Hydrology and
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Discussions

Interactive comment on "Modelling stream flow and quantifying blue water using modified STREAM model in the Upper Pangani River Basin, Eastern Africa" *by* J. K. Kiptala et al.

Anonymous Referee #1

Received and published: 17 February 2014

I have read the manuscript entitled "Modelling stream flow and quantifying blue water using modified STREAM model in the Upper Pangani River Basin, Eastern Africa" with great interest. This research article discusses an interesting approach towards modeling stream flow and quantifying blue water using modified STREAM model in the Upper Pangani River Basin in Eastern Africa. I think, the manuscript is valuable for the scientific community and recommend its publication. However, I will comment critically to further improve the paper and suggest the authors to revise the paper for its possible publication.

Specific comments:

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1. The authors have used the double mass curve to derive the rainfall up to mountains peak using the rainfall data of the neighboring stations. Please explain in detail about double mass curve or at least provide suitable reference. Of course, this is well known method, but for readers it would be good to understand in detail.

2. P15778, L 8: the authors discussed the short comings in the remotely sensed rainfall data. I agree with it, but the bias can be removed using limited ground data. For instance see Cheema and Bastiaanssen (2012), Local calibration of TRMM rainfall data. It will be nice to briefly discuss the short comings.

3. In model development section P15778 L 18; Is 8 day time step is a constraint? Can it be applied at daily time step? If you use the time step smaller than 8 days, how much your results would change. I am very much interested in checking the sensitivity of the developed model in the form of scenario analysis. Is there any sensitivity analysis performed? Would be nice to include it as well.

4. In the paper, the ETb is calculated from the groundwater as capillary rise C(t). Which equations have been used to calculate the capillary upflow from groundwater? I would suggest the authors to read papers by Vervoort and Van der Zee, 2008, 2009 regarding calculating capillary upflow. They have developed analytical equations for capillary upflow and effect of capillary upflow on the soil moisture. Integrating these equations in your analysis would give another angle of checking your results.

5. For simulating the model, how many years of rainfall data were used. For calculating long term average of discharge and other water balance components, you need to simulate the model for longer times. This may be another reason of underestimating/overestimating the discharge. I would suggest the authors to generate long term rainfall from the Poisson rainfall function and use this generated rainfall data for calculating the long term averages. For long term simulations, the moments become stabilize and output becomes more promising, if possible.

6. The regression line shows R2 more than 0.5, but the Qo and Qs don't lie on the 1:1

line especially for greater magnitude of discharge. Of course, you have explained that clouded satellite images create uncertainty and that's way both discharge differ a lot. Please write some words about possibilities of reducing this uncertainty in clouding. This is a great challenge to do further research. I also think that there are sources of errors in addition to clouding that generate theses uncertainties.

7. P15781, L 15: In the equation 3, Is it total Ta?

8. In the conclusion section it will be good to provide %age of various performance indicators used.

General Remarks:

1. P15587 L2: Use "five" instead of 5.

L18: Eqs. (15) and (16), respectively.

L20: "squared" instead of square

2. P 15774 L 10: Resulted instead of resultant

L 25: Remotely instead of remote

3. P 15775 L14: Please use latest references. E.g. Cheema et al 2013 has used satellite derived rainfall to parameterize the SWAT model while Eta from ETLook was used to calibrate the model to determine contribution of groundwater use in total blue water use. L 20: I am not convinced with this statement. Such effects can be avoided using passive microwave imagery. Kindly rephrase the sentence.

L23: method of using of Eta.

4. P 15777 L7: Remotely instead of remote

5. P 15778 L2: "developed by" instead of "from recent research"

6. P 15779 L1: "was" instead of "is"

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L23: "calculated" instead of "calculate"

At the end, I would suggest that the paper can be considered for publication after going through the suggested revisions.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 15771, 2013.

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