

## **The development of a Kriging based gauge and radar merged product for real-time rainfall accumulation estimates**

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Weather radar measurements allow high resolution, real-time estimates of precipitation at the surface to be made, which can be used by hydrological models for flood forecasting and warning applications. However radar estimates are prone to errors due to the vertical profile of reflectivity, beam broadening, variations in the drop size distribution, attenuation and orographic enhancement which can limit their use for hydrological applications. Conversely, rain-gauges provide an accurate but spatially sparse measurement of rainfall accumulations. Combining the high density of radar estimates with the high accuracy of gauge measurements to produce a high resolution merged product means that better use of radar measurements can be made in hydrological applications as the merged estimate has smaller errors than a radar-only estimate and is less sparse than the gauge-only measurement.

Kriging is a geospatial interpolation method which has been shown to be well suited to blending rain gauge and radar rainfall data and hence many different forms of Kriging have been developed for this application in recent years. The central concept common to all of these schemes is the inclusion of the semi-variance of the rain-gauges in the surrounding neighbourhood, along with their distance from the un-gauged point, in the interpolation calculations.

The results of using a number of different Kriging techniques to merge canned gauge and radar data collected over the UK are presented to illustrate the benefits of a merged gauge and radar product. This work has recently been developed to provide a merged 15 minute accumulation in real-time for England and Wales. Examples of the real-time merged product generated using the UK tipping bucket rain-gauge and radar network will be presented and the challenges involved in producing this data for flood forecasting purposes will be discussed.