

Interactive comment on “An integrated model for the assessment of global water resources – Part 1: Input meteorological forcing and natural hydrological cycle modules” by N. Hanasaki et al.

Anonymous Referee #1

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Recommendation: return for major revision

This paper is very interesting and ambitious as well. I am debating with myself: should I give it an easy pass since the authors have put so much efforts or I need act as checker before it is truly ready for prime time. Listed below my three concerns:

1) There is one problem with the paper in that most of the information on the six modules (and repeated in this article) can be found in many previous publications and studies. What is new/innovation about this two-part paper? Is because it put the six modules together? What is your theoretic basis and assumption to justify we can to-

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tally assess/model global water resources by integrating the six modules? Why these modules, why six?

Your introduction part: "we tried to avoid model calibration involving the fit of simulated results to available observation records. It is well established that hydrological models do not reproduce observed hydrographs very well without model calibration (or model parameter tuning). However, in global-scale hydrological modeling, model calibration is a difficult issue. There are a few reasons for this. First, it is virtually impossible to calibrate the model worldwide because of the limited availability of observations, especially in developing countries. Second, both models and input meteorological forcing and validation data contain considerable uncertainty (Oki et al., 1999), and it is not always easy to attribute errors in simulations to improper settings of model parameters. Moreover, we intended to apply the model to future projection under climate change. Thus, the transparency and physical validity of the model are quite important because the simulated results are highly model dependent. Therefore, we extensively examined the simulated results of the model using model inherent parameters; even this sometimes produces large errors"

2) I agree that it is almost impossible to calibrate the global scale hydrologic model worldwide, the exact reason you gave up calibration. Since each module accounts certain degree of error/uncertainty, how the error/uncertainty will propagate through the integrated system from data end to prediction end while you manage to keep the mass and energy balance budget closed? Any reliable strategy suggested here?

3) We might have certain degree of confidence/control of natural aspect of the system (such as routing, meteorological input data, and crop growth etc.), but it is extremely difficult or even infeasible at this stage to model/ figure out the anthropogenic activities (e.g. water withdrawal module) at the daily time scale, the elemental temporal resolution of this system. Recall that you even gave up calibrating the hydrological model, how can someone parameterize/calibrate the anthropogenic activities. Convince me if I am way too conservative.

My recommendation, therefore, is that HESSD should not accept this heavy-duty and well written paper at present form because there are many known unknown. This is not an indication that the manuscript is not interesting to audiences. I am almost sure that what you are trying to do is extremely important. In short, in my opinion this integrated system is not ready for prime time given its present contents.

I am looking forward to seeing an improved version.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 3535, 2007.

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4, S1482–S1484, 2007

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