HLWYM HEmails

From: Stuart Stothoff
Sent: Sunday, April 29, 2007 9:02 PM
To: Randall Fedors
Cc: Eugene Peters; James Winterle
Subject: itym runon

Randy

I'm tracking down the basis for the runon formula in ITYM as we discussed some time back. The formula coded in ITYM is indeed equation 3-8 in the hydrology updates to 5.0.1. Eq. 3-8 does not provide units for havi or Ei. I missed catching that omission in my technical review.

Equation 3-8 is

Ei = 4.097 + 0.3 Ari - 0.0104 havi

where

Ei is excess precipitation due to runon
Ari is (sum_upslope A)/Ai
havi is (sum_upslope A h)/(sum_upslope A)

In August 2005 I had Woolhiser send me a spreadsheet with the analysis, which I finally looked at today (it was a quattro file so it took a little doing). The spreadsheet only has columns for contributing plane, slope, area [m], soil depth [unlabeled, except for one in mm], available storage [unlabeled], and excess infil [unlabeled, except one in mm]. The spreadsheet does not include runon or runoff. I calculated Ari and havi in the spreadsheet for the downslope planes. Based on this spreadsheet, I presume that eq. 3-8 has Ei and havi in mm, with Ari dimensionless. The coefficients for 3-8 are consistent with this interpretation, since maximum Ari is about 27 and havi is typically in the hundreds from the spreadsheet.

There appear to be some issues to resolve with the formula.

- The cdepdem.dat file seems to be in m rather than mm
- Many of the plane elements in the spreadsheet had negative excess infiltration, which doesn't make sense to me
- It would probably be more general to cast the equation in terms of upslope storage capacity rather than upslope soil depth
- It's not clear that excess infiltration is the relevant quantity: since Breath accounts for runoff, runon alone may be more relevant

I'd also like to look at the derivation for the equation to check how E takes into account the numerous individual storms contributing to MAP but not to runon/runoff.

If the formula is for havi in mm, and cdepdem.dat is in m

- All of the ITYM runs to date overestimate Ei in equation 3-8
- The draft appendix for UZFLOW is inconsistent

I think that cdepdem.dat is most logically defined in m, just so we don't mix units from m to mm. The simple correction, assuming that eq. 3-8 continues to describe excess precipitation in ITYM, is to change the coefficient for havi to -10.4 in ITYM and the UZFLOW appendix, and rerun the simulations for the million-year report. I suggest that this step be done in order to get the UZFLOW chapter finished on Monday. Note that I am on travel the rest of the week.

I also think that we should take a second look at the derivation for the ITYM documentation report ASAP, since it would be nice to update ITYM for the million-year report as well. Randy, is the actual derivation in any of your scientific notebooks or elsewhere? If so, could you point out where I can get it?

stu

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