Geophysical Research Abstracts
Vol. 16, EGU2014-1897, 2014
EGU General Assembly 2014

Towards an effective calibration theory for a broadly applied land surface model (VIC)

Lieke Melsen (1), Adriaan Teuling (1), Paul Torfs (1), and Massimiliano Zappa (2)

(1) Wageningen University, Hydrology and Quantitative Water Management, Wageningen, Netherlands (lieke.melsen@wur.nl), (2) Swiss Federal Research Institute, WSL, Birmensdorf, Switzerland

The Variable Infiltration Capacity (VIC, Liang *et al.*, 1994) model has been used for a broad range of applications, in hydrology as well as in the fields of climate and global change. Despite the attention for the model and its output, calibration is often not performed. To improve the calibration procedures for VIC applied at grid resolutions varying from meso-scale catchments to the 1 km 'hyper'resolution now used in several global modeling studies, the parameters of the model are studied in more detail. An earlier sensitivity analysis study on a selection of parameters of the VIC model by Demaria *et al* (2007) showed that the model is not or hardly sensitive to many of its parameters. With improved sensitivity analysis methods and computational power, this study focuses on a broader spectrum of parameters and with state of the art methods: both the DELSA sensitivity analysis method (Rakovec *et al.*, 2013) and the ABC-method (Vrugt *et al.*, 2013) will be employed parallel to a single cell VIC model of the Rietholzbach in Switzerland (representative of the 1 km hyperresolution), and a single and multiple-cell VIC model of the meso-scale Thur basin in Switzerland. In the latter case, also routing plays an important role. With critically screening the parameters of the model, it is possible to define a frame work for calibration of the model at multiple scales.

References

Demaria, E., B. Nijssen, and T. Wagener (2007), Monte Carlo sensitivity analysis of land surface parameters using the Variable Infiltration Capacity model, J. Geophys. Res., *112, D11,113*.

Liang, X., D. Lettenmaier, E. Wood, and S. Burges (1994), A simple hydrologically based model of land surface water and energy fluxes for general circulation models, J. Geophys. Res., *99 (D7),14,415-14,458*.

Rakovec, O., M. Hill, M. Clark, A. Weerts, A. Teuling, and R. Uijlenhoet (2013), A new computationally frugal method for sensitivity analysis of environmental models, Water Resour. Res., *in press*

Vrugt, J.A. and M. Sadegh (2013), Towards diagnostic model calibration and evaluation: Approximate Bayesian computation, Water. Resour. Res. *49, 4335-4345*.