Result 1.

Body waves:
- Travel faster and therefore arrive earlier than surface waves.
- More impulsive
- Shorter period
- Lower amplitude
- P and SV waves in the vertical and longitudinal components. SH in the transverse component.

Surface waves:
- Travel slower (Love waves faster, $V_L = \beta$, than Rayleigh $V_R \approx 0.91 * \beta$)
- Exhibit dispersion
- Longer period
- Higher amplitude
- Rayleigh in the vertical and longitudinal components. Love in the transverse component.

The S wave is predominantly SV polarized (lowest component in the transverse component)

Result 2

Event Origin Time = 12:40:13

Phase	**Arr. Time**	**Travel time**	**Group Velocity**	**Depth of Sensitivity (IASP)**
P	12:50:43	0:10:30	13.1746	2271 km
S	13:01:48	0:21:35	6.409266	1000km
Love beg.	13:11:04	0:30:51	4.484063	71 km
Love end	13:21:04	0:40:51	3.452579	20km
Rayleigh beg.	13:14:16	0:34:03	4.062653	71 km
Ray. End	13:29:04	0:48:51	2.877947	20 km

Rayleigh/Love = 0.906 → Close to the value for a Poisson's ratio of 0.25

Result 3. See table above

Although the depth of penetration of the surface waves is deep (until the moho), they are much shallower than the body waves. Furthermore, as expected, the last waves to arrive in the surface wave train travel to much shallower depths.

Result 4.

$$\lambda = V * T$$

Love wave length = 215 – 41 km

Rayleigh wavelength = 194 – 46 km

The wavelengths are consistent with the inferred depth of sensitivity for each of the wave types. In fact, if a quarter wavelength is assumed then the correlation between quarter wavelength and depth is very accurate. Clearly longer wavelengths penetrate deeper into the earth.

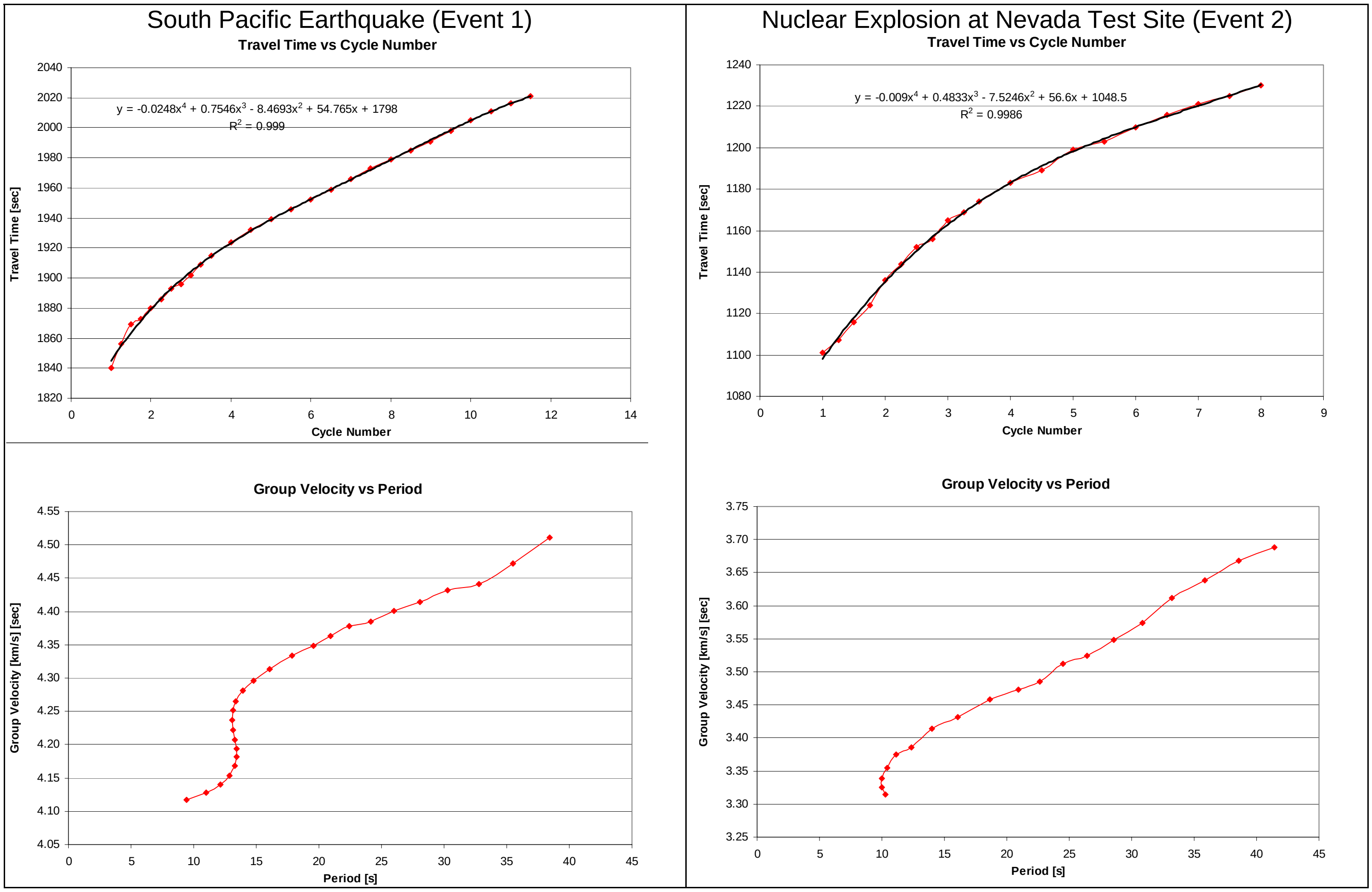
Result 5 & 6

Event origin time = 15:13:02

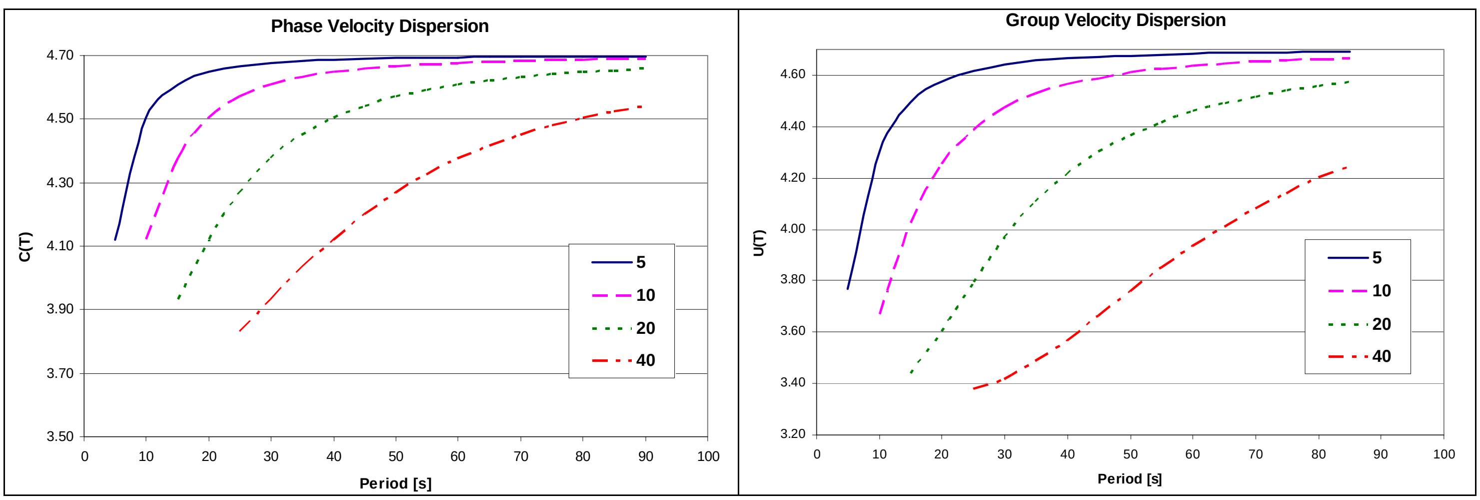
Phase	**Arrival time**	**Trav. time**	**Group vel.**	**Wavelenth (km)**
Love beg	15:31:50	0:18:48	3.599291	223km
Love end	15:33:50	0:20:48	3.253205	32km

The velocity of these Love waves is very slow indicating the wave is propagating in the crust. The wavelength of the longest period is very long with respect to the depth (-20 km). The shorter wavelength is consistent with the depth of sensitivity. Once again, longer wavelengths penetrate deeper into the earth.

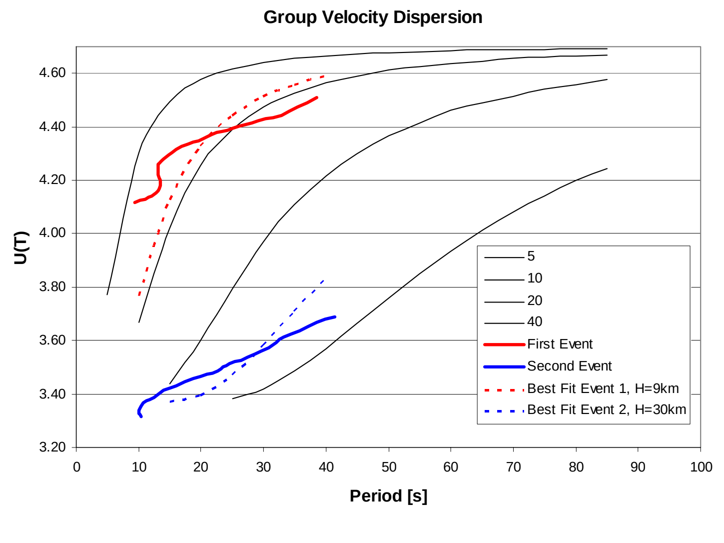
Result 7, 8.



Result 9, 10, 11.



Result 12.



The fit is not great because the model is based in a layer over a half space, which is not exactly the earth structure for the travel paths.
13) Although the fit is not perfect, it does shows how the continental crust is much thicker (about 30km in this model, for the second event) than the ocean crust (about 9km in this model, for the first event). This is in accordance with studies of the earth structure.
In fact, the path for event one is oceanic. This is manifested by the relatively fast upper mantle velocity seen in the observed group velocity curve. The path for event two is continental. Love wave dispersion effectively distinguishes the differences between oceanic and continental crust and upper mantle structure.

14) If we are able to clearly decompose the three directions of motion into Vertical, Longitudinal and Transverse, this would give the azimuth of the event. In order to differentiate these components, the Love and Rayleigh waves would be clearly separated because of the difference in their velocities and the long distance they have traveled. By rotating the measured components until the Love waves are present only (theoretically) on one component, we would be able to estimate the event's azimuth.
Also, since the dispersion for oceanic and continental paths is so different it is possible to, with adequate training, estimate the path given knowledge of where the station is with respect to oceanic and continental paths. At Berkeley if the dispersion is oceanic then the azimuth is from the west, where as if the dispersion is continental then the azimuth may be between 0-180 degrees.

Result 15.
For mixed paths the determination of group velocity by dividing distance by traveltime will yield an average value over the path. If a path traverses both oceanic and continental regions then the obtained group velocity would be faster than the continental value and slower than the oceanic value.
Clearly, the very big difference in thickness between the two crustal layers in the two environments would complicate the analyses.

Result 16.
Love waves are produced due to boundary conditions of the propagating SH waves. Shear waves cannot travel in fluid, and therefore the ocean bottom becomes the surface boundary. Therefore, the calculations do not include a water layer.
Rayleigh waves, although are created in part due to p-waves, which can travel in water, they also need SV waves to propagate. Again, SV waves cannot travel in fluid medium, and therefore, the ocean floor is the boundary.

Result 17.
Rayleigh waves should be observed, however Love waves should not because p-waves and SH waves are completely deoupled.