Illuminating the architecture of the greater Mount St. Helens magmatic system from slab to surface

GeoPRISMS Geodynamic Processes at Rifting and Subducting Margins

earthscope

NSF

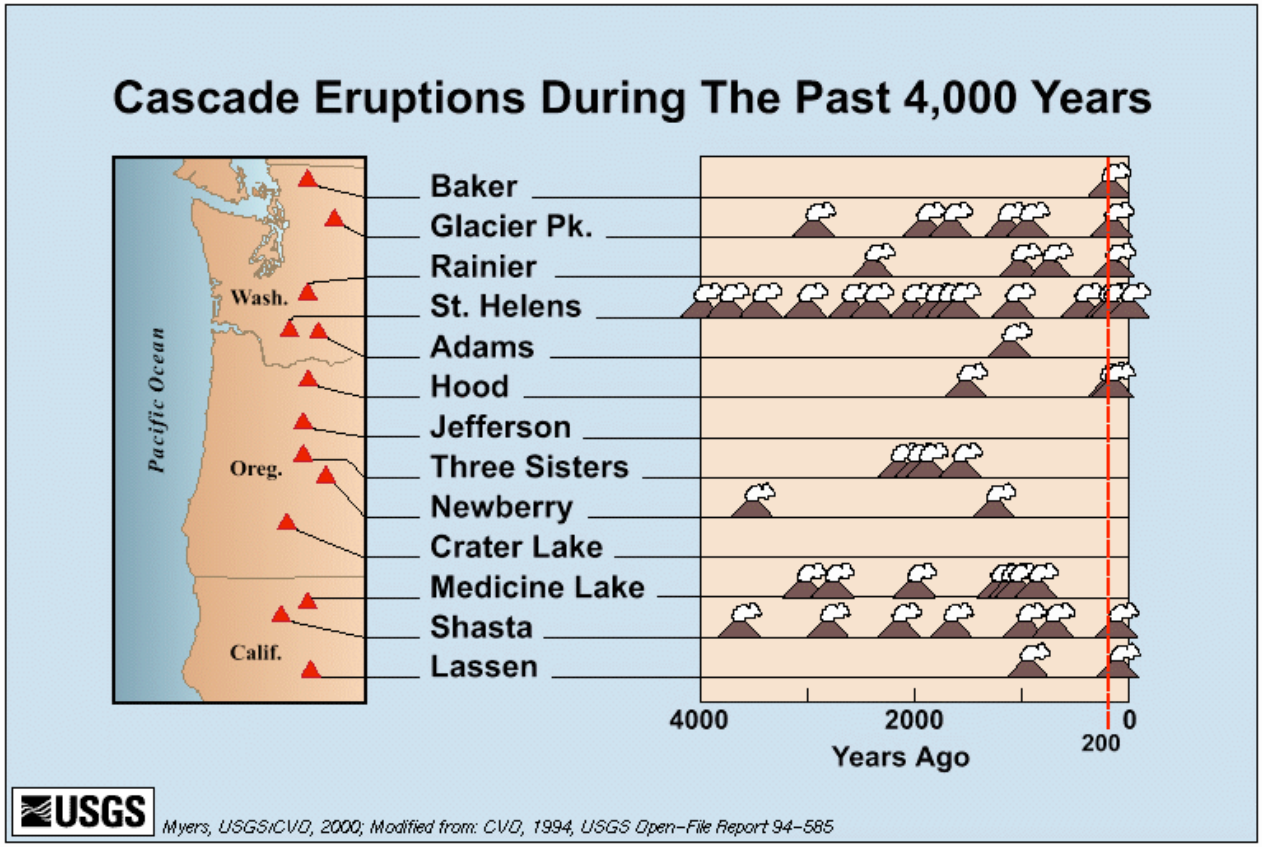
USGS science for a changing world

Mount St. Helens Team

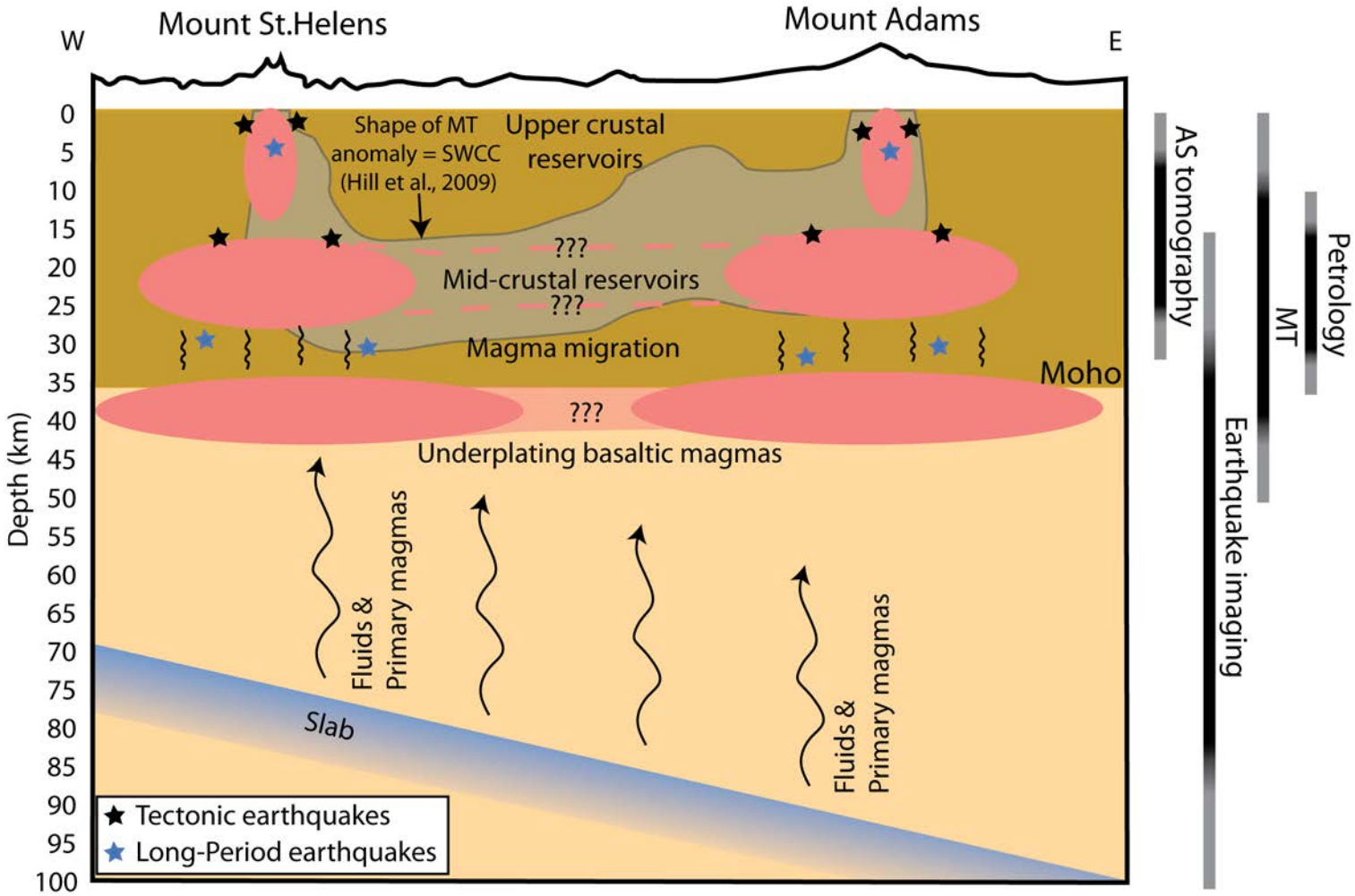
- Geophysics
  - Active-source seismology
    - Levander (Rice) and collaborators
  - Earthquake seismology
    - Abers (LDEO), Creager, Vidale, Houston (UW), Moran, Denlinger (USGS), Levander (Rice)
  - Electromagnetic Imaging (MT)
    - Schultz (OSU), Bedrosian (USGS)
- Petrology – magma chamber dynamics
  - Sisson, Clynne, Pallister (USGS), Bachmann (UW),

Why Mt St. Helens?

- It's active!
- Reasonable size
- Well-characterized
- Access for instrumentation

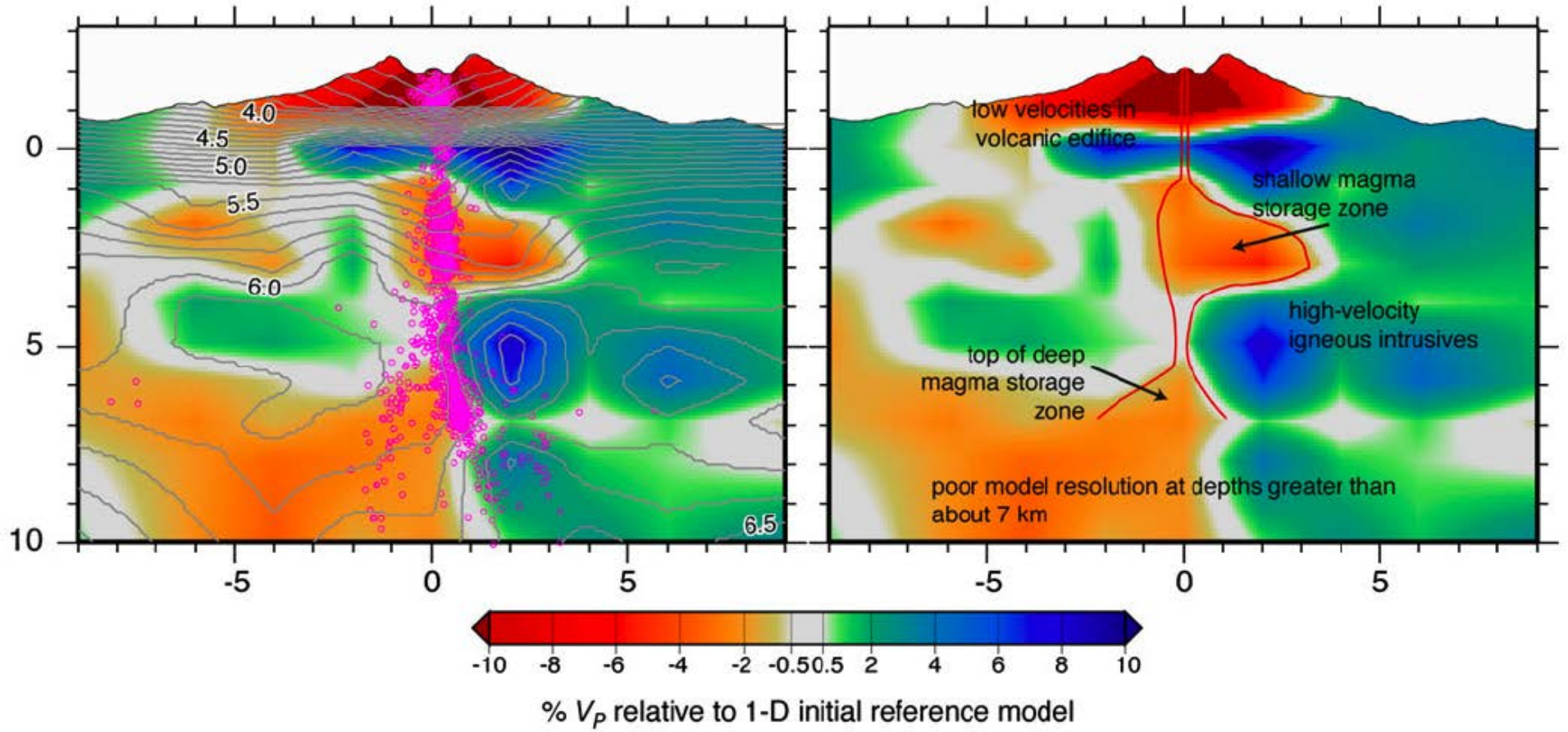


Imaging Targets



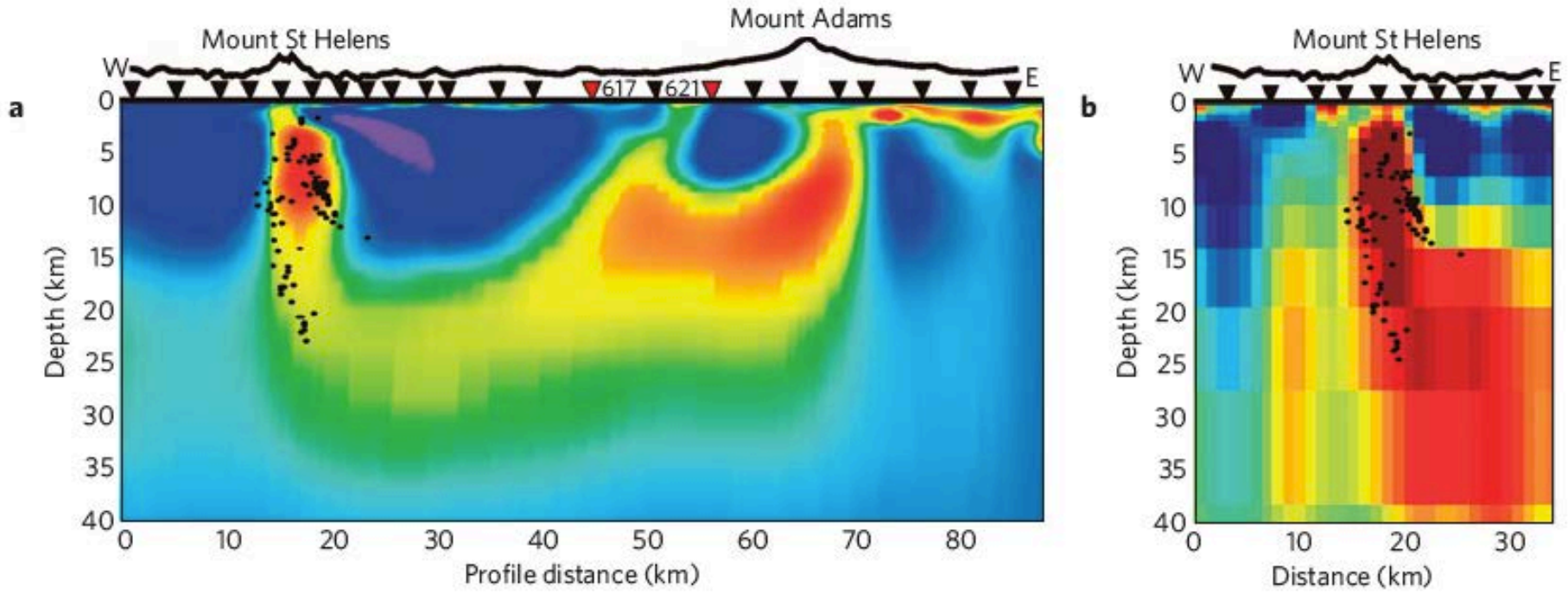
Some existing imaging
Upper crustal magma reservoir

E-W cross-section



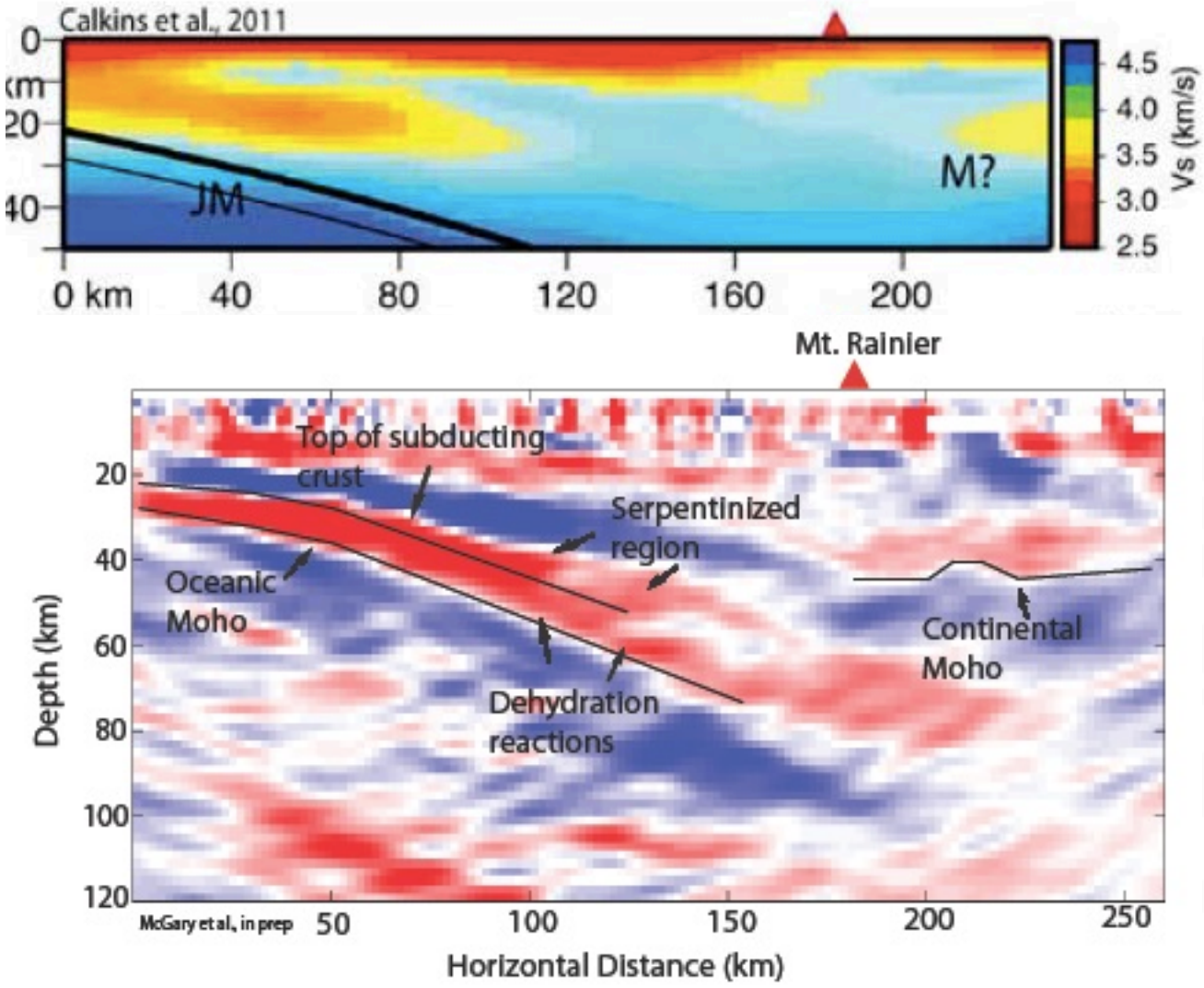
Waite and Moran, 2009

Magma plumbing from existing MT

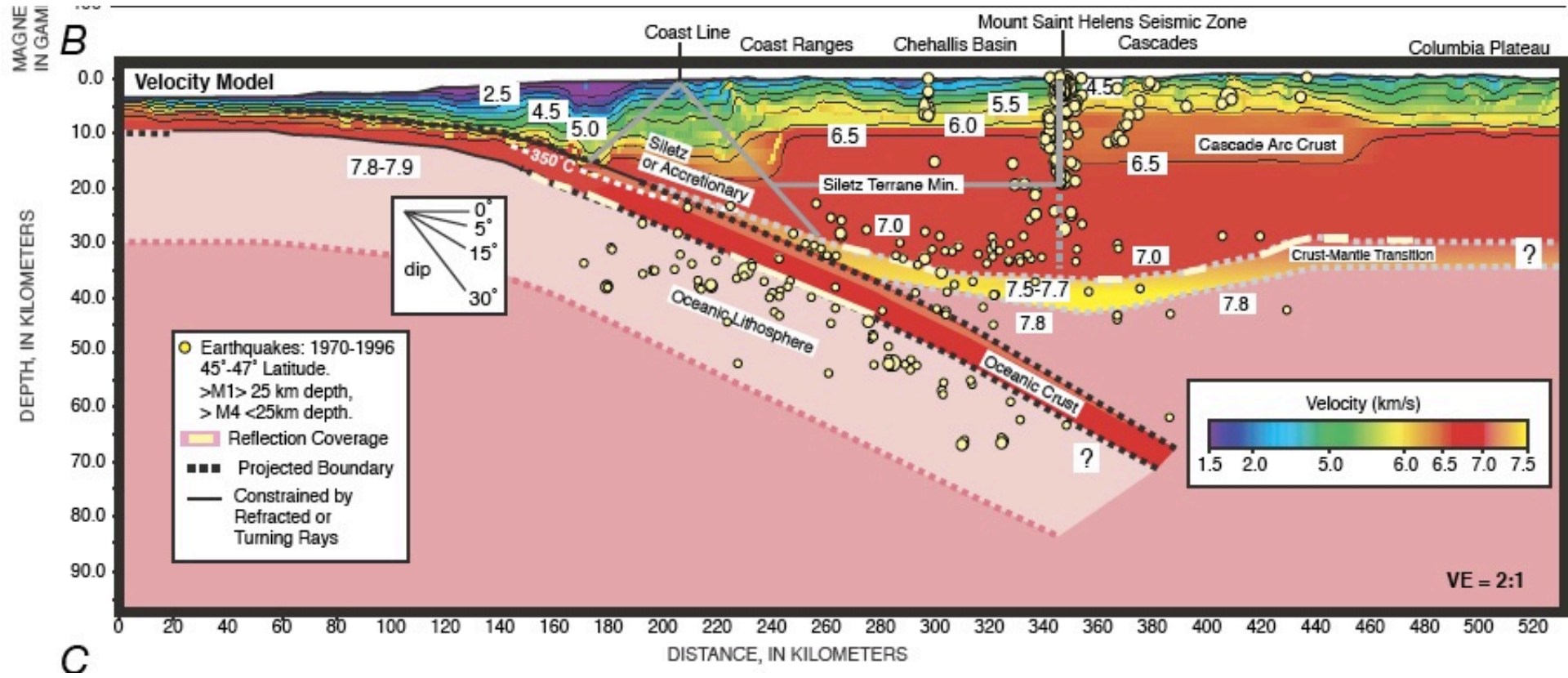


Hill et al., 2009

Existing seismic imaging

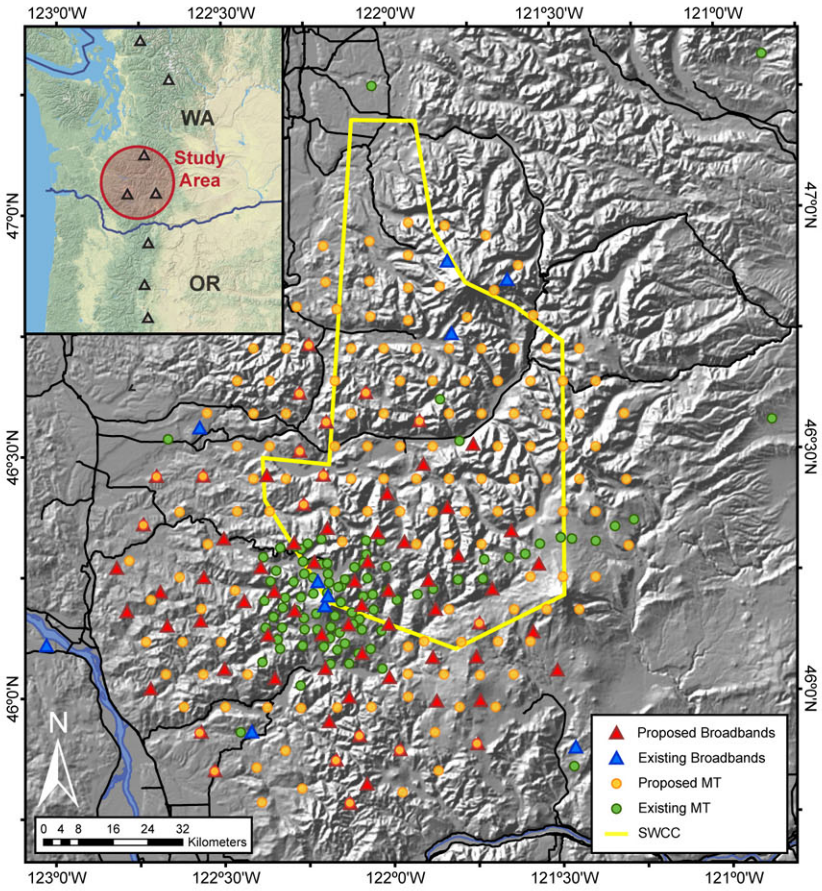


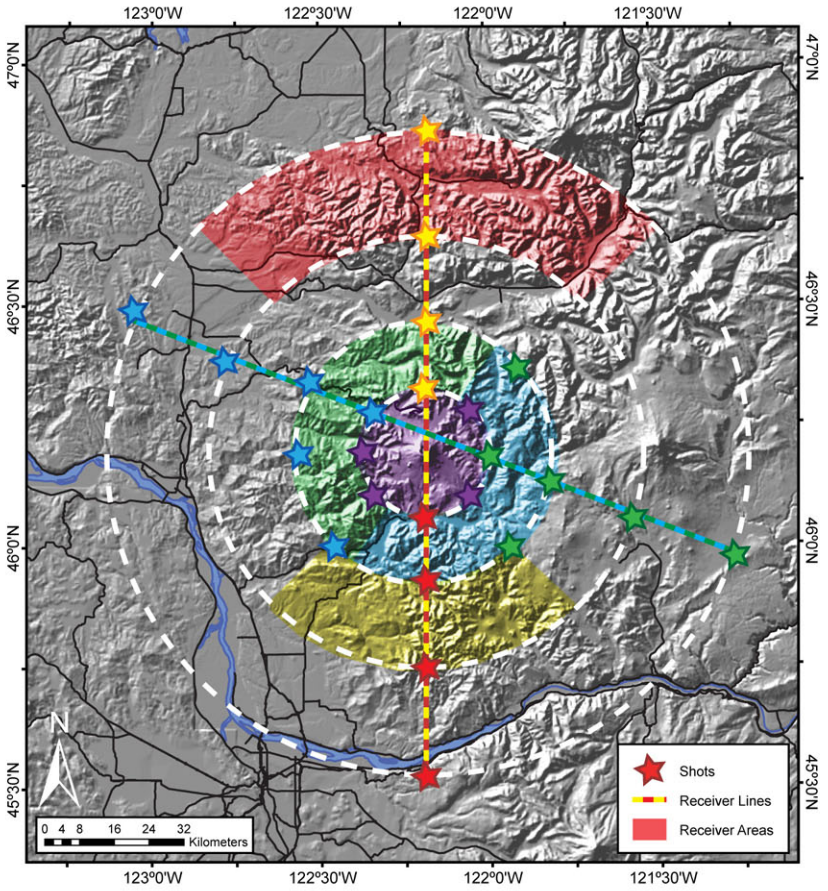
Seismic velocity model



Parsons et al., 1998

Planned arrays





Passive Seis: 70 broadbands + existing MT: 150 wideband sites

Active 3D Seis: 2600 Texans/multiple deploy

Some Impacts

- Long term goal:
  - Try to see magmas from their mantle source to the near-surface
- Near term goal:
  - When complete, we will produce the largest, most comprehensive dataset for plumbing of any volcanic system
- Vehicle for publicizing GeoPRISMS science broadly
- Strong collaborations with other groups