

3-D Velocity Structure and Seismicity around the Shanchiao Fault in Northern Taiwan

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Shanchiao fault, characterized by a normal fault, located in northern part of Taiwan with NNE strike. The most populated region in Taiwan, Taipei Basin, Tatum volcanic zone, and two nuclear power plants (Chinshan and Kuosheng) are all in the study area. Understanding the underground velocity structure and the characteristics of Shanchiao fault activity in this area is essential. However, the local seismicity is relatively low, and the lack of medium and large-scale earthquakes in the area. By contrast, there are a few micro-earthquake in this area. In order to improve the resolution and increase ray path coverage, we deployed a dense microearthquake monitoring network with more than 40 stations, including 13 new real-time broadband station and dozens of permanent stations by five organizations (CWB, TVO, IES, NCREE, ITRI). The events detected by this network were used to invert the P wave velocity (V_p) and P wave to S wave velocity ratio (V_p/V_s) structure in the study area. After the preliminary locating of events, we applied the double-difference tomography (tomoDD), which is a method to solve for the 3-D velocity structure and more precise earthquake relocation. Using both the absolute and differential arrival time data, we can reconstruct the one-dimensional and three-dimensional structure of V_p , and V_p/V_s . The results can be estimated tomographic appearance of the Shanchiao fault, as well as the adjacent Tatum volcanic zone underground velocity structure profile. At the same time we are not only able to get the correlation between seismic events and fault structure, but also to more understand the seismogenic process around the Shanchiao Fault.