Student research project (‘Proposition de stage’, niveau M1)

Title: crustal influences on travel time dispersion of P and S waves

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The *finite frequency* interpretation of seismic travel times has the potential to greatly improve the resolution of seismic images of the lower mantle. This new technique exploits the fact that the observed small delays of seismic P and S waves are slightly frequency dependent. This frequency dependence gives information about the size of anomalies in the mantle. If the anomaly is large, delay times in low and high frequency bands should be the same. But if the anomaly is small, it will only be seen by the highest frequency waves. We say that the travel time is *dispersive.*

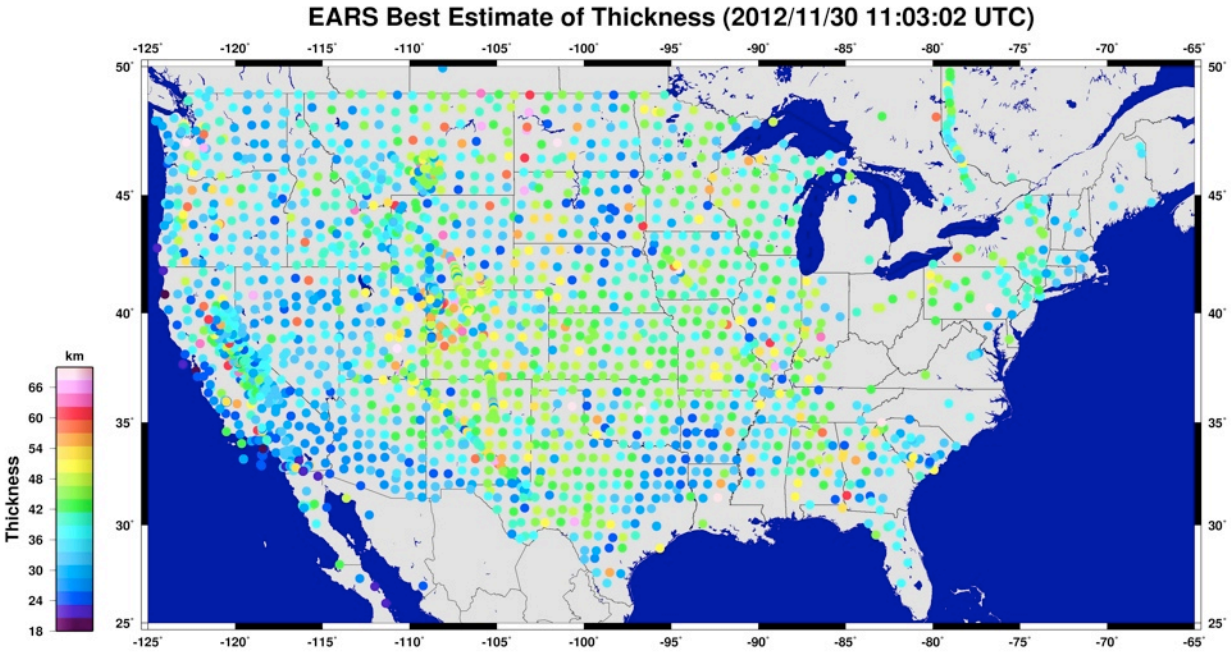
However, reverberations in crustal layers also generate dispersive effects. In this project we shall wish to calculate the dispersive effect on P and S waves for several hundred stations in the US-Array deployment:

This array has now allowed us to estimate the crustal thickness beneath each station, and makes it possible to predict the dispersion of an incoming seismic body wave that reverberates between the bottom of the crust (the Moho) and the surface. In a first phase of the project we shall recuperate the latest estimates for crustal thickness and average crustal velocities beneath each station. For a number of target distances to the epicenter,

we shall construct maps of predicted dispersion. For a small number of earthquakes we then measure the dispersion, to evaluate the importance of the `crustal effect'.

If (as we suspect) we need to correct for the crustal effect this project may lead to a larger project at the Master 2 level, in which we develop a correction method that can be used for the global data set of P and S wave delay times.

The following figure summarizes our most current information on crustal thickness beneath the US Array stations in North America:



The research will be done in the seismology laboratory of Geoazur in Sophia Antipolis.

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