



Local Biogeophysical Climate Effects Largely Independent of Geographical Land Cover Change Distribution

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Land cover change (LCC) happens locally. However, in almost all simulation studies assessing biogeophysical climate effects of LCC, local effects (due to alterations in a model grid box) are mingled with non-local effects (due to alteration in wide-ranging climate circulation). This study presents a method to separate local and non-local effects. The presented method is applicable to any land surface process that is acting locally but capable of influencing wide-ranging climate when applied on a larger scale. Concerning LCC, this method is more widely applicable than methods used in earlier studies, and it derives local and non-local effects from the same pair of simulations. The study illustrates the possibility of validating simulated local effects by comparison to observations on a global scale, and contrasts the underlying mechanisms of local and non-local effects. The simulation results show that local effects within a grid box are largely independent of the worldwide distribution of LCC. Accordingly, by the identification of local effects, an essential part of the climate consequences of LCC can be studied independently of the considered LCC scenarios, which differ strongly in climate modelling studies.