

**Extracting Short-period Surface Waveforms From Seismic Noise for the Purpose of
Estimating Local and Near-Regional Velocity and Attenuation Structure**

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FINAL REPORT

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1. Work Completed

As reported in the previous quarterly report, three main research areas were investigated during this research effort:

- a) Developing time-frequency analysis tools to improve the measurements of group-speed estimates from the ambient noise cross-correlation waveform. The developed methodology was applied to the cross-correlation waveform obtained from seismic noise recorded southwest of the Hawaiian Islands
- b) The “straight ray hypothesis”. used in our previous tomographic inversion from Sabra et al. [2005a] was systematically investigated using a two dimensional ray propagation code, in Matlab. Significant curvature of the ray path was predicted, especially in the basin areas and its surroundings due to the strong velocity contrast existing in Southern California. Such variations should thus be accounted for to improve surface wave tomography maps.
- c) The ambient noise cross-correlation technique was applied to the problem of Detecting temporal changes around the Parkfield section of the San Andreas Fault associated with large regional and teleseismic earthquakes. The goal is to better understand the response of fault zone material (i.e., temporal changes of fault zone) to the teleseismic/regional events using ambient noise cross-correlation . In particular the influence of the number of stacking days (from 1 to 30) used for each cross-correlation waveforms, as well as the influence of the sensor pair locations (to infer spatial variations of the velocity changes around the San Andreas Fault) was demonstrated.

2. Properties Acquired:

None.

3. Reports, Articles and Presentations:

- Zhao, Z. Peng, K.G. Sabra “High-resolution temporal changes around the Parkfield section of the San Andreas Fault “ for special issue of Earthquake Science (EQS) on ambient noise seismology. (accepted for publication)
- P. Zhao, Z. Peng, K.G. Sabra “Monitoring temporal changes around the Parkfield section of the San Andreas Fault from ambient noise cross-correlations“, article in preparation for Geophysics Research Letters.

4. Finances

The budget has been spent accordingly to initial budget estimate.