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甘肃天水地区地壳上部二维速度结构成像研究

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2-D velocity images of upper crust in Tianshui area, Gansu Province

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摘要 利用有限差分和不规则网格最小二乘正反演算法,对青藏高原东北缘暨西秦岭天水—武都地区两条高分辨人工地震测深剖面的Pg波走时进行层析成像反演,结果显示该区基底界面起伏较大,构造复杂,断裂丰富、较陡且延伸较大,多数断层切割基底.礼县-西和之间的低速异常反映了沉积盆地的结构特征,结晶基底深度在5 km左右.武山以东速度等值线横向变化明显,表现为褶皱.成县盆地速度变化平缓且速度值相对较高,基底埋深较浅,深度不到3 km.礼县附近存在一条近南北断裂,5 km深度以下有明显的上涌低速异常,可能为青藏高原深部幔源物质上升的通道.

关键词 南北构造带, 秦岭造山带, 人工地震勘探, 有限差分层析成像

Abstract: We used the Pg-wave arrival times from high-resolution active-source seismic sounding to carry out the tomographic job on the northeastern margin of Qinghai-Tibet plateau, that is, the Tianshui-Wudu area in West Qinling, with finite difference forward and least squares inversing algorithm with irregular meshes. The results indicate that the study area has rich and complex fractures, such as the fluctuant basement and the steep faults mostly extending to great depths and cutting through the basement. The low-velocity zone between Lixian and Xihe reflects the existence of Xi-Li sedimentary basin, the basement of which is about 5 km deep. The pronounced changing of the velocity contour on the east of Wushan is consistent with the fold region nearby. The Chengxian basin has a relatively high and gently changing velocity,the basement depth of which is less than 3 km. Near Lixian there is a near north- south fault, and a low-velocity zone exists beneath about 5 km depth in the tomographic profile, which may be the upwelling channel of the deep mantle substance in the Tibetan Plateau.

Keywords North-south tectonic belt, Qinling orogenic belt, Seismic exploration, Finite-difference tomography

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