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三河—平谷8.0级地震区地壳结构和活动断裂研究——利用单次覆盖深反射和浅层地震剖面

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Research on crustal structure and active fault in the Sanhe-Pinggu Earthquake (M8.0) Zone based on single-fold deep seismic reflection and shallow seismic reflection profiling

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摘要

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摘要 跨1679年三河—平谷8.0级地震区完成的单次覆盖深地震反射剖面 and 浅层地震反射剖面, 揭示了三河—平谷地震区的地壳结构和断裂的深、浅构造特征. 结果表明, 该区地壳以TWT6~7 s左右的强反射带为界分为上地壳和下地壳, 上地壳厚约18~21 km, 下地壳厚约13~15 km. 剖面揭示的地壳深断裂和浅部活动断裂具有上下一致的对应关系, 其中, 陡倾角的深断裂切割了下地壳和壳幔过渡带, 向上延伸至上地壳, 将地壳深部构造与浅部活动断裂联系在一起, 这种深、浅共存的断裂构造体系是控制该区地震孕育和发生的重要因素, 也是三河—平谷8.0级地震的深、浅构造背景.

关键词: 三河—平谷地震区 地壳结构 初至波层析成像 深浅构造特征 断层活动性

Abstract: The crustal structure and deep-shallow tectonic features of the Sanhe-Pinggu Earthquake (M8.0, 1679) Zone are explored by using a single-fold deep seismic reflection profile and a shallow seismic reflection profile. The results show that the crust beneath the investigated area is divided into upper and lower crust by a strong reflective zone at about 6~7 s TWT. The thickness of the upper and lower crust is about 18~21 km and 13~15 km, respectively. The seismic reflection profile reveals that the deep fault in crust coincides well with the active fault in the shallow subsurface. Among all the faults, the deep fault has a larger dip angle, and it cuts the lower crust and crust-mantle transitional zone. This deep fault extends upwards into the upper crust, and joins the crustal deep structure to the shallow active fault. The complex faults and crustal structures in deep and shallow are the tectonic background for Sanhe-Pinggu Earthquake, which controlled the earthquake activity in the area.

Keywords: Sanhe-Pinggu Earthquake Zone Crustal structure First arrival wave tomographic imaging Deep-shallow tectonic feature Fault activity

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