

Review of revised manuscript by Chou et al.: Evaluating the Atibaia River Hydrology using JULES6.1

This manuscript describes the authors' use of the JULES land surface model to simulate the hydrology (principally river flow) of the Atibaia catchment in Brazil. The model is considered to perform reasonably, with the main deficiency being attributed to the lack of good rainfall data for input.

I also reviewed the earlier iteration of this manuscript and I consider the current iteration to be a distinct improvement - the authors have addressed many if not all of the points raised in the previous reviews. The results are now presented and discussed better. Though I do still have some concerns - for example I can imagine further data processing and runs that it would be interesting to carry out - these are largely overridden by my appreciation of what the authors are attempting to do. The main attraction of this work is that it is assessing the extent to which a land surface model can be used to model river flow in a relatively small and relatively data-sparse area that is important for water supply to major urban populations. The need to be able to address pressing issues around water supply to some extent override the desire to provide a definitive modelling study - there is always more that can be done, and sometimes it is better to do a reasonable job rather than demand endless further investigation. That said, I will note a few such possible extensions and questions below.

Abstract L15: "We explore the use of local precipitation collection complement with multiple sources of global reanalysis data". I think this is rather overselling what was done, which was to use local rainfall data with data from a single reanalysis product. Reword as "We explore the use of local precipitation data in conjunction with data from a global meteorological reanalysis" or similar.

Abstract L16: "Our results show that the coarse resolution of rainfall data is the main reason for reduced model performance." As with the previous iteration of the manuscript, I think this is a rather bold conclusion. I would be happier with "Our results suggest...".

Rainfall data

L43: "runoff fluxes are simulated in gridbox with rainfall data from the nearest monitoring station (Campinas, Atibaia, and Nazare Paulista) of Campinas Agronomic Institute (Campinas-IAC)". For years with missing data, rainfall "is replaced by using the time series from the nearest Department of Water and Electricity (DAEE) station". As there are 5 DAEE stations shown in Fig.1, I am wondering why you didn't use those for rainfall, rather than using the 3 Campinas-IAC gauges. Perhaps the DAEE stations have more missing data (though they are being used to replace missing data)?

Only gauges from the Atibaia catchment have been used - could gauges from adjacent catchments also be used to get a better idea of the rainfall coverage (perhaps with a more sophisticated analysis than the nearest-gauge approach currently employed)? Given that one of the main conclusions of the study is that better rainfall data are required, it would seem sensible to explore all possible sources of data. Similarly, there are global rainfall products and (meteorological) reanalysis products that might be considered. Although these might be of questionable value over such a relatively small catchment, and their value likely depends on the quality and number of local observations that are incorporated in them, other studies have shown that these can be useful sources of input data - and they can have advantages such as spatial representivity, complete high frequency time series, and consistent relationships between variables. These data might or might not improve the modelling

results, but given the lack of current in situ data, their use should be considered. Ideally this would be part of the current study but otherwise some of these possibilities (or others) should be discussed. The last two paragraphs of Section 3.2 (~L160) could be expanded to better signpost this possible future direction; at present this is scarcely touched with L167 "There is a possibility for the model to be further improved once more adequate rainfall data is available."

Other points

L92: "Mean value and standard deviation of the topographic index data is obtained from Marthews et al. (2015) as follows:" - the text that follows actually described something else (related, but not the mean and std dev).

L100: "Soil hydraulic characteristics can be estimated using the relationship of Brooks & Corey (1964) or a more robust formulation of Van Genuchten (1980)." Do the PTFs of Hodnett and Tomasella provide parameter values for both of these hydraulic parameterisations? Which approach was used in the JULES modelling?

Calibration (sensitivity) is assessed only at the basin outlet, but the same parameters are then used for all sub-basins. It would be interesting to know if calibration at other gauges would return similar parameter values (backing up your use of the outlet alone) or might suggest spatial variation of parameters - e.g. from lowland to upland regions, which might be expected to behave differently. Given that several flow gauges are available (and used) why not at least explore whether a better model set up is possible?

Figures and Tables

Please indicate the gauging station or part of catchment used in each figure and table. e.g. sensitivity results in Fig.3 is at outlet (I think). L149 says Fig.5 is for the lower basin - this should be included in the caption for Fig.5. I'm guessing that the later plots are also for the outlet - but that should be clear.

Figure 2 doesn't add much - I would consider removing it.

Minor points and language

The manuscript is written in reasonable English, but the phrasing is rather odd at times. The meaning is generally obvious, but a fluent speaker of English could tidy the manuscript, possibly with relatively little effort.

Here I list a few examples of bad phrasing here, but there are more:

L25: "Up-to-date, a few research activities"

L28: "In which, a commonly used"

L160: "Despite the highly variation"

L139: "more intense rainfall" - better as "more rainfall". "Intensity" is usually used when characterising shorter timescales, e.g. the rainfall rate during a rain event, not an annual total.

Citations: Some of these are not formatted correctly. e.g. L82 Clark consistently appears as "Clark, Douglas B."