

# Volcanism in Eastern Oregon

Deep Mantle Plume?

Upper Mantle Plume?

Back-arc Basin?

Something Else?

# Three ways to melt the mantle

- Add water
- Add heat
- Reduce pressure



6 M Paulina Basalt flows Cove Palisades, Madras, Oregon



Cove Palisades Intra-Canyon Flow



Base of lower sequence, Cove Palisades



Smith Rocks State Park: ignimbrite flows & intrusive necks



John Day Formation in foreground, Rattlesnake Tuff on ridge



Picture Gorge Basalts, John Day River



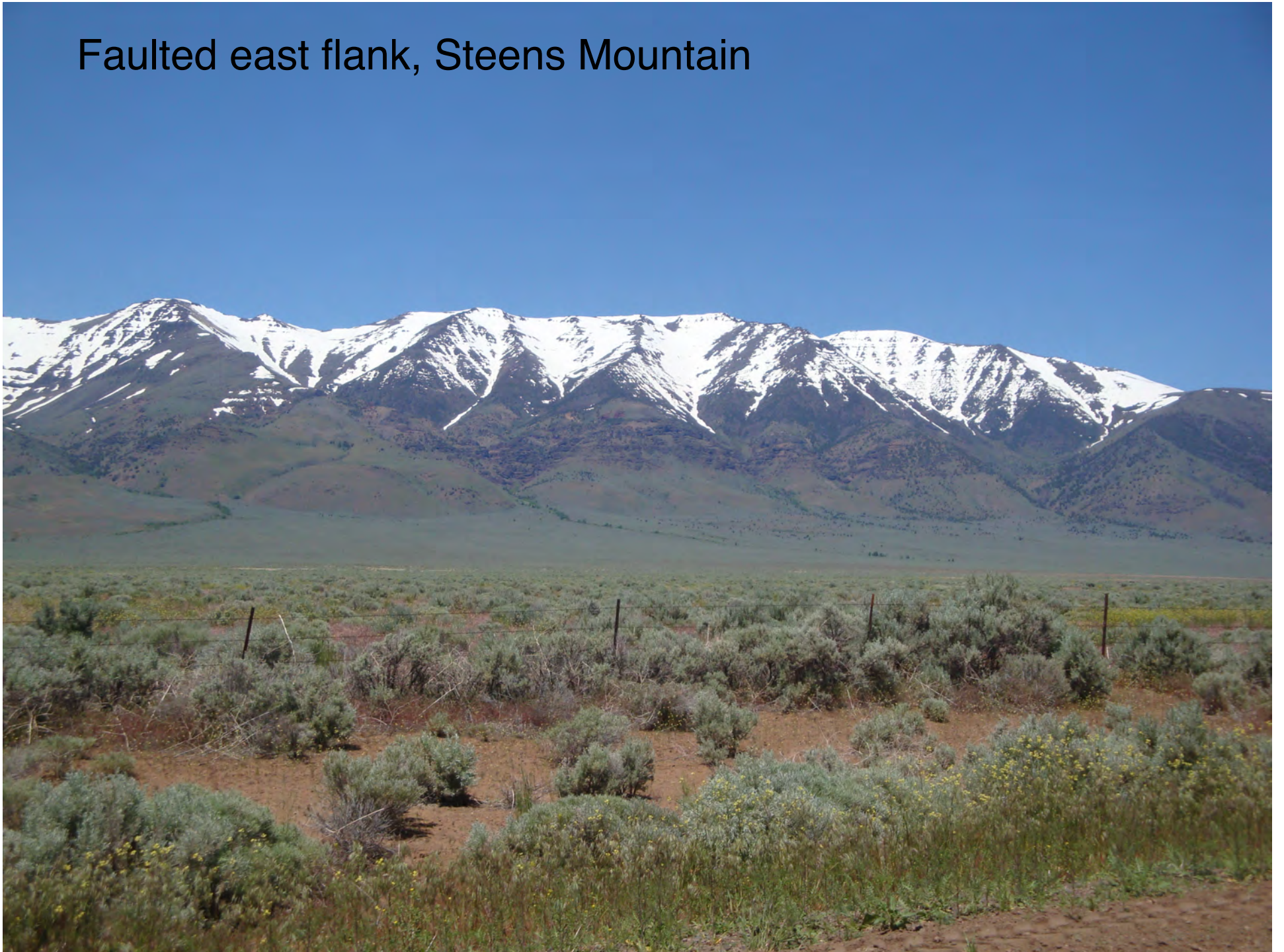
# Hart Mountain



# West flank, Steens Mountain



# Faulted east flank, Steens Mountain



# Wildhorse Canyon, west flank, Steens Mountain



<http://www.blm.gov/or/districts/burns/recreation/images/steens-kiger.jpg>

# Oregon-Idaho Graben, near Juntura, OR



# I-84 between Ontario and Baker City



# Seven Devils Mountains above Hell's Canyon



CRB west side Hell's Canyon







CRB Dikes in Wallowa Granite

# Wallula Gap, Columbia River



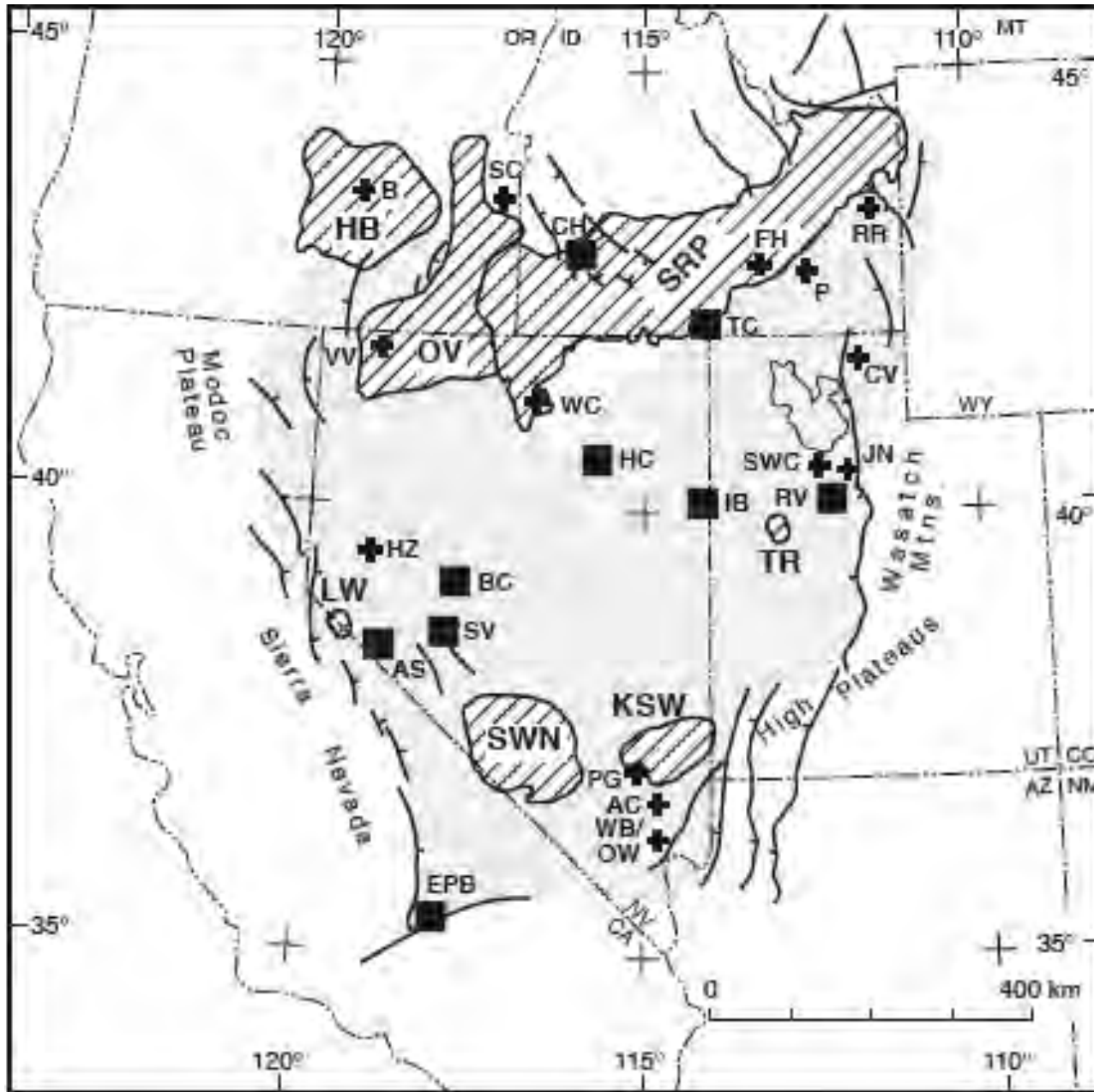


Geologists in field gear, CRB, Wallula Gap





Haystack Rock, Cannon Beach . . .

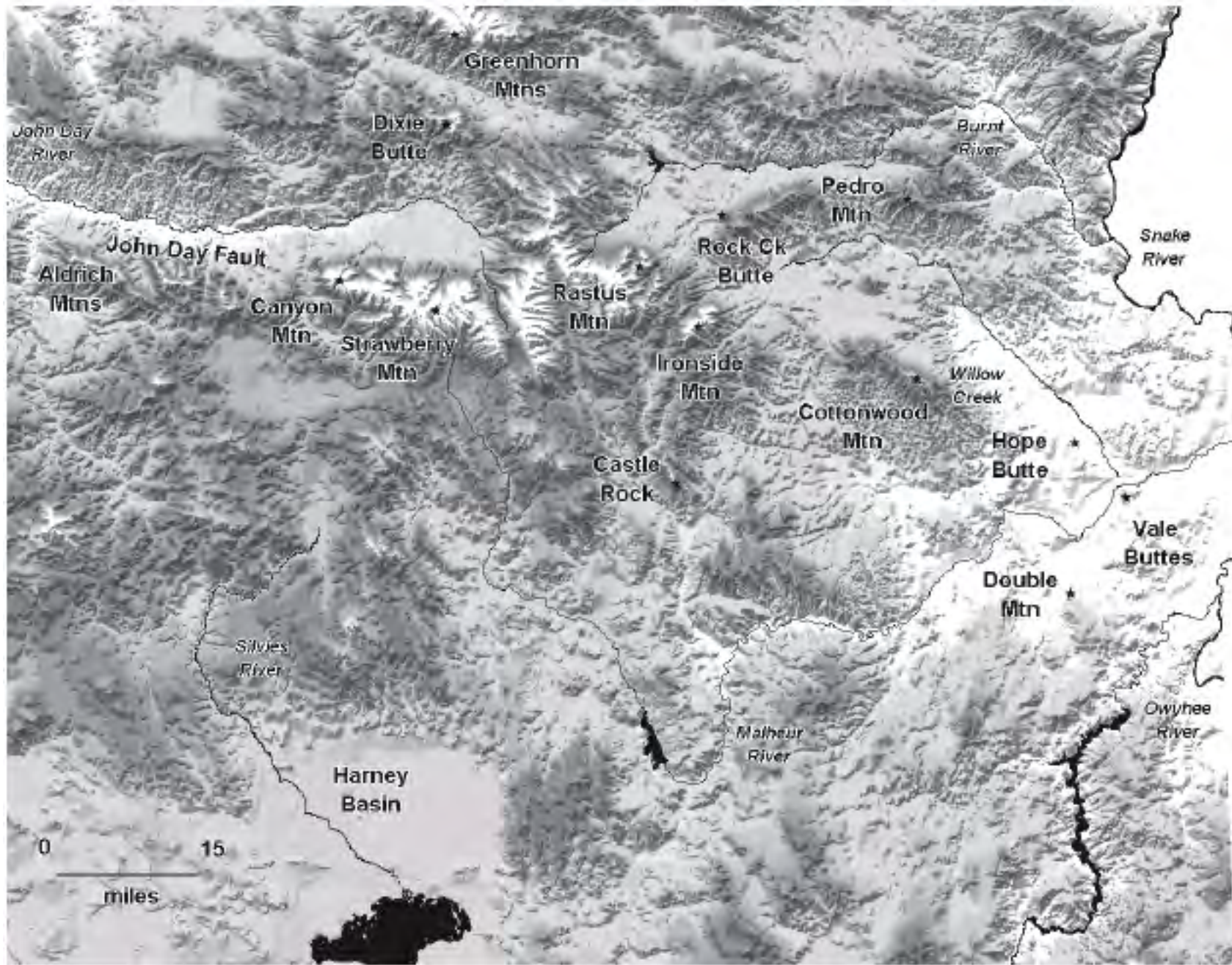


Miocene Silicic Volcanic Centers

Streck and Ferns (2004)

The Rattlesnake Tuff and  
other Miocene silicic  
volcanism in Eastern Oregon

Field Trip Guide  
2004 GSA Cordilleran  
Meeting





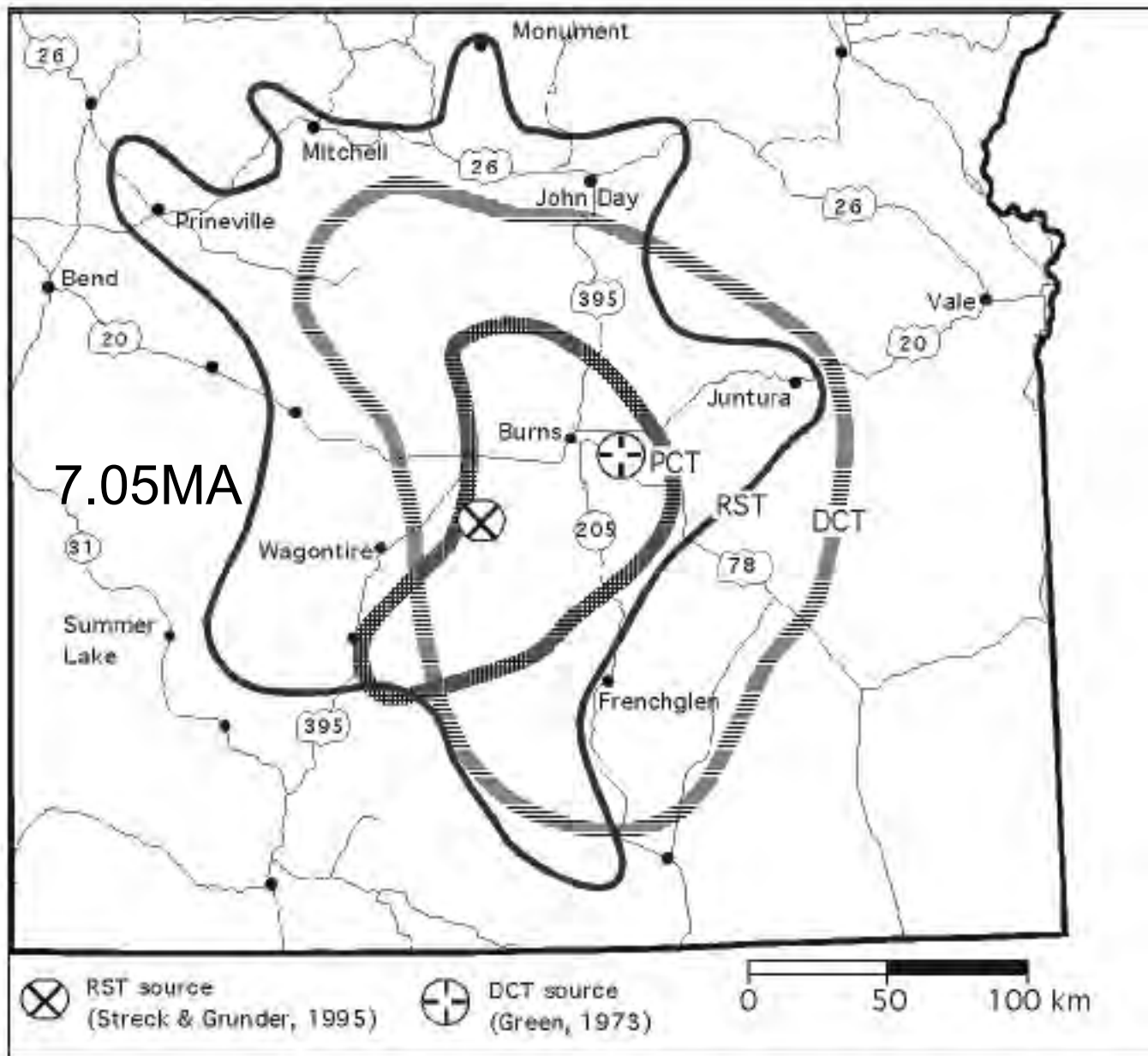


Figure 4. Inferred outlines and source areas of Harney Basin Tuffs. RST, Rattlesnake Tuff; PCT, Prater Creek Tuff; DCT, Devine Canyon Tuff. Outlines for DCT and PCT modified from Green (1973) and Walker (1979), respectively.

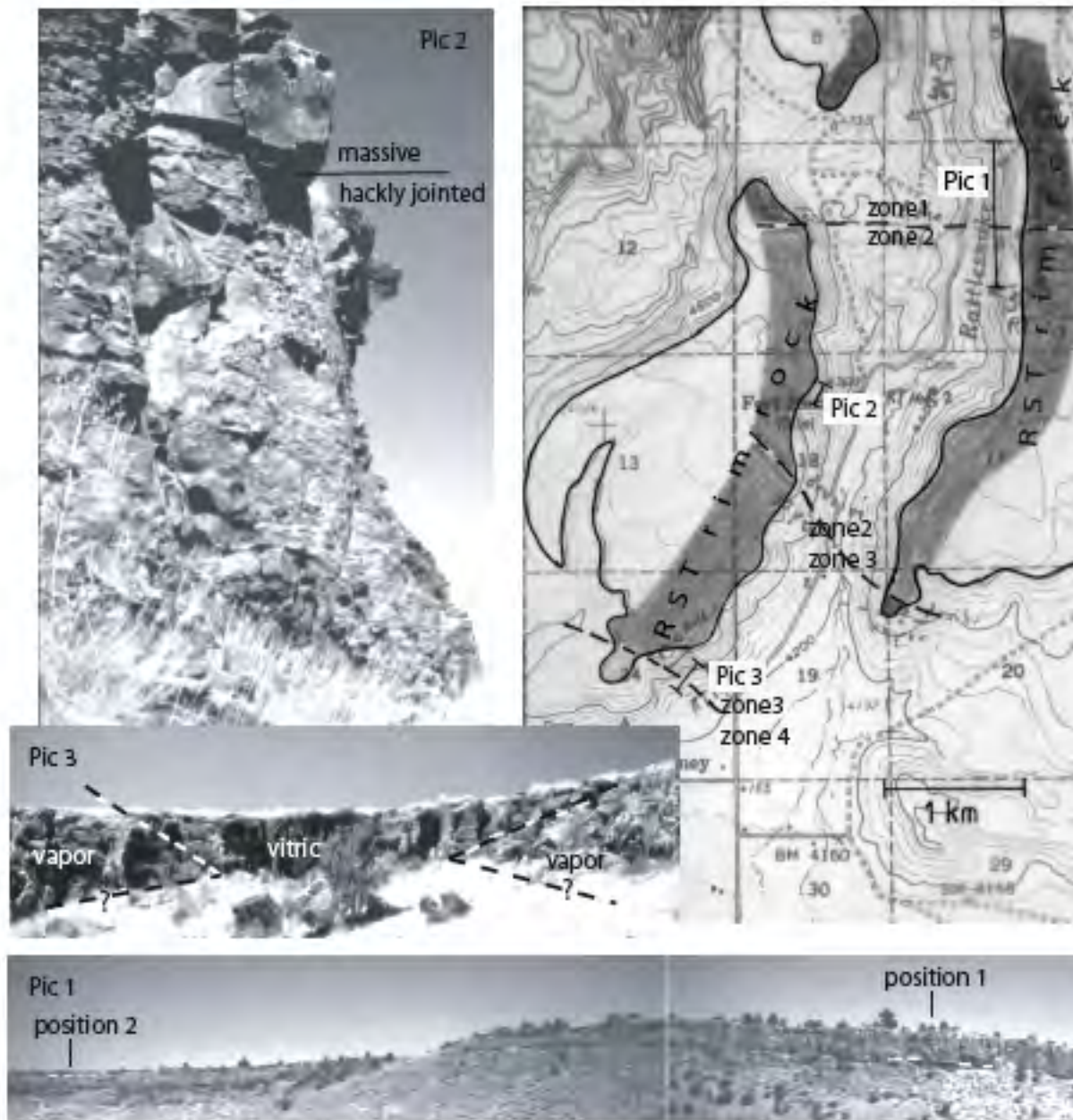


Figure 5. Overview of local facies changes. Zone 1: tuff dominated by thick lithophysal tuff underlying pervasively devitrified tuff and overlying (inferred, not exposed here) lower non- to densely welded vitric tuff. Zone 2: tuff dominated by pervasively devitrified tuff (Pic 2) overlying lower vitric tuff and underlying upper vitric tuff. Zone 3: tuff section consists of partially welded (with pumice) tuff that is vitric or vapor phase altered. Zone 4: vitric incipiently welded tuff. Picture 1: at position 1, densely welded vitrophyre exposed below white dashed line and section is topped with float of upper vitric tuff and at position 2, entire section below white dashed line is lithophysal tuff. Picture 2 shows pervasively devitrified tuff throughout in two facies, hackly jointed and massive. Picture 3: in middle of picture, tuff consists entirely of vitric tuff (vitric) that splits into a lower and upper vitric tuff separated by vapor phase tuff (vapor) further to the right and left, dashed lines indicate position of sharp interfaces between vitric and vapor phase tuff (analogous to the one seen in fig. 13 in Streck and Grunder, 1995).

## Rattlesnake Tuff Outcrops

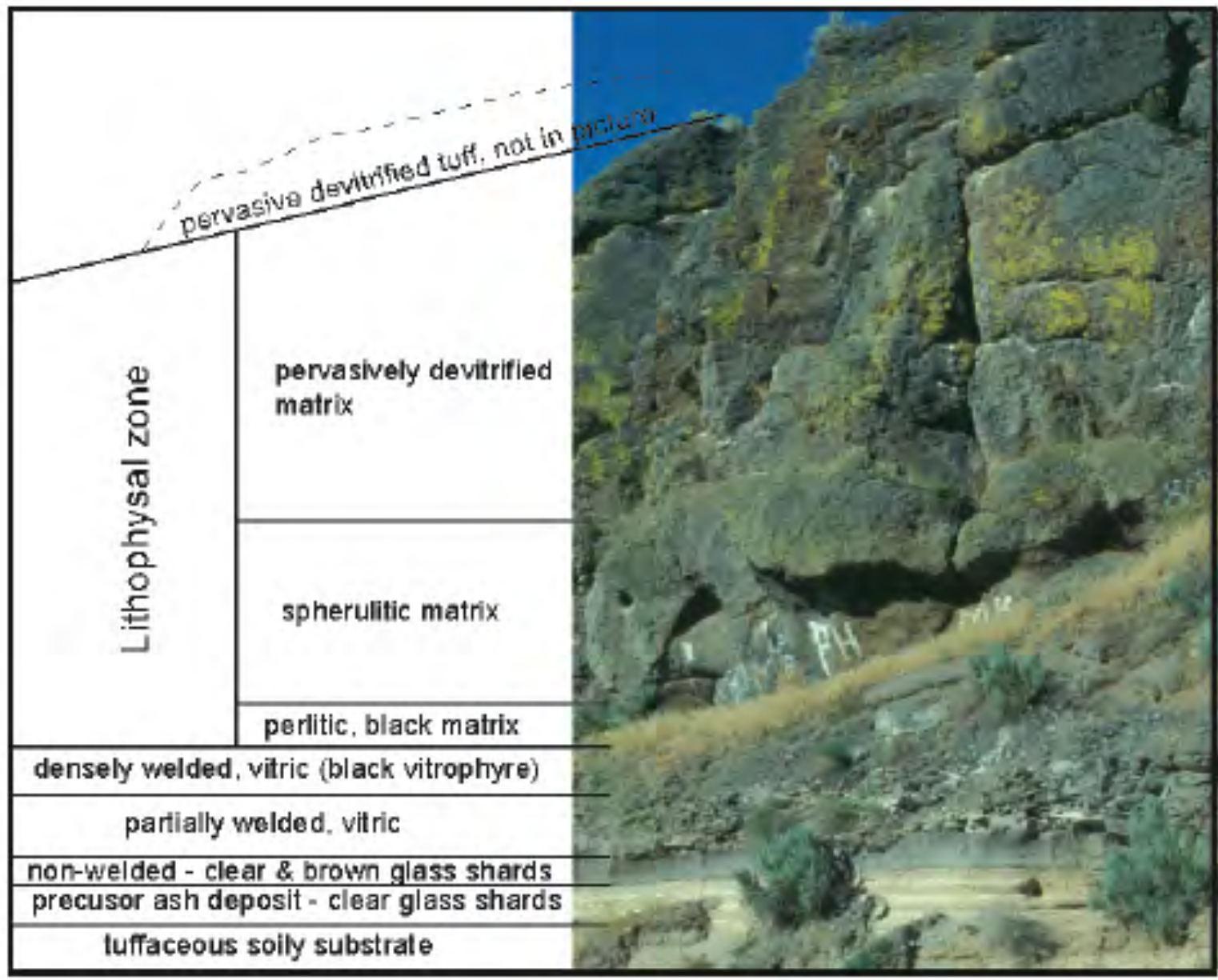


Figure 6. Outcrop stratigraphy of Rattlesnake Tuff at Stop 7.

## Type Locality Rattlesnake Tuff

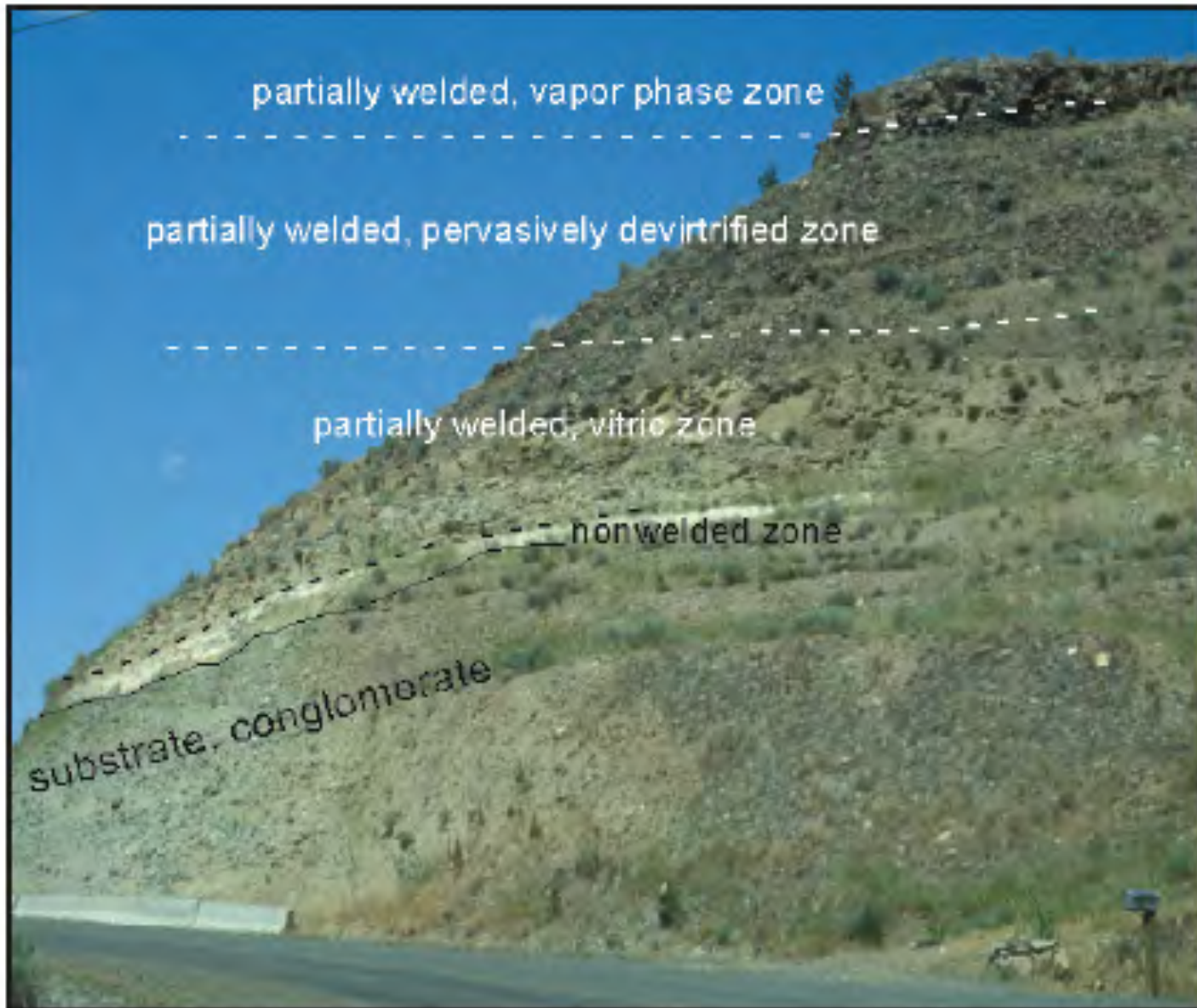


Figure 7. Outcrop stratigraphy of Rattlesnake Tuff at Stop 9.

Distal edge of Rattlesnake Tuff