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Climate-Carbon cycle feedbacks in multiple idealised experiments

C. Jones (1), P. Cadule (2), L. Bopp (2), P. Friedlingstein (2)

(1) Hadley Centre, Met Office, Exeter, UK (chris.d.jones@metoffice.gov.uk) (2) IPSL/LSCE, Paris

C4MIP (the coupled climate carbon cycle model intercomparison project) was a major first step in quantifying the uncertainty in the climate-carbon cycle feedback between 11 coupled models, and identifying the key mechanisms involved. The results will feature in the IPCC's Fourth Assessment report. It is timely for the carbon cycle modelling community to be making plans for future work, and how it will impact on the IPCC's 5th assessment report. One aspect of climate change modelling which C4MIP aims to make use of is the idealised experiment. Idealised experiments such as 1% p.a. increasing CO2 or fixed 2xCO2 have been widely used in climate modelling. It is our intention to extend these ideas for use in coupled climate-carbon cycle experiments.

Recent recommendations (see Friedlingstein et al presentation in this session) for Earth System modelling experiment design for the AR5 include prescribing CO2 concentration scenarios rather than prescribing emissions and simulating the resulting CO2 concentration. We present results from two coupled climate-carbon cycle GCMs following this design for idealised, prescribed CO2 scenarios of differing rates of increase: 0.5%, 1% and 2% p.a.. We aim to address several key questions: - are the new experiments easier to set-up/analyse as a result of their design? - do they allow more consistent intercomparison of other climate quantities between models, even when carbon cycle behaviour differs - do they lead to quantitatively/qualitatively different answers to the original C4MIP experiments - and if so, what are the most important quantities to assess from such experiments

An important focus of the analysis will be to assess to what extent the rate of forcing affects the results. We anticipate that some aspects of the carbon cycle feedback will be sensitive to the rate of CO2 increase, while others may not. It is important to quan-

tify this effect in order to make recommendations for future experimental design and choice of idealised scenario.