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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Riparian evapotranspiration shapes stream flow dynamics and water budgets in a Mediterranean catchment" *by* Anna Lupon et al.

Anonymous Referee #2

Received and published: 19 February 2018

General comments: This paper seeks to determine the influence of riparian evapotranspiration (ET) in streamflow dynamics and the prediction of water budgets at a catchment scale. The authors used a flexible landscape scale rainfall-runoff model to simulate daily stream exports with and without the influence of riparian ET. The results demonstrate that when the riparian ET compartment is considered in the model, then the prediction across seasons and sub-catchments are improved. Moreover, the article studies the influence of this compartment under climate scenarios and demonstrates that riparian ET could play a significant role when estimating catchment hydrology with respect to climate change, especially under extreme drought conditions. The paper is well-written and straightforward, and the scientific findings represent a valuable contri-

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Discussion paper

bution to the field. I recommend publication with minor revisions.

Specific comments:

My main concern in this manuscript relates to the model's description. With the information provided, it is difficult to follow how each piece of information falls into place for the simulation. For example, L135-138 mention procedures which include water pressure sensors to determine stream water level, the use of an ISCO sampler, and an empirical relationship between flow and water level using a slug chloride addition. The connection between these sentences seems unclear; was the water level data measured while conducting tracer injections? It is also not clear to me if these parameters were used as model inputs or if they were used further to compare between the observed and the simulated streamflows (L144). If they do not belong to the model inputs, I recommend placing that information in a different section. I believe section 3.3, "Calibration procedure," could start at L141 (remove redundant information from L162), and then the technical information regarding streamflow evaluation could be included in L144. If, on the other hand, my interpretation about the use of these parameters is inaccurate and they belong to section 3.2, please clarify their role as model inputs and include how the observed streamflow data was gathered (e.g. nearby gaging station, instream discharge measurements).

In addition, it seems unclear if the model is capable of considering different types of vegetation and its influence on riparian ET. It would be very useful to condense the information expressed in sections 3.2 and 3.3. I also recommend the creation of a conceptual figure or table that lists all the variables used for input, calibration, and the model output, as well as a short description of ET related parameters and model capabilities in term of predictions regarding vegetation changes. Consider replacing the titles within the "Materials and methods" section to: 3.2 Model inputs and 3.3 Model configuration and calibration procedure.

Technical corrections:

L48: Please provide some references.

Figure 1: The location map on the top right needs more context; it would be useful to label key landmarks (i.e. names of countries or cities) for better reference. The color code used is difficult to follow. It is hard to identify the areas where the riparian zone is present since the color selected is masked by the color used for stream delineation (in the printed version, the riparian zone color code looks black). It might also be useful to number your stream sites in the figure and then add the corresponding label in the legend (e.g. 1 Upstream; 2 Midstream; 3 Downstream). The map also includes contour lines that seem to be representative of the catchment elevation, however, these are not mentioned in the figure caption, please clarify.

L147: Consider changing “divided” to “categorized”.

L162: Insert “in the literature” after “ET values reported”.

L165: Change “the” to “model” in “Note that the instances. . .”.

L175-176: It is unclear how the authors defined dormant and vegetative period. Please add more clarification in regards to this. Also, L192 attributes the specific month of the data set to the periods under discussion. It would be more useful to state this classification the first time the periods were mentioned in the text (i.e. L175-176).

L195: Is riparian ET one of PERSiST’s outputs, or was it calculated using modeled streamflow data? So far, only streamflow (catchment water fluxes) has been introduced as a model result. Please briefly list output parameters of interest under the model description in section 3.1.

L294: Is the length of vegetative period determined only by the simulated values of ET (e.g. ET rates > 0 mm d-1)? I think this could be clearer with more insights on what the authors used to classify this period.

L373-374: It is unclear how the extension of the vegetative period in the climate model’s scenarios can be associated to early onset of the leaf out period after considering the

limitations of the model in L330-334. Please clarify.

L376: The role of vegetation in the model's performance or predictive capabilities has been understated throughout the text, hence arguing that model results "strongly support" an effect of climate change in tree phenology seems uncertain. Please provide clarification or references that help support this statement.

L384-385: This seems to contradict the statement on L376.

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