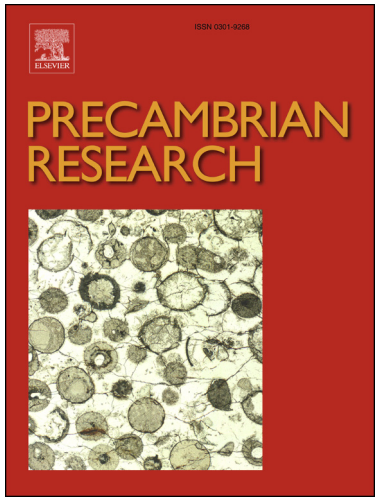

Evidence for a crustal root beneath the Paleoproterozoic collision zone in the northern Ordos block, North China

Chun-Yong Wang, E. Sandvol, Hai Lou, Xingchen Wang, Yongshun Chen

PII: S0301-9268(17)30239-5
DOI: http://dx.doi.org/10.1016/j.precamres.2017.09.009
Reference: PRECAM 4881

To appear in: *Precambrian Research*

Received Date: 4 May 2017
Revised Date: 15 September 2017
Accepted Date: 16 September 2017

Please cite this article as: C-Y. Wang, E. Sandvol, H. Lou, X. Wang, Y. Chen, Evidence for a crustal root beneath the Paleoproterozoic collision zone in the northern Ordos block, North China, *Precambrian Research* (2017), doi: http://dx.doi.org/10.1016/j.precamres.2017.09.009

Evidence for a crustal root beneath the Paleoproterozoic collision zone in the northern Ordos block, North China

Chun-Yong Wang[a,b], E. Sandvol[c], Hai Lou[b], Xingchen Wang[a,b], Yongshun Chen[d]

[a] Key Laboratory of Seismic Observation and Geophysical Imaging, China Earthquake Administration, Beijing 100081, CHINA

[b] Institute of Geophysics, China Earthquake Administration, Beijing 100081, CHINA

[c] Department of Geological Sciences, University of Missouri, MO 65211-1380, USA

[d] Beijing University, Beijing 100161, CHINA

Abstract

Recent studies have shown that Paleoproterozoic rocks, called the Khondalite Belt, crop out along a nearly EW-trending zone in the northern edge of the Ordos block, North China. This widely distributed Khondalite rock suggests that they originated in the margin of a passive continent during the Paleoproterozoic Era. Seismic stations deployed in the northern Ordos block and its adjacent regions provided abundant information on crustal thicknesses and Vp/Vs ratios, which were determined by use of receiver function *H*-κ stacking. The *H*-κ stacked images show an approximately EW-trending anomalous zone with thickened crust (~46.5 km) and a higher Poisson's ratio (0.28) beneath the Khondalite Belt in the Paleoproterozoic collision zone. Based on the long-wavelength information of gravity anomalies, a two-dimensional crustal density model indicated that a crustal root with a density contrast of 130 kg/m^3 between the root and surrounding mantle is required for the isostatic gravity compensation. The ratio of surface elevation to crustal root thickness was 0.02, suggesting that the exhumation of the crustal root in response to surface erosion continued to occur over time scales of hundreds of millions of years. This crustal thickening model is evidence for the crustal root beneath the Paleoproterozoic collision zone in the northern Ordos block. As the density contrast becomes smaller, the amount of isostatic rebound in response to erosion also decreases, and therefore the crustal root is maintained.

Keywords Northern Ordos block; Paleoproterozoic collision; Teleseismic receiver function; Crustal root; Isostatic compensation

Highlights: Crustal root is in the collision zone; Thickened crust remains; High Poisson's ratio

1. Introduction

The North China Craton (NCC) formed in the Archean–Paleoproterozoic and was stable before the Mesozoic. Since the late Mesozoic, the tectonic movement of the eastern and western regions of the North China block has been differentiated. Additionally, since the Mesozoic, the eastern NCC has experienced intense transformation where the lithosphere has thinned (Menzies