Review of "Using observed river flow data to improve the hydrological functioning of the JULES land surface model (vn4.3) used for regional coupled modelling in Great Britain (UKC2)" by Martínez-de la Torre et al. (2018)

Summary

This manuscript presents simulation results from the Joint UK Land Environment Simulator (JULES) applied to 13 selected catchments in Great Britain. The authors compared observed and simulated streamflow discharge in these catchments. The objective is to analyse the differences between observed and simulated discharge and improve the prediction skill of JULES. A new topographic parameterisation has been proposed that can improve JULES' capability of reproducing daily observed discharge. Overall, the manuscript presents useful research that is of interest to the readers of GMD. However, there are some issues, which deserve attention before publication.

Major issues

1) The major weakness of this manuscript is its introduction. There are several issues related to the presentation style of the research in the introduction section.

- The last sentence of the first paragraph reads "In this paper we present the methods of evaluation for the runoff generation and how we have improved the selection of hydrological parameters for Great Britain in order to allow use of JULES within the coupled system." Without mentioning the related works and convincing the readers about the usefulness of the study (in relation to the knowledge gap in previous research efforts), this first paragraph already summarises the research. This structure of the introduction is not particularly interesting. Also note that there are two textual errors in this sentence (i.e., missing comma after *paper* and missing definite article before *use*). This manuscript requires proof-reading to improve grammar.

- The second paragraph summarises the runoff generation mechanisms in JULES. The third paragraph starts like this "The island of Great Britain represents an ideal platform to tackle the runoff generation in LSMs as it presents diverse climatic …". This sentence gives the reader an impression that JULES has some issues in generating runoff, which is tackled in this research. What are these issues? I did not find them in the previous paragraph. The authors should make these issues clear before this sentence.

- The introduction is also confusing because the usefulness of the study is not apparent from it. One sentence like "However, a LSM widely used in the research community like JULES needs physically-based parameters that produce sensible results at the regional and global scale, independently of the region studied (i.e. avoiding local calibration)." does not suffice. The authors should make the innovation and usefulness of the study very clear in relation to previous studies. Again, note an incorrect article before *LSM*.

- The last paragraph states the workflow of the manuscript. "Then, based on those catchment results, we present a simple model development that introduces a topography dependency in a parameter, reaching the best results for the region and avoiding catchment calibration." Which parameter? Best results of what? "Finally the implications of the new approach are investigated further using a cross-spectral analysis of performance against observations at time scales exceeding a day." How does the cross-spectral analysis fit to the objective of the study? (Note a missing comma after *finally*).

The authors should re-think about the introduction to make the objective and usefulness of the study clear to the readers.

2) It seems that the major contribution of this study is the proposed spatial dependence of S_0/S_{max}. However, it is described in Section 3.4. I understand that the authors developed this parameterisation based on the comparison between observed and simulated runoff, which has been discussed in the previous sections. However, such an important contribution should not be introduced so late in the manuscript. The spatial dependence of b can be described in a separate section after the introduction (or even in the methods section). Later, it can be substantiated in the results section using the modelled and observed runoff data.

3) The conclusion section just summarises the study. What is the take-home message? What are the useful findings that can benefit the scientific community? The authors should make these clear in the conclusion.

Minor comments

1) The spectral analysis (Figure 10) compares the performance of JULES-PDM with slope dependent S_0/S_{max}. How does the spectral power of the observation compare with JULES-PDM with default parameters? Does the inclusion of slope dependent S_0/S_{max} improve JULES' performance in reproducing runoff at timescales longer than a day? I would assume it does (looking at Figure 9). The authors may consider including this comparison in the spectral analysis.

2) As I have mentioned earlier, this manuscript needs a proof-reading to improve the language.

3) What are the *Great Britain catchments* (Section 2.2 and other places in the manuscript)? Can this be replaced by *Selected catchments in Great Britain* or something like that?

4) Similarly, what is a *Great Britain hydrological model*?

5) Caption of Figure 1: Generally, an abbreviation goes inside the parentheses (NRFA). "Note that the catchments Ure, Severn1 and Ock are contained within the larger catchments Ouse, Severn2 and Thames, respectively." May be you could call them *sub-catchments*?

6) Caption of Figure 2: Variability *of* the soil moisture …

7) Caption of Figure 10: In each case*,* the variability and relative timing *of* daily …