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Thermal Infrared Remote Sensing of Volcanoes

Oregon

1. *Ramsey and Fink, Bull. of Volc. 1999*
   How does weather (other than cloud coverage), location, time of day, season, etc. affect data collection? In particular, do any of these alter the recognition of different surface morphologies/vesicularities?

SFU

2. *SFU (Terry) GRL, vol. 34:*
   What was the purpose of the end member plus quartz admixtures i.e what did the quartz contribute and is there a TIR for quartz?

UNAM

3. How is the random orientation of the vesicles and blocks on the surface of a dome minimized to have little significance in remote sensing situations? (Ana)

Colima

4. In slides 49 and 50 the apparent vesicularity at Sheveluch Volcano is seen to decrease between 12 March 2005 and 29 March 2005: does this show that lower vesicularity material cools more slowly?

ASU

4. *slide 48*
   Can FLIR or TIR be used to monitor the evolution (compaction, maybe alteration) of pyroclastic deposits (fall, flow and surge deposits) over time? Can FLIR or TIR be used to distinguish potential flow units in ignimbrites (i.e. Bandelier Tuff)?

Buffalo

5 .*In Ramsey and Fink (1999) you state:*

"High spatial and moderate spectral resolution [ASTER] data will allow monitoring of changes in dome morphology, composition and temperature...these changes may signal flow-front collapse..."

Eight years later, has ASTER data lived up to this expectation? If not, why not?

MTU

6. *Slide #47 and Slide #48* show a distinction between layers. I amassuming the different temperatures reflect water saturation within thehigher layer- is that right? If so, can we quantify the amount ofsaturation? Could we see a compositional difference regardless of watercontent?

McGill

7. *Slide 38*
   In sedimentary deposits, how can you distinguish between true vesicularity of pumiceous material and simple pore space porosity?

Colima

8. Grainsize versus emission spectra (frequencies, not intensities): If you have a green rock and you pulverise it to ash, the ash is still green. Is this an oversimplification? If so, how big an effect to reflected waves / different emission surfaces have?

Oregon

8. How do TIR measurements from weathered surfaces compare with fresh surfaces? Is the emitted signal significantly altered or muted? If so, is there a difference between lab sample measurements and remote sensing measurements

SFU

9. *GRL 07, vol 34*
   The theoretical model based on the trend of the 2 end members seems to show a good approximation, however, in nature the rock composition are composed of more than a mix of 2 end members. Are there some other studies based on more complex synthesized rock?

Buffalo

10. *In Ramsey and Fink (1999*) how did you determine vesicularity? The images of CVP and FVP appear to differ mostly in vesicle size rather than percent vesicle volume

UNAM

11 Could the method discussed in Vaughan et al. (2005) be applied to study old volcanoes, or old structures with alteration. (Nacho)

MTU

12. *Slide#57*
    How accurately can we measure or determine temperatures in a volcano conduit? In the slide we see a model for estimated lava rise but the temperature for the magma is still estimated. Since heat loss is ongoing as magma rises and extrudes/erupts, how close can we get to a real number for temperatures in the conduit?

Colima

13. Slides 57 and 58:
Can you give a bit more detail on this model. In estimating the lava position, how is L (depth) found? How do you estimate conductivity when the phreatic blasts show that some water/advective heat transfer must be involved?

ASU

13. If TIR theory is invalid for clay-sized particles, can the proportion of alteration products be estimated from how much the signal deviates from the linear spectral mixing relationship?

McGill

14. When measuring lava domes usimg TIR, is there any way to extract information about the water or microlite content out of the spectra?

UNAM

15. In slide 21, the distance to the measured lava flow is really small (5.7 m) and the other parameters probably do not significantly affect the analysis, but what happens when you increase the distance to the camera (like distal measurements of big active volcanoes)? How much is the data affected? (Victor)

SFU

16. *SFU (Terry) GRL, vol. 34:* Can the spectra shown in Fig. 2 be replicated and are they comparable or identifiable in collected samples?

ASU

17. Can ASTER be used to create an isotherm map of the top of a spreading volcanic plume?

MTU

18. Slide# 32 shows corrected and uncorrected data. I am interested in what techniques you use to correct ASTER images. Also, how do you know when you've got "good" data?

Colima

19. What are the pros and cons of the data an IR camera versus a satellite for volcano monitoring? What are the advantages/disadvantages of the 8-14 microns band versus the 2-4.5 microns band? At Colima we have found that the SWIR is more sensitive to hot gases from fumaroles.

UNAM

19. The temperature in the flow changes with time, how does this affect the spectrum registered by TIR. (Alejandro)

EXTRAS

SFU

SFU (Terry) Bulletin of Volcanology (99). What are the potential confounders for the TIR data i.e. ash, gas, age of target, ground cover/vegetation?

(GRL 07 vol34, slides 15,17,23) What is the estimated error on laboratory experiments of the emissivity of the sample?

(slide 21) What is the accuracy of the TIR (thermal infrared)? Error bar on data?

ASU

Using the Stefan-Boltzmann law and heat conduction of a particular magma composition (slide 57), are there estimated corrections to deal with post-extrusion crystallization or exsolution? Will any affect of this be overprinted by a cooling crust?

Slide 23: What other affects could account for the large temperature variance? Specifically, in Hawaii, there is a very high humidity, and it is known that water vapor attenuates radiance from lava. Furthermore, as the temperature contrast increases between the lava and surrounding atmosphere, the water vapor would take a bigger chunk our of the measured radiance, resulting in lower "brightness" (emissivity), and resulting in lower temperature readings. How do you account for the atmosphere between your cameras and the lava? Could tweaking your calibration for this for various water vapor affects change the emissivity reading of the lava to back out a more accurate temperature?