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Modelling the terrestrial carbon cycle: sensitivity to climate forcing and model formulation

K. Sturm (1), P. Friedlingstein (2), M. Bentsen (1,3), C. Heinze (1) and K. Assmann (1)

(1) Bjerknes Centre for Climate Research, Bergen, Norway, (kristof.sturm@bjerknes.uib.no / Phone: +47 5558 8699), (2) Laboratoire des Sciences du Climat et de l'Environnement - IPSL, Saclay, France, (3) Nansen Environmental and Remote Sensing Centre, Bergen, Norway

The terrestrial biosphere is a major component in the climate system, considering its biogeochemical and biogeophysical feedbacks on the atmosphere. For instance, vegetation is involved in water fluxes from soils to the atmosphere through transpiration, as well as carbon assimilation through photosynthesis. Hence it influences the surface water and energy budgets, with further physical feedbacks because of roughness length and albedo. Its role within biogeochemical cycles of radiatively active compounds, primarily CO_2, reflects its chemical feedbacks. Land-surface models (LSM) intend to simulate the major physical and chemical processes taking place in soils (e.g. hydrology, microbial activity) and vegetation.

In the present contribution, we present simulations over 1860-2000 with three LSM: LPJ (Sitch et al., 2003), SLAVE (Friedlingstein et al., 1995) and ORCHIDEE (Krinner et al., 2006), driven either by CRU gridded observations (Mitchell, 2004) or Bergen Climate Model (BCM) simulations. We focus on the the net ecosystem production (NEP), or net CO_2 fluxes, and the relation between C assimilation and water budget. We discuss the difference between the simulated vegetation types and C reservoirs, as well as their sensitivity to the climate forcing.

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