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Interactive comment on "Climate change over the high-mountain versus plain areas: Effects on the land surface hydrologic budget in the Alpine area and northern Italy" *by* Claudio Cassardo et al.

Anonymous Referee #3

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The paper presents assessment of changes of land water budget terms in Northern Italy under future climate changes. The regional climate model RegCM3 simulations are used as a forcing for the land surface scheme UTOPIA. The modeled seasonal and spatial patterns of precipitation, evapotranspiration, runoff, soil storage, net radiation are examined, and implications for regional economies are formulated.

My major concerns related to the paper are: 1) There is no proper comparison of results obtained to other similar studies conducted for this region, elucidating what is the new knowledge attained. Some of other relevant papers are cited (Lautenschlager et al., 2008; Jacob et al., 2007), but the comparison is very limited. 2) The physical

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analysis of simulation results is somewhat superficial. The simple effects are explained, whereas the more complicated ones (like the absence of spatial correlation between evapotranspiration and precipitation, lines 1-4 on p.7) are commented by too general statements. In this respect, the striking separation of regions with large dry and wet days numbers anomalies at Figure 7 is left without deserving physical analysis (lines 25+, p.7 are merely descriptive text). 3) No general description of UTOPIA model is provided together with necessary references to previous work, where the model has been shown to be robust for the particular region under study.

More specific comments are: 1) The period 1961-1990 is hardly can be used to reflect "present climate". The period 1980-2010 is more appropriate. 2) p.3, line 30. There seem to be no physical reason for interpolating in time the precipitation and radiation fluxes by different methods. Does cubic spline interpolation conserves the sums of radiation fluxes? Were the output radiation data from RegCM3 presented as accumulated radiation sums or as fluxes? 3) p.4, line 1. “Short grasses are assumed to cover the whole domain”. Not clear. Where there any other vegetation types in the domain? 4) The authors confined their analysis of soil moisture changes to examination of the water content of the top 5-cm-thick layer of the land model. Why not considering the whole root-occupied layer?

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