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郯庐断裂带鲁苏皖段及邻区地壳速度结构

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Crustal velocity structure beneath the Shandong-Jiangsu-Anhui segment of the Tancheng-Lujiang Fault Zone and adjacent areas

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摘要

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摘要 郯庐断裂带是我国东部规模最大的深断裂带. 为了揭示该断裂带的深部结构, 本文利用江苏、安徽、山东、上海和浙江地震台网记录的近震到时资料, 对8700个地震事件重新精确定位, 进而开展了多震相地震走时成像法反演地壳速度结构. 通过分析郯庐断裂带鲁苏皖段及邻区三维地壳速度结构图像, 发现(1)研究区内不同构造块体具有差异明显的地壳速度结构, 即下扬子断块总体速度偏低, 华北断块速度高于下扬子断块, 大别断褶带和苏鲁断块整体速度最高; (2)在上地壳5~15 km内苏鲁超高压变质岩带的P波速度明显高于其他地区, 中地壳速度与周围区别不大, 但下地壳该区域速度也较高; (3)在20~25 km深度范围内, 30° N~36° N, 115° E~124° E间显示为低速异常区, 研究区内发生的中强地震与该低速异常区分布有较强的空间对应关系; (4)莫霍面总体呈现西深东浅, 南深北浅的形态; (5)研究区内沿郯庐断裂带速度结构呈现分段性, 反映了不同构造块体间的速度差异, 郯庐断裂带具有明显的构造块体边界特征.

关键词: 郯庐断裂带鲁苏皖段及邻区 三维地壳速度结构 苏鲁超高压变质岩带 低速区与中强震

Abstract: The Tancheng-Lujiang fault zone is the largest deep fault zone in eastern China. The 8700 local seismic events recorded by the network across Jiangsu, Anhui, Shandong, Shanghai and Zhejiang Province are relocated. We developed a multiphase travelt ime inversion (MUTI) algorithm to inverse crust velocity structure. The 3-D velocity structure beneath the Shandong-Jiangsu-Anhui segment of the Tancheng-Lujiang fault zone and adjacent areas was imaged by seismic tomography. The result shows that the crust can be divided into upper, middle and lower crust. We found the following features: (1) There are evident velocity differences among different tectonic units in the research area: lower velocities in the lower Yangtze fault block, intermediate in the China-Korean fault block, and higher in the Dabie-Sulu block. (2) The P-velocities of UHPM belt are higher than adjacent areas in the upper crust and lower crust, especially at depths of 5~15 km; (3) There are low-velocity areas in the range of 30° ~36° N, 115° ~124° E at depths 20~25 km. There is spatial correlation between lower velocity areas and major earthquakes. (4) The Moho depths are deeper in the southwest and shallower in the northeast. (5) The velocity structure of the Tancheng-Lujiang fault zone in the research area exhibits segmentation, and velocity differences exist among various tectonic units, which indicate that the Tancheng-Lujiang fault zone is a boundary among different geological blocks.

Keywords: Shandong-Jiangsu-Anhui segment of Tancheng-Lujiang Fault Zone and its adjacent area 3-D crustal velocity structure Crustal structure of Su-Lu UHPM belt Lower velocity area and major earthquakes

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