

Review of ‘Evaluating the Atibaia River Hydrology using JULES6.1’

This paper presents results of applying JULES v6.1 to the Atibaia river catchment in Brazil. The authors compare modelled river flow predictions with observed values, comparing the two saturation excess schemes available in the JULES code; PDM and TOPMODEL. The authors perform a sensitivity analysis of parameters within PDM and TOPMODEL and conclude that either option can be used to satisfactorily estimate river flow. The authors suggest that better rainfall drivers would improve the model results further. While this is likely true, I feel that consideration of other sources of error would also be appropriate – in particular the relatively coarse resolution of the JULES runs and the choice of river routing model. I also think the manuscript would benefit from some clarifications, particularly in the results and discussion section. Please see below for specific comments.

Comments:

Please make sure the citation style is consistent throughout.

Line 11 (and elsewhere) the phrase ‘environmental processes changes’ is a bit confusing – please could you rephrase this?

Line 16. I disagree with the statement that ‘Our results show that the coarse resolution of the rainfall data is the main reason to reduce model performance’

Line 34. I’m not clear what the relevance of the MCMC model is here – is this just another example of alternative modelling methods? Please clarify.

Line 48. I would describe the driving data for JULES as ‘meteorological’, rather than ‘hydrometeorological’.

Line 56. Does the region really have both C3 and C4 grasses? And, later in the paper you mention that 12% of the catchment is urban. Can you comment on that here?

Line 61. Please make sure you are clear in the distinction between precipitation and throughfall.

Line 64. Could you make it a bit clearer that you have compared results from using PDM and TOPMODEL?

Line 71. What is the spatial scale over which you have calculated the soil physics parameters from textures in the HWSD? IS it representative of the subcatchments you have used?

Line 74 (or elsewhere) can you make it clear that you have run JULES with each subcatchment as an effective grid box? The more usual approach is to divide an area of interest into approximately square grid boxes. (I don’t think there’s any problem with doing it by subcatchment, but it needs to be clear!)

Line 76. Can you make clearer how rainfall data are substituted in the case of missing data? And can you give the reader an idea of how representative the rainfall data are likely to be for each catchment?

Line 80. Can you justify using this simple river routing model rather than RFM or similar, as is more usual? Should the equation in this paragraph be labelled equation (1)? Also please make sure you define all the symbols in all equations in the paper – adding in units can also be really helpful to the

reader. Should there be two different values of C for surface and subsurface flows? How was the value for this chosen?

Line 98. Can you make this clearer?

Line 108. Can you explain how you account for the effect of dams?

Lin 117. Why do you use a value of 0.085 here? I would suggest that equation (1) is not necessary.

Line 120. Which quantity is this the standard deviation of? Please make sure all symbols used are clearly defined – also for the equations from line 125.

Line 125. Please can you make clear to the reader what these metrics mean – i.e. what constitutes a ‘good score’ etc?

Line 134 (and elsewhere). Can you please make clearer what you mean by ‘gradually alters the hydrograph’?

Line 137. You state that the flow is changed to a subsurface flow-dominated regime, but is this shown in the results section?

Line 139. The choice of $b_{pdm} = 0.5$ is also not demonstrated in the results shown.

Figure 3. Are these points mean flows? Daily/hourly data points? Please clarify. I would also suggest adding a 1:1 line and/or plotting these with a square aspect ratio to make the relationship clearer. The caption of 3.a is also a little tricky to read.

Line 143. Is this conclusion shown in figure 3d as stated? Please make this clearer if so.

Line 143. Please justify the statement that peak flow was reduced for a lower t_{i_max} .

Lin 150. Please comment on the fact that although TOPMODEL scores better in terms of NSE and R^2 , the bias is worse.

Line 155: Please reword this as the meaning is unclear

Line 157 and throughout. Please be specific about which metric you are referring to by ‘modelling performance’ (e.g. NSE here)

Line 160. You state that uncertainty in rainfall data **could** be the main driver for the gap. I agree that it could be, but could you comment on other sources of error and/or uncertainty?

Line 161. What do you mean by ‘complimentary’ here?

Line 162. Can you rephrase this sentence? Not sure what is meant by ‘variated’ or ‘significant modelling period’.

Line 164 – 167. Can you make sure all of these statements are reflected in the results data shown?

Line 169. You compare to SWAT results here; can you show some results or otherwise justify this assertion?

Small things:

Line 15. Suggest changing ‘to evaluate’ to ‘of evaluating’

Line 49. Suggest changing 'which' to 'and'

Line 54. 'detailly' is not a word, please replace

Line 61. Not sure 'presented' is the right word here – could you reword this?

Line 113. Suggest changing 'modelling' to 'modelled'

Line 130. Suggest replacing 'using' with 'in'.

Suggest including a reference to <https://doi.org/10.5194/gmd-12-765-2019>, in which JULES + PDM and JULES + TOPMODEL are calibrated for some river catchments in the UK.