

Interactive comment on “Estimation of water yield in the hydrographic basins of southern Ecuador” by Saula Minga-León et al.

Anonymous Referee #1

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General comment

Estimating water yields in poorly gauged areas with large topographical and climate heterogeneity remains challenging. Therefore, the combination of multiple data sources and the use of the model to solve the water budget in areas like the south of Ecuador is very interesting. However, the manuscript is more focused on the specific case than in the broader implications of the proposed methods. This is evidenced in the lack of clear research questions that could go beyond the current objective: “to estimate and map annual water yield for the 1970-2015 period in nine hydrographic basins of the south of Ecuador”. By stating the research questions the conclusions could also be stronger and more relevant to a broader public. Furthermore, you have a large data set (1970-2015) why not use part of it to calibrate the model and the other to validate?

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Specific comments

Pg3L2: "However, the uncertainty introduced by errors in climate data can be significant and non-spatially heterogeneous, subsequently affecting the estimated spatial distribution of water yield." How will this be considered? does it need to be considered?

Pg3L8 in relation to pg2L5. Water yields estimated for the 1970-2015 time period are not necessarily “current” given the fast changes caused by land cover and climate change. This also raises the question of how much hydrological variability was observed within this long time period? Could any trends be found? This could be outside the scope of your paper; however, I believe it is necessary to describe the observed behavior of the hydro-climatic variables within the study period as context information.

Pg3L11: Are you sure the precipitation range over the Amazon side of the Andes is that low? Please see precipitation data for the cerro El Consuelo (> 4000 mm) Bendix, J., Rollenbeck, R., Fabian, P., Emck, P., Richter, M., Beck, E., 2008. Climate Variability: temporal heterogeneities, In: Beck, E., Bendix, J., Kottke, I., Makeschin, F., Mosandl, R. (Eds.), Gradients in a Tropical Mountain Ecosystem of Ecuador, Ecological Studies. Springer Berlin Heidelberg, Berlin, Heidelberg, pp. 281–290. doi:10.1007/978-3-540-73526-7 Why not include the data from El Consuelo, if it is available?

pg7L9: You are using a land use map of 2014, which is at the end of the study period (1970-2015). It is reasonable to assume that significant land-cover change has taken place during the study period. How can you assume that a 2014 map is representative for the study period? If this assumption is not supported, how can it affect your results?

pg7L16: You estimated PAWC from data available from HWSD? or you obtained PAWC data from HWSD? if the first, please state how.

pg8L8: Sorry, I do not understand what do you mean by "The calibration was performed up to the elevation of the stations".

pg10L4 and Table 4: Your study area has a very sharp precipitation gradients accord-

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ing to the position within the Andean system (e.g. Amazonian, High-Andean valleys, Pacific slopes). It can be easily predicted that the basins in the high Andean valleys will have a lower water yield and that the ones from the Amazonian side will have a larger water yield by just using precipitation data. In this regard, your aim could go beyond stating which basins have higher water yields and maybe focus more on the limitations to estimate water yields and the importance of understanding how other variables different to precipitation modulate them. Can you please provide information on the position within the Andean system of each studied basin. This information can be provided by an underlying position classification in figure 3f.

pg13Figure6: This is part of your results and they could be better placed in the results section. Also, I do not see how the plot shows what you are trying to explain in L9-10 because in the plot you cannot see anything related to water yield. This plot can be improved. For example, the colors representing the basins could be graduated from higher to lower water yield

pg14L24: It is not a matter of algorithms, it is a problem of the available data. If the gauging density does not represent the spatial heterogeneity of rainfall there is no algorithm that can fix it. Once we have data to represent the spatial variability then we can evaluate the best way to interpolate it.

Technical corrections

pg6L7: An image is not the same as a map. I think you are referring to precipitation and temperature distribution maps

pg10L10 Where are you getting these values from? include reference to Table 5

pg11 and Table5: Please correct the units Mm3.

pg14L12: I could not find in Table 5 any reference to LUC

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