CENOZOIC THERMAL AND COMPOSITIONAL STRUCTURE OF THE LITHOSPHERE IN EASTERN CHINA: XENOLITH-DERIVED PROFILE OF THE UPPERMOST MANTLE

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Abstract
Xenoliths from five localities covering the three tectonic domains in eastern China were studied. These xenoliths were found in alkaline basalts and basanites extruded in Miocene and Pleistocene. Xenoliths from Wangqing, northeastern China folding belt, were derived from spn-lherzolite stability field, with the shallowest around the plg-spn lherzolite transition zone, representing a riftting environment. In north China craton, xenoliths from Huinan were more depleted, probably laid at a relatively upper level, whereas xenoliths from Kuandian show much smaller variations in mode contents and mineral chemistry, representing a more primary mantle region. Xenoliths from Xilong and Mingxi, southeastern China folding belt, were derived from spn-lherzolite stability field to spn-grt lherzolite transition zone.

Ca-in-opx thermometer gives lherzolites equilibrium temperatures between 840°C to 1020°C for Wangqing and Kuandian, 920°C to 1060°C for Huinan, and 880°C to 1150°C for both Xilong and Mingxi. Olv-opx-spn/cpx oxybarometers give the xenoliths logfo2(FMQ) between +0.5 to -2.0. Differences in the redox states between the localities and between both recorded by spn and cpx for each locality could be attributed to earlier partial melting, metasomatism, or reoligy.

The primary spinels in Wangqing lherzolites transfered into plg + alkaline feldspar + glass + secondary spn phases, ad still pyroxenes in lherzolites and pyroxenites with plg + alkaline feldspar + glass patches, and primary garnets in Mingxi lherzolites thansfered into spn + opx + cpx + secondary grt corona, indicating that in some northeastern China localities part of lherzolites could be shallow around plg-lherzolite transition zone, and in southeastern localities, a small number of lherzolites could be deep around spn-grt lherzolite transition zone.

The crust-mantle boundary lies at about 30km in northeastern China folding belt and north China craton, about 4km shallower than seismic refraction defined Moho. Plg-spn lherzolite transition zone in some northeastern localities probably around 25km (0.75GPa). Seismic velocity analyses on the xenoliths suggest that the major jump in Vp marking the Moho is caused by a change from dominant pyroxenite in the lower crust to dominant spn-lherzolite in the uppermost mantle. Spn-lherzolites are located at a depth range from 30 to 63km in northeastern China folding belt and north China craton, and about 36 to 83km in southeastern China folding belt.