**Spin-up CABLE to steady state values of biogeochemical pools**

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This document explains the steps required for obtaining steady or quasi-steady state biogeochemical pool sizes for running CABLE.

Before these steps, you need to ensure following variables are set to appropriate values:

In “casa\_variable.F90” (../CABEL2.0\_mpi/core/biogeochem/), “initcasa” is set to 1. This assumes that the initial pool sizes are read in from the *restart* file or *gridinfo* file.

In “cable.nml”, choose the appropriate values:

“ l\_casacnp” is set to “ TRUE”.

“ l\_laiFeedbk” is set to “TRUE” if prognostic canopy LAI is used, or to “FALSE” if prescribed LAI is used;

“ l\_vcmaxFeedbk” is set to “TRUE” if prognostic *v*cmax is used, or “FALSE” is prescribed *v*cmax is used. However it must be set to “FALSE” if “icycle” is set to 1.

“icycle” is set to 1, 2 or 3.

For “icycle”=1 (or C cycle only);

Step 1: In “cable.nml”, set “spincasa” to .FALSE., “spincasainput” to .TRUE.,

Step 2 : Using a script to run CABLE at least 50 times by reusing the meteorological forcings. At the end of the simulation, CABLE will generate a set of files for accelerated spin of biogeochemical cycles.

Step 3: insert filenames into “output/fcnpspin.lst”. The first line in the file “fcnpspin.lst” should be number of files.

Step 4: In “cable.nml”, set “spincasa” to .TRUE., “spincasainput” to .FALSE., run CABLE for accelerated spin.

Step 5. ”, set “spincasa” to .FALSE., “spincasainput” to .TRUE., run CABLE to check the changes in biogeochemical pool sizes. Run more times by reusing the meteorological forcing.

For “icycle” >1 (CN or CNP)

You firstly need to repeat all the five steps as for the case “icycle” =1, except uncomment out two lines before “end subroutine biogeochem” in “casa\_inout.F90”.

After obtaining the steady state values, then comment out the two lines as uncommented out previously, and repeat the five steps as in “icycle”=1.

**Some common diagnosis**

NEE represents net ecosystem carbon exchange. At steady state, annual NEE should be close to zero for each land point. However you may find this may not be case for some land points. Here are common causes:

1. When some land points are running of mineral N and labile P, nutrient feedback on C allocation, and the constraint of minimal LAI together can cause NPP, canopy LAI to oscillate. This should only happen when “icycle” is set to 2 or 3. In this case, once should lower GPP by reducing vcmax/leaf N or leaf P slopes.
2. The accelerated spinup does not really help much. This is a known issue, particularly when “icycle” is set to 2 or 3, and the initial simulation (first time over the five steps is too short. The aim of initial simulation is to obtain steady NPP. If NPP still fluctuates, a loner initial simulation is required.