HLWYM HEmails

From: James Winterle
Sent: Friday, April 06, 2007 10:49 AM
To: John Stamatkos
Cc: Donald Hooper; 'Roland Benke'; Sitakanta Mohanty
Subject: RE: treatment of wind speed in ashplume.f

John:

I talked to Bret about this. He seems to agree that this should not become a big resource sink, given that this abstraction is more or less superceded by the ashremob model. He is going to talk with Brit to see if they can provide some assistance with the chapter revision from the NRC end. He also mentioned that if the explanation of the wind direction in this chapter is at least as good as what was in the TPA version 4.0 user guide, they might be able to live with that. He is
supposed to get back with me on Monday with a proposed path forward.

--Jim

-----Original Message-----
From: John Stamatakos [mailto:jstam@cnwra.swri.edu]
Sent: Thursday, April 05, 2007 5:20 PM
To: James Winterle
Cc: 'Don Hooper'; 'Roland Benke'
Subject: FW: treatment of wind speed in ashplume.f

Jim,

Per our discussion, here is the email that dicusses the isseus with
Ashplumo

John

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-----Original Message-----
From: Don Hooper [mailto:dhooper@cnwra.swri.edu]
Sent: Wednesday, April 04, 2007 10:18 PM
To: jstam@cnwra.swri.edu
Cc: rbenke@cnwra.swri.edu
Subject: treatment of wind speed in ashplume.f

John,

RE: treatment of wind speed in ashplume.f

Ashplume.f (program name: ASHPLUME and part of the ASHPLUMO module) contains subroutines for wind direction (winddirect) and wind speed (windspeed). The original formulations are still in the ashplume.f code and are based on a Monte Carlo approach for sampling the wind field, as described in Jarzemba, et al. (1997) and Jarzemba (1997). With the acquisition of actual upper atmosphere data from the Desert Rock airstrip near Mercury, Nevada, a new value for wind speed was inserted into the tpa.inp input file. The original (TPA 4.0) Jarzemba exponential input value for windspeed was changed to a lognormal distribution, and then the lognormal distribution was updated again in 2006. The Jarzemba model also uses a stochastic approach for wind direction, but this is less critical as the wind direction is fixed to the south for high-level waste calculations. A verification is needed to see if this lognormal distribution is what the ashplume.f code expects and if the code properly (mathematically and conceptually) handles this value. We believe the current value for wind speed in the tpa.inp file is correct, but this should also be verified.

Although validation exercises have been run, a validation exercise to examine this specific problem (i.e., wind speed) does not appear to have been conducted in the past. The original Jarzemba code is not commented out, but there is a question as to whether this older code is still appropriate for the new lognormal distribution. Or stated another way, whether this revised input value for wind speed is appropriate based on the original Jarzemba code and its incorporation of binning (Monte Carlo) for wind speed and wind direction.

The key formulation in the entire ashplume.f code is a complex double integral from the original Suzuki (1983) paper. This integral, and the parameter sensitivities that are associated with it, make this a challenging exercise for tracking movement of parameter values throughout the code. The subroutine calls are difficult to follow and even appear to be called more than once per model run. Wind direction is complicated by the binning approach used by Jarzemba and how ash distribution changes (along x and y
axes) with increasing distance from the volcano (one direction is perpendicular). Recent offline calculations by Roland Benke have demonstrated the difficulty in conducting sensitivity analyses for this code and in tracking the wind speed value.

I'm pleased that we may have identified a problem and can improve the overall TPA code, but this will require some work. Since the code is in FORTRAN, what is now needed is someone who can spend 20 to 40 hours to thoroughly go through the ashplume.f code and find, document, and explain how the wind speed value is used and "moved" through the code with its complicated subroutine calls and ambiguous input/output documentation. Ashplume.f can be run independently and basic debugging techniques (e.g., print statements) could be employed to aid the analysis. It is possible that some code may need to be commented out, meaning a SCR may be in order (and requiring more hours and validation).

Finally, it is possible that I'm leaving out some part of this discussion, but this is my current understanding of the problem.

-Don Hooper

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From: James Winterle

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