The Youngest Magmatic Event in Eastern North America

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- 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).

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

• Tomography cross section

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 to 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