

EarthScope Seminar 2010

03/09/2010 – Discussion Notes (Eun-Sun Chong and John D. West)

Topic: Receiver Functions

Main Paper:

- Mapping chemical and Phase discontinuities in the crust and upper mantle. Gilbert et al.

Ancillary Readings:

1. North American Lithospheric Discontinuity Structure Imaged by Ps and Sp receiver functions. Abt et al.
2. Support of High Elevation in the Southern Basin and Range Based on the Composition and Architecture of the Crust in the Basin and Range and Colorado Plateau. Frassetto et al.
3. Iterative Deconvolution and Receiver Function Estimation. Ligorria and Ammon.

Summary: Gilbert et al. studied crustal thickness in western US using P receiver functions, common conversion point stacking and 60km grid as well as constant Vp and Vp/Vs ratio.

Thickness map (Figure 3)

1. Discussed expected offset from using Vp/Vs. About 5km is average but in this paper, their margin is 50km, which is too large.

Figure 8

1. There are a lot of white spaces on this map.

Double Moho (Figure 6)

- 1 Western Colorado plateau transition.
- 2 There are a lot of structures in the figure that can be interpreted.
- 3 What does double Moho mean?
 - a They see two different locations?
- 1 Crustal modelers say that depth is (using CRUST2.0 in Figure 4) between 30 and 50km thick.
 - a The figure shows thickening as it moves from west to east.
- 1 Their figures need color charts to show what colors represent what range of depth.
- 2 Figure 3 shows missing stations. Their data is not from TA stations. They used bins.
 - a Appearance of data gap in Fig 3 and 2 in eastern Utah. There are stations where they have left blank in their figures. They seemed to have left out the area that's the transition zone within the Moho.
- 1 They are very puzzled by the "big hole".
- 2 Conclusion is there is not a double Moho but rather it jumps down.
 - a The lower one must be the actual Moho and the upper one must be some sort of a discontinuity.
- 1 Perhaps they could have investigated more into the whole Double Moho idea and word it better in a way that it might make sense.

2 Figure 6 shows they assume uniform V_p across the whole crust.

Lateral Smearing

1. The deep red structure underneath Great Plains.
2. Is it likely that the bump underneath Colorado plateau can be lower?

Summary: Frassetto et al. assumed high V_p/V_s in core complexities. Support of high elevation in the southern

Summary: Abt et al. Receiver function studies P and S. Found a rather strong LAB in western US. In eastern US, they found They did not see lithospheric stuff but they saw a discontinuity. The transition must be at least 50-70km thick for lithosphere but they cannot see.

What is happening on Figure 1?

1. There is no Moho map included in this publication.
2. Supposedly the Moho gets deep near the Mid East US according to Figure S3.

Figure 1 shows all stations.

1. The paper is not too old but the map lacks TA stations.