Interactive comment on "Changes in land cover and stream flows in Gilgel Abbay catchment, Upper Blue Nile basin – Ethiopia" by T. H. M. Rientjes et al.

Anonymous Referee #1

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General comments

- It is an interesting paper utilizing (i) RS data to detect land use change over 30 year period, (ii) statistical analysis to assess trends of runoff in the same catchment. The interesting part of the paper is not clearly reflected, i.e., how results from (ii) supports or reject results from (i). It also lacks the discussion on physical processes that might happen because of land use change. A possibility to discuss physical processes is by a rainfall-runoff model, but could be a lot of work for this paper. - It does not add much to the research question(s) by extending part of the analysis (river flow trends)

to neighboring catchments. Either make similar analysis to all catchments (land use change detection plus trend analysis), or give complete analysis to one catchment. - Though the structure of the paper is good, the text doesn't follow a clear story line that links research question(s), material, methodology to results and discussion.

Specific comments

- P9569, L3, give reasoning or justification that impact of land cover change decreases with catchment size increase. - P9569, L6 to 16, is it wise to derive a generic conclusion on impact of land cover change on runoff, if the process itself is physically controlled by the local context as stated in L 14-15. Re-phrase this paragraph, e.g., "different results" could be more meaningful than "inconsistent results" - P9570, L5, see Tesemma et al., 2010, 0.1002/hyp.7893 in hydrological processes, is a relevant study in the same basin. - P9570, L8, update Gragne et al, 2008 to correct year. - P9571, L28, give more in-depth discussion about the quality of the discharge series at Gilgel Abay, which actually derived from rating curve equations, in particular at high flood, and at low flow. How much is the uncertainty involved, and how this affects the answer of the core question - impact of land use change on runoff? - P9573, L19, why not using a more recent image than 2001 if ground truthing is done in 2008? - P9576, L21, Q5, Q95, low index, high index, check definition. - P9576, L21, could be more robust to use seasonal means (high or flood season or low or dry season) instead of single values for Q5, Q95. - P9589, Table 2, WM appears two times, why? - P9578, L20, discuss this results in relation to results given in literature for the same basin if not for the same catchment, see Bewket et al 2005, Musefa (ITC thesis 2007), among others, ... Why results are different? - P9578, L23, why stream record not up to date? - P9593, Table 6, what is the reason of including Megch and Gumera? they are different catchments, and given information doesn't add much - P9579. Top paragraph. How these results influenced by quality of discharge data, in particular at high/low month, e.g., June? The results could well be attributed to inaccuracies of the rating curve. Please discuss critically. - P9579. Top paragraph, perhaps interesting to compute and discuss results per season,

e.g., low season, high season - P9579, L4 to L19, the sample size of 3 catchments is too small to derive generic results - P9582. It is important to single out or assess the effect of rainfall to be able to infer impact of other parameters (e.g., land cover change) on catchment runoff. - L9583, L25. The literature (e.g., on South-African catchments) shows that forest ET is higher compared to other vegetations, implies higher runoff for deforested catchments. Could you verify your conclusion against this? - Conclusion is a bit long, and not evidently strong

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