

1 Supplemental material submitted for the paper

2

3

4 **Bergen earth system model (BCM-C): Model description and regional**  
5 **climate–cycle feedbacks assessment**

6

7 J. F. Tjiputra, K. Assmann, M. Bentsen, I. Bethke, O. H. Otterå, C. Sturm,  
8 and C. Heinze

9

10

11 **Introduction:**

12

13 This supplemental material contains five figures. Figure 1 shows the Taylor  
14 diagram comparing the model simulated primary biogeochemical tracers with  
15 the observation. It shows the role of using difference atmospheric forcing fields  
16 between the NCEP (Assmann et al., submitted to the same volume) and BCM-  
17 C. Figure 2 shows the Taylor diagram for different seasons for the BCM-C model.  
18 Figure 3 shows time-series of annual land-air CO<sub>2</sub> fluxes, terrestrial vegetation,  
19 soil, and litter carbon content simulated by the terrestrial component of the  
20 BCM-C. Figure 4 shows time-series of annual air-sea CO<sub>2</sub> fluxes, net primary  
21 production, particle organic carbon export, and calcite export simulated by the  
22 ocean component of the BCM-C. Both model outputs are from the last 400 years  
23 simulation of the REF simulation. Finally, Fig. 5 shows the the relationships  
24 between changes in surface temperature and total precipitation for the different  
25 latitudinal regions simulated by the BCM-C.

26

27

28

29

30

31

32

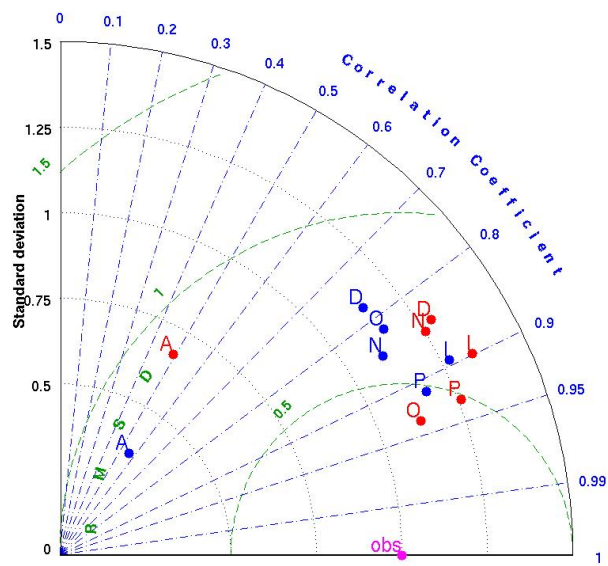


Figure 1: Taylor diagram comparing the simulated mean (1978-2007) and observed 3-D primary ocean biogeochemical tracer fields (weighted by volume) of P phosphate, N nitrate, I silicate, O oxygen, D DIC, and A alkalinity. Red dots represent results when the model is forced by NCEP (Assmann et al., submitted to the same volume), whereas blue dots represent results from the BCM-C.

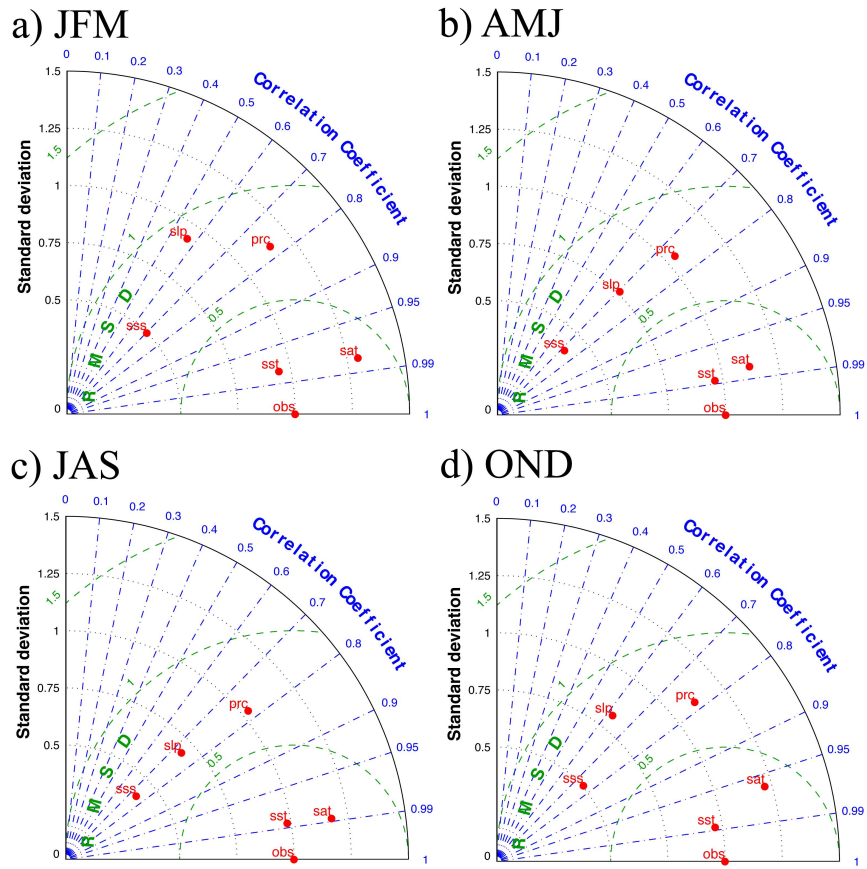


Figure 2: Taylor for (a) JFM, (b) AMJ, (c) JAS, and (d) OND seasons for SST, SSS, surface air temperature (SAT), precipitation (PRC), and SLP.

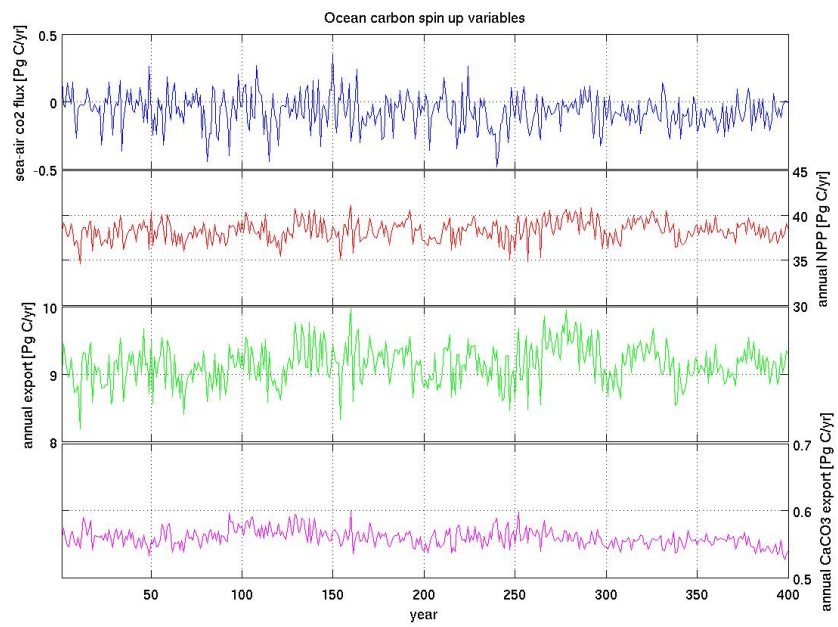


Figure 3: Time-series of annual sea-air carbon fluxes, net primary production, organic carbon export, and calcium carbonate export simulated by the BCM-C. The period represents the last 400 year projections from the REF simulation.

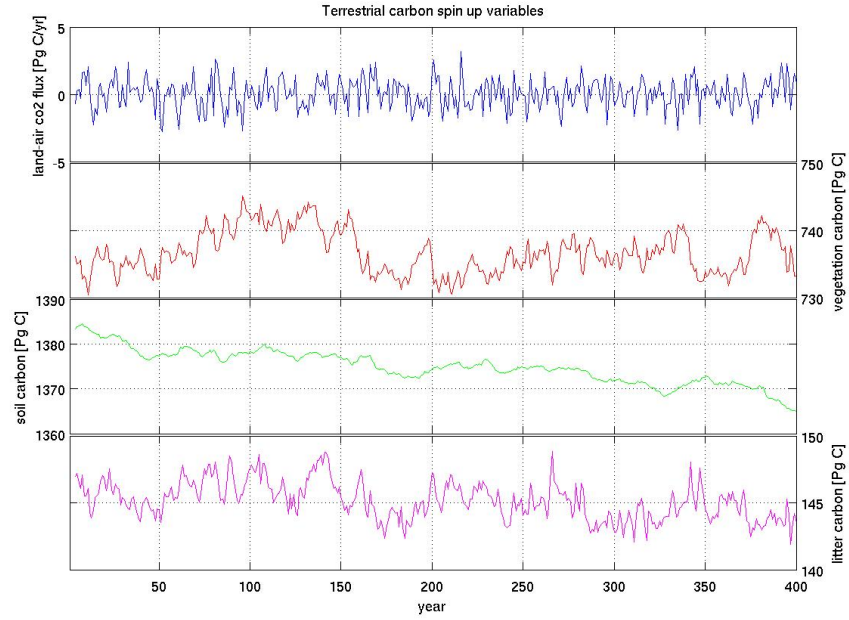


Figure 4: Time-series of annual land-air carbon fluxes, terrestrial vegetation, soil, and litter carbon content simulated by the BCM-C. The period represents the last 400 year projections from the REF simulation.

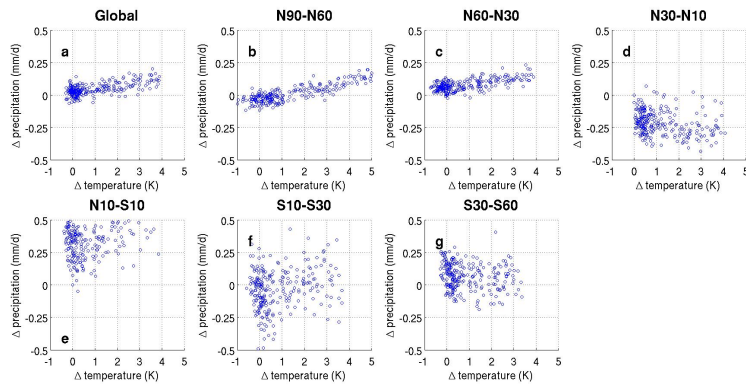


Figure 5: Simulated changes in surface temperature plotted in relations to changes in total precipitation for different regions. Regions are defined similarly as Fig. 7 in the main manuscript.