HLWYM HEmails

From: Keith Compton
Sent: Tuesday, March 21, 2006 7:08 PM
To: Donald Hooper; Roland Benke; Brittain Hill
Subject: Tephra Dilution Factor

Roland, Don:

I currently have a slide in which I show the equation for tephra dilution as

d= V_ash/(V_sediment+V_ash)

= 1/(1+(Y_sediment/Y_ash)((A_basin/a_ash)-1))

I have an idea... If I define RSY (relative sediment yield) as Y_ash/Y_sediment and f (fraction of catchment basin covered by tephra) as a_ash/A_basin, I believe that I obtain the following simplification:

d = 1/(1+ (1-f)/(Rf))

= Rf/(Rf+(1-f))

This is in some ways a simpler expression and helps to explain the impact of relative sediment yield on dilution (i.e., the lower the RSY, the more dilution). The expression yields (if my quick math was not mistaken) the following relationships:
Dilution Factors:

	f								
RSY	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	0%	0%	0%	0%	0%	0%	0%	0%	0%
1	10%	20%	30%	40%	50%	60%	70%	80%	90%
2	18%	33%	46%	57%	67%	75%	82%	89%	95%
3	25%	43%	56%	67%	75%	82%	88%	92%	96%
4	31%	50%	63%	73%	80%	86%	90%	94%	97%
5	36%	56%	68%	77%	83%	88%	92%	95%	98%

If my math is right, I may supplement my slides with this formulation to help me explain the impact of RSY on dilution. I could also recast depletion times in terms of RSY and show a 1/R dependence. This would help me to emphasize the fast that a relatively low level of accelerated erosion would limit the dilution effect; that one would expect large dilution only if one expected extremely low erosion rates or very small fractions of the basin covered by tephra; and that the RSY has impacts in both directions (i.e., dilution and depletion affect risk in opposite directions). Just a thought...

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Recipients:
"Donald Hooper" <dhooper@cnwra.swri.edu>
Tracking Status: None
"Roland Benke" <rbenke@cnwra.swri.edu>
Tracking Status: None
"Brittain Hill" <Brittain.Hill@nrc.gov>
Tracking Status: None

Post Office:

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