



Investigating the crustal reflections of Taiwan from autocorrelation of seismic noise

Zhuo-Kang Guan and Hao Kuo-Chen

Department of Earth Sciences, National Central University, Taoyuan City, Taiwan (s12085240@hotmail.com)

Seismic interferometry is widely applied in various scales to reconstruct seismic signals for investigating Earth interior. The method of Phase Cross Correlation (PCC) takes less pre-processing and is more stable for retrieving of crustal signals than that of the conventional cross correlations by using amplitude information. In order to obtain the crustal reflectors in Taiwan, we applied auto-correlation with PCC to two independent datasets, (1) temporary seismic array in eastern Taiwan with 110 short period seismometers and (2) broadband seismic arrays (BATS and TAIGER) in Taiwan. As a result, the retrieved crustal reflectors, such as Moho reflectors, are stable with different recording time periods and instruments: temporal and spatial signal consistencies in the same site and neighborhood stations, respectively, and also high waveform similarities between short period and broadband seismometers.

Comparing the results with previous studies of velocity model and receiver function, the reflections at 10-12 seconds (roughly 30-40 km) are often observed in most of the results which are correlated to the Moho depths inferred from the receiver function and tomography studies. It is interesting to note that, besides the Moho reflections, some inter-crustal reflectors beneath the Central Range are revealed. The results show that the autocorrelation method has the potential to investigate some signals that are difficult to observe in the past by using other methods.

Another interesting observation from a dense seismic array in eastern Taiwan shows that the chimei fault serves as a sharp boundary to separate the reflectional signals into the northern and southern parts. In the southern part few reflections can be observed and also lack high frequency energies from autocorrelation comparing with those in the northern part. It implies that the distribution of ambient sources or near surface materials could influence the results. After examining the PCC's feasibility and stability in this study, it is necessary to verify the reliability of results by understanding the source's properties and local geological situations before interpretation.