HLWYM HEmails

From: Brittain Hill [bhill@cnwra.swri.edu]
Sent: Wednesday, August 18, 2004 6:10 PM
To: Christopher Grossman
Cc: Lane Howard; MASMITH@cnwra.swri.edu; Osvaldo Pensado; Oleg Povetko; Patrick Laplante; Roland Benke; Ronald Janetzke; RNES@cnwra.swri.edu; Bret Leslie; David Esh; Keith Compton; Richard Codell; Robert Lukes; Robert Johnson (NMSS); Sitakanta Mohanty; Andy Campbell; John Trapp; Timothy McCartin
Subject: Re: TSPAI KTI Meeting
Attachments: Suzuki6b_compare.jpg

As background for tomorrow's discussions, I'd like to present a few points for consideration:

1) There are two main concerns with ASHPLUME. One is that the relationships used to calculate vent diameter and eruption velocity (eqs 4-2 to 4-6 in Jarzemba et al., 1997) do not appear to give realistic velocities or diameters. This was detailed in Dick's section in the RARI report. A second concern, however, is that the original Suzuki (1983) model may not be conserving mass for different eruption conditions.

2) Attached is a figure I've made from Suzuki's original figure 6b. This figure shows that mass is not conserved when the parameter 'beta' is varied. In these examples, all eruption parameters (mass, velocity, column height, grain size etc.) are kept constant and beta varies from 0.02 (black lines) to 0.5 (red lines).
You can see that for any given elipse (which represents an area of equal mass deposited, e.g., 200 g/cm2), the area of the elipse is significantly greater for the high beta (0.5) relative to the low beta (0.02). Low beta, though, has a 500 g/cm2 area that is absent from the high beta run.
When you calculate the areas of each elipse and sum for total mass, the realization with beta = 0.5 has ~20% more mass than for beta = 0.02. In addition, Suzuki (1983) had an error that resulted in greater mass loss for higher values of beta (which was corrected by Jarzemba). My suspicion is that the root problem lies in the diffusion function P(z) (equation 7 of Suzuki, 2-2 in Jarzemba).

3) We have been developing a parallelized version of ASHPLUME to use for the tephra remobilization calculations. In the process of debugging the new code, we compared results with original runs using ASHPLUME in 1997. When the mass was summed over the realization grid, we kept getting unstable total mass (to +/- 2x input mass!) when we varied some parameters such as beta or average grain size. After verifying that the code was numerically correct, we began exploring an alternative model (called TEPHRA, by Connor and Bonadonna,
unpub.) that substituted the offending P(z) diffusion function with a simple linear mass diffusion function.
This new function, which eliminates the need to calculate an eruption velocity or vent radius, appears stable and accurately reproduces the 1995 Cerro Negro deposits even better than old ASHPLUME.

4) For TPA 5.0.1, we are working on an improved basis for modeling the redistribution of potential tephra fall deposits. Using TEPHRA, we sample eruption conditions (as in ASHPLUME) and use a realistic wind field to calculate the mass of ash+HLW deposited at (i) the RMEI location, (ii) in the fluvial redistribution basin, and (iii) in the eolian redistribution basin. We develop a 1024-line look-up table by stochastically sampling the range of eruption and source-term conditions, along with the wind field. The point is that we do not need ASHPLUME to evaluate dose with the realistic model.

5) Since DOE is using the same ASHPLUME model as we are, we may need to keep the current version of ASHPLUME intact in order to do part of our LA review. We can, however, force the TEPHRA code into an ASHPLUME mode by feeding it a simple windfield that is fixed towards the RMEI location. This provides a measure of risk significance for the possible errors in ASHPLUME/Suzuki, versus an alternative model that appears more realistic (TEPHRA).

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Christopher Grossman wrote:

> Item Type: Appointment
> Start Date: 08/19/2004 10:00 am (Thursday)
> Duration: 1 Hour, 30 Mins
> Place: T-8 A1
>
> VTC established with CNWRA.
> Teleconferencing Bridge line was not established. If needed, please advise me.
>
> Agenda:
> 1. TSPA-FEIS/GoldSim - Pensado/Compton (30 minutes)
> a. Basic model architecture
> 2. TPA - ASHPLUME Errors Discussion - Codell (60 minutes)
> a. Summary of issue(s)
> b. Proposed path forward
>
> If you have any handouts for your discussion, please distribute electronically prior to meeting - Thanks.

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Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 1186

Mail Envelope Properties (4123D3BE.6CB9AFB2)

Subject: Re: TSPAI KTI Meeting
Sent Date: 8/18/2004 6:10:06 PM
Received Date: 8/18/2004 6:10:55 PM
From: Brittain Hill

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Suzuki6b_compare.jpg	235021	

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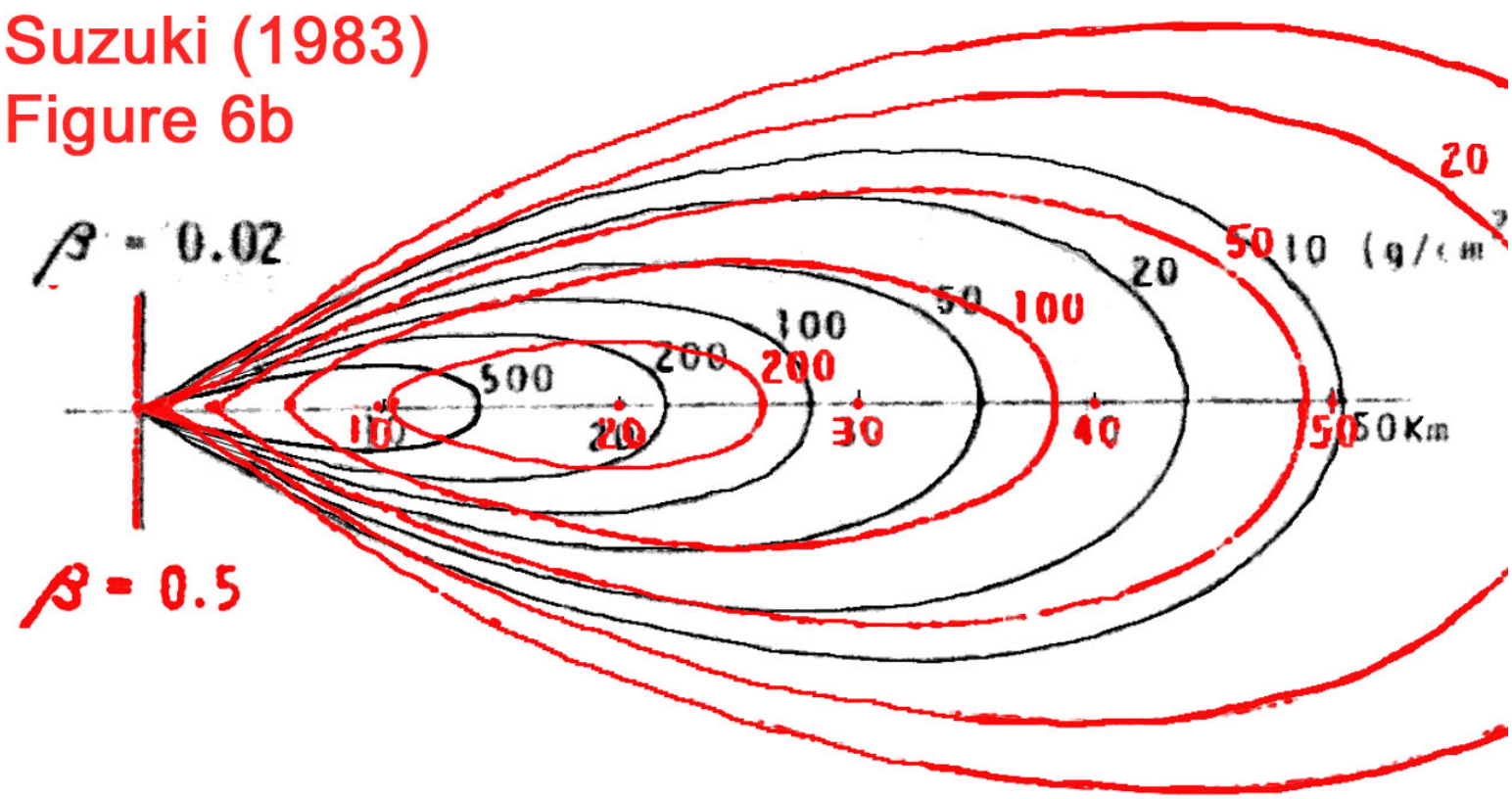
Suzuki (1983)
Figure 6b
β = 0.02
β = 0.5
20
50
10 (g/cm²)
20
50
100
100
200
200
500
10
20
30
40
50
50Km