EarthScope Seminar Discussion Notes

03.02.2010 Chunpeng Zhao

Topic 1: The 10% temperature perturbation in the geodynamic model of West et al. 2009 is unintuitive.

Reply: This is just someway to destablize the drip to start downwelling. Slab window opens up a hot upwelling which heated the drip up to make it unstable. So if you look at the tomography model, which has blobs like feature everywhere, so if the blobs were heated up, everyone will go down.

Topic 2: The dynamic process of the drip is unclear.

If there are heterogeneity everywhere, are those thermal or compositional? Which implies some dynamic process going on. It could be a small scale convections that is too complex to be seen.

To make the drip intrinsically dense is less intuitive. How come the drip on top of a hot layer has not been happen during earlier times?

Reply: The cold and dense drip material was there before the heating process (which is introduced by the slab window). But its viscosity is too high for it to start dripping process. So it is attached to the lithosphere due to its high viscosity.

Topic 3: Can splitting time tell us how strong the mantle flows?

Reply: It is more complex to link the splitting time with the strength of the flow. It depends on how thick the flow layer, temperature of the layer and composition of the layer. High temperature will cause the dislocation creep to the diffusion creep, which does not generate the anisotropy.

Topic 4: How does drip die? Drip is pulling cold lithosphere down, the seismic velocity is going to be the highest at the top of the drip. But in Figure 2, the tomography model shows the drip does have a diffusive top.

Reply: It is possible that the lithosphere material stops feeding the drip.

Topic 3: Is the drip really sampled in the anisotropic measurements? It will be great if you can integrate the anisotropic data into a 3D tomographic model.

Reply: That is certainly possible and important to do in the future research.

Most replies are made by John West.