CIDER Volcano Event Tree Read me

Chuck Connor

June 11, 2019

For the event tree workshop we will use material available on:

<http://gscommunitycodes.usf.edu/gs/public/welcome/CIDER.html>

please check out this link in advance, if you have time!

During our workshop we will break into groups of 6-8 people and each group will work on one of the following problems of your choice, or develop a similar problem of your own!

1. Consider the event tree for tephra fallout (Tephra Event Tree link).
2. How can this tree be improved (how can the nodes be changed?) specifically for explosive eruptions of Volcan de Colima (Mexico).
3. Consider estimating transition probabilities for a tree using data available on the Smithsonian GVP webpage for Volcan de Colima. If you wish, everyone in the group estimate the transition probability for VEI, given that an eruption occurs. Compare your probabilities and figure a means of accounting for the differences (this is expert elicitation!).
4. Use the Tephra2 probability tool to estimate magnitude of tephra fallout for a nearby city (say, Cuidad Guzman, Longitude: -103.46, Latitude: 17.70). Estimate the probability of tephra mass loading exceeding some threshold (e.g., 10 kg/m2)
5. Consider the sensitivity of your tree and probabilities to your assumptions.
6. Consider a lava flow hazard model (Lava Logic Tree link) for the Flagstaff area (San Francisco volcanic field, SFVF).
	1. What would an event tree look like for evaluating potential scenarios following a shallow earthquake swarm somewhere in the SFVF (say around 450,000 E and 3905000 N)?
	2. Given sparse experience with shallow seismic swarms in the region, what data could be brought to bear for evaluating transition probabilities on your tree?
	3. How might lava flow models be used to test scenarios (consider using MOLASSES or another tool).
7. Consider a Cascades volcano, like Lassen (see Lassen event tree) or another volcanic system of your choice. A major challenge is to figure how the academic community can contribute to developing and evaluating an event tree for potential eruption, before or during unrest.
	1. Develop an eruption event tree, logic tree, and/or Bayesian network for at least some potential scenarios (it is hard to be exhaustive!)
	2. How do previous studies help identify “hidden nodes” in Bayesian networks?
	3. How can previous data (e.g., stratigraphy, crystal clocks, geophysical anomalies) be used to inform transition probabilities on specific nodes of the tree? (see Bayes’ rule link).
	4. How might your tree help prioritize investigations prior to unrest?

Rules of the Road

1. The main point is to actually draft an event tree, logic tree, or Bayesian network. Poster paper is provided to help with this step! The exercise will be successful if you make progress on this draft event model as a group. Consider advantages and shortcomings of the approach. It is interesting to see where folks disagree and how to account for the range of models!
2. Some simple modeling tools are available on the website to use as you which. Please don’t run thousands of models (a probabilistic assessment!) as our AWS site is a single server and probably can’t take it!
3. Consider calculating some probabilities using your tree and tools like excel, matlab, or modify the javascript provided.
4. If all goes well we will have time at the end to discuss our trees.