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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Climate model validation and selection for hydrological applications in representative Mediterranean catchments" *by* R. Deidda et al.

Anonymous Referee #1

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The material provided in this paper is of interest for climate change impact studies in catchment scale hydrology. Authors makes use of performance metrics to assess several Ensembles RCMs on their ability to reproduce the precipitation and temperature regime over selected areas. A state of the art reference dataset (EOBS) is used to evaluate the RCMs output. This paper addresses scientific questions relevant to the scope of HESS, and presents novel concepts to a degree. However some of scientific methods that are used in this paper lack of solid scientific basis and there are several points of criticism that make the manuscript inadequate for publication in HESS in the present form. Each point is discussed in detail below:

a)The title of the paper does not reflect the content of the manuscript. The fact that precipitation and temperature are considered for evaluation, does not justify the "hydrological applications" and "catchments" parts of the title. An alternative title should exclude those parts of the title, e.g. "Regional climate models performance in the representation of precipitation and temperature over selected areas".

b)Authors compare the RCMs data to the E-OBS dataset on the period 1951-2010. An important point, that is not given the proper significance, is that the ENSEMBLES RCMs are run from 1951(or 1961) to 2000 under the control emission scenario, while the simulations from 2000 on, are under the A1B emission scenario. The comparison of E-OBS to the RCM data between 2000 and 2010 is valid only under the assumption that this decade's emissions followed the A1B scenario.

c)Authors introduce performance metrics to rate the overall RCM ability to be used for hydrological impact studies. Firstly, in equations (6) and (7), authors use weighting factors of 50% to account for both P and T. However they do not elaborate with the selection of the specific weight. The deviation of P and T from the observations affect in different degrees the efficiency of a hydrological model, thus the $\frac{1}{2}$ weights are arbitrarily defined. A weighting factor in this case should be subject to the hydrological model used, the climatology of the basin etc. Furthermore, a metric that assesses the overall RCM performance for hydrological applications should consider the ability of the model to reproduce the ET component of the hydrological cycle.

d)This study makes use of small areas to compare the performance of several RCMs for their ability to reproduce P, T fields. However the performance of the RCMs over such limited in number and extend areas cannot consist a reference for hydrological applications in general. There are papers in the literature that address the questions that this paper tries to address, in a more holistic way over larger domains (see Kjellström, 2010).

Other comments: I would like to bring to Authors' attention two publications that elab-

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orate with model comparison techniques. The one is Taylor (2012) who introduces a method to summarize the degree of correspondence between various simulated and observed fields using a single diagram. The second is a performance metric introduced by Perkins (2007) that may be relevant to the “errors at 100 uniformly spaced probability levels” (Page 9124 – line 1 and Figure 8) (This citation is already used in the literature review of this manuscript).

Figure 1 is vague and does not provide the information described in the figure caption i.e. the location of each considered area for the comparison.

Reference

Kjellström E, Boberg F, Castro M, Christensen HJ, Nikulin G, Sánchez E (2010) Daily and monthly temperature and precipitation statistics as performance indicators for regional climate models. Clim Res 44:135-150

Perkins SE, Pitman AJ, Holbrook NJ, McAneney J (2007). Evaluation of the AR4 climate models' simulated daily maximum temperature, minimum temperature, and precipitation over Australia using probability density functions. Journal of Climate

Taylor, K. E. (2001), Summarizing multiple aspects of model performance in a single diagram, J. Geophys. Res., 106(D7), 7183–7192, http://dx.doi.org/10.1029/2000JD900719.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 9105, 2013.