EARTHSCOPE SEMINAR

DISCUSSION SUMMARY

JANUARY 29, 2007

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Paper title: High-Resolution Surface-Wave Tomography from Ambient Seismic Noise

Authors: Shapiro, Campillo, Stehly and Ritzwoller

The goal of this paper is to develop a new method to seismically image crust and upper mantle structure without the need for earthquake sources. Using ambient seismic noise, such as that caused by regularly scheduled passing trains, the authors propose a technique to constrain group velocity beneath California, giving a detailed image of crustal structure beneath the region.

Several people raised the question of what exactly was the method being used in this study. From a discussion on previous studies which employed similar steps, the group was able to clarify that the correlation between stations was performed using moving windows of narrow frequency bands. It was agreed that this method is a very powerful research tool as it gives us one of the best images of the crustal structure of Western North America to date. We discussed the fact that this method can also tell us a lot about crustal composition and crustal contributions to heat flow. This is turn would enable to extract the thermal profile for the region.

We spent time discussing the periods used in this study. We saw data for periods from 8 s to 24 s. It was suggested that the upper limit for this method would be a period of 24 s. Because the source for this study was ambient seismic noise, which is high frequency, it would be difficult to get energy from these sources at periods greater than 24s.

The group agreed that it would be beneficial to be able to get information on upper mantle structure in this area from this data. But this brought up the question of what would be done in areas which have strong changes in crustal thicknesses, such as the transition zone in Arizona. Tomography tends to 'smooth' out structure, so it was asked "would we ever be able to see sharp boundaries such as those due to changes in crustal thickness?" It was suggested that techniques such as azimuthal anisotropy could be used to obtain information in areas with thick crust, such as the Colorado Plateau. The discussion on anisotropy raised the question about using the technique to distinguish between different tectonic blocks.

It was agreed that this method was a powerful tool and that the authors presented a useful study of Western North America crustal structure.