

Interactive comment on “Evaluation of surface properties and atmospheric disturbances caused by post-dam alterations of land-use/land-cover” by A. T. Woldemichael et al.

Anonymous Referee #1

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Summary: this paper evaluates the impact of land-use/land-cover change by dam construction and irrigation on the near-surface and boundary layer properties. The topic is interesting and fits into the scope of the journal. The paper is well written and the results are clearly presented. However, there are two major concerns. The first concern I have is that the simulated results have no validation. I also quickly went through the two papers from the same group (Woldemichael et al. 2012, 2013) and did not find validation of near-surface temperatures, winds, fluxes, boundary layer profiles, etc. The only validation that was carried out in these two papers is rainfall and runoff.

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The second concern is that the paper is simply a follow-up paper based on the same simulations in Woldemichael et al. (2012, 2013). It does not appear to me that this paper contributes much more as compared to Woldemichael et al. (2012, 2013). In fact I like the previous 2 papers much more than this one. The results of this paper are superficial in some sense if we consider the fact that the authors have already analyzed the impact of land-use/land-cover change on precipitation using the same simulations, as the impact on precipitation is certainly through the impact of near-surface properties and boundary layer properties. Thus it is unclear to me what is the novelty of this paper.

Other comments:

Fig. 5, Fig. 6, Fig. 7 and others: are these period-averaged values, daily averaged values or what values are you plotting?

Fig. 6: the changes in sensible and latent heat fluxes at the ARW location clearly show some patterns, which are not discussed at all. For example, the authors simply report a decrease in the sensible heat flux on the order of 15 W m^{-2} or greater. This is rather superficial and does not seem to explain much of the pattern observed in Fig. 6.

Fig. 7: how do you quantify the significance when you say ‘a more significant transformation was observed in the change between the non-irrigation to control compared to the pre-dam to control results due to its less difference in land use change’?(line 20, page 5050) by eye?

Fig. 9: the results are not discussed except one sentence explaining the difference between the two locations (line 1-4, page 5052). Why not show the difference between different runs?

Line 14, page 5052: ‘This documents that the circulations due to LULC changes can transport moisture and heat higher into the atmosphere as discussed below’. I didn’t see any discussions that could corroborate this argument. The only sentence that

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is sort of relevant is 'both scenarios showed well developed vertical motion that was responsible in transporting moisture from the surface to higher altitudes'. However, this did not explain the difference between scenarios.

Fig. 12 and 13: why is the CAPE result only shown for the control case? Then how you do quantify the impacts of land-use/land-cover change on the CAPE? If you don't quantify the impacts, what is the point of showing these 2 figures and what do you mean by 'there is also the important question as to how LULC affects these synoptically driven winter time systems'? Am I missing something? And why 'since positive CAPE is recognized as a major factor that is altered by LULC'?

Conclusions, "(4) there were well developed ..' : please show the co-location between these well-developed motions and the precipitation difference.

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