

Deep Earth Structure and Dynamics Breakout Group Summary

(DEEP = planet's center to roughly base of lithosphere)

Recent USArray work (general):

**Seismic heterogeneity at many scale lengths, global and regional (from seismic tomography)
Reflective surfaces found at many depths (from migration, etc)
Wave field multi-pathing --> very strong contrasts**

Recent USArray work (more specific):

**Topography of upper mantle phase boundaries (T, C)
Strong and sharp edged heterogeneities, upper and lower mantle (T, C, pmelt)
Deep mantle large and possibly dense chemically distinct regions, beneath surface hot spots.
Structures consistent with plumes, slabs, drips**

Looking forward (General goals):

**Integrate models, top to bottom of mantle
Multidisciplinary approach (mineral physics, geodynamics, geochemistry, tectonics, etc.)
Algorithms: identify regions that produce wave splitting & multi-pathing (tie to tomography)**

Looking forward (some specifics):

**Deep focus earthquakes, phase transition boundaries, lithosphere/asthenosphere boundary,
fate of slabs, water in the mantle, deep chemical piles at the CMB, anisotropy, plumes, and
Geodynamics and mineral physics predictions for framework building**

Specific target: mapping the Farallon slab in high resolution:

**Excellent target for integrative studies across disciplines
As array marches east, S. American earthquakes permit new imaging
What is the shape? How does it widen? How sharp are contrasts in properties?
Is there anisotropy in the slab? Why? How does it relate to dynamics?
Pursue a flexarray deployment?**