

Topic 1: Modeling

SFU: (JVGR 1992)

1. Were different chamber top shapes used other than flat, i.e. convex, concave, convoluted / ridged? What is the sensitivity of your models to this? Also, was there any thought given to monitoring sound or vibration generated by the analogue system? (**Terry, SFU**)

Buffalo

2. Can you discuss the cumulative effect of assumptions on your error budget as well as scaling issues between your models and the real world (ex: foam collapse time vs. fire fountain duration; container size vs. magma chamber size)

ASU

3. Has anyone tried running this type of experiment with a multi-chambered set up where a foam could form in multiple areas at different levels in the subsurface? Just theoretically speaking, how do we think this could change or effect predicting the *frequency* of foam collapse events, and therefore fire fountaining, bubble bursting, and/or gas pistoning episodes?
 - a. What parameters could we vary in the experimental set up to test this? Gas flux? Chamber dimensions? Pressures at various levels?

SFU/UBC

4. I was wondering about the different viscosity oils used for the laboratory experiments and the possible eruption types (see slides 6&7 of the Laboratory experiments section). "A laboratory volcano (4)" seems to imply that effusive activity to plinian columns may be a continuum with higher gas fluxes being responsible for the changes in eruption style. If this is true, why use different viscosity oils in the lab experiments? Can all eruption types be replicated in the lab volcano (with all oils)?

Topic 2: Foam

Buffalo

1. How large an area / volume of foam would be needed to sustain fire fountaining for weeks? How long do fire fountains typically last? Also, is there generation of foam as the event occurs, or does all or most of the foam have to be generated prior to the event? Is there a gas contribution from magma chamber decompression during and after foam collapse?

ASU

2. How are the researchers able to estimate the combined effects of magma movement, magma viscosity, bubble movement, bubble expansion (or lack of), and bubble coalescence (or lack of) to explain how pressure equilibration does not occur in the bubbles while they ascend through the conduit?

Buffalo

3. Can you have a collapsing foam cascade where a deeper magma chamber event (CO₂-rich foam collapse) triggers a shallower magma chamber H₂O-rich foam collapse?

Topic 3: Chamber and Eruptive Mechanism Questions

McGill

1. Could you please elaborate on the physical process behind the oscillations of the big bubbles and what causes their eventual bursting?

Buffalo

2. What do we know about the sizes and shapes of magma chambers at strombolian / hawaiian volcanoes?

UBC

3. We don't often see plinian eruptions with basaltic composition magma, do these eruptions require abnormally high gas fluxes? Are these fluxes reasonable to assume? Or is there an implied viscosity difference that makes these eruptions possible? (Heather, UBC)

McGill

4. Is there evidence for material coming from the conduit rather than the reservoir especially for sustained subplinian eruptions and what are the implications for your model?

MTU

5. In the case of Volcán de Fuego, a basaltic stratovolcano in Guatemala, there has been an alternation in activity during the historical period. Around 7 eruptions since 1524 have been classified as VEI = 4 (e. g. in 1932 and 1974), but in between there are extended periods of time (e. g. 1999 to the present) when the volcano is in a persistent state of low level activity, with a few small eruptions per day (single explosions producing thermals that rise 10's to 100's of meters). About once or twice a year since 1999, the activity increases and produces a regular size strombolian eruption (e. g. last week), which sometimes triggers the evacuation of the surrounding villages. Could this alternation be explained mainly by gas accumulation and release, rather than new magma input from depth? If so, is there any way to estimate or constrain the potential size and intensity of a developing eruption, let's say, that starts as a strombolian event but could end up in a subplinian or even plinian event (e. g. the last week crisis)?

UBC

6. Figure 3 (Bull Volc 2006) is full of information! Can you give any more details regarding the different 'decompression periods'? More specifically, why is there a very short decompression period right after the TT (trigger thermal) and why is the D4 very large? What does this imply in terms of process? Lastly, since you

mentioned that Etna and Masaya are also basaltic subplinian in terms of eruption dynamics- how would your figure "gas velocity vs time" plot as a comparative study between all 3 volcanoes?(**Rebecca Ellen, UBC**)

McGill

7. Are large bubbles also formed in more viscous intermediate and silicic composition subplinian eruptions?

Topic 4: Questions specific to the Shishaldin Eruption

ASU

1. In the Bulletin of Volcanology paper about acoustic measurements at Shishaldin, the equations for acoustic power indicate that acoustic power is proportional to the distance (r) between the vent and the microphone suggesting that acoustic power is amplified with distance from source. However, I would expect the acoustic power and pressure to attenuate with distance from the source. Please explain why acoustic power is proportional and not inversely proportional to the distance from the source.

MTU

2. In the case of the Shishaldin 1999 eruption there seems that the Subplinian event was triggered (and preceded ~26 min. before) by the rise of a large over pressurized bubble. Could this be a general mechanism to shift from less intense to more intense (e. g. Subplinian of even Plinian) activity at basaltic volcanoes? It was also possible to recognize in hindsight when this bubble started to move upwards, would it be possible to recognize such an event in real time and predict the onset of more intense activity during a crisis?

ASU

3. In the Bulletin of Volcanology paper about acoustic measurements at Shishaldin, gas velocities are estimated. Do gas velocities=plume velocities? In other words, do the gas velocities represent the gas-particle mixture velocities of the plume?

MTU

4. It seems that at Shishaldin volcano, the transition between the “pre-Subplinian”, the Subplinian and then the Strombolian activity involved mainly changes in the gas flux from the chamber to the conduit and from there to the surface. What is the magma flux associated with this eruption? What is the ratio of gas to magma (in mass) being erupted? What is the relative velocity at which the gas is moving with respect to the magma? Is it mainly gas flow through a magma filled conduit, due to a high mobility in a low viscosity magma? And if so, how would this situation change with increasing viscosity? Could you explain more about the “foam collapse” process?

Extra Questions:

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Terminology Discussion:

Could you please explain how you define/use the terms - gas flux, gas volume, hum event, temperature event – in your models.

UNAM Questions

Theme: Weather conditions- sensor reception

From: Vergnolle et al, 2004

- What is the normal effect of the humidity in the propagation of the acoustic wave? Exists any correction factor that we could use for the data interpretation? Is this method (acoustic measurement) enough valid for tropical or had-weather conditions volcanoes? (**Víctor**)

Theme: Explosive Volcanism

From: Vergnolle et al, 2004

- How could we correlate the acoustic waves and the seismic signal of a big explosion –plinian explosion- and how close are both? Exists any work about acoustic waves produced by pyroclastic flows? If yes, how does it like? (**Víctor**)

Theme: Volcanic structure

From: Vergnolle et al, 2004

- Could you clarify the effect of the volcano conduit geometry on wave propagation and specially on the data interpretation? (**Natalia**)

Theme: Signal reception

From: Vergnolle et al, 2004

- The Vulcanian activity is associated to destruction of domes. In this kind of activity, what is the possibility of the acoustic measurement to be altered and therefore the plume height/ acoustic measurement ratio? (**Hugo Murcia**)

Other Questions

Alejandro

What other data besides the acoustic recordings is necessary to calculate the velocity and high of the column

Some interference like the wind seems not to be relevant, but sometimes during eruptions thunders are produced, and other kind of interference may be found, is there a way to distinguish between the interference and the sounds produced by the eruption.

How far the microphones should be located from the volcano to consider a reliable evidence to calculate high, gas velocity, etc.

Does the fact of not having a calibration devise in Alaska for the equipment makes all this recordings reliable.

Seismic signs during the ascension of the bubbles are not clear because of the tremor and other signs registered, is there any other way to register the movement of the ascension of the bubbles.

Judith

With the measurements of pressure, temperature, gas, etc. can you construct an analogic model by other volcano? (By predict time and style of the eruption)

Is it possible to detect or modeling a bubble with a geophysical survey over the volcano, by know depth and size of the bubble(s)? (i.e. gravimetry)