

引用本文(Citation):

郭震, 唐有彩, 陈永顺, 宁杰远, 冯永革, 岳汉. 华北克拉通东部地壳和上地幔结构的接收函数研究. 地球物理学报, 2012,55(11): 3591-3600,doi: 10.6038/j.issn.0001-5733.2012.11.008

GUO Zhen, TANG You-Cai, John CHEN, NING Jie-Yuan, FENG Yong-Ge, YUE Han. A study on crustal and upper mantle structures in east part of China Craton using receiver functions. Chinese J. Geophys. (in Chinese), 2012, 55(11): 3591-3600, doi: 10.6038/j.issn.0001-5733.2012.11.008

## 华北克拉通东部地壳和上地幔结构的接收函数研究

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A study on crustal and upper mantle structures in east part of North China Craton using receiver functions

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摘要

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摘要 利用北京大学和早期中国科学院地质与地球物理研究所在华北克拉通东部地区布设的共34台宽频带地震仪记录的远震体波资料, 获取P波接收函数和S波接收函数, 再分别通过偏移成像和共转换点叠加(CCP)和倾斜叠加得到了华北克拉通东部横跨郯庐断裂带地区沿剖面的地壳和上地幔速度间断面分布. 研究表明, 鲁西隆起下方的莫霍面的深度要比华北盆地和青岛地区浅约5 km, 形成类似屋顶状的莫霍面隆起. 郯庐断裂带和聊考断裂带下方的莫霍面有明显的错断. 岩石圈与软流圈的分界面(以下简称LAB)的深度从太行山山前的约100 km深度上升到鲁西隆起下方约60 km深, 向东在青岛地区下方LAB深度进一步变浅. 我们利用倾斜叠加计算台站下方波速比得到地壳内的泊松比变化, 结果显示鲁西隆起泊松比值分布相对均匀, 而青岛地区内泊松比变化剧烈, 可能反应了该地区作为苏鲁大别超高压变质带的北缘经历了较为复杂的地质演化过程.

关键词 华北克拉通, 地壳和上地幔间断面, S波接收函数, LAB, 泊松比, 鲁西隆起, 苏鲁大别超高压变质带

Abstract: The P-wave and S-wave receiver function analysis has been performed along a profile which consists of 34 broadband seismographs to image the crustal and upper mantle structure in east part of North China Craton (NCC). The results reveal that the Moho interface lies at a depth of more than 30 km below the North China basin and shallows to less than 30 km in the West Shandong (Luxi) uplift which displays a dome-like shape. This Moho depth jump is roughly coincident with the transverse location of the Liaokao fault. An obvious uplift of the Moho is also detected below the Tanlu fault zone, which reflects that the fault may cut through the Moho under it. The lithosphere-asthenosphere boundary(LAB) is observed ~100 km beneath the Taihang orogenic belt and increases to ~60 km below the Luxi uplift. Farther eastward, it seems to be shallower beneath the Qingdao region. We also apply the slant-stack method to determine Poisson's ratio. The result shows rather uniform distribution of Poisson's ratio in the Luxi uplift. In contrast, it is much variable in the Qingdao region which is the north part of the Sulu-Dabie ultra-high-pressure metamorphic belt, implying a more complex evolution history.

Keywords North China Craton, Discontinuity of crust and upper mantle, S receiver function, LAB, Poisson's ratio, Luxi uplift, Sulu-Dabie ultra-high-pressure metamorphic belt

Received 2012-06-10;

Fund: 国家自然科学基金项目(90814002,40821062)资助.

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