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Climate-vegetation interactions - A genuine issue for interdisciplinary research

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It is well known that the biosphere reacts to changes in climate. But climate also reacts to changes in the biosphere. In the last years climate research has started to include such feedbacks, especially between land vegetation and climate, into their climate models. E.g. the recent 4th UN World Climate Report for the first time broadly acknowledges the additional insight obtained from climate simulations that include the dynamics of the (mostly biospheric controlled) global carbon cycle. Models of this type, that are under heavy development in different climate research centres, will be routinely used in the next years for climate change studies. But judged by the wealth of knowledge on ecological processes, the representation of the biosphere in such models is extremely oversimplified. This is partly owed to the fact that such models are still at their infancy, but also has a deeper reason in the nature of the subject: from the viewpoint of the atmosphere, ecological details are irrelevant since the turbulent atmospheric boundary layer acts like a very efficient average of physical properties like temperature and air moisture. But this doesn't mean that ecological detail is irrelevant to climate change: climate relevant changes in vegetation structure, composition and distribution may result from subtle ecological processes and thus cannot be ignored. Hence there is strong need from the climate modelling community for integrating currently neglected degrees of ecological complexity. Surely this does not mean to represent every process at its most complex level. Instead it is hoped that by understanding how ecological processes at different complexity levels and spatial and temporal scales are linked, models of ecosystem dynamics at a level of detail appropriate for climate simulations can be developed. The talk will give an overview on the status of the integration of vegetation into climate models and point out important interdisciplinary research questions arising in this context.

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