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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Hydrological model parameter dimensionality is a weak measure of prediction uncertainty" *by* S. Pande et al.

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Model complexity is a very important issue in environmental sciences. Thus I read the paper with much interest. After reading the paper I have some problems with regard to the methodology. These are

- The methodology uses an inequality type approach - providing an upper limit for a probability of exceedence. The underlying theory uses the Markov inequality which, similarly to the Chebysev inequality, is a very *rough* inequality providing a weak upper limit (the advantage being the independence of the distribution). Thus the upper limits which are called complexity are not very precise estimates of risk and thus not necessarily comparable.

  Further I have a problem of the transfer of the upper limit to the risk. The argumentation is somewhat as if $x < a$, $y < b$ and $a < b$ would imply $x < y$ which of course is not true.

- Algorithm 1 is a pure resampler. The goal of hydrological modelling is not to repeat modelling under the same stationary conditions, but to transfer it to different conditions. It is under the different conditions where one faces risks. It is under the changed conditions where complex models are sometimes considered as more plausible. (There is a constant debate on the use of very complex so called *physically based* models for climate change assessment. The argument is often that the risk is lower as the model is based on more founded principles.) A reasonable weather generator might resolve the problem of stationarity and could give some insight to the complexity vs model transfer problem.

- The strong restrictions of Algorithm 1 are contrasted by Algorithm 2. Here the choice of the parameters α is not completely clear. The use of Latin Hypercube Sampling gives me the impression that the authors do not restrict their model parameters to such which are useful for the case study example. A large number of uncontrolled parameter combinations may lead to nonsense models for which the risk is irrelevant for any application.

I would be interested to know the authors' opinion on the above raised problems.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 2555, 2014.