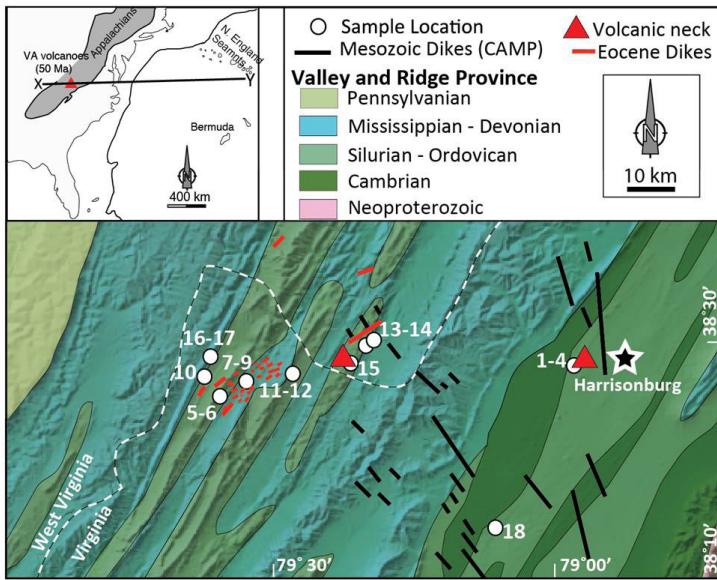


The Youngest Magmatic Event in Eastern North America

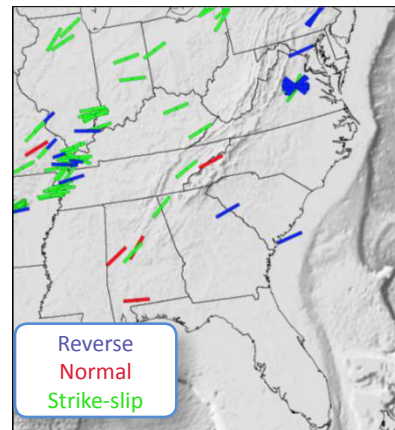
Esteban Gazel

- Geologic Map of the VA Eocene Magmatic Event



1-4: Mole Hill
 5-6: Trimble Knob
 7-9: State Route 63
 10: Hightown Dike

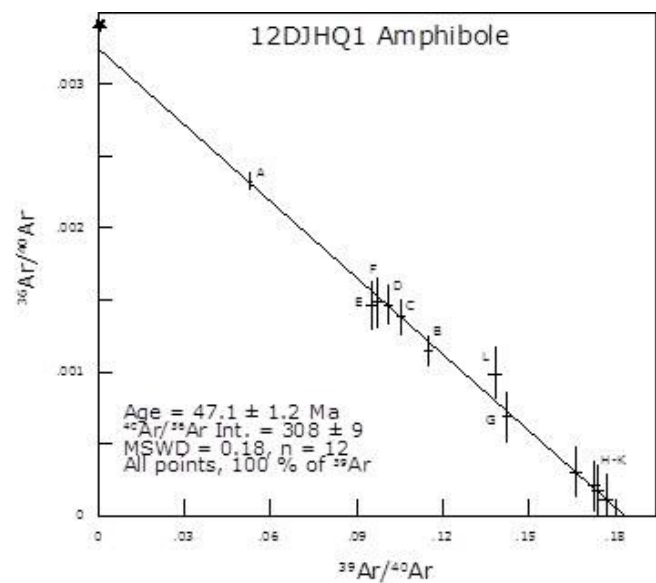
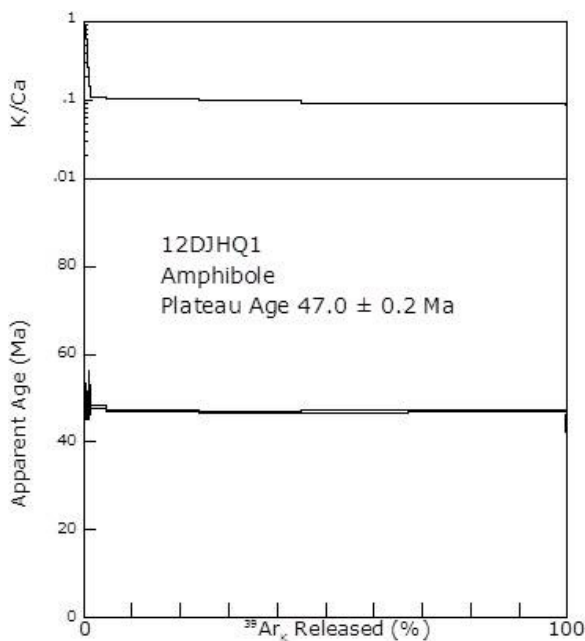
11-12: Hull Farm
 13-15: Sugar Grove
 16-17: Hightown Quarry
 18: Vulcan Quarry



Left: From Mazza et al. (Geology, 2014).

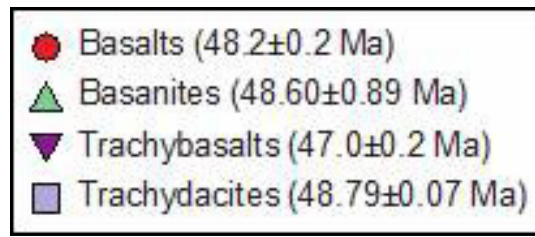
Right: North America Moment Tensor - Saint Louis University Earthquake Center.

- Example Ar/Ar age for the Eocene volcanic pulse in the ENAM

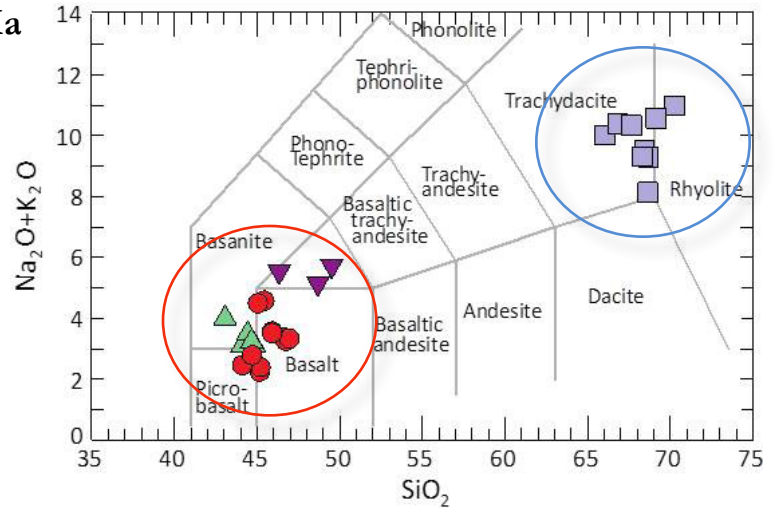


From Mazza et al. (Geology, 2014).

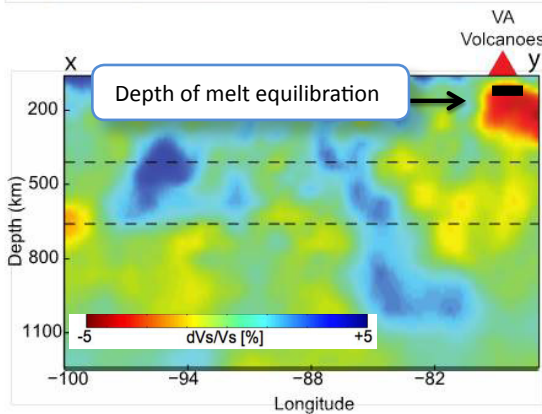
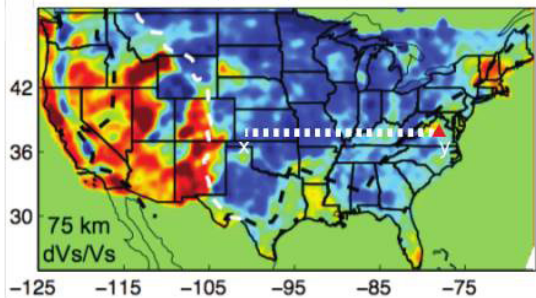
- Bimodal volcanism in VA ~47-49 Ma**



From Mazza et al. (Geology, 2014).



Schmandt and Lin, (GRL, 2014)



- Tomography cross section**

Thermobarometric results agree with seismic evidence for a thin LAB below the Eocene Volcanoes

Evidence for a low-shear wave velocity “scar” below the Eocene volcanoes

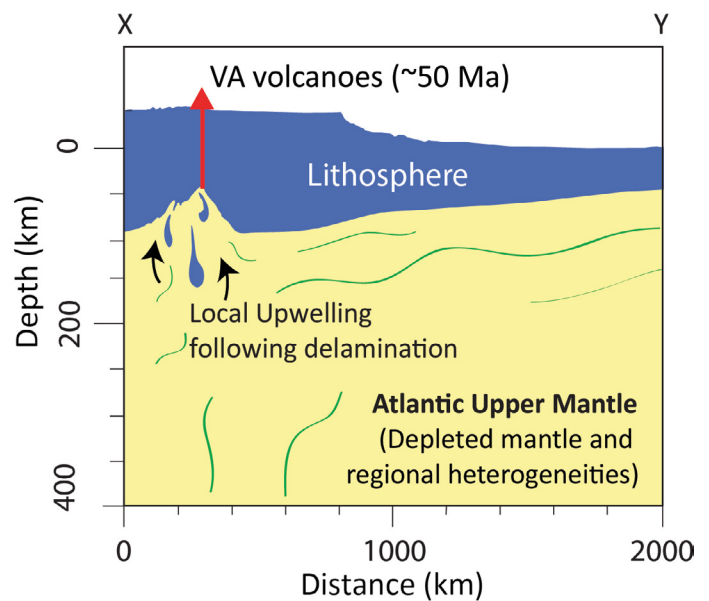
$^3\text{He}/^4\text{He}$ ($(R/RA) \gg 1$) from local thermal springs connects the shallow crustal fracture systems to a region deep into the mantle (Baedke and Silvis, 2009)

- What produced the Eocene event?**

Reorganization of plate motion and change in the orientation of the regional stress field in the Eocene (Southworth et al., 1993)

Intraplate signature but T too low for a deep mantle plume (Mazza et al., 2013).

Lack of a thick lithosphere below the Eocene magmas in VA (while thick in other Appalachian locations, Wagner et al., 2012)



◆ Localized upwelling, possibly lithospheric delamination