Hydrology and
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Discussions

Interactive comment on "Large-basin hydrological response to climate model outputs: uncertainty caused by the internal atmospheric variability" *by* A. Gelfan et al.

Anonymous Referee #1

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General comments:

The manuscript definitely deserves publication. It will be of interest for modelers doing climate impact assessment and analysis of hydrological trends under climate variability and change. Only a minor revision is required: to reformulate some sentences, to improve quality of graphs, and explain some points (see below).

Specific comments:

(1). Description of two models should be a bit extended. It should include a description of spatial disaggregation schemes and routing schemes used in both models.

(2). The model performance is described too shortly in section 3 (only references). In addition to references it would be good to describe shortly, in 2-3 sentences, how the model calibration/ validation was done for these large river basins (for multiple gauges?), and to list obtained criteria of fit for the calibration and validation periods.

(3). Both models are assigned as the physically based tools. Most probably, major processes are parametrized using physically-based approaches. However, the question is: is it sufficient to assign them to the class of physically-based models? Are both models fully distributed (3-dimentional), and what is the grid size? Do they both include full surface and groundwater balances and energy balance? Do they both include ONLY physically-based equations, and no any empirical or semi-empirical ones? Do they correspond to criteria outlined in Freeze and Harlan (1969) for a "physically-based digitally simulated hydrologic response model"? (see also K. Beven paper, http://eprints.lancs.ac.uk/4421/1/Blueprint.pdf). Maybe the applied models should be rather classified as models of intermediate complexity or process-based models?

Technical corrections needed: 1. All abbreviations should be written in full when first mentioned (e.g., 2305, l. 16) 2. 2306: why "artificial" scenarios? 3. 2306: why hydrometeorological "impact" (if it is forcing). 4. 2306: why "development" of this approach (maybe rather "application"?). 5. 2306: differ within → differ by 6. 2307, l. 2: favors → favor 7. 2307: measurement data → measured data 8. 2307: , primarily, → primarily 9. 2311, l. 27: belong to → occurs in 10. 2312, l. 11: successively → successfully? 11. Fig. 2: two identical graphs for P, no graph for T, please exchange. 12. 2316: similar fields → similar patterns 13. 2317: to explain more accurately: if monthly or daily water discharge, then other indices are needed, and not j = 1, 2, . . ., 34. 14. 2321, p. 4: not only "require different input data", but also "are differently structured and parametrized". 15. All Figures: please increase size of font on axes and subtitles. 16. 2326, l. 19-25: not necessary to repeat this here. 17. 2327: point 1 could be subdivided into two.

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