

# ***Interactive comment on “Climate change impacts on hydroclimatic regimes and extremes over Andean basins in central Chile” by Deniz Bozkurt et al.***

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First, I would like to clarify that this is not a formal review of this manuscript, but rather a short comment from a reader. Bozkurt et al. report the uncertainty associated with GCM choice on projected hydrologic changes in Central Chile, with emphasis on precipitation, ET, runoff, and soil moisture. The topic is extremely relevant (Murphy et al. 2004; Vano et al. 2015), and the manuscript contains valuable information for the hydrology community. In my opinion, the manuscript would strongly benefit from more context on hydrologic model performance over the baseline period (1976-2005). In particular, the results from Figure 4 suggest that hydrologic model calibration results (from DeMaria et al.) are not satisfactory. In view of this, I have three specific suggestions:

1. The metrics currently included in Figure 4 are based on mean annual runoff, and the calibration results reported by the previous studies by DeMaria et al. are based on monthly flows. In my opinion, it would be very informative to see evaluation results based on daily time steps, especially considering the analyses of extremes (Figure 11). If the authors have daily observations and simulations of runoff, something like the Kling-Gupta Efficiency (KGE; Gupta et al. 2009) would help with this purpose. More importantly, additional metrics based on signature measures of hydrologic behavior (e.g., Yilmaz et al. 2008; Hrachowitz et al. 2014) would provide information on how VIC is doing on simulating high/low flow volumes, basin flashiness, etc.

2. The calibration of soil parameters in VIC bring the risk of creating artificial changes in basin-averaged water storage. Did the authors check that  $P \sim Q + ET$  over the historical baseline period? If the previous is not true, the model very likely produced increase/decrease of water stored in the soil column, and this could amplify projected monthly changes in Figure 10.

3. Overall, hydrologic modeling decisions such as model structure and parameter values may have large implications on projected climate change impacts (e.g., Wilby 2005; Jiang et al. 2007; Bae et al. 2011; Najafi et al. 2011; Surfleet et al. 2012; Surfleet and Tullos 2013; Vano et al. 2012; Mendoza et al. 2016; Mizukami et al. 2016). Moreover, VIC response to snow parameters is quite sensitive (e.g., Elsner et al. 2014; Mendoza et al. 2015). A discussion on these sources of uncertainties – especially on the VIC parameters included in the calibration process – would help to provide context for model performance and hydrologic change results reported in the paper. The authors could also look at the work by Robert Wilby (e.g., Wilby and Harris 2006; Wilby and Dessai 2010) for further discussion on additional sources of uncertainty.

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