Proterozoic mantle lithosphere beneath the Khanka massif in Far East Russia: *In situ* Re-Os evidence

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The Os isotope compositions of sulfides in mantle xenoliths from the Sviyaginsky volcano, Far Eastern Russia, reveal the presence of Proterozoic subcontinental lithospheric mantle (SCLM) beneath the Khanka massif. T_{RD} model ages for individual sulfides indicate the oldest age of 2.5 ± 0.5 (2σ) Ga, whereas both their T_{MA} and T_{RD} model ages reveal similaer peak ages at 1.1 and 0.8 Ga, suggesting later thermotectonic events in the SCLM. Our sulfide age data indicate that at least part of the SCLM beneath the Nakhimovka terrain of the Khanka massif, where the Sviyaginsky volcano locates, is Mesoproterozoic, even as old as Paleoproterozoic. The Os peak ages at 1.6 and 1.3-1.1 Ga, especially later correlating with crustal U-Pb and Rb-Sr isochron age, could record either the accretion of a new SCLM volume, or a pre-Central Asia Orogenic Belt (CAOB) event that influenced both the SCLM and overlying crust of the Khanka massif. The most pronounced Os age peak at 0.8 Ga corresponding to the time of amalgamation of the Khanka massif suggests significant mantle involvement during the accretion of the CAOB, supporting the hypothesis that large amounts of juvenile crust were formed during the accretion (Jahn, 2004). The juvenile material added on the Khanka massif during the amalgamation could be part of the juvenile crustal growth in the subduction zone. It is recorded either by less-modified residual sulfides or modified sulfides without Os isotope disturbance, which preserve information on the timing when the mantle melts were add as juvenile material on the Khanka massif. The similarity between the crustal U-Pb dates, Nd model ages, Rb-Sr isochron age and our sulfide Os model ages suggests that the sulfide ages may actually date metasomatic events in the SCLM, related to contemporaneous tectonothermal events in the overlying crust. Therefore, Os modal ages of mantle sulfides in the study provide the first evidence from the SCLM to support that the Khanka massif is an ancient, at least Proterozoic, microcontinent existing prior to the CAOB orogeny.