**Biogeosciences
Discussions**

Interactive
Comment

Interactive comment on "Parameter-induced uncertainty quantification of soil N₂O, NO and CO₂ emission from Höglwald spruce forest (Germany) using the LandscapeDNDC model" *by* K.-H. Rahn et al.

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General comments

The use of the Gelman/Rubin statistic $\widehat{R}$ needs some clarification, because the authors seem to have confused two definitions of $\widehat{R}$ and their respective threshold recommendations. Gelman et al. (2004) note that they have switched their definition of $\widehat{R}$ between the first and second edition of their book:

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$$\widehat{R}_{1st\ ed.} = \frac{n-1}{n} + \frac{B}{nW}, \text{with a recommended threshold of 1.2} \qquad (1)$$

$$\widehat{R}_{2nd\ ed.} = \sqrt{\frac{n-1}{n} + \frac{B}{nW}}, \text{with a recommended threshold of 1.1} \qquad (2)$$

In chapter 3.1 the authors use the square-root definition $\widehat{R}_{2nd\ ed.}$, but choose a convergence threshold of $\widehat{R} < 1.2$ from Kass et al. (1998) which refers to the definition of $\widehat{R}_{1st\ ed.}$ If indeed $\widehat{R}_{2nd\ ed.}$ was used, a threshold of 1.2 does not indicate that the four chains are near convergence. Furthermore, the densityplots of the 4 different chains in Figure 4 do not give a lot of confidence that the chains have indeed converged and should be used to construct a common sample from the posterior. The authors should check how they used $\widehat{R}$ and its respective threshold and continue with the MCMC sampling using the proper convergence criterium, if necessary.

The proposed bi-modality of the parameter EFFAC (Fig. 4B) is not too convincing, as only two of the four chains sample both modes. Maybe the authors could address this bi-modality problem by trying stronger priors for this parameter or using the DREAM algorithm which is especially powerful when dealing with multimodality (Vrugt et al., 2009).

References

Gelman, A., Carlin, J., Stern, H., and Rubin, D.: Bayesian data analysis, 2nd ed., Chapman & Hall/CRC, Boca Raton, 2004.

Kass, R. E., Carlin, B. P., Gelman, A., and Neal, R. M.: Markov Chain Monte Carlo in Practice: A Roundtable Discussion, The American Statistician, 52, 93-100, 1998.

Vrugt, J. A., ter Braak, C. J. F., Diks, C. G. H., Robinson, B. A., Hyman, J. M., and Higdon, D.: Accelerating Markov Chain Monte Carlo Simulation by Differential Evolution with Self-Adaptive Randomized Subspace Sampling, International Journal of Nonlinear Sciences and Numerical Simulation, 10, 273-290, 2009.

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