

Update from 0806 to 1501 (compiled in Nov. 2015)

1. Input: NBY0 and IYR0 are now two separate inputs in APEXCONT. Also, the first two lines in this file are now free formatted.
2. Input: With new modules added, PARM.dat now has 110 parameters (PARMS)
 - a. PARM(98) = REGULATES FLOW BETWEEN SOLUBLE AND EXCHANGEABLE K POOLS
 - b. PARM(99) = REGULATES FLOW BETWEEN EXCHANGEABLE AND FIXED K POOLS
 - c. PARM(100) = CENTURY SLOW HUMUS TRANSFORMATION RATE(D⁻¹)(0.00041_0.00068)
 - d. PARM(101) = CENTURY PASSIVE HUMUS TRANSFORMATION RATE(D⁻¹)(0.0000082_0.000015) ORIGINAL VALUE = 0.000012
 - e. PARM(102) = CRLNC = LOWER NC RATIO OF BIOMASS - POINT AT WHICH CR = 0 AND TRANSFORMATIONS OF STRUCTURAL LITTER AND METABOLIC LITTER ARE. UNIMPEDED BY NC RATIO OF BIOMASS
 - f. PARM(103) = CRUNC = UPPER NC RATIO OF BIOMASS - POINT AT WHICH CR = 1 AND TRANSFORMATIONS OF STRUCTURAL LITTER AND METABOLIC LITTER ARE UNIMPEDED BY NC RATIO OF BIOMASS
 - g. PARM(104) = WKA = SPECIFIC BASE RATE FOR AMMONIFICATION (d⁻¹)
 - h. PARM(105) = WNCMIN = BMNC AT WHICH IMMOBILIZATION IS A MAXIMUM; BMNC AT WHICH AMMONIFICATION CEASES
 - i. PARM(106) = WNCMAX = BMNC AT WHICH IMMOBILIZATION CEASES; BMNC AT WHICH AMMONIFICATION IS A MAXIMUM
 - j. PARM(107) = VMU = MAXIMUM RATE OF UPTAKE OF N DURING IMMOBILIZATION (gN (gC⁻¹) d⁻¹)
 - k. PARM(108) = WKMNH3 = HALF SATURATION CONSTANT FOR AMMONIA IMMOBILIZATION (mg N L⁻¹)
 - l. PARM(109) = WKMNO2 = HALF SATURATION CONSTANT FOR NITRITE IMMOBILIZATION (mg N L⁻¹)
 - m. PARM(110) = WKMNO3 = HALF SATURATION CONSTANT FOR NITRATE IMMOBILIZATION (mg N L⁻¹)
3. Input: PARM.dat has 4 new parameters added as input to the new Izaurralde denitrification method (XKN5, XKN3, XNK1, CBVT)

PARMS	Description	Literature Average	Experimental ranges	
			g/m3	g/m3
	Michaelis Menten constant (Km)	g/m3	g/m3	g/m3
		Average	Low	High
XKN5	NO3 reduction	28.497	5.000	50.000
XKN3	NO2 reduction	1.077	0.300	4.000
XKN1	N2O reduction	0.046	0.003	0.200

4. New module: two additional options are added for denitrification modeling
 - a. IDNT=3 : Izaurralde Denitrification Subprogram (Original DW)
 - b. IDNT=4 : Izaurralde Denitrification Subprogram (New DW)

5. New module: 4-mm slug method is added to better simulate soil moisture accounting in the root zone when SW is greater than field capacity.
 - a. IPRK = 1 : 4-mm Slug method (default=0)
6. New module: PHOENIX model for N & C simulation
 - a. ICP = 1 : Mineralization and immobilization of N and C is simulated using pools following CENTURY (Izaurralde et al. 2006) and C/N of microbial biomass following PHOENIX (McGill et al. 1981) (default ICP=0 –CENTURY Model)
7. New module: Izaurralde's model for N transformation through nitrification and volatilization are dependent on PARM(80) and soil Ph.
 - a. NTV = 1 : Izaurralde's model (default NTV=0)
8. Input: 3 new input (IPRK, ICP,NTV) in line 2 of APEXCONT.dat
 - a. IPRK=0: the default percolation method with which soil moisture content (SW) greater than field capacity (FC) drains subsoil layers instantly
 - b. IPRK=1: percolation of SW greater than FC is simulated iteratively as a function of PARM82 and Ksat in which SW is released no more than 4mm in each iteration. This option keeps SW > FC for an extended time.
 - c. ICP=0 : PHOINIX method for C&N modeling
 - d. ICP=1 : CENTURY method
 - e. NTV=0 : Original APEX nitrification and volatilization equations
 - f. NTV=1 : IZAURRALDE equations
9. Output: two new output files are available (lines 12-14 in PRINT.DAT)
 - a. 41 : DNC=DAILY NITROGEN/CARBON CESAR IZAURRALDE
 - b. 42 : DHS=DAILY HYDROLOGY/SOIL
10. Input: FPSC (floodplain saturated hydraulic conductivity, mm/h) in APEXCONT.DAT is changed to FPS0 (floodplain saturated hydraulic conductivity adjustment factor) (0.1-10)
11. INPUT: two inputs are added in line 6 of APEXCONT.DAT
 - a. DZDN = LAYER THICKNESS FOR DIFFERENTIAL EQ SOLN TO GAS DIFF EQS(m) (column 7)
 - b. DTG = TIME INTERVAL FOR GAS DIFF EQS (h) (column 8)
12. MUSI is removed. It was a variation of MUSLE that allowed user input to MUSLE
 - a. BUS in APEXCONT.DAT is now removed
13. Input: two new inputs added to *.sub file in line 5
 - a. SAT1 = SATURATED CONDUCTIVITY(GREEN & AMPT) ADJUSTMENT FACTOR(.01_10.) (Column 11)
 - b. FPS1 = FLOODPLAIN SATURATED CONDUCTIVITY ADJUSTMENT FACTOR(.0001_10.) (column 12)
14. Tables: header lines are added to FERT.DAT and PEST.DAT