

利用地震面波频散重建川滇地区壳幔S波速度

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摘要 利用适配滤波频散分析技术分析覆盖川滇地区的长周期面波记录, 计算了周期10~100 s内的面波群速度频散, 对研究区进行划分尺度大小 $1.5^{\circ} \times 1.5^{\circ}$ 分格后, 采用射线追踪方法求取各分段射线的长度和时间, 得到各个格子的纯路径频散。继而采用阻尼最小二乘法求解, 反演得到该研究区壳幔S波速度分布。研究表明, 川滇地区表现出地壳增厚和缩短, 在地壳和上地幔顶部, 川滇菱形块体内部与其外部相比, 虽然存在局部速度负异常, 总体上呈相对高速, 其周边的走滑断裂带呈现深至上地幔顶部的负速度异常, 这有助于地壳块体沿断裂的侧向挤出; 此外, 云南西部和四川西部壳内和上地幔高导层的存在被认为是与部分熔融的物质或与滑脱构造相关; 从纬向剖面和经向剖面可以得到四川盆地莫霍面平均深度大约为45 km, 云南地区莫霍面深度南北方向不一致, 云南地区最北端深度达到49 km, 南端莫霍面深度大约为36 km, 这说明不同构造块体在构造运动过程中受到影响的程度不同。

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Reconstruction of the S-wave velocity structure of crust and mantle from seismic surface wave dispersion in Sichuan-Yunnan Region

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Abstract We apply the technique of matched filter frequency time analysis to process long period surface wave data covering Sichuan and Yunnan regions, and then obtain the surface wave group velocity dispersion in the period range 10~100 s. Then we use the grid inversion method to extract pure path dispersion in the grid of $1.5^{\circ} \times 1.5^{\circ}$ after getting the distance and time in the grid of the study area by ray tracing, at the same time, we employ the damped least-square method to determine the crust-mantle S wave velocity structure in the Sichuan and Yunnan region. The result shows that the crust of the region is thickened and shortened. In spite of some local low velocity anomalies, the crust and uppermost mantle of the rhombic Chuan-Dian block as a whole have relatively high velocity as compared with the surrounding areas. The peripheral strike-slip faults display negative velocity anomalies down to the top of upper mantle, which facilitates the lateral extrusion of crustal blocks along the faults. The high conductivity layer in the crust and upper mantle in western Yunnan and Sichuan is connected with partial melting or detachment structure. The average depth of Moho of Sichuan basin is about 48 km. The Moho in Yunnan reaches 58 km in the north end and is about 51 km in the south end, which proves that different blocks are affected differently by tectonic movement.

Key words [Frequency-time analysis](#); [Surface wave dispersion](#); [Crustal and upper mantle structure](#); [Thickness of the crust](#); [S wave velocity](#)

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