Michigan Tech

1. *Monitoring and Hazard Prediction*:
What are some good low tech / low cost options for monitoring dome growth with the purpose of predicting dome collapse? (Julie)

2. *Seismicity and Dome Growth*:
Exogenous dome growth seems to produce more shallow seismic activity due to shear fracture zones. Are there seismic signals associated with endogenous dome growth? If so, what are the similarities or differences between the two and what are they able to tell us? (Hans L)

3. *Gas Diffusion:* (Voight and Elsworth, Sparks)
How does gas diffusion occur through the dome (as mentioned in the Voight and Elsworth paper), as a dissolved phase diffusion or as interconnected bubbles/cracks network? Would this imply diffuse degassing throughout the dome Has this been observed? Sparks mentions that in some cases this is not the case. (Rudiger)

University of Colima

1. *Seismicity:* (Slide 16)
What is the mechanism of the aseismic plug flow? How is it aseismic?

2. *Flow Banding:* (Slide 12)
Hugh has previously talked about the smearing out of the ash-filled cracks as being one possible origin for flow banding. If the flow is laminar at this stage, and the fractures are occurring only at the margins, how does the ashy material and therefore the flow-banding get distributed throughout the whole flow?

3. *Magma movement*:
Within the upper conduit region the walls often consists of loose, deformable and permeable material. What difference does this make to the physics of the magma flow when compared to the idealised non-deforming conduit?

McGill University

1. *Dome growth* (see Sparks 1997)
   Does lava dome shrinkage due to magma withdrawal occur at any volcanoes other than Lascar? Should magma withdrawal be viewed as a common or extremely rare phenomenon?

2. *Shallow conduit processes* (Sparks and Neuberg et al.)
   Some volcanoes show evidence for an additional gas flux in the shallow conduit system, for instance from recharge in the magma chamber. What would be the effect of such an additional gas flux on the models described by Sparks and Neuberg et al.; would you expect a dome to be more or less prone to collapse?

University at Buffalo

1. *Seismicity* (Neuberg et al 2006)
   Based on the brittle failure due to viscosity of the magma and the location of conduit resonance, is there a way to determine the composition of the magma from seismic signals? (Erik)

2. *Rainfall and dome collapses* (slide 36)
   How does rainwater in dome fissures suppress degassing? Isn't the water at atmospheric pressure? Wouldn't the gas just seep into the water and bubble out of it? If the wall rock is above 100C so that water is turning to steam rather than ponding, doesn't the steam just escape the same way the water seeped in? (Marc)

3. *Glass transition* (Slide 9.)
   Do the arrows labeled "added water" and "added silica" show the direction the glass transition boundary moves in, or does it show the direction in which the system goes? What do the big yellow arrows represent? (Marc)

4. *(back-up question) glass transition/conduit conditions/auto-brecciation*
   While not mentioned in the presentation, the phenomenon of auto-brecciation (the complete and rapid disintegration of hot dome rocks when struck) of dome blocks has been observed at lava domes. This has sometimes been attributed to high internal gas pressures of the rocks. Does this relate to what goes on in the glass transition zone?
   (Sarah and Leila)

SFU

1. *Seismic waveforms* (Fig. 3, Neuberg 2006 – *slide 32*)
   Please describe how the waveform families are defined. Are these families specific (distinct) to each volcano, or is there a representative form common to all volcanoes. (*Guillaume & Terry*)

2. *Fracture/faulting orientation* (Fig. 4, Neuberg 2006 – *slide11, 12 & 13*)
   Is there a preferential orientation to the shear fracturing and faulting within the conduit? In the magma or the country rock or both? (Nathalie)

3. *Pressurisation* (Neuberg)
   Can you clarify on the causes of pressurization in your model? If the pressurisation is gas driven, where is that gas coming from – from the fracturing melt or is it streaming from depth as a separate gas phase? Is the low period EQ resonance caused by the magma or the gas? (*Nathalie*)

Extra***:*** *Safety Factor vs failure plane and pressurization* (*Fig 2 & 3 Voight 2000 – slide 31*)

Please clarify the details of these figures. Specifically the shape of the various curves and how they relate to the stability of the dome, i.e., the safety factor (*Guillaume*)

UNAM

1. *Tornillos and Low-frequency earthquakes*

   At Galeras Volcano, the low-frequency earthquakes were named "tornillos" by their similarity with these objects. What is the difference between the "tornillos" events in the Galeras volcano and the low-frequency earthquakes in other volcanoes as predecessors to similar eruptions? Why are the signals different?

   (*Hugo Murcia)*

2. *Experimental work-modeling magma brittle failure*

In Neuberg et al., (2006) paper it is recommended to work on glass with vesicles and crystals to determine conditions under which gas-charged magma will fracture. What do those experiments consist of? *(Natalia)*

3. *Endogenous vs. exogenous lava-domes (Slide 7).*

Could you please discuss the subtleties between endogenous and exogenous growth and how they relate to dome stability? Specifically, what is the role of fracturing in the different dome styles? How can we recognize the seismic signal of endogenous and exogenous domes? Is there any textural variation among lava-dome types and a transition between them in the field?

(Rudiger-MIT and Victor-UNAM)

If there is time….

4. *tilt cycles* (In Neuberg et al., (2006) paper)

Could you explain what is the correlation between seismic swarms and tilt cycles? *(Fabiola)*

UBC

1. *Dome Geometry* (Voight/Elsworth Paper; Figure 1)

   Have analogue models been made to test lava dome collapse geometry? If so, what are the benefits of having an analogue model to back up the numerical/theoretical modeling techniques? What would an analogue model look like in this case- material etc? Could you test the actual 'trigger mechanism' and induce the low-frequency earthquakes?

2. *Field evidence for brittle failure in magma* (Neuberg et al paper)

When looking at the Icelandic field evidence, (Tuffen et al 2003) says that the 'seismic energy released during formation of such fractures is consistent with recorded low-frequency earthquakes.' Can you measure the amount of seismic energy that was used to form the fractures? Are estimations made? Can you explain what you see in the field a bit more?

3. Field Relationships (Voight and Elsworth)

Would it be possible to determine from field relationships and/or textures if a B&A flow had pressurized diffusive volatiles prior to dome collapse? (As compared with B&A flows that had only volatiles trapped in vesicles) Could the pressurized diffusive volatiles contribute to the mobility of some B&A flows?

Arizona State University

1. *Lava dome failure*

When applied to lava domes, can the factor of safety fluctuate, assuming failure does not occur? In other words, can block stability increase and decrease as the extrusion rate increases and decreases, or is it impossible to "reacquire stability?"

2. *Lava dome failure*

The schematic models of endogenous domes show that the erupting lava pushes out laterally, slowly pushing the entire dome upwards and outwards; whereas, the exogenous dome erupts lava from the top.

- Does one type of growth create steeper domes and therefore have a higher chance of failure?
- Do any of the models predict one to be more unstable than the other, or is there no real correlation?
- Is there a relationship between the style of growth and the style of collapse?
- What is the role of fracturing in the different growth styles?

3. *pressurization*

Are there atmospheric pressure waves generated by the pressure oscillations within the dome at SHV?