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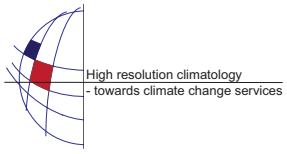

Determining the accuracy of gridded climate data and how this varies with observing network size

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The National Climate Information Centre at the Met Office regularly produces assessments of mean monthly values of weather parameters and their anomalies over the UK. These are based on daily measurements at a network of observing sites, and produced by a method of gridding and interpolation. Monthly series of gridded temperature and rainfall at 5km resolution have been produced back to 1910, and of sunshine back to 1929.

However, it is recognised that the gridded values, and corresponding areal-average values, are subject to error; for example, earlier work shows that the RMS error for point temperature estimates is around 0.4 degrees C on average.

Hence we would like to be able to place error bars on our monthly estimates, including the areal values which are used to place recent weather into context against our historical series. This could also affect our interpretation of values in terms of which years have produced the most extreme values in our series.

Another reason for doing this is to determine how far back we could potentially extend our historical series, given the availability of data which is increasingly limited as we go further back before 1910.

Experiments have been done to estimate the mean errors in gridded values of temperature and rainfall, and how these errors vary when we artificially thin out the observation network. Currently the UK contains approx 400 stations for temperature and 3000 for rainfall, these figures having declined from a peak of around 570 and 5400 respectively in the 1970s.

Results show that the mean estimated error of our calculated areal values increases only relatively slowly when we artificially remove stations from the available observations. However, this is partly because, with fewer stations, the gridding software then finds it easier to provide a 'fit' to the pattern of the remaining observations. From our results, it is suggested that a network size of at least 80 stations is required to give reliable areal estimates for the UK, meaning that we would be able to extend our historical series back to around 1875 (rainfall) and 1902 (temperatures).