



A method for assessing the distinguishability of land covers and soils in land surface models: Basic principles and first results.

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Land surface-atmosphere interactions are shaped by temporally and spatially varying characteristics of land cover and soil. Yet, model parameters representing these characteristics are oftentimes highly uncertain. Against the background of the parameter uncertainty it is questionable if models are actually always able to describe the emulated systems in such detail as is claimed.

Taking this into account, honesty demands that models are simplified as far as possible. A further argument for such a simplification is that the parameterisation of a model is generally an expensive task and should be avoided for land covers and soils whose physical effect cannot be distinguished by the model. On the other hand, the simplification must not go too far. Land surface models have to meet certain minimum requirements pertaining to their ability to reproduce land covers and soils in a differentiated manner. In a model which is used for a land cover change study, for example, the respective covers have to be distinguished not only formally, but in their actual effect.

A method is presented which contributes to answering the following fundamental questions: (1) How far should land surface models be simplified in order not to feign an explanatory power they do not possess? (2) How far can land surface models be simplified without losing their explanatory power? (3) Which land surface model is appropriate for a given task with respect to its ability to differentiate between the land covers and soils of interest? Where is need for model improvements?

Application of the method is exemplified by means of the model Noah-LSM. Ongoing studies aiming at characterising a number of wide-spread land surface models with respect to their ability to distinguish the physical effect of different land covers are outlined.