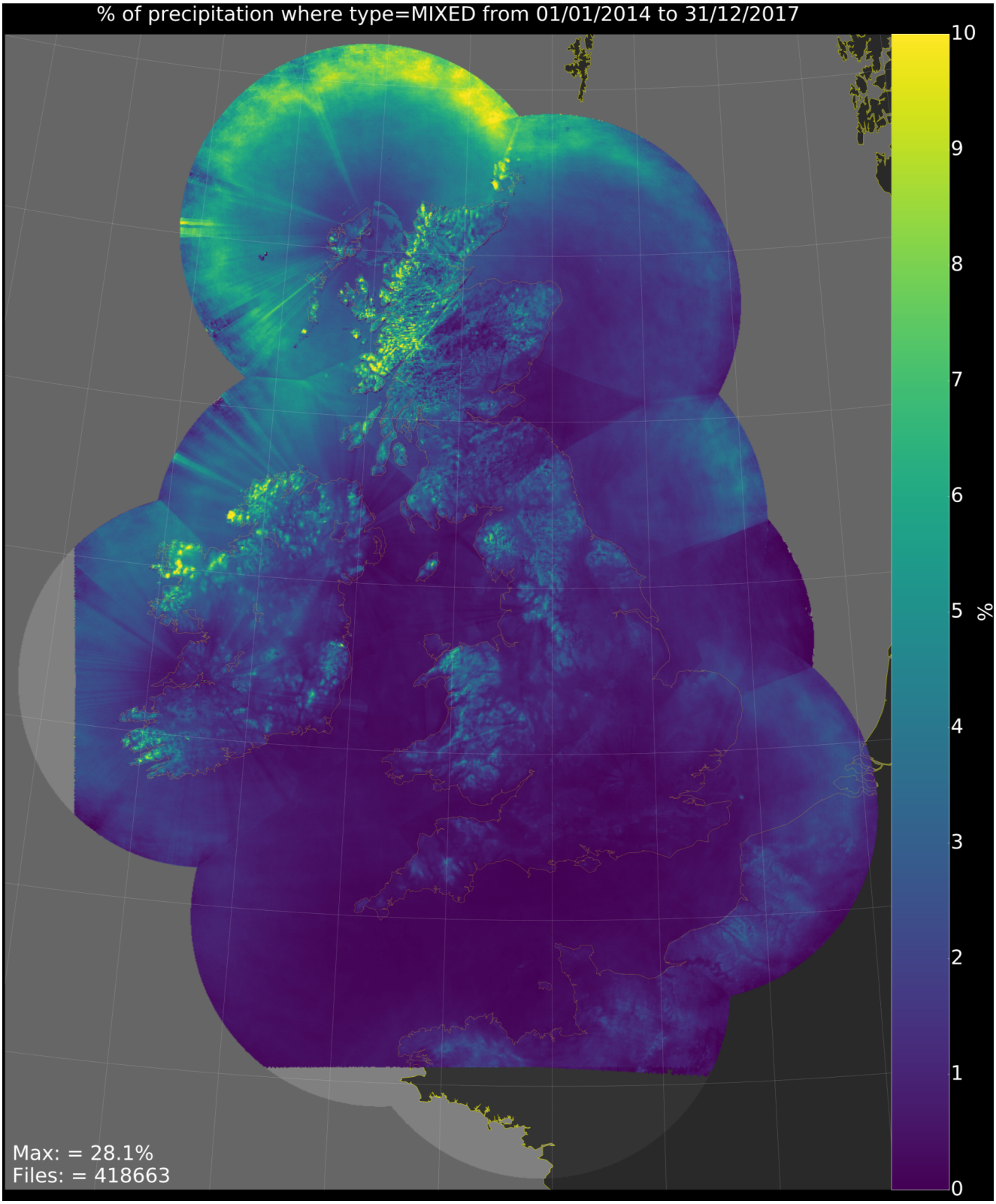
Changes in precipitation type at the surface can have a significant impact on mid-latitudinal and mountainous regions. To aid decision-makers, the UK Met Office have produced maps of surface precipitation type (SPT) in near-real-time for the UK and Ireland since late 2013. The methodology of this SPT product is also applicable more widely, and is valuable to developing nations, as it requires only single polarisation radar (or satellite) and is computationally inexpensive to operate. The methods can also be applied to space-borne radars for global coverage and historical precipitation rate datasets such as TRMM or GPM.

The algorithm used in the SPT product uses 1) radar estimated precipitation rate and 2) the local height of the 0ºc wet-bulb isotherm from an NWP model. Therefore, the SPT product attempts to resolve precipitation type changes over terrain and also capture the role of evaporative cooling to more accurately detect the rain/mixed/snow boundary. Hail is also detected with a reflectivity-height criterion.

In this study, 5 years of SPT data are compared against several surface in-situ measurements: 1) 97 UK Met Office automatic present weather stations, which rely on a visibility-temperature algorithm; 2) 24 UK Met Office stations manned by a trained meteorological observer; 3) a network of 13 optical disdrometers installed around the UK (the Disdrometer Verification Network, or DiVeN); 4) public crowdsourced reports of hail which are quality-controlled by the European Severe Weather Database (ESWD).

Both the SPT product and the in-situ surface data are categorical, and both have deficiencies which make the verification complex. These issues are addressed using a verification technique which varies the spatial and temporal tolerances of the SPT product, amongst others. The results not only evaluate the SPT product; they also highlight the strengths and weaknesses of different surface observations for precipitation type measurements.

Keywords: hydrometeor classification algorithms, quantitive precipitation estimation, verification, in-situ measurements, hydrometeor type, statistics


% of precipitation where type=MIXED from 01/01/2014 to 31/12/2017
10
9
8
7
6
5
4
3
2
1
0
%
Max: = 28.1%
Files: = 418663