

## ***Interactive comment on “Conditioning rainfall-runoff model parameters for ungauged catchments and land management impacts analysis” by N. Bulygina et al.***

### **Anonymous Referee #3**

Received and published: 16 April 2009

The paper presents a methodology to estimate parameters of a rainfall runoff model by conditioning them using prior information on the baseflow index for different soil classifications. The authors use a Bayesian approach to constrain the model parameters. The paper is well written and generally I find their approach interesting. I have some comments to make which I believe the authors need to address.

#### Detailed comments

My major concern about the implemented methodology is with the approach the authors follow to quantify the impact of afforestation. The only information used to estimate the posterior distribution of the parameters is that afforestation leads to an increase in

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baseflow and the likelihood function they implemented is a binary function which retains from the prior parameter distribution all those parameter sets that lead to an increase in the base flow index. The resulting posterior distribution is therefore an arbitrary distribution that is not conditioned with any quantitative information about the extent of reduction in the base flow index. Making inference based on such a distribution does not have a sound basis and I feel that the authors should be circumspect about their analysis and conclusions.

The authors have indicated that some of the parameters are not identifiable using the prior information they used. They have stated in their conclusions that the model is not sensitive to these parameters over their particular case study period while admitting that it could become sensitive for other periods. Wouldn't this limit the applicability of the model for prediction? Why not try to estimate these parameters using additional prior information and validate the model over a period that covers all possible spectrum of the flow regime in the catchment?

Page 1915, line 11: What is Ndef? Does it stand for the conventional Nash Sutcliffe measure?

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 1907, 2009.

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