



Analysis of carbon climate feedback using the Unified Model HadCM3LC coupled carbon climate model.

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It is important to determine the carbon climate feedback in order to quantify future climate change and permissible anthropogenic carbon emission for various climate stabilisation scenarios. However the strength of this feedback is still unknown. The so-called Gregory method is used to assess the slow and fast carbon feedbacks in the HadCM3LC coupled climate carbon cycle model. We performed twelve five-year experiments using a fully coupled model but with perturbed prescribed atmospheric concentrations of carbon dioxide (i.e., starting from a pre-industrial state but with doubled or quadrupled atmospheric concentrations). Century-long simulations have also been performed in order to assess the slower feedbacks. We have performed simulations where both or either one of the radiation and vegetation parametrisations see the perturbed concentrations. The vegetation and climate responses are analysed in these experiments as a function of time after the perturbation. We focus on surface temperature, radiative budget imbalance, clouds feedbacks, precipitation, gross primary productivity, and net primary productivity.