Three dimensional crustal \( V_p \) structure beneath the Pearl River Estuary from joint onshore-offshore seismic experiment

Liwei Wang\(^1,2\), Xiuwei Ye\(^1\), Xiaona Wang\(^1\), Zuoyong Lv\(^1\), Yunpeng Zhang\(^2\), and Baoshan Wang\(^2,3\)

\(^1\)Guangdong Provincial Key Laboratory of Earthquake Early Warning and Safety Diagnosis of Major Projects, Guangdong Earthquake Agency, Guangzhou, 510070, China
\(^2\)Key Laboratory of Seismic Observation and Geophysical Imaging, Institute of Geophysics, China Earthquake Administration, Beijing, 100081, China
\(^3\)School of Earth and Space Sciences, University of Science and Technology of China, Hefei, 230026, China

The Pearl River Estuary (PRE) area is located in the northern margin of South China Sea (SCS), which is a typical rifted passive continental margin between the South China Block and SCS Basin. The Littoral Fault Zone (LFZ) crossing the PRE is an important seismogenic and boundary fault. Strong earthquakes occurred in both the west and east segments. While, the middle segment of the LFZ in PRE area is lack of large earthquake and possibly a seismic gap. Imaging the fine structure of the PRE area is helpful to understand the background of the spatial heterogeneity of seismicity. To explore the crustal structure of the PRE area, we carried an active-source experiment in July 2015. During the experiment, an airgun array composed of four individual airguns with total volume of 6000 \( \text{m}^3 \) mounted on SCSIO’s R/V Shiyan II was used as the seismic source. A total of 12200 shots were fired every 300 meters along 10 NW and 3 NE-trending shooting profiles. Six dynamite sources with a charge range from 1000 to 2500 kg were also shot on the land. During the experiment, 431 receivers including 29 ocean bottom seismographs (OBS), 256 short period seismometers, and 146 broadband seismometers were available. We manually picked \( P_g \) arrivals from the airgun and dynamite sources. We calculated a minimum 1D velocity model by VELEST. We then obtained the upper crust \( V_p \) structure using three-dimensional seismic tomography. Our preliminary result reveals that the \( V_p \) is consistent with local geological settings. There are low velocity anomaly beneath the LFZ and obvious velocity anomalies across the NW- and NE-trending active faults, which maybe potential threat to the Greater Bay Area.