Calibration Steps

As of v2.4.24, kE should be ~0.0001, which makes c\_smax~100.

Phenology

1. Turn calibrate off (calibrate = -999, CalVPs=0, PIIflag=0, CalLosses=0).
2. Freeze the inorganic nutrients (ENH4, ENO3, and EPO4) by setting hold constant to “True”. Under the “Options” tab, set the reset options for drivers and selected states to 365 days (will be used below) and check “hold selected state variables constant” option.
3. Temperature driven seasonality: In a one-year run, adjust DDs, Ddbud, alphaGfc, and chicT so that canopy fraction timing is correct. This may have been done in Excel but check it again. Reload the state variables between runs.

Water budget and Photosynthesis

1. Set reset on water, snowpack, nitrogen sub-efforts, ENH4, ENO3, EPO4, soil heat, Ave requirements, and Ave acquisitions to false. Set reset to “true” for vW, vI, and vCO2. Leave holdconstant=true on ENH4, ENO3, and EPO4. Reset=true for Phase II soil pools.
2. In an annual run, set cumulative water uptake and cumulative interception close to target value by adjusting the appropriate parameters (see Calibration parameter list.docx).
3. Then adjust gC, gI, and scg until the C sub-efforts, vCO2, vI, and vW return to the initial value at the end of the year and Cum GPP is near the target.
4. Repeat steps 2 and 3 until CumInt, CumUW and CumGPP are equal to the target and the sub-efforts return to their initial value.

Annual C, N, P cycles

1. Leave calibrate off (calibrate = -999) and set reset as in step 1 under Water budget.
2. Carbon: Adjust the C fluxes so they are within 10-20% of the target value. Adjust them in this order:
   * 1. GPP and NPP
     2. UdoC and LdoC
     3. LcWC and LcWCa
     4. TiiC
     5. Let the calibrator adjust MiiC, MiiN and MiiP.
     6. RCm
3. Nitrogen: UdoN, LitN, LcWN, LcWNa, TiiN, and MiiN are controlled by the C flux and do not need to be adjusted.
   * 1. NNSfix and UNfix
     2. Nitr and Dntr
     3. UNH4, UNH4m, and RNm
     4. UNO3 and UNO3m
4. Phosphorus: LitP, LcWP, LcWPa, TiiP, and MiiP are controlled by the C flux and do not need to be adjusted manually.
   * 1. Paw
     2. PO4P and Pnow
     3. PnoS and PocclW
     4. UPO4, UPO4m, RPm

Things to try if the model does not respond to parameter adjustments.

1. Make sure all fluxes are within an order of magnitude.
2. Try moving on and then come back to the flux that’s giving you trouble.
3. Check leaching losses.

Calibration

If the model crashes during calibration just continue calibrating. **Make sure to manually reload the state variables first!**

1. Set Stop Time to 365000. Then set “output every” under output options to output every 365 days.
2. Freeze the three inorganic nutrient pools (ENH4, ENO3, and EPO4) by setting hold constant to “True”. Turn off “reset” on the Phase II soil pools. Under the “Options” tab, set the reset options for drivers and selected states to 365 days and check “hold selected state variables constant” option.
3. Make sure both “states” and “parameters” are not checked in the reload option.
4. Set calibrate = 0.01, CalVPs = 0.1, PIIflag:=0, and CalLosses = 0. Run for 1000 years. Soil pools won’t return to initial values because the inorganic nutrients are frozen. As long as they are stable continue to the next step.
5. Unfreeze the inorganic nutrient pools. Set calibrate = -0.01.
6. Set “output every” under output options to output every 3650 days
7. Run the model for 10,000 years. The site is calibrated.
8. Repeat 1000 yr runs until the variability in the state variables is uniform about one. Dissolved states will
9. Once the site is calibrated set calibrate=-999, set all holdconstant’s to false, and set “reset” for all state variables except the cumulative variables, degree day positive, and degree day negative to false.
10. Test if the model is stable by running a 1000 yr run.

Notes:

CalLosses is a switch to calibrate LNH4, LNO3, and LPO4, it should be set to zero and not changed.

PIIflag is a switch to turn off the calibration of the Phase II soil pools. This is no longer used.

If GPP is not responding to changes in gC and gI, check scg, it may be too small. The Hubbard Brook and wet sedge values of scg were ~10-5. 10-6 was too small in wet sedge tundra. Lately scg ~10-4.