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AN: **V32A-02**
TI: Phanerozoic Evolution of Lithospheric Mantle beneath the North China Craton: Evidence from Change in Oxidation State
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AB: We examined representative mantle xenoliths from two areas of the Archean North China Craton (NCC). Eight xenoliths come from the Mesozoic high-Mg diorites in the Laiwu area, western Shandong Province, close to the Qinling-Dabie-Sulu UHP zone, and 19 from the Cenozoic alkali basalts in the Longgang area, eastern Jilin Province, close to the northern margin of NCC. Therefore, these peridotites represent Mesozoic and Cenozoic Subcontinental Lithospheric Mantle (SCLM) underlying the NCC, respectively. Oxidation state (fO2) was calculated using the Spl-Ol-Opx oxybarometry and the Ol-Spl Fe-Mg exchange thermometry of Ballhaus et al. (1991). The xenoliths in Mesozoic diorites are mainly dunite with <5% harzburgite. Harzburgites are generally thought to be residue after influx partial melting, as supported by Re-depletion model ages of ~ 2.6 Ga (e.g., Gao et al. 2007). However, the studied harzburgites show variable Mg in olivine (Fo=88-93) and moderate Cr in spinel (Cr# =0.4-0.6), suggesting that our samples have undergone metasomatism by a low-Mg melt. The dunite samples are characterized by high Mg in olivine (Fo = 90-94) and high Cr in spinel (Cr#>0.7). Both dunites and harzburgites are oxidized, with fO2 ranging from △FMQ+1.02 to +2.4 (median at △FMQ+1.92), similar to that of sub-arc mantle xenoliths. The temperatures for dunite and harzburite are calculated to be 640-820oC and 690-800oC, respectively. Xenoliths in the Cenozoic volcanic rocks in northern NCC are mainly lherzolites with minor harzburgites (<10 %), with both characterized by moderate Mg in olivine (Fo = 89-91) and low Cr in spinel (Cr# = 0.1-0.35). These peridotites indicate temperatures ranging between 810-1020oC, and fO2 values ranging from △FMQ -1.2 to +0 (median at △FMQ -0.4), values that are similar to those of abyssal peridotites, as well as the Ronda and Beni Bousera massifs, whcih are tectonically protruded asthenospheric mantle peridotites. Lithospheric mantle underlying major Archean cratons, such as the Kaapvaal and Slave cratons, is known to be in relatively reduced oxidation state (e.g., Woodland and Koch, 2003; McCammon and Kopylova, 2004). Mantle below the NCC has experienced subduction of oceanic lithosphere from the east and south, collision with the

Yangtze craton and major asthenospheric upwelling in Mesozoic; these processes were accompanied by changes in mineral compositions and oxidation state. Our data show that southern part of the NCC was oxidized during Mesozoic subduction and the subsequent collision of the Yangtze craton, whereas mantle below the northern part of the NCC is similar to the asthenospheric mantle. These data are consistent with an earlier proposal that a thick Archean lithosphere was removed in this region, and replaced by asthenospheric mantle before Cenozoic time. Keywords: North China craton; mantle xenoliths; Laiwu; Longgang; oxidation state; subduction; collision; upwelling asthenosphere.
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