

Interactive comment on “Regionalised spatiotemporal rainfall and temperature models for flood studies in the Basque Country, Spain” by P. Cowpertwait et al.

Anonymous Referee #2

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Review comments

Regionalised spatiotemporal rainfall and temperature models for flood studies in the Basque Country, Spain

General comments

1. The paper describes an application of using stochastic precipitation and temperature models to generate long term time series that can be used to drive a distributed rainfall runoff model to produce discharge time series. The methods and models implemented are not new but the application is relevant to hydrological sciences. The paper can be

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considered for publication after corrections are made.

2. The paper dwells on the description of the precipitation and temperature models (over 15 pages), but really the methods and equations used, in particular for the P model, are not new and can be found in literature. The only feature that is probably new is the inclusion of different storm types, although the study actually used two types only. A large number of equations were presented without detailed explanation, as authors often cited the references and assume readers would understand. If authors present equations in the main text without explaining them, I don't see why they should not be put in an appendix and cite the references.

3. On page 10374, authors mentioned 'infilling the missing data and disaggregating the daily data to hourly values'. What method did authors use to fill up the data gaps? For disaggregation, did authors divide daily by 24?

4. On page 10384, 'Also, the predicted range for equal maximum temperatures in winter and summer is greater in winter, as would be expected for a maritime climate with higher temperature drops at night in winter. For example, the coefficient for February is 0.62 compared to -4.45 for August indicating a lower range for August and, hence, a higher temperature drop in February'. What do authors mean by 'range for EQUAL maximum temperatures'?

5. On page 10384, authors state 'An important application of the rainfall and temperature models is to predict flooding using continuous flow simulation from a hydrological catchment model.' After reading this sentence, I was expecting some exciting application in prediction of floods using the P/T models described at length in the previous test. And again on page '10386', authors say 'A unique set of correction factors is sought for the whole catchment for the set of events and, if this is achieved, the fitted model should make good predictions.' Throughout the paper, prediction of floods was never made. Furthermore, I cannot understand the rationale of calibrating the model using 13 flood events, performing no validation using separate events, but then jumping to long-term

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continuous simulation. I don't see why the conceptual model would perform well for long-term continuous simulation when it was only calibrated based on 13 events. And I am not convinced that the calibration is sufficient for simulating long term discharges, even the authors were only comparing the annual Qmax. I am afraid that I cannot agree with the authors stating on page 10387 'the model can be regarded as highly representative of the hydrological response of the catchment'. 'Highly representative' is a bit over stated.

6. Figure 10 shows discharges at the B2Z1 site are underestimated in 4 out of 6 cases ($Q_{sim} < Q_{obs}$), especially the last subfigure shows almost 200 difference in the peak discharge. By the way, the fonts for the axes are too small to read. In Figure 11, $Q_{max(sim)} > Q_{max(obs)}$ with the same frequency can be clearly seen. It will be useful if the authors explain the overestimation in simulated probabilities, e.g., is this due to underestimation of Q_{sim} during the model calibration?

7. On page 10386, authors mentioned 'a regionalisation procedure was used to...', it is necessary to mention what regionalisation procedure was used in this study. It seems authors referred to the method from Velez et al 2009?

8. On page 10388 'The models are therefore validated for the catchment and can be used with confidence in further studies.' What further studies do the authors refer to here? It will be helpful to elaborate on some outlooks.

Specific comments

P10367

'too course'

Change to 'too coarse'

'One of the earliest such models to be developed was a model based on a spatial-temporal Poisson process'

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Please consider to rephrase the sentence: 'One of the earlier models was based on a spatial-temporal Poisson process'

P10371

'do not need to fitted separately'

Change to 'do not need to be fitted separately'

P10385

'Downwards and after receiving its main tributary, the Ibai-Eder River, the valley widens and flattens before reaching the Atlantic (Fig. 9).'

the Ibai-Eder River mentioned in the text is not reflected in the figure 9.

'The TETIS model was selected to represent the hydrological processes'

Consider to change to 'The TETIS model was selected to simulate the hydrological processes'

'the substrate hydraulic conductivity'

Do you mean 'subsurface', not 'substrate'?

P10386

'These correction factors are modified to calibrate the model to a set of recorded events, using the Nash-Sutcliffe efficiency coefficient (or R2) to assess goodness-of-fit.'

Consider to rephrase to

'These correction factors are calibrated using a set of recorded events. The Nash-Sutcliffe efficiency coefficient (or R2) is used to assess the goodness-of-fit.'

'an excellent fit (Beven, 2000)'

Which page and section did Beven (2000) state 0.8 indicates an excellent fit?

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'relies on three maps of parameters'

What are the three maps of parameters?

'absolute peak error'

OBS-SIM or SIM-OBS? Where has it been specified?

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