

## 7. CENTURY Output Variables

CENTURY contains many output variables that you can examine but we have listed some of the important ones divided into categories. First, verify that the abiotic factors seem reasonable for the climate of your system. If you have data for soil temperature or stream flow, for example, compare the measured values with the appropriate output variables. Some of the output variables relating to plant production reflect growth while others reflect total biomass or biomass of plant parts. Verify that plant growth and biomass are reasonable for your system. Also, verify that soil C, N, and P are reasonable. For example, mineral N should be low ( $<1$ ) during most of the year in native systems not subjected to high N inputs. You should have some idea of total soil SOM C for your system to compare with the output variable somtc. If any of these major outputs seem incorrect there is likely a problem in your schedule file, your site file, or your crop or tree file. Consider various output variables to help diagnose your particular problem. See Appendix 2 for output variable definitions.

### Abiotic Factors

- precip
- pet
- evap
- tran
- stemp
- tave
- defac
- avh2o(1)
- stream(1)

### Plant Production

#### Grass/Crop Systems

- agcacc
- bgcacc
- aglive
- bglive
- cgrain
- stdedc

#### Forest Systems

- fcacc
- rleave
- frootc
- fbrchc
- rlwode
- crootc

## Soil C, N, P

- somtc
- tnetmn(1)
- tnetmn(2)
- tminrl(1)
- tminrl(2)
- somte(1)
- somte(2)

The following flow diagrams can also be used as a guideline for selecting which output variables to extract from the CENTURY binary output file. The output variable name for a pool is listed in the box representing the pool along with a short description of the value that variable represents.

## **CENTURY Output Variables By Category**

### **CO<sub>2</sub> Output Variables**

AMT1C2 - Annual accumulator for surface CO<sub>2</sub> loss due to microbial respiration during litter decomposition.

AMT2C2 - Annual accumulator for soil CO<sub>2</sub> loss due to microbial respiration during litter decomposition.

AS11C2 - Annual accumulator for CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of surface SOM1 to SOM2.

AS21C2 - Annual accumulator for CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of soil SOM1 to SOM2 and SOM3.

AS2C2 - Annual accumulator for CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of SOM2 to soil SOM1 and SOM3.

AS3C2 - Annual accumulator for CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of SOM3 to soil SOM1.

AST1C2 - Annual accumulator for CO<sub>2</sub> loss due to microbial respiration during litter decomposition of surface structural into SOM1 and SOM2.

AST2C2 - Annual accumulator for CO<sub>2</sub> loss due to microbial respiration during litter decomposition of soil structural into SOM1 and SOM2.

CO2CCE(1,1,1) - In a grassland/crop system, the calculated effect on minimum C / N ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(1,1,2) - In a grassland/crop system, the calculated effect on minimum C / P ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(1,1,3) - In a grassland/crop system, the calculated effect on minimum C / S ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(1,2,1) - In a grassland/crop system, the calculated effect on maximum C / N ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(1,2,2) - In a grassland/crop system, the calculated effect on maximum C / P ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(1,2,3) - In a grassland/crop system, the calculated effect on maximum C / S ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(2,1,1) - In a forest system, the calculated effect on minimum C / N ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(2,1,2) - In a forest system, the calculated effect on minimum C / P ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(2,1,3) - In a forest system, the calculated effect on minimum C / S ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(2,2,1) - In a forest system, the calculated effect on maximum C / N ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(2,2,2) - In a forest system, the calculated effect on maximum C / P ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CCE(2,2,3) - In a forest system, the calculated effect on maximum C / S ratios of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CPR(1) - In a grassland/crop system, the calculated effect on production of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CPR(2) - In a forest system, the calculated effect on production of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CRS(1) - In a grassland/crop system, the calculated effect on root-shoot ratio of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CRS(2) - In a forest system, the calculated effect on root-shoot ratio of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CTR(1) - In a grassland/crop system, the calculated effect on transpiration rate of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

CO2CTR(2) - In a forest system, the calculated effect on transpiration rate of doubling the atmospheric CO<sub>2</sub> concentration from 350 ppm to 700 ppm.

MT1C2(1) - Accumulator for unlabeled surface CO<sub>2</sub> loss due to microbial respiration during litter decomposition.

MT1C2(2) - Accumulator for labeled surface CO<sub>2</sub> loss due to microbial respiration during litter decomposition.

MT2C2(1) - Accumulator for unlabeled soil CO<sub>2</sub> loss due to respiration.

MT2C2(2) - Accumulator for labeled soil CO<sub>2</sub> loss due to respiration.

RESP(1) - Annual unlabeled CO<sub>2</sub> respiration from decomposition (g/m<sup>2</sup>).

RESP(2) - Annual labeled CO<sub>2</sub> respiration from decomposition (g/m<sup>2</sup>).

S11C2(1) - Accumulator for unlabeled CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of surface SOM1 to SOM2.

S11C2(2) - Accumulator for labeled CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of surface SOM1 to SOM2.

S21C2(1) - Accumulator for unlabeled CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of soil SOM1 to SOM2 and SOM3.

S21C2(2) - Accumulator for labeled CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of soil SOM1 to SOM2 and SOM3.

S2C2(1) - Accumulator for unlabeled CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of SOM2 to soil SOM1 and SOM3.

S2C2(2) - Accumulator for labeled CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of SOM2 to soil SOM1 and SOM3.

S3C2(1) - Accumulator for unlabeled CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of SOM3 to soil SOM1.

S3C2(2) - Accumulator for labeled CO<sub>2</sub> loss due to microbial respiration during soil organic matter decomposition of SOM3 to soil SOM1.

ST1C2(1) - Accumulator for unlabeled CO<sub>2</sub> loss due to microbial respiration during litter decomposition of surface structural into SOM1 and SOM2.

ST1C2(2) - Accumulator for labeled CO<sub>2</sub> loss due to microbial respiration during litter decomposition of surface structural into SOM1 and SOM2.

ST2C2(1) - Accumulator for unlabeled CO<sub>2</sub> loss due to microbial respiration during litter decomposition of soil structural into SOM1 and SOM2.

ST2C2(2) - Accumulator for labeled CO<sub>2</sub> loss due to microbial respiration during litter decomposition of soil structural into SOM1 and SOM2.

**Crop and Grass Output Variables**

ACCRST - Accumulator of C in straw removed (g/m<sup>2</sup>).

AGCACC - Growing season accumulator for aboveground C production (g/m<sup>2</sup>/y).

AGCISA(1) - Growing season accumulator for aboveground unlabeled C production (g/m<sup>2</sup>).

AGCISA(2) - Growing season accumulator for aboveground labeled C production (g/m<sup>2</sup>) .

AGLCIS(1) - Aboveground unlabeled C (g/m<sup>2</sup>).

AGLCIS(2) - Aboveground labeled C (g/m<sup>2</sup>).

AGLCN - Aboveground live C/N ratio = -999 if either component = 0.

AGLIVC - C in aboveground live (g/m<sup>2</sup>).

BGCACC - Growing season accumulator for belowground C production (g/m<sup>2</sup>).

BGCISA(1) - Growing season accumulator for belowground unlabeled C production (g/m<sup>2</sup>).

BGCISA(2) - Growing season accumulator for belowground labeled C production (g/m<sup>2</sup>).

BGLCIS(1) - Belowground live unlabeled C (g/m<sup>2</sup>).

BGLCIS(2) - Belowground live labeled C (g/m<sup>2</sup>).

BGLCN - Belowground live C/N ratio; = -999 if either component = 0.

BGLIVC - C in belowground live (g/m<sup>2</sup>).

CGRACC - Accumulator for grain and tuber production (g/m<sup>2</sup>).

CGRAIN - Economic yield of C in grain + tubers (g/m<sup>2</sup>).

CINPUT - Annual C inputs.

CISGRA(1) - Unlabeled C in grain (g/m<sup>2</sup>).

CISGRA(2) - Labeled C in grain (g/m<sup>2</sup>).

CPROD C - Total monthly C production (g/m<sup>2</sup>/month).

CRETA - Annual accumulator of C returned to system during grazing/fire (g/m<sup>2</sup>/year).

CRMVST - Amount of C removed through straw during harvest (g/m<sup>2</sup>/month).

CRPVAL - A numerical representation of the current crop, used for sorting output by crop; created by a system of assigning values to characters as in A=1, B=2, etc. and 1=0.1, 2=0.2, etc. and adding the values together (example: AB2 = 3.2).

HARMTH - 0 = in non-harvest months, 1 = in a harvest month.

HI - Harvest index (CGRAIN / AGLIVC at harvest).

PTAGC - Growing season accumulator for potential aboveground C production (g/m<sup>2</sup>/y).

PTBGC - Growing season accumulator for potential belowground C production (g/m<sup>2</sup>/y).

SDREMA - Annual accumulator of C removed from standing dead during grazing/fire (g/m<sup>2</sup>).

SDRMAI(1) - Annual accumulator of unlabeled C removed from standing dead during grazing/fire (g/m<sup>2</sup>).

SDRMAI(2) - Annual accumulator of labeled C removed from standing dead during grazing/fire (g/m<sup>2</sup>).

SHREMA - Annual accumulator of C removed from shoots during grazing/fire (g/m<sup>2</sup>).

SHRMAI(1) - Annual accumulator of unlabeled C removed from shoots during grazing/fire (g/m<sup>2</sup>).

SHRMAI(2) - Annual accumulator of labeled C removed from shoots during grazing/fire (g/m<sup>2</sup>).

STDCIS(1) - Unlabeled C in standing dead (g/m<sup>2</sup>).

STDCIS(2) - Labeled C in standing dead (g/m<sup>2</sup>).

STDEDC - C in standing dead material (g/m<sup>2</sup>).

**Forest Output Variables**

ACRCIS(1) - Growing season accumulator for unlabeled C production in forest system coarse root component (g/m<sup>2</sup>/y).

ACRCIS(2) - Growing season accumulator for labeled C production in forest system coarse root component (g/m<sup>2</sup>/y).

AFBCIS(1) - Growing season accumulator for unlabeled C production in forest system fine branch component (g/m<sup>2</sup>/y).

AFBCIS(2) - Growing season accumulator for labeled C production in forest system fine branch component (g/m<sup>2</sup>/y).

AFRCIS(1) - Growing season accumulator for unlabeled C production in forest system fine root component (g/m<sup>2</sup>/y).

AFRCIS(2) - Growing season accumulator for labeled C production in forest system fine root component (g/m<sup>2</sup>/y).

ALVCIS(1) - Growing season accumulator for unlabeled C production in forest system leaf component (g/m<sup>2</sup>/y).

ALVCIS(2) - Growing season accumulator for labeled C production in forest system leaf component (g/m<sup>2</sup>/y).

ALWCIS(1) - Growing season accumulator for unlabeled C production in forest system large wood component (g/m<sup>2</sup>/y).

ALWCIS(2) - Growing season accumulator for labeled C production in forest system large wood component (g/m<sup>2</sup>/y).

CPRODA - Annual accumulator of C production in crop/grassland + forest = net primary production (g/m<sup>2</sup>/year).

CPRODF - Total monthly forest C production (g/m<sup>2</sup>/month).

CROOTC - C in forest system coarse root component (g/m<sup>2</sup>).

CRTACC - Growing season accumulator for C production in forest system coarse root component (g/m<sup>2</sup>/y).

CRTCIS(1) - Unlabeled C in forest system coarse root component (g/m<sup>2</sup>).

CRTCIS(2) - Labeled C in forest system coarse root component (g/m<sup>2</sup>).



FBRACC - Growing season accumulator for C production in forest system fine branch component (g/m<sup>2</sup>/y).

FBRCHC - C in forest system fine branch component (g/m<sup>2</sup>).

FBR CIS(1) - Unlabeled C in forest system fine branch component (g/m<sup>2</sup>).

FBR CIS(2) - Labeled C in forest system fine branch component (g/m<sup>2</sup>).

FCACC - Growing season accumulator for C production in forest system (g/m<sup>2</sup>/y).

FROOTC - C in forest system fine root component (g/m<sup>2</sup>).

FRSTC - Sum of C in forest system live components (RLEAVC + FROOTC + FBRCHC + RLWODC + CROOTC) (g/m<sup>2</sup>).

FRTACC - Growing season accumulator for C production in forest system fine root component (g/m<sup>2</sup>).

FRT CIS(1) - Unlabeled C in forest system fine root component (g/m<sup>2</sup>).

FRT CIS(2) - Labeled C in forest system fine root component (g/m<sup>2</sup>).

FSYSC - Total C in forest system i.e. sum of soil organic matter, trees, dead wood, forest litter.

RLEAVC - C in forest system leaf component (g/m<sup>2</sup>).

RLVACC - Growing season accumulator for C production in forest system leaf compartment.

RLV CIS(1) - Unlabeled C in forest system leaf component (g/m<sup>2</sup>)

RLV CIS(2) - Labeled C in forest system leaf component (g/m<sup>2</sup>).

RLWACC - Growing season accumulator for C production in forest system large wood component (g/m<sup>2</sup>/y).

RLW CIS(1) - Unlabeled C in forest system large wood component (g/m<sup>2</sup>).

RLW CIS(2) - Labeled C in forest system large wood component (g/m<sup>2</sup>).

RLWODC - C in forest system large wood component (g/m<sup>2</sup>).

SUMRSP - Monthly maintenance respiration in the forest system (g/m<sup>2</sup>).

TCREM - Total C removed during forest removal events (g/m<sup>2</sup>).

W1LIG - Lignin content of dead fine branches (fraction lignin in WOOD1).

W2LIG - Lignin content of dead large wood (fraction lignin in WOOD2).

W3LIG - Lignin content of dead coarse roots (fraction lignin in WOOD3).

WD1CIS(1) - Unlabeled C in forest system WOOD1 (dead fine branch) material (g/m<sup>2</sup>).

WD1CIS(2) - Labeled C in forest system WOOD1 (dead fine branch) material (g/m<sup>2</sup>).

WD2CIS(1) - Unlabeled C in forest system WOOD2 (dead large wood) material (g/m<sup>2</sup>).

WD2CIS(2) - Labeled C in forest system WOOD2 (dead large wood) material (g/m<sup>2</sup>).

WD3CIS(1) - Unlabeled C in forest system WOOD3 (dead coarse root) material (g/m<sup>2</sup>).

WD3CIS(2) - Labeled C in forest system WOOD3 (dead coarse root) material (g/m<sup>2</sup>).

WOOD1C - C in WOOD1 (dead fine branch) component of forest system (g/m<sup>2</sup>).

WOOD2C - C in WOOD2 (dead large wood) component of forest system (g/m<sup>2</sup>).

WOOD3C - C in WOOD3 (dead coarse roots) component of forest system (g/m<sup>2</sup>).

WOODC - Sum of C in dead components of forest system (g/m<sup>2</sup>).

**Nitrogen Output Variables**

AGLIVE(1) - N in aboveground live for grass/crop (g/m<sup>2</sup>).

AMINRL(1) - Mineral N in layer 1 before uptake by plants.

BGLIVE(1) - N in belowground live for grass/crop (g/m<sup>2</sup>).

CROOTE(1) - N in forest system coarse root component (g/m<sup>2</sup>).

CRPSTG(1) - Retranslocation N storage pool for grass/crop (g/m<sup>2</sup>).

EGRACC(1) - Accumulator of N in grain + tuber production for grass/crop (g/m<sup>2</sup>).

EGRAIN(1) - Economic yield of N in grain + tubers for grass/crop (g/m<sup>2</sup>).

ELIMIT - Indicator of the limiting element, = 1 if N is the limiting element, = 2 if P is the limiting element, = 3 if S is the limiting element.

EPRODC(1) - Actual monthly N uptake for grass/crop (g/m<sup>2</sup>/month).

EPRODF(1) - Actual monthly N uptake in forest system (g/m<sup>2</sup>/month).

ERETA(1) - Annual accumulator of N returned to system during grazing/fire for grass/crop (g/m<sup>2</sup>/year) .

ERMVST(1) - Amount of N removed as straw during harvest for grass/crop (g/m<sup>2</sup>/month).

ESRSNK(1) - N source/sink (g/m<sup>2</sup>) .

EUPACC(1) - Growing season accumulator for N uptake by grass, crop, or tree (g/m<sup>2</sup>).

EUPAGA(1) - Aboveground growing season accumulator for N uptake by plants for grass/crop (g/m<sup>2</sup>).

EUPBGA(1) - Belowground growing season accumulator for N uptake by plants for grass/crop (g/m<sup>2</sup>).

EUPPRT(1,1) - Growing season accumulator for N uptake by forest leaf component (g/m<sup>2</sup>).

EUPPRT(2,1) - Growing season accumulator for N uptake by forest fine root component (g/m<sup>2</sup>).

EUPPRT(3,1) - Growing season accumulator for N uptake by forest fine branch component (g/m<sup>2</sup>).

EUPPRT(4,1) - Growing season accumulator for N uptake by forest large wood component (g/m<sup>2</sup>).

EUPPRT(5,1) - Growing season accumulator for N uptake by forest coarse root component (g/m<sup>2</sup>).

FBRCHE(1) - N in forest system fine branch component (g/m<sup>2</sup>).

FERTOT(1) - Accumulator for N fertilizer.

FORSTG(1) - Retranslocation N storage pool for forest.

FROOTE(1) - N in forest system fine root component (g/m<sup>2</sup>).

FRSTE(1) - Sum of N in forest system live components (RLEAVE(1) + FROOTE(1) + FBRCHE(1) + RLWODE(1) + CROOTE(1)) (g/m<sup>2</sup>).

FSYSE(1) - Total N in forest system i.e. sum of soil organic matter, trees, dead wood, forest litter.

GROMIN(1) - Gross mineralization of N.

LHZEAC(1) - Accumulator for N inputs to 0-20 cm layer from the lower horizon pools associated with soil erosion (g/m<sup>2</sup>).

METABE(1,1) - Metabolic N in surface litter (g/m<sup>2</sup>).

METABE(2,1) - Metabolic N in soil litter (g/m<sup>2</sup>).

METMNR(1,1) - Net mineralization for N for surface metabolic litter .

METMNR(2,1) - Net mineralization for N for soil metabolic litter .

MINERL(1,1) - Mineral N content for layer 1 (g/m<sup>2</sup>).

MINERL(2,1) - Mineral N content for layer 2 (g/m<sup>2</sup>).

MINERL(3,1) - Mineral N content for layer 3 (g/m<sup>2</sup>).

MINERL(4,1) - Mineral N content for layer 4 (g/m<sup>2</sup>).

MINERL(5,1) - Mineral N content for layer 5 (g/m<sup>2</sup>).

MINERL(6,1) - Mineral N content for layer 6 (g/m<sup>2</sup>).

MINERL(7,1) - Mineral N content for layer 7 (g/m<sup>2</sup>).

MINERL(8,1) - Mineral N content for layer 8 (g/m<sup>2</sup>).

MINERL(9,1) - Mineral N content for layer 9 (g/m<sup>2</sup>).

MINERL(10,1) - Mineral N content for layer 10 (g/m<sup>2</sup>).

MINERL(NLAYER +1,1) - Deep storage layer for N leached.

NFIX - Amount of symbiotic N fixation (g/m<sup>2</sup>/month).

NFIXAC- Accumulator for amount of symbiotic N fixation (g/m<sup>2</sup>/month).

PARENT(1) - Parent material N (g/m<sup>2</sup>).

RLEAVE(1) - N in forest system leaf component (g/m<sup>2</sup>).

RLWODE(1) - N in forest system large wood component (g/m<sup>2</sup>).

RNPML1 - Mineral N/P ratio used to control soil N - fixation using a regression equation based on Kansas data.

S1MNR(1,1) - Net mineralization for N for surface microbes SOM1E(1,1).

S1MNR(2,1) - Net mineralization for N for active pool SOM1E(2,1).

S2MNR(1) - Net mineralization for N for slow pool SOM2E(1).

S3MNR(1) - Net mineralization for N for passive pool SOM3E(1).

SDRMAE(1) - Annual accumulator of N removed from standing dead during grazing/fire for grass/crop (g/m<sup>2</sup>).

SECNDY(1) - Secondary N (g/m<sup>2</sup>).

SHRMAE(1) - Annual accumulator of N removed from shoots during grazing/fire for grass/crop (g/m<sup>2</sup>).

SNFXAC(1) - Annual accumulator for symbiotic N fixation for grass/crop system.

SNFXAC(2) - Annual accumulator for symbiotic N fixation for forest system.

SOILNM(1) - Annual accumulator for net mineralization of N in soil compartments (soil organic matter + belowground litter + dead coarse roots) (g/m<sup>2</sup>).

SOM1E(1,1) - N in surface microbe pool (g/m<sup>2</sup>).

SOM1E(2,1) - N in active soil organic matter (g/m<sup>2</sup>).

SOM2E(1) - N in slow pool soil organic matter (g/m<sup>2</sup>).

SOM3E(1) - N in passive soil organic matter (g/m<sup>2</sup>).

SOMSE(1) - Sum of N in SOM1E, SOM2E, and SOM3E (g/m<sup>2</sup>).

SOMTE(1) - Total N in soil organic matter including belowground structural + metabolic.

STDEDE(1) - N in standing dead for grass/crop (g/m<sup>2</sup>).

STREAM(2) - N from mineral leaching of stream flow (base flow + storm flow) (g/m<sup>2</sup>).

STREAM(6) - N from organic leaching of stream flow (base flow + storm flow) (g/m<sup>2</sup>).

STRMNR(1,1) - Net mineralization for N for surface structural litter.

STRMNR(2,1) - Net mineralization for N for soil structural litter.

STRUCE(1,1) - Surface litter structural N (g/m<sup>2</sup>).

STRUCE(2,1) - Soil litter structural N (g/m<sup>2</sup>).

SUMNRS(1) - Annual accumulator for net mineralization of N from all compartments except structural and wood (g/m<sup>2</sup>/y).

TCERAT(1) - Total C/N ratio in soil organic matter including belowground structural + metabolic.

TCNPRO - Total C/N ratio for grass, crop, or tree production.

TEREM(1) - Total N removed during forest removal events (g/m<sup>2</sup>).

TMINRL(1) - Total mineral N summed across layers (g/m<sup>2</sup>).

TNETMN(1) - Annual accumulator of net mineralization for N from all compartments (g/m<sup>2</sup>/y).

TOTALE(1) - Total N including source/sink.

VOLEX - Volatilization loss as a function of mineral N remaining after uptake by grass, crop, or tree (g/m<sup>2</sup>).

VOLEXA - Accumulator for N volatilization as a function of N remaining after uptake by grass, crop, or tree (total N for entire simulation) (g/m<sup>2</sup>).

VOLGM - Volatilization loss of N as a function of gross mineralization.

VOLGMA - Accumulator for N volatilized as a function of gross mineralization (total N for entire simulation) (g/m<sup>2</sup>).

VOLPL - Volatilization of N from plants during harvest for grass/crop.

VOLPLA - Accumulator for N volatilized from plant at harvest for grass/crop (total N for entire simulation) (g/m<sup>2</sup>).

W1MNR(1) - N mineralized from the WOOD1 (dead fine branch) component of a forest system (g/m<sup>2</sup>).

W2MNR(1) - N mineralized from the WOOD2 (dead large wood) component of a forest system (g/m<sup>2</sup>).

W3MNR(1) - N mineralized from the WOOD3 (dead coarse root) component of a forest system (g/m<sup>2</sup>).

WDFX - Annual atmospheric and non-symbiotic soil N fixation based on annual precipitation (wet and dry deposition) (g/m<sup>2</sup>).

WDFXA - Annual N fixation in atmosphere (wet and dry deposition) (g/m<sup>2</sup>).

WDFXAA - Annual accumulator for atmospheric N inputs (g/m<sup>2</sup>/y).

WDFXAS - Annual accumulator for soil N fixation inputs (g/m<sup>2</sup>/y).

WDFXMA - Monthly N fixation in atmosphere (g/m<sup>2</sup>).

WDFXMS - Monthly non-symbiotic soil N fixation (g/m<sup>2</sup>).

WDFXS - Annual non-symbiotic soil N fixation based on precipitation rather than soil N/P ratio (g/m<sup>2</sup>).

WOOD1E(1) - N in WOOD1 (dead fine branch) component of forest system (g/m<sup>2</sup>).

WOOD2E(1) - N in WOOD2 (dead large wood) component of forest system (g/m<sup>2</sup>).

WOOD3E(1) - N in WOOD3 (dead coarse roots) component of forest system (g/m<sup>2</sup>).

WOODE(1) - Sum of N in dead components of forest system (g/m<sup>2</sup>).

**Phosphorus Output Variables**

AGLIVE(2) - P in aboveground live for grass/crop (g/m<sup>2</sup>).

AMINRL(2) - Mineral P in layer 1 before uptake by plants.

BGLIVE(2) - P in belowground live for grass/crop (g/m<sup>2</sup>).

CROOTE(2) - P in forest system coarse root component (g/m<sup>2</sup>).

CRPSTG(2) - Retranslocation P storage pool for grass/crop (g/m<sup>2</sup>).

EGRACC(2) - Accumulator of P in grain + tuber production for grass/crop (g/m<sup>2</sup>).

EGRAIN(2) - Economic yield of P in grain + tubers for grass/crop (g/m<sup>2</sup>).

EPRODC(2) - Actual monthly P uptake for grass/crop (g/m<sup>2</sup>/month).

EPRODF(2) - Actual monthly P uptake in forest system (g/m<sup>2</sup>/month).

ERETA(2) - Annual accumulator of P returned to system during grazing/fire for grass/crop (g/m<sup>2</sup>/year).

ERMVST(2) - Amount of P removed as straw during harvest for grass/crop (g/m<sup>2</sup>/month).

ESRSNK(2) - P source/sink (g/m<sup>2</sup>).

EUPACC(2) - Growing season accumulator for P uptake by grass, crop or tree (g/m<sup>2</sup>).

EUPAGA(2) - Aboveground growing season accumulator for P uptake by plants for grass/crop (g/m<sup>2</sup>).

EUPBGA(2) - Belowground growing season accumulator for P uptake by plants for grass/crop (g/m<sup>2</sup>).

EUPPRT(1,2) - Growing season accumulator for P uptake by forest leaf component (g/m<sup>2</sup>).

EUPPRT(2,2) - Growing season accumulator for P uptake by forest fine root component (g/m<sup>2</sup>).

EUPPRT(3,2) - Growing season accumulator for P uptake by forest fine branch component (g/m<sup>2</sup>).

EUPPRT(4,2) - Growing season accumulator for P uptake by forest large wood component (g/m<sup>2</sup>).



EUPPRT(5,2) - Growing season accumulator for P uptake by forest coarse root component (g/m<sup>2</sup>).

FBRCHE(2) - P in forest system fine branch component (g/m<sup>2</sup>).

FERTOT(2) - Accumulator for P fertilizer.

FORSTG(2) - Retranslocation P storage pool for forest.

FROOTE(2) - P in forest system fine root component (g/m<sup>2</sup>).

FRSTE(2) - Sum of P in forest system live components (RLEAVE(2) + FROOTE(2) + FBRCHE(2) + RLWODE(2) + CROOTE(2)) (g/m<sup>2</sup>).

FSYSE(2) - Total P in forest system i.e. sum of soil organic matter, trees, dead wood, forest litter.

GROMIN(2) - Gross mineralization of P.

LHZEAC(2) - Accumulator for P inputs to 0-20 cm layer from the lower horizon pools associated with soil erosion (g/m<sup>2</sup>).

METABE(1,2) - Metabolic P in surface litter (g/m<sup>2</sup>).

METABE(2,2) - Metabolic P in soil litter (g/m<sup>2</sup>).

METMNR(1,2) - Net mineralization for P for surface metabolic litter.

METMNR(2,2) - Net mineralization for P for soil metabolic litter.

MINERL(1,2) - Mineral P content for layer 1 (g/m<sup>2</sup>).

MINERL(2,2) - Mineral P content for layer 2 (g/m<sup>2</sup>).

MINERL(3,2) - Mineral P content for layer 3 (g/m<sup>2</sup>).

MINERL(4,2) - Mineral P content for layer 4 (g/m<sup>2</sup>).

MINERL(5,2) - Mineral P content for layer 5 (g/m<sup>2</sup>).

MINERL(6,2) - Mineral P content for layer 6 (g/m<sup>2</sup>).

MINERL(7,2) - Mineral P content for layer 7 (g/m<sup>2</sup>).

MINERL(8,2) - Mineral P content for layer 8 (g/m<sup>2</sup>).

MINERL(9,2) - Mineral P content for layer 9 (g/m<sup>2</sup>).

MINERL(10,2) - Mineral P content for layer 10 (g/m<sup>2</sup>).

MINERL(NLAYER +1,2) - Deep storage layer for P leached.

OCCLUD - Occluded P (g/m<sup>2</sup>).

PARENT(2) - Parent material P (g/m<sup>2</sup>).

PLABIL - Accumulator of labile phosphate in all layers.

RLEAVE(2) - P in forest system leaf component (g/m<sup>2</sup>).

RLWODE(2) - P in forest system large wood component (g/m<sup>2</sup>).

S1MNR(1,2) - Net mineralization for P for surface microbes SOM1E(1,2).

S1MNR(2,2) - Net mineralization for P for active pool SOM1E(2,2).

S2MNR(2) - Net mineralization for P for slow pool SOM2E(2).

S3MNR(2) - Net mineralization for P for passive pool SOM3E(2).

SDRMAE(2) - Annual accumulator of P removed from standing dead during grazing/fire for grass/crop (g/m<sup>2</sup>).

SECNDY(2) - Slowly sorbed P (g/m<sup>2</sup>).

SHRMAE(2) - Annual accumulator of P removed from shoots during grazing/fire for grass/crop (g/m<sup>2</sup>).

SOILNM(2) - Annual accumulator for net mineralization of P in soil compartments (soil organic matter + belowground litter + dead coarse roots) (g/m<sup>2</sup>).

SOM1E(1,2) - P in surface microbe pool (g/m<sup>2</sup>).

SOM1E(2,2) - P in active soil organic matter (g/m<sup>2</sup>).

SOM2E(2) - P in slow pool soil organic matter (g/m<sup>2</sup>).

SOM3E(2) - P in passive soil organic matter (g/m<sup>2</sup>).

SOMSE(2) - Sum of P in SOM1E, SOM2E, and SOM3E (g/m<sup>2</sup>).

SOMTE(2) - Total P in soil organic matter including belowground structural + metabolic.

STDEDE(2) - P in standing dead for grass/crop (g/m<sup>2</sup>).

STREAM(3) - P from mineral leaching of stream flow (base flow + storm flow) (g/m<sup>2</sup>).

STREAM(7) - P from organic leaching of stream flow (base flow + storm flow) (g/m<sup>2</sup>).

STRMNR(1,2) - Net mineralization for P for surface structural litter .

STRMNR(2,2) - Net mineralization for P for soil structural litter .

STRUCE(1,2) - Surface litter structural P (g/m<sup>2</sup>).

STRUCE(2,2) - Soil litter structural P (g/m<sup>2</sup>).

SUMNRS(2) - Annual accumulator for net mineralization of P from all compartments except structural and wood (g/m<sup>2</sup>/y).

TCERAT(2) - Total C/P ratio in soil organic matter including belowground structural + metabolic.

TEREM(2) - Total P removed during forest removal events (g/m<sup>2</sup>).

TMINRL(2) - Total mineral P summed across layers (g/m<sup>2</sup>).

TNETMN(2) - Annual accumulator of net mineralization for P from all compartments (g/m<sup>2</sup>/y).

TOTALE(2) - Total P including source/sink.

W1MNR(2) - P mineralized from the WOOD1 (dead fine branch) component of a forest system (g/m<sup>2</sup>).

W2MNR(2) - P mineralized from the WOOD2 (dead large wood) component of a forest system (g/m<sup>2</sup>).

W3MNR(2) - P mineralized from the WOOD3 (dead coarse root) component of a forest system (g/m<sup>2</sup>).

WOOD1E(2) - P in WOOD1 (dead fine branch) component of forest system (g/m<sup>2</sup>).

WOOD2E(2) - P in WOOD2 (dead large wood) component of forest system (g/m<sup>2</sup>).

WOOD3E(2) - P in WOOD3 (dead coarse roots) component of forest system (g/m<sup>2</sup>).

WOODE(2) - Sum of P in dead components of forest system (g/m<sup>2</sup>).

**Soil Output Variables**

CLITTR(1,1) - Surface unlabeled residue (g/m<sup>2</sup>).

CLITTR(1,2) - Surface labeled residue (g/m<sup>2</sup>).

CLITTR(2,1) - Soil unlabeled residue (g/m<sup>2</sup>).

CLITTR(2,2) - Soil labeled residue (g/m<sup>2</sup>).

CLTFAC(1) - Effect of cultivation on decomposition for SOM1; = CLTEFF(1) if cultivation occurs in the current month; = 1 otherwise.

CLTFAC(2) - Effect of cultivation on decomposition for SOM2; = CLTEFF(2) if cultivation occurs in the current month; = 1 otherwise.

CLTFAC(3) - Effect of cultivation on decomposition for SOM3; = CLTEFF(3) if cultivation occurs in the current month; = 1 otherwise.

CLTFAC(4) - Effect of cultivation on decomposition for structural; = CLTEFF(4) if cultivation occurs in the current month; = 1 otherwise.

CSRSNK(1) - Unlabeled C source/sink (g/m<sup>2</sup>).

CSRSNK(2) - Labeled C source/sink (g/m<sup>2</sup>) .

DBLIT - Delta 13C value for belowground litter for stable isotope labeling.

DMETC(1) - Delta 13C value for metabolic surface C for stable isotope labeling.

DMETC(2) - Delta 13C value for metabolic soil C for stable isotope labeling.

DSLIT - Delta 13C value for surface litter for stable isotope labeling.

DSOM1C(1) - Delta 13C value for SOM1C(1) for stable isotope labeling.

DSOM1C(2) - Delta 13C value for SOM1C(2) for stable isotope labeling.

DSOM2C - Delta 13C value for SOM2C for stable isotope labeling.

DSOM3C - Delta 13C value for SOM3C for stable isotope labeling.

DSOMSC - Delta 13C value for soil organic matter for stable isotope labeling.

DSOMTC - Delta 13C value for total soil C for stable isotope labeling.

DSTRUC(1) - Delta 13C value for surface structural C for stable isotope labeling.

DSTRUC(2) - Delta 13C value for soil structural C for stable isotope labeling.

LHZCAC - Accumulator for C inputs to 0-20 cm layer from the lower horizon pools associated with soil erosion (g/m<sup>2</sup>).

METABC(1) - Metabolic C in surface litter (g/m<sup>2</sup>).

METABC(2) - Metabolic C in soil litter (g/m<sup>2</sup>).

METCIS(1,1) - Metabolic surface litter unlabeled C (g/m<sup>2</sup>).

METCIS(1,2) - Metabolic surface litter labeled C (g/m<sup>2</sup>).

METCIS(2,1) - Metabolic soil litter unlabeled C (g/m<sup>2</sup>).

METCIS(2,2) - Metabolic soil litter labeled C (g/m<sup>2</sup>).

SCLOSA - Accumulated C lost from soil organic matter by erosion (total C for entire simulation) (g/m<sup>2</sup>).

SCLOSS - Total C loss from soil organic matter by erosion for current month (g/m<sup>2</sup>).

SOM1C(1) - C in surface microbe pool (g/m<sup>2</sup>).

SOM1C(2) - C in active soil organic matter (g/m<sup>2</sup>).

SOM1CI(1,1) - Unlabeled C in surface microbe pool (g/m<sup>2</sup>).

SOM1CI(1,2) - Labeled C in surface microbe pool (g/m<sup>2</sup>).

SOM1CI(2,1) - Unlabeled C in active soil organic matter (g/m<sup>2</sup>).

SOM1CI(2,2) - Labeled C in active soil organic matter (g/m<sup>2</sup>).

SOM2C - C in slow pool soil organic matter (g/m<sup>2</sup>).

SOM2CI(1) - Unlabeled C in slow pool soil organic matter (g/m<sup>2</sup>).

SOM2CI(2) - Labeled C in slow pool soil organic matter (g/m<sup>2</sup>).

SOM3C - C in passive soil organic matter (g/m<sup>2</sup>).

SOM3CI(1) - Unlabeled C in passive soil organic matter (g/m<sup>2</sup>).

SOM3CI(2) - Labeled C in passive soil organic matter (g/m<sup>2</sup>).

SOMSC - Sum of labeled and unlabeled C from SOM1C, SOM2C, and SOM3C (g/m<sup>2</sup>).

SOMSCI(1) - Sum of unlabeled C in SOM1C, SOM2C, and SOM3C.

SOMSCI(2) - Sum of labeled C in SOM1C, SOM2C, and SOM3C.

SOMTC - Total soil C including belowground structural and metabolic (g/m<sup>2</sup>).

SOMTCI(1) - Total unlabeled C in soil including belowground structural + metabolic.

SOMTCI(2) - Total labeled C in soil including belowground structural + metabolic.

STRCIS(1,1) - Unlabeled surface litter structural C (g/m<sup>2</sup>).

STRCIS(1,2) - Labeled surface litter structural C (g/m<sup>2</sup>).

STRCIS(2,1) - Unlabeled soil litter structural C (g/m<sup>2</sup>).

STRCIS(2,2) - Labeled soil litter structural C (g/m<sup>2</sup>).

STREAM(5) - C from organic leaching of stream flow (base flow + storm flow) (g/m<sup>2</sup>).

STRLIG(1) - Lignin content of surface structural residue.

STRLIG(2) - Lignin content of soil structural residue.

STRUCC(1) - Surface litter structural C (g/m<sup>2</sup>).

STRUCC(2) - Soil litter structural C (g/m<sup>2</sup>).

TOMRES(1) - Total unlabeled C in soil, belowground, and aboveground litter.

TOMRES(2) - Total labeled C in soil, belowground, and aboveground litter.

TOTALC - Total C including source/sink.

TOTC - Minimum annual total non-living C, where total is: SOM1C(1) + SOM1C(2) + SOM2C + SOM3C + STRUCC(1) + STRUCC(2) + METABC(1) + METABC(2).

**Sulfur Output Variables**

AGLIVE(3) - S in aboveground live for grass/crop (g/m<sup>2</sup>).

AMINRL(3) - Mineral S in layer 1 before uptake by plants.

BGLIVE(3) - S in belowground live for grass/crop (g/m<sup>2</sup>).

CROOTE(3) - S in forest system coarse root component (g/m<sup>2</sup>).

CRPSTG(3) - Retranslocation S storage pool for grass/crop (g/m<sup>2</sup>).

EGRACC(3) - Accumulator of S in grain + tuber production for grass/crop (g/m<sup>2</sup>).

EGRAIN(3) - Economic yield of S in grain + tubers for grass/crop (g/m<sup>2</sup>).

EPRODC(3) - Actual monthly S uptake for grass/crop (g/m<sup>2</sup>/month).

EPRODF(3) - Actual monthly S uptake in forest system (g/m<sup>2</sup>/month).

ERETA(3) - Annual accumulator of S returned to system during grazing/fire for grass/crop (g/m<sup>2</sup>/year).

ERMVST(3) - Amount of S removed as straw during harvest for grass/crop (g/m<sup>2</sup>/month).

ESRSNK(3) - S source/sink (g/m<sup>2</sup>).

EUPACC(3) - Growing season accumulator for S uptake by grass, crop, or tree (g/m<sup>2</sup>).

EUPAGA(3) - Aboveground growing season accumulator for S uptake by plants for grass/crop (g/m<sup>2</sup>).

EUPBGA(3) - Belowground growing season accumulator for S uptake by plants for grass/crop (g/m<sup>2</sup>).

EUPPRT(1,3) - Growing season accumulator for S uptake by forest leaf component (g/m<sup>2</sup>).

EUPPRT(2,3) - Growing season accumulator for S uptake by forest fine root component (g/m<sup>2</sup>).

EUPPRT(3,3) - Growing season accumulator for S uptake by forest fine branch component (g/m<sup>2</sup>).

EUPPRT(4,3) - Growing season accumulator for S uptake by forest large wood component (g/m<sup>2</sup>).

EUPPRT(5,3) - Growing season accumulator for S uptake by forest coarse root component (g/m<sup>2</sup>).

FBRCHE(3) - S in forest system fine branch component (g/m<sup>2</sup>).

FERTOT(3) - Accumulator for S fertilizer.

FORSTG(3) - Retranslocation S storage pool for forest.

FROOTE(3) - S in forest system fine root component (g/m<sup>2</sup>).

FRSTE(3) - Sum of S in forest system live components (RLEAVE(3) + FROOTE(3) + FBRCHE(3) + RLWODE(3) + CROOTE(3) (g/m<sup>2</sup>).

FSYSE(3) - Total S in forest system i.e. sum of soil organic matter, trees, dead wood, forest litter.

GROMIN(3) - Gross mineralization of S.

LHZEAC(3) - Accumulator for S inputs to 0-20 cm layer from the lower horizon pools associated with soil erosion (g/m<sup>2</sup>).

METABE(1,3) - Metabolic S in surface litter (g/m<sup>2</sup>).

METABE(2,3) - Metabolic S in soil litter (g/m<sup>2</sup>).

METMNR(1,3) - Net mineralization for S for surface metabolic litter.

METMNR(2,3) - Net mineralization for S for soil metabolic litter.

MINERL(1,3) - Mineral S content for layer 1 (g/m<sup>2</sup>).

MINERL(2,3) - Mineral S content for layer 2 (g/m<sup>2</sup>).

MINERL(3,3) - Mineral S content for layer 3 (g/m<sup>2</sup>).

MINERL(4,3) - Mineral S content for layer 4 (g/m<sup>2</sup>).

MINERL(5,3) - Mineral S content for layer 5 (g/m<sup>2</sup>).

MINERL(6,3) - Mineral S content for layer 6 (g/m<sup>2</sup>).

MINERL(7,3) - Mineral S content for layer 7 (g/m<sup>2</sup>).

MINERL(8,3) - Mineral S content for layer 8 (g/m<sup>2</sup>).

MINERL(9,3) - Mineral S content for layer 9 (g/m<sup>2</sup>).



MINERL(10,3) - Mineral S content for layer 10 (g/m<sup>2</sup>).

MINERL(NLAYER +1,3) - Deep storage layer for S leached.

PARENT(3) - Parent material S (g/m<sup>2</sup>).

RLEAVE(3) - S in forest system leaf component (g/m<sup>2</sup>).

RLWODE(3) - S in forest system large wood component (g/m<sup>2</sup>).

S1MNR(1,3) - Net mineralization for S for surface microbes SOM1E(1,3).

S1MNR(2,3) - Net mineralization for S for active pool SOM1E(2,3).

S2MNR(3) - Net mineralization for S for slow pool SOM2E(3).

S3MNR(3) - Net mineralization for S for passive pool SOM3E(3).

SATMAC - Accumulator for atmospheric S deposition (g/m<sup>2</sup>).

SDRMAE(3) - Annual accumulator of S removed from standing dead during grazing/fire for grass/crop (g/m<sup>2</sup>).

SECNDY(3) - Secondary S (g/m<sup>2</sup>).

SHRMAE(3) - Annual accumulator of S removed from shoots during grazing/fire for grass/crop (g/m<sup>2</sup>).

SIRRAC - Accumulator for irrigation S inputs (g S / m<sup>2</sup>).

SOILNM(3) - Annual accumulator for net mineralization of S in soil compartments (soil organic matter + belowground litter + dead coarse roots) (g/m<sup>2</sup>).

SOM1E(1,3) - S in surface microbe pool (g/m<sup>2</sup>).

SOM1E(2,3) - S in active soil organic matter (g/m<sup>2</sup>).

SOM2E(3) - S in slow pool soil organic matter (g/m<sup>2</sup>).

SOM3E(3) - S in passive soil organic matter (g/m<sup>2</sup>).

SOMSE(3) - Sum of S in SOM1E, SOM2E, and SOM3E (g/m<sup>2</sup>).

SOMTE(3) - Total S in soil organic matter including belowground structural + metabolic .  
STDEDE(3) - S in standing dead for grass/crop (g/m<sup>2</sup>).

STREAM(4) - S from mineral leaching of stream flow (base flow + storm flow) (g/m<sup>2</sup>).

STREAM(8) - S from organic leaching of stream flow (base flow + storm flow) (g/m<sup>2</sup>).

STRMNR(1,3) - Net mineralization for S for surface structural litter.

STRMNR(2,3) - Net mineralization for S for soil structural litter.

STRUCE(1,3) - Surface litter structural S (g/m<sup>2</sup>).

STRUCE(2,3) - Soil litter structural S (g/m<sup>2</sup>).

SUMNRS(3) - Annual accumulator for net mineralization of S from all compartments except structural and wood (g/m<sup>2</sup>/y).

TCERAT(3) - Total C/S ratio in soil organic matter including belowground structural + metabolic.

TEREM(3) - Total S removed during forest removal events (g/m<sup>2</sup>).

TMINRL(3) - Total mineral S summed across layers (g/m<sup>2</sup>).

TNETMN(3) - Annual accumulator of net mineralization for S from all compartments (g/m<sup>2</sup>/y).

TOTALE(3) - Total S including source/sink.

W1MNR(3) - S mineralized from the WOOD1 (dead fine branch) component of a forest system (g/m<sup>2</sup>).

W2MNR(3) - S mineralized from the WOOD2 (dead large wood) component of a forest system (g/m<sup>2</sup>).

W3MNR(3) - S mineralized from the WOOD3 (dead coarse root) component of a forest system (g/m<sup>2</sup>).

WOOD1E(3) - S in WOOD1 (dead fine branch) component of forest system (g/m<sup>2</sup>).

WOOD2E(3) - S in WOOD2 (dead large wood) component of forest system (g/m<sup>2</sup>).

WOOD3E(3) - S in WOOD3 (dead coarse roots) component of forest system (g/m<sup>2</sup>).

WOODE(3) - Sum of S in wood components of forest system (g/m<sup>2</sup>).

**Water and Temperature Output Variables**

ADEFAC - Average annual value of DEFAC, the decomposition factor which combines the effects of temperature and moisture.

ANERB - The effect of soil anaerobic conditions on decomposition; used as a multiplier on all belowground decomposition flows.

ASMOS(1) - Soil water content of layer 1 (cm).

ASMOS(2) - Soil water content of layer 2 (cm).

ASMOS(3) - Soil water content of layer 3 (cm).

ASMOS(4) - Soil water content of layer 4 (cm).

ASMOS(5) - Soil water content of layer 5 (cm).

ASMOS(6) - Soil water content of layer 6 (cm).

ASMOS(7) - Soil water content of layer 7 (cm).

ASMOS(8) - Soil water content of layer 8 (cm).

ASMOS(9) - Soil water content of layer 9 (cm).

ASMOS(10) - Soil water content of layer 10 (cm).

ASMOS(NLAYER + 1) - Soil water content in deep storage layer (cm).

AVH2O(1) - Water available to grass/crop/tree for growth in soil profile (sum of layers 1 through NLAYPG) (cm h<sub>2</sub>O).

AVH2O(2) - Water available to grass/crop/tree for survival in soil profile (sum of all layers in profile, 1 through NLAYER) (cm h<sub>2</sub>O).

AVH2O(3) - Water in the first 2 soil layers (cm h<sub>2</sub>O).

DEFAC - Decomposition factor based on temperature and moisture.

EVAP - Monthly evaporation (cm).

IRRACT - Actual amount of irrigation (cm h<sub>2</sub>O/month).

IRRTOT - Accumulator for irrigation (cm h<sub>2</sub>O).

PET - Monthly potential evapotranspiration (cm).

PETANN - Annual potential evapotranspiration (cm).

PRCANN - Annual precipitation (cm).

PRCFAL - Fallow period precipitation; the amount of rain which falls during the months after harvest until the month before the next planting (cm).

PTTR - Potential transpiration water loss for the month.

RAIN - Monthly precipitation (cm).

RWCF(1) - Relative water content for layer 1.

RWCF(2) - Relative water content for layer 2.

RWCF(3) - Relative water content for layer 3.

RWCF(4) - Relative water content for layer 4.

RWCF(5) - Relative water content for layer 5.

RWCF(6) - Relative water content for layer 6.

RWCF(7) - Relative water content for layer 7.

RWCF(8) - Relative water content for layer 8.

RWCF(9) - Relative water content for layer 9.

RWCF(10) - Relative water content for layer 10.

SNLQ - Liquid water in snowpack (cm).

SNOW - Snowpack water content (cm H<sub>2</sub>O).

STEMP - Average soil temperature in (deg C).

STREAM(1) - cm H<sub>2</sub>O of stream flow (base flow + storm flow).

TAVE - Average air temperature (deg C).

TRAN - Monthly transpiration (cm).