

EARTHSCOPE SEMINAR

DISCUSSION SUMMARY

MARCH 30, 2010

PRESENTER: ED GARNERO

NOTE-TAKER: PEI-YING PATTY LIN

DISCUSSION 6: Linking deformation between the surface, crust, and mantle

Paper1: Subcontinental-scale crustal velocity changes along the Pacific-North America plate boundary. Davis et al., Nature (2006).

Summary:

Using continuous GPS data to talk about the sharp boundary. Station started from east to west over 1nm/yr.

Brainstorming:

- In Fig2, it will be better to plot the derivative of the derivative so that we can see the slope changing. Plotting a year of the slope change might be able to see more clear velocity changes. Matt mentioned actually Davis has updated figure to show the eastward and westward spatial and temporal motion.
- Why do they use 2.5 years? Does the value 2.5 come from some portion of time? Why do they use the earliest 2.5 years not latest 2.5 years to determine the trend? When they choose another reference, the eastward motion might be westward motion and westward motion might be the larger westward motion.
- GPS should care lateral and vertical motion. In the paper, they showed lateral variation only. It might not have a lot of vertical motion. Also, the vertical motion is also difficult to measure.

Paper2: Absolute plate motions constrained by shear wave splitting orientations with implications for hot spot motions and mantle flow. Kreemer, Journal of Geophysical Research (2009).

Summary:

In Fig3, it shows simple cases to explain the observed difference in hot spot velocity and absolute plate motion velocity.

Brainstorming:

- You have something on surface. You can dream of the story happen beneath it.
- Is the flow of the motion a control factor or not? Is it driven by convection model? A Chickens and eggs problem.

Paper3: Rotation and plate locking at the southern Cascadia subduction zone. McCaffrey et al., Geophysical Research Letters (2000).

Summary:

Using GPS vectors and surface tilt rates to get the rotation of western Oregon and plate locking area. In fig 3, the dark area showed the motion per year of the locked. Rotation part is less controversial.

Brainstorming:

- Locked area vs. ETS: different between calculated and observed anomaly signals can be explained by ETS.
- The velocity of the plate motion dominated by the trench and also showed the Euler-pole motion.