Hydrol. Earth Syst. Sci. Discuss., 10, C4698–C4700, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C4698/2013/

Hydrology and Earth System Sciences
Open Access
Discussions

Interactive comment on "Rainfall and temperature estimation for a data sparse region" *by* R. L. Wilby and D. Yu

R. L. Wilby and D. Yu

r.l.wilby@lboro.ac.uk

Received and published: 6 September 2013

Referee #1 helpfully asks for more discussion about the transferability of our approach to other data sparse regions; ways in which the methodology and choice of variables might be refined; and minimum data requirements. Clearly these points are related.

Until tested elsewhere we can only speculate about the transferability of our approach. However, the experimental design was intended to explore this important aspect within the confines of our two rainfall networks for Yemen (by calibrating and validating the model using different data sets). The satisfactory performance for Taiz suggests that the model is transferrable even when skill is assessed across a wider range of diagnostics. Moreover, we deliberately build the model using data that are in the public

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

domain, and intuitively related to local weather (e.g., elevation, latitude). In section 6 we mention other priority regions that could be investigated.

Similarly, we also outlined steps that could be taken to refine the model in sections 5 and 6. Most of the suggested variables can be derived from a DEM, so this represents the minimum data requirement. None of the proposed statistical developments are more data intensive than the existing model. Nevertheless, there is clearly a trade-off between the amount/quality of available meteorological data for calibration and the parsimony/confidence placed in model parameters. The approach is still applicable even if predictability varies amongst parameters (as is the case, see Table 3 final column). However, skilful estimation of precipitation occurrence (PWET), amount (RTOT) and mean temperature (ATBAR) might be regarded as a minimum performance threshold. We will make these points in the revised manuscript.

Referee #1 raises two specific queries: one about the overlap between Networks A and B; the other about interpretation of the gamma model results presented in Figure 13.

We have checked the extent of overlap between our networks and find that there are only eight stations in common. This means that use of Network B to validate the model is still a stringent test since there remain 63 stations that were not used for model calibration.

Figure 13 compares observed and modelled extreme rainfall totals using the daily total with 10-year return period as the diagnostic. Again, given limited data available for model calibration, and estimation of an extreme statistic that has greater return period than the length of record, this is a severe test. The tested models (gamma, root4 and log) show varying degrees of skill, recognising that there is uncertainty in the quality of the observations too. Each produces a hypothetical distribution based on their respective parameters with varying degrees of match to the empirical distribution.

We regard gamma as “more precautionary” because this model generates marginally

HESSD

10, C4698–C4700, 2013

larger values than observations. This means that if the output is used for assessing risks from heavy rainfall (such as soil erosion or flash flooding) the magnitude of the impact will be similarly uplifted. Any adaptations to these events would, therefore, be inherently precautionary. We will explain these points better in the revised manuscript.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 7575, 2013.