

Interactive comment on “CEH-GEAR: 1 km resolution daily and monthly areal rainfall estimates for the UK for hydrological use” by V. D. J. Keller et al.

Anonymous Referee #2

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The paper describes a new data set, CEH-GEAR comprising daily and monthly rainfall over the 244,343 UK grid points 1890-2012. The motivation for the work is that there is at present only a 5km daily and monthly rainfall since 1961 from the Met Office, and as the authors say on page 85 line 23 that for hydrology we need 1km data going back before 1960.

The current version of the paper does not have convincing evidence of the reliability of the new CEH-GEAR data set and the errors in their 1km daily rainfall totals.

1. Validation is provided by using an independent Scottish data set of 200 tipping bucket data since 1960 of which 121 were used (page 96, line 4) and from this sub-

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set only tipping buckets at least 5km away from the daily gauges were used (page 96, lines 5-6). Two questions: a) How many were actually used, and b) how is it possible in Fig 7 to produce errors for distances below 5km if the gauges had to be >5km away? Note also that Fig 7 is the median – but for using the new data for historical studies of catchment response and so forth it is the more extreme events that are the most important. More detail is needed on how good are the interpolations for the more extreme flood producing events. Third point. It is essential that the authors carry out the same comparison with the existing 5km data set, to see if this 1km data gives better agreement with the SEPA gauges.

2. Data before 1960. After 1960 there was on average one gauge per 40 km^2 . However before 1960 there were more gauges, but we learn page 86 line 25 that only a limited proportion of the pre-1961 data is currently available in digital form. The crucial question is how many gauges are used in the CEH-GEAR data set pre 1961 and how does that impact upon the errors of the 1km CEH-GEAR data set. Apart from knowing that it must be worse than the post 1960 data we have no estimate of these errors. Some idea of the sparseness of the digitised data set can be gleaned from page 93, lines 24-26, when we learn that the number of 1km grid boxes is 244,343 but the number that were 100km away from a gauge was 46,394 (about 20%) in 1890 and 20,604 (about 10%) in 1910, falling to just 34 after 1961. Clearly the digitized data set must be far more sparse than post 1960, so we need more details on just how many digitized gauges were included and we must know how this affects the errors.

To achieve this the authors need to remove some independent gauges to check the 1km interpolations. This could be achieved by using some gauges that operated for short periods and are not included in the CEH-GEAR analysis. Failing this, they need to remove some gauges from the present analysis, repeat the analysis to produce the CEH-GEAR 1km data set, and then check the 1km interpolations with those actually measured by the gauges. Unless this is done, the user has no idea how accurate and reliable this new 1km data really are.

