

Corrections to NSERL Report #10 – Hillslope Profile and Watershed Model Documentation

Updated January 7, 2009

The following are corrections and clarifications to NSERL report #10.

1. Chapter 2, Page 2.2 – Above equation 2.1.5, “represent the daily precipitation amounts” *for wet days only* “for each month.” (Otherwise, it’s zero.) Also, it might be mentioned that if the precipitation r comes out to be <0.01 inch (or negative), it’s set to 0.01 inch (according to the CLIGEN code).
2. Chapter 2, Page 2.2 – About Equation 2.1.5 – an error in the equation itself, and some background information on the equation:

- a. To match Nicks’ published equation and the CLIGEN code, Equation 2.1.5 should read:

$$1. \quad x = \frac{6}{g} \left\{ \left[\frac{g}{2} \left(\frac{X - u}{s} \right) + 1 \right]^{\frac{1}{3}} - 1 \right\} + \frac{g}{6}$$

- b. Equation 2.1.5 comes from Fiering (1967), according to Nicks (1974), who adapted its use to rainfall instead of streamflow. This equation has been noted by at least two authors to be valid within a restricted range of skewness (-0.5 to 0.5 or -1.0 to 1.0).
3. Chapter 2, Page 2.3 – Below equation 2.1.9, it might more accurately say " N_k is the number of storms with time to peaks less than or equal to the interval" (instead of "peaks in the interval").
 4. Chapter 2, Page 2.20 –
 - a. The Nicks reference should read:
 - i. Nicks, A. D. 1985. Climate data generation. Proceedings of the Natural Resources Modeling Symposium. Pingree Park, Colorado, October 16-21, 1983. USDA-ASA ARS-30. pp. 297-300.
 - b. The other two references referred to are:
 - i. Fiering, Myron B. 1967. Streamflow Synthesis. Harvard University Press, Cambridge, Mass.
 - ii. Nicks, A. D. 1974. Stochastic generation of the occurrence, pattern, and location of maximum amount of daily rainfall. Proceedings of the Symposium on Statistical Hydrology Held at Tucson, Arizona, August 31 – September 2, 1971. USDA-ARS Miscellaneous Publication 1275. pp. 154-171.

5. Chapter 3, Page 3.2 - Shortly before equation 3.3.4, the units of *efthco* should be

6. $L \cdot \text{min}^{-1} \cdot ^\circ\text{C}^{-1}$ (not $L \cdot \text{min}^{-1} \cdot ^\circ\text{C}^{-1}$).
7. Chapter 4, Page 4.5 – Below equation 4.4.7, “at time t_i ” should read “at time t_1 ”.
8. Chapter 7, Page 7.4 -- the “fraction of soil surface disturbed by the tillage implement” in the table is listed as 0.1 for “plow, moldboard, 8” ” (Which would only be 10%). In the WEPP database, it is 100% for the 8” moldboard plow, the value in table 7.5.1 should be 1.
9. Chapter 7, Page 7.5, equation 7.7.2 uses a variable CEC_r and says it is the ratio of the CEC_c to clay content (0-1). This is incorrect, as CEC_r is the ratio of the CEC_c to percent clay. The equation in the code uses the ratio of CEC_c to (100* clay content).
10. Chapter 7, Page 7.6, equation 7.7.4 uses same variable CEC_r as discussed in note above. Again, CEC_r is the ratio of CEC_c to percent clay.
11. Chapter 7, Page 7.37, equation 7.10.8 has an exponential raised to the power of $(-\rho_c \cdot \text{daydis})$ where ρ_c has been defined earlier in the chapter to be the consolidated bulk density of the soil in kg/m^3 and daydis is the cumulative days since disturbance. This is incorrect. The actual exponent in the model code is $(-b\text{consd} \cdot \text{daydis})$ where $b\text{consd}$ is the consolidation decay coefficient in units of day^{-1} , and it is set to a constant value of 0.02 in subroutine SCON.FOR.
12. Chapter 7, Page 7.37, equation 7.10.10, the exponent is incorrect (missing a negative sign). Change “ $4\sin\Omega$ ” to “ $-4\sin\Omega$ ”.
13. Chapter 7, Page 7.41, equation 7.11.9 has same exponent as described in note above. Again, this is incorrect. The actual exponent in the model code is $(-b\text{consd} \cdot \text{daydis})$ where $b\text{consd}$ is the consolidation decay coefficient in units of day^{-1} , and it is set to a constant value of 0.02.
14. Chapter 7, Page 7.42, equation 7.11.14 has same exponent as described in notes above. Again this is incorrect. The actual exponent in the model code is $(-b\text{consd} \cdot \text{daydis})$ where $b\text{consd}$ is the consolidation decay coefficient in units of day^{-1} , and it is set to a constant value of 0.02.
15. Chapter 7, Page 7.43, second paragraph, change “given in Table 7.10.3” to “given in Table 7.10.4”.
16. Chapter 8, Page 8.2, Equation 8.2.3 the “0.65” is a specific parameter value for corn and other crops, but not all crops; the more general parameter is the radiation extinction coefficient, $EXTNCT$.
17. Chapter 8, Page 8.9 -- On Table 8.2.1, the units of $CRIT$ (growing degree days) should be $^\circ\text{C}\cdot\text{days}$, not just $^\circ\text{C}$.
18. Chapter 9, Page 9.1 - Equation 9.2.4 should have a negative sign in the exponent.
19. Chapter 9, Pages 9.12-9.13 – The equations in section 9.6 should be numbered 9.6.1 through 9.6.7 rather than 9.7.1 through 9.7.7.
20. Chapter 11, Page 11.6, Section 11.3.5, first paragraph, last sentence, change to “Equation [11.3.13] is solved using a Runge-Kutta numerical method.”
21. Chapter 11, Page 11.6, last sentence, change “Eq. [11.3.17]” to “Eq. [11.3.14]”.

22. Appendix , Page A.1 – model status information is out of date. As of January 2009, the most recent model version was v2008.907. The area code for the contact phone numbers should be changed from (317) to (765). The Web site for the soil erosion laboratory is “<http://topsoil.nserl.purdue.edu>” and the direct link to the WEPP model page is “<http://topsoil.nserl.purdue.edu/nserlweb/weppmain>”.