

SECOND CIRCULAR

Workshop on "Surtseyan" volcanism

Leaders: JDL White (Otago, NZ), BD Pauly (UC Davis, USA)

This workshop focuses on the well-preserved Quaternary surtseyan volcanoes Pahvant Butte and Black Point. We will consider why these volcanoes have different morphologies and variations in bedding style, and what pre-, syn-, and post-eruptive process might be responsible. Specific questions include these. What were the initial eruptive products, and how were they deposited? How did depositional processes and resulting deposits change as the edifices grew subaqueously, transitionally, and subaerially? At what point during tuff cone/ring construction did palagonitization begin? How rapidly does tuff cone/ring palagonitization proceed? What field evidence indicates timing of palagonitization? Are tuff cone/ring constructional facies related to the timing and extent of palagonitization? Side trips are intended to Tabernacle volcano, Lunar Crater, Panum Crater, and Ubehebe Craters.

Dates & Times: 2nd -9th October, 2007. Trip begins in Las Vegas 8:00 a.m. Tuesday Oct. 2, returning to Las Vegas ~5 p.m. Oct. 9.

Travel: Workshop start/finish, Las Vegas, Nevada.

Cost: \$ 975: Includes transportation, lodging for 7 nights (Oct 2-8), meals and refreshments.

Registration Deadline: September 2, 2007

Payment details: Mail US checks (postmarked by 31-Aug) to Bruce Pauly, 1330-A Galaxy Way, Concord, CA 94520

Credit Card: Contact James directly – we had a solution, but currency exchange rates are currently in flux and a new, US-based solution, may need to be arranged.

For further information: james.white@otago.ac.nz; bdpauly@ucdavis.edu





Workshop schedule:

Monday, October 1st

pre-trip

Suggested arrival in Las Vegas; organizers can meet flights at airport and drop participants at lodging of their choice

Tuesday, October 2nd

DAY 1

7:30 a.m., collect participants; 8:00, arrive Pahvant area around lunchtime. Overview of Pahvant morphology. Examine reworked volcanoclastic deposits of southern platform, and the inner wall of the cone. Reworked deposits are predominantly sideromelane, whereas palagonite is important in deposits of cone inner wall. Some features bear on the question of timing of palagonite formation and should support lively discussion.



Night at Best Western Paradise Inn, Fillmore

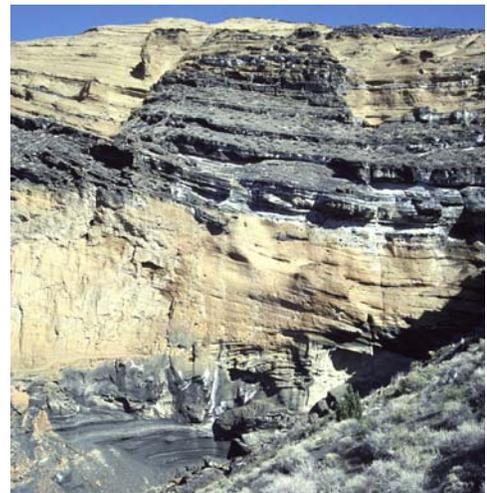
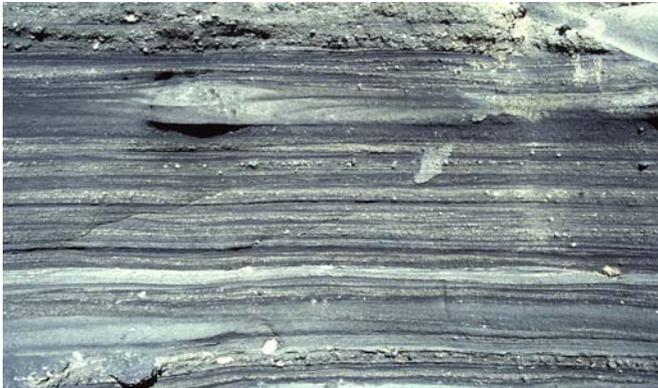




Wednesday, October 3rd

DAY 2

Full day Pahvant. Examine subaqueous cone and mound and cone deposits on western to northwestern part of volcano. Might some of the cone deposits be remnants from older volcanoes at the site? There are well-exposed sideromelane "mound" deposits with "bombs", underlying palagonitized deposits of other origins. Also present are subaqueous cone deposits, and overlying subaerial cone beds.



Night at Best Western Paradise Inn, Fillmore

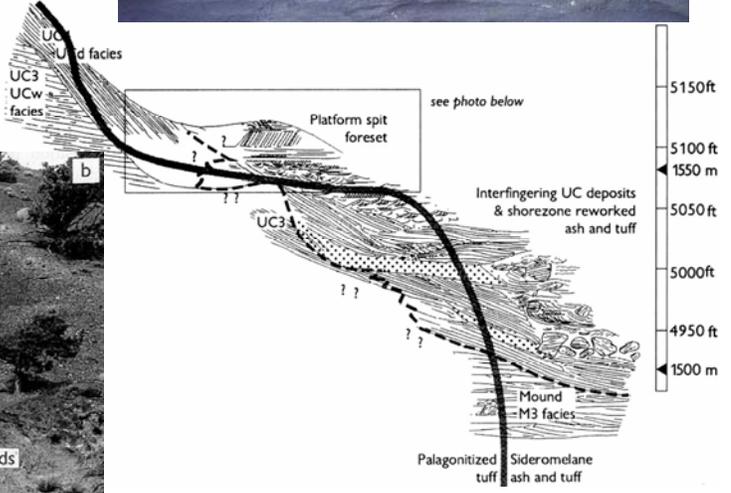
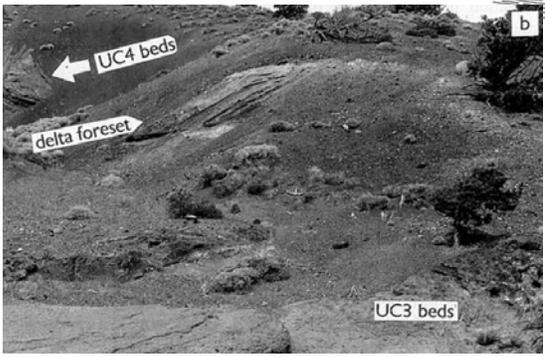
Thursday, October 4th

DAY 3

Pahvant + (if time) Tabernacle Butte. Walk into "northern gully" and examine transition from subaqueous to subaerial deposits. There are excellent examples of differentially palagonitized beds, and beach-spit deposits that give an indication of the highest known Bonneville lakestand. Tabernacle includes a breached tuff/scoria cone with a sort of pillowy-edged lava flow said to have been emplaced with its surface at lake level.



Night at Best Western Paradise Inn, Fillmore





Friday, October 5th

DAY 4



Travel on highway US 6 to Lee Vining, California – mid-travel break to examine Lunar Crater, Nevada. We can spend an hour or two, depending on travel schedule, at Lunar Crater. In addition to stretching our legs, the aim will be to compare bedding and particle characteristics of this maar volcano (and maybe neighboring cinder cones) with those of Pahvant, Black Point, and also Panum Crater.

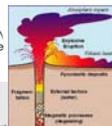
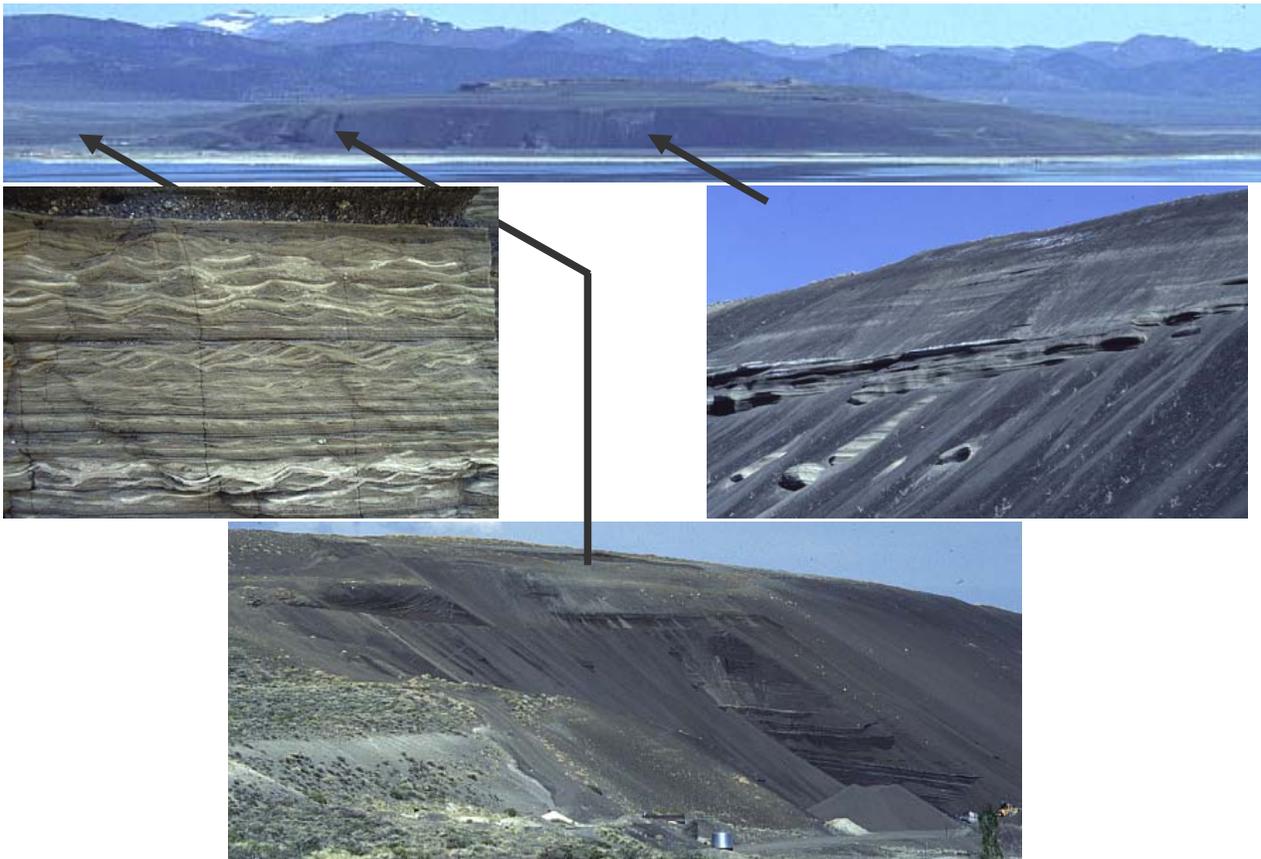
Night at Lake View Lodge, Lee Vining, CA.

Saturday, October 6th

DAY 5

Black Point ash sheet and subaqueous edifice outcrops, natural & quarry. The ash sheet is surprisingly thin where exposed in a gully a km or so west of the volcano, and shows bedforms indicating deposition from current(s) flowing south, rather than outward from the volcano. Is the abrupt thinning only due to interaction with glacial underflow, or are volcanic processes (eruption, dispersal) responsible? A variety of bedding styles forming the edifice will be examined, and their implications for transport and perhaps eruptive processes discussed.

Night at Lake View Lodge, Lee Vining.





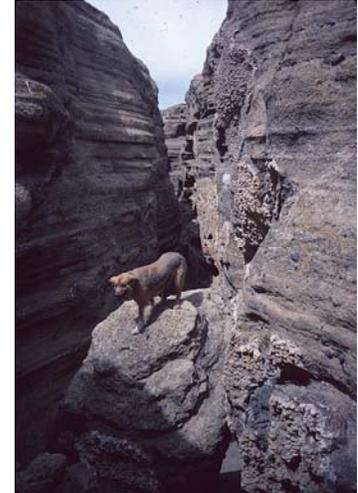
Sunday, October 7

DAY 6



The upper part of Black Point comprises remnants of several tuff rings built on the subaqueously constructed mound, and the western summit area is the target for day 2.

We will partly focus on timing of palagonite formation and what role it may have played in evolution of volcano morphology. A variety of depositional styles are evident, and there are well-developed unconformities near the eastern crest that may record erosion by directly ejected tephra slurries. Large tufa-crustured "fissures" suggest early spreading of the underlying volcano, as does widespread evidence for ring deposit deformation during eruption, and slumping during and afterwards.



Night at Lake View Lodge, Lee Vining.

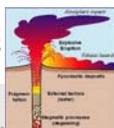
Monday, October 8th

DAY 7

Our examination of Black Point will conclude with examination of the southeastern summit and flank, traversing up the volcano from lake level. There is further evidence of syn-eruptive deformation from unconformities, and some of the deposits have abundant tachylitic lapilli suggesting episodes with significant "magmatic" fragmentation. For sedimentologists, there are also some nicely developed eolian granule dunes developed with the vesicular sideromelane.



If our scheduling works out, we will proceed to Panum Crater after lunchtime.

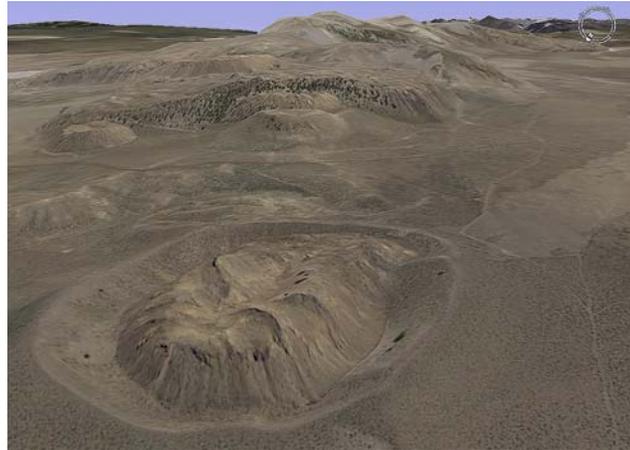




Monday, October 8th

DAY 7 (cont'd)

Panum Crater and its obsidian dome formed about 1200 years ago. Heiken and Wohletz (1987) identified surge dune deposits, and characterized the tephra. Early beds contain about 10% lithic fragments, with later ones having only 5%. Particles are dominantly blocky to equant, with moderate to low vesicularity that decreases upwards in the deposit. The obsidian dome itself has been studied to provide constraints on rhyolite viscosity (Castro and Cashman, 1999). Afterwards, continue south to Lone Pine.



Night at Comfort Inn, Lone Pine.

Tuesday, October 9th

DAY 8

Drive for around 3 hrs to Ubehebe Craters. From the craters, it is approximately 3.5 hrs, 230 miles, back to the airport in Las Vegas.

We will spend a few hours, depending on travel schedule, at Ubehebe Craters, and will compare bedding and particle characteristics of these maar volcanoes with those of Pahvant, Black Point, Lunar Crater, and Panum Crater.

The trip terminates upon return to Las Vegas (or after supper, if we get back to Las Vegas before then). James and Bruce fly out at 9 p.m.



NOTE: Participants remaining in Las Vegas overnight before departures on the 10th should arrange lodging as desired; we can drop people off at their hotels.

post-trip





Papers including sites to be visited, and key palagonite information.

- Bishop, J.L., Schiffman, P., and Southard, R., 2002. Geochemical and mineralogical analyses of palagonitic tuffs and altered rinds on pillow basalts in Iceland and applications to Mars. In Smellie, J.L. and Chapman, M.G. (eds.), *Volcano-Ice Interaction on Earth and Mars*. Geological Society of London, Special Publications 202:371-392. *Discusses applicability of palagonitization as a potential analog for Martian surface processes*
- Castro, J. and Cashman, K.V. (1999) Constraints on rheology of obsidian lavas based on mesoscopic folds. *J. Struct. Geol.*, 21: 807-819. *Panum Crater's obsidian dome*
- Christensen, M.N. and Gilbert, C.M. (1964) Basaltic cone suggest constructional origin of some guyots. *Science*, 143: 240-242. *This is about Black Point*
- Condie, K.C. and Barsky, C.K. (1972) Origin of Quaternary Basalts from Black Rock Desert Region, Utah. *Geol. Soc. Am. Bull.*, 83: 333-&. *Includes Pahvant and area*
- Drief, A. and Schiffman, P., 2004, Very low temperature alteration of sideromelane in hyaloclastites and hyalotuffs from Kilauea and Mauna Loa volcanoes: implications for the mechanism of palagonite formation. *Clays Clay Min* 52(5):623-635 *Describes degree of similarity of palagonitized glass to smectite*
- Farrand, W. H. & Singer, R. B. (1991) Spectral analysis and mapping of palagonite tuffs of **Pavant Butte**, Millard County, Utah. *Geophys. res. Let.*, 18, 2237-2240.
- Fisher, R.V. and Schminke, H.U., 1984. *Pyroclastic Rocks*. Springer-Verlag, New York. *Good introduction to palagonitization (alteration of basaltic glass) on pages 314 to 327*
- Gilbert, G. K. (1890) Lake Bonneville. *Mon. U.S. geol. Surv.*, 1, 1-438. *Includes Pahvant & area*
- Heiken, G. and Wohletz, K.H. (1987) Tephra deposits associated with silicic domes and lava flows. *Geol. Soc. Am. Spec. Pap.*, 212: 55-76. *Includes Panum Crater*
- Kelleher, P.C. and Cameron, K.L. (1990) The geochemistry of the Mono Craters - Mono Lake Islands Volcanic Complex, eastern California. *J. Geophys. Res.*, 95: 17,643-17,659.
- Oviatt, C. G. & Nash, W. P. (1989) Late Pleistocene basaltic ash and volcanic eruptions in the Bonneville basin, Utah. *Bull. geol. Soc. Am.*, 101, 292-303. *About Pahvant Butte*
- Scott, D. and Trask, N. (1971) *Geology of the Lunar Crater Volcanic Field, Nye County, Nevada*. Geological Society Professional Paper, 599-1. *Freely available online.*
- White, J. D. L. (1996) Pre-emergent construction of a lacustrine basaltic volcano, **Pahvant Butte**, Utah (USA). *Bull. Volcanol.*, 58, 249-262.
- White, J.D.L. (2001) Eruption and reshaping of **Pahvant Butte** volcano in Pleistocene Lake Bonneville. In: *Volcaniclastic Sedimentation in Lacustrine Settings International Association of Sedimentologists Special Publication*, 30: 61-80.
- Wohletz, K. H. & Sheridan, M. F. (1983) Hydrovolcanic explosions II. Evolution of basaltic tuff rings and tuff cones. *Am. J. Sci.*, 283, 384-413 *Includes Pahvant Butte*



RELEASE FORM

Workshop on Surtseyan Volcanism

Oct. 2 through Oct. 9, 2007

The undersigned Workshop participant is aware that the Workshop involves various risks, including (but not limited to): travel to/from the Workshop start/finish (Las Vegas, Nevada), automobile travel both on and off-road, hiking to/from dormant volcanoes, climbing/descending dormant volcanoes, and exposure to the elements such as lightning, heat, cold, dehydration, inhospitable weather, insects, etc.

The undersigned Workshop participant RELEASES from ANY RESPONSIBILITY the Workshop organizers (as well as their institutes, employers, and insurers), the Workshop drivers (as well as their institutes, employers, and insurers), the Workshop sponsors, the companies (and their employees and insurers) providing rental vehicles for the Workshop, and the employees, owners, and insurers of any establishment such as hotels, restaurants, and gas stations used by the Workshop.

The undersigned Workshop participant ASSUMES ALL RESPONSIBILITY for all aspects of their travel to and from the Workshop.

I (print name) _____

have read and accept all of the above Release Clauses.

(signed) _____

(date) _____

PARTICIPANT EMERGENCY CONTACT INFORMATION

Workshop on Surtseyan Volcanism

Oct. 2 through Oct. 9, 2007

Participant name: _____

Home Phone Number (with country code if non-US): _____

Work Phone Number (with country code if non-US): _____

E-mail address: _____

Emergency Contact Person Name: _____

Relationship to Participant: _____

Home Phone Number (with country code if non-US): _____

Work Phone Number (with country code if non-US): _____

E-mail address: _____

Participant Health Insurance Information:

Provider: _____

Policy Number: _____