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Imaging Subsurface Structure of Tehran/Iran region using Ambient Seismic Noise Tomography

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Tehran, capital of Iran, is surrounded by many active faults (including Mosha, North Tehran and North and/or South Rey faults), however our knowledge about the 3D velocity structure of the study area is limited. Recent developments in seismology have shown that cross-correlation of a long time ambient seismic noise recorded by pair of stations, contain information about the Green's function between the stations. Thus ambient seismic noise carries valuable information of propagation path which can be extracted. We obtained 2D model of shear wave velocity (Vs) for Tehran/Iran area using seismic ambient noise tomography (ANT) method.
In this study, we use continuous vertical component of data recorded by TDMMO (Tehran Disaster Mitigation and Management Organization) and IRSC (Iranian Seismological Center) networks in the Tehran/Iran area. The TDMMO and IRSC networks are equipped with CMG-5TD Guralp sensor and SS-1 Kinemetrics sensor respectively. We use data from 25 stations for 12 months from 2009/Oct. to 2010/Oct.
Data processing is similar to that explained in detail by Bensen et al. (2007) including processed daily base data. The mean, trend, and instrument response were removed and the data were decimated to 10 sps.
One-bit time-domain normalization was then applied to suppress the influence of instrument irregularities and earthquake signals followed by spectral normalization between 0.1-1.0 Hz (period 1-10 sec). After cross-correlation processing, we implement a new stacking method to stack many cross-correlation functions bases on the highest energy in a time interval which we expect to receive the Rayleigh wave fundamental mode. We then obtained group velocity of Rayleigh wave by using phase match filtering and frequency-time analysis techniques. Finally, we applied iterative inversion method to extract Vs model of shallow structure in the Tehran/Iran area.