FUTURE EVOLUTION OF THE TERRESTRIAL CARBON CYCLE CONSTRAINED BY CURRENT OBSERVATIONS: RESULTS FROM A CARBON CYCLE DATA ASSIMILATION SYSTEM (CCDAS)

P. Rayner[1], M. Scholze[2], P. Friedlingstein[1],T. Kaminski[3], J.L. Dufresne[4], W. Knorr[2], R. Giering[3], H. Widmann[5]

[1]*LSCE France*
[2]*Univ. of Bristol, UK*
[3]*Fastopt, Germany*
[4]*LMD France*
[5]*MPI Meteorology, Germany*

ABSTRACT

In a Carbon Cycle Data Assimilation System (CCDAS) one infers the values of the parameters controlling the function of a process model using various observations. One can then calculate quantities of interest from the optimized parameters and the model. One can also calculate the uncertainties on the parameters and propagate these to uncertainties of the calculated quantities. In Rayner et al. [2005] we assimilated atmospheric observations over two decades, into a terrestrial model and calculated fluxes over this period. Here we extend this work by calculating the response of the calibrated terrestrial biosphere to a GCM simulation of future climate. Using this combination we are able to comment on the fate of terrestrial carbon pools and fluxes under climate change, calculate the uncertainties of the response, and determine which parameters in the model are responsible for this uncertainty. We include an extra parameter that scales the climate change signal from the GCM projection. We thus extend the sensitivity and uncertainty analysis to include the climate sensitivity.