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Interactive comment on "Uncertainties in climate change projections and regional downscaling: implications for water resources management" *by* W. Buytaert et al.

W. Buytaert et al.

w.buytaert@imperial.ac.uk

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The methodology applied to study the impact of climate change on water resources in the study region of the tropical Andes in Ecuador is very basic: the delta approach has been applied for statistical downscaling in its simplest form: no seasonal dependency of the change factors, or dependency on the probability or return period has been considered, while these dependencies could have been easily incorporated (the excuse of limited ground station data cannot be used here).

The argument that statistical downscaling or disaggregation could not be applied because of lack of long records and because of low density of ground stations (pages 3

and 4), does not completely hold. Given that the rainfall-runoff modeling applied does make use of rainfall input from 13 gauges only, the statistical downscaling could have been limited to those 13 stations. Due to the limited length of these series, the statistical downscaling relationships could indeed be of limited accuracy, but still applicable (although I guess longer series are available for that region).

We are aware that we applied a very basic downscaling method which is open to improvement. Such research is currently ongoing, but faces many challenges related to finding the adequate statistical distributions, relations with synoptic climate variables and models for spatial dependency. Therefore, we think that it is outside the scope of the paper, as this study is mainly about the value of regional downscaling and water management. That said, some improvements such as the inclusion of seasonal dependency are indeed easy to implement and although we found only a limited impact on the projections, we are willing to do so.

Page 8: change in potential evapotranspiration was calculated after adapting only the average monthly temperature for future conditions. Why was this done? Climate models normally also produce results on radiation, humidity, etc. Given that the historical potential evapotranspiration series were obtained by the FAO-Penman Monteith method (end of page 8), I do not see why changes in radiation, humidity, etc. could not have been taken into account.

The original radiation and humidity data from which the evapotranspiration series were calculated were not available to this project, which means that we could not adapt them for future conditions. Therefore we used the Thornthwaite equation (calibrated with the Penman Monteith data) for extrapolation to future conditions. We acknowledge that this may not be sufficiently explained in the text and will improve the formulation. Additionally, not all of these variables are available from all GCMs (particularly radiation and humidity), which would have restricted the number of models in the ensemble.

The runoff simulations have been carried out with a daily time step, but only results at

monthly aggregation time have been shown. It would be good to report also on the daily runoff results (as this is of relevance as well for the water resources management in the region).

No, the seasonality is aggregated from a daily to a monthly time step, but the flow duration curves are presented at a daily time step.

The technical comments will be incorporated in a revised manuscript.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 1821, 2010.