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## 华北克拉通中西部地区地壳厚度与波速比研究

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Study on crustal thickness and velocity ratio in mid-western North China Craton

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摘要

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**摘要** 本文使用华北科学台阵和中国国家地震台网164个地震台站记录的远震波形资料,用最大反褶积方法提取接收函数,采用接收函数 $H-k$ 叠加方法得到了各台站下方的地壳厚度和波速比. 研究表明,华北克拉通中西部地区的地壳厚度由东向西加深,其中东部的华北平原地区地壳厚度介于30~33 km,中部的燕山—太行地区地壳厚度介于33~40 km之间,西部的鄂尔多斯块体地壳厚度达40~42 km. 研究显示该区的地壳平均波速比与地壳厚度没有明显相关性,这可能与该区地壳厚度、地壳组成横向变化异常强烈有关. 研究区的地壳平均波速比介于1.68~1.86之间,东部盆地地区台站下方的波速比变化较大,多数分布于1.70~1.80之间;山区平均波速比主要集中分布于1.70~1.77之间,暗示山区块体较东部盆地地区地壳组成更富长英质,而缺少铁镁质成分. 该区地壳厚度与地形高度具有很好的相关性,其斜率为6.6,较青藏高原东缘地区的斜率更高,通过分析表明,华北克拉通中西部地区上地幔顶部岩石密度相对较低,为古老的、低密度难熔的、富镁贫铁的克拉通,可为地壳提供更大的浮力.

**关键词:** 华北克拉通 接收函数 地壳厚度 波速比

**Abstract:** In this study, broadband seismic records from 164 digital seismic stations of the North China Seismic Array and the China Digital Seismic Network were used to compute crustal thickness and velocity ratio ( $V_p/V_s$ ) using the receiver function method and  $H-k$  stack. The results show that the crustal thickness of mid-western North China Craton deepens from east to west, the thickness is about 30~33 km in eastern plain area, 33~40 km in Yanshan-Taihangshan area and 40~42 km in Ordos block. The results also demonstrate that the correlation between the crustal average velocity ratio and the crustal thickness is not obvious, which may be related with intensive lateral variety of crustal thickness and crustal composition in the research area. The crustal average velocity ratio is about 1.68~1.86, it is mostly between 1.70 and 1.80 and changes slightly in the eastern plain area; and it is mainly between 1.70 and 1.77 in the mountain area, which suggests that the crustal composition of the mountain area has more felsic matters and lacks mafic minerals. In the research area, the relevance between the crustal thickness and the elevation is distinct, the slope is 6.6, which is higher than that in eastern Tibetan Plateau. The study results indicate that the rock density of the top of upper mantle in mid-western North China Craton is comparatively lower, and the craton is an ancient, low density, refractory craton with rich magnesium and poor iron composition, which can provide a greater buoyancy for the crust.

**Keywords:** North China Craton Receiver function Crustal thickness Velocity ratio

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