

Spinup Plans for CCSM3.5 Physics & BGC

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Background

- CCSM3.5 will be finalized ~~Mar~~ early-June
- This is not a public release for CCSM.
- Single resolution: FV1.9x2.5-gx1v5
- Model to be used for BGC development purposes, has changed considerably from CCSM3.0
- Step 1: spinup/stabilize physics
- Step 2: spinup/equilibriate BGC

Step 1: spinup/stabilize physics

- Goal: Tune model such that 1870's configuration is radiatively balanced and transient run from 1870-2000 produces realistic climate for 1990's
- This differs from CCSM3 development.
- It is what SSC wants for CCSM4.
- It is better to learn the process now than later.

Step 1: spinup/stabilize physics

- 1) Spinup CLM+C/N with 1870 CO₂ and NCEP forcing.
- 2) Tune CAM+CLM+C/N, initializing CLM+C/N from 1). Balance radiation for 1870 configuration. May require iterations.
- 3) Run POP+CICE+BEC for ~100 years to generate consistent POP+CICE IC. Force with output from 2). May require iterations to tune sea ice albedos.

Step 1: spinup/stabilize physics

- 4a) Multi-decadal run fully coupled run from 2) & 3), 1870 configuration
- 4b) 20th Century run from 2) & 3), specified atmospheric CO₂.
- Iterate 4a) & 4b) until 4a) is radiatively balanced and 4b) has realistic climate for 1990's. If results are not good, will have to decide on the fly what to change.

Step 2: spinup/equilibriate BGC

- Incrementally couple BGC, leading to fully prognostic carbon cycle, to 1870's configuration from Step 1.
- 1) Add BEC to model from Step 1). Perform short coupled run to spinup short timescale BGC components. Fixed CO₂.
- 2) Spinup BEC with forcing from 1). Cycle POP physics to avoid drift away from model of Step 1). Fixed CO₂. Acceleration ideas are welcome.

Step 2: spinup/equilibriate BGC

- 3) Spinup BEC further in fully coupled context, coupling OCN DIC to ATM CO₂. Novel idea: restore LND CO₂ tracer to OCN CO₂ tracer to prevent drift.
- 4) Spinup CLM+C/N with forcing from 3), using LND CO₂ tracer.
- 5) Couple BEC from 3) and C/N from 4) in fully coupled run, keep radiation at 280ppm.
- 6) Continue 5, couple to NET CO₂ radiation.

Step 2: spinup/equilibriate BGC

- Please tell us if you see inconsistencies. There are untried ideas in the proposal.
- Question/Comments...