What we believe

- The mantle is not isoviscous
- Average upper mantle viscosity is 10^{21} Pa s
- There is some primitive mantle somewhere
- The upper mantle is highly anisotropic
- There is mass flux through the 670 discon
- Only 30 % of 670 boundary has no flux
- The CMB is compositionally heterogeneous
- MORB reservoir is not whole mantle
- Hawaii plume to CMB but Iceland to 670 km
- Dynamic topo precludes 670 is obstruction

- Hotspots are not all plumes; OIB is reservoir
- Viscosity increases with depth
- Weak asthenosphere
- Weak plate boundaries
- The mantle is not homogeneous
- Plumes exist
- Some mantle has experienced partial melt
- Primitive geochemical reservoirs exist
- There are reservoirs in the lower mantle
- Cs and Rb are not reliable indicators of this

- Melts record P, T, X of melting process
- Some hotspots are plume surface expressions
- Lower crust trace element composition known
- OIB source not equal to MORB source
- Viscosity increase tracks 670 phase change
- Africa superplume is active upwelling
- Plumes tap source other than MORB
- Dynamic topo poorly constrains mantle flow
- Continental crust differs from oceanic crust
- Mantle convection happens

- More discons than 410, 670, CMB, ICB
- Lower mantle is Mg,Ca-pv, Mw
- Heat transport from core up Earth is known
- Small scale convections in upper mantle
- Length scales of heterogeneities are known
- Some convection cells are whole-mantle
- Nd-isotopes track progressive differentiation
- Upper mantle eclogite denser than ambient
- Mantle cooled; viscosity up; length scales up