Os isotope systematics of Ru-Os sulfides and Ru-Os-Ir alloys from the Verkh-Neivinsk and Kunar ophiolite-type complexes (Russia)

I.YU. BADANINA[1*], K.N. MALITCH[1], E.A. BELOUSOVA[2], I.S. PUCHTEL[3] AND V.V.MURZIN[1]

[1]Institute of Geology and Geochemistry UB RAS, Ekaterinburg, 620016, Russia (*correspondence: innabadanina@yandex.ru)

[2]CCFS/GEMOC, Macquarie University, Sydney, NSW 2109, Australia (elena.belousova@mq.edu.au)

[3]University of Maryland, College Park, MD 20742, USA (ipuchtel@umd.edu)

The Os isotopic compositions of Ru-Os sulfides and Ru-Os-Ir alloys have been shown to retain a record of mantle depletion events, owing to their very low Re content and resistance to alteration [1]. This study used EMPA, LA-MC-ICPMS and N-TIMS techniques to explore chemical and Os-isotope compositions of Ru-Os sulfides and coexisting Os-rich alloys within primary platinum-group mineral (PGM) assemblages derived from different in age ophiolite-type complexes (i.e., Paleozoic Verkh-Neivinsk in the Middle Urals, and Neoproterozoic Kunar in northern Taimyr).

A range of subchondritic initial $^{187}Os/^{188}Os$ values obtained for 'primary' Ru-Os sulfides and Ru-Os-Ir alloys at Verkh-Neivinsk (0.11619–0.12565) and Kunar (0.11848–0.12239) are clearly indicative of derivation from a long-term Re-depleted source. The LA-MC-ICPMS data identify a restricted range of subchondritic initial $^{187}Os/^{188}Os$ values for coexisting laurite and Os-rich alloy pairs that form 'primary' PGM assemblage at Verkh-Neivinsk (e.g., 0.11774–0.11786), which is close to a $^{187}Os/^{188}Os$ value of single Os-Ru-Ir alloy measured by N-TIMS (0.117214±0.000001, $\gamma Os_{(440\ Ma)}$=-5.6). T_{RD} ages of PGMs at Verkh-Neivinsk (ca 1.5 Ga) record a much older melting event compared to the age estimates (from 470 to 390 Ma) for the formation of oceanic crust in the Urals. Os-isotope data at Kunar are consistent with a Neoproterozoic age for the formation of the Chelyuskin ophiolite, which is correlated with coeval ophiolites of other Arctic regions and mark the opening of the Paleo-Pacific ocean and the breakup of the Neoproterozoic supercontinet Rodinia between 900 and 700 Ma [2]. Our data imply that the Re-Os system in PGMs has remained closed since the time of their formation, despite later thermal events that affected both ophiolite-type complexes.

The study was supported by RFBR (grant 18-05-00988).

[1] Pearson D.G. et al. (2007) *Nature* **449**, 202-205. [2] Dobretsov N.L. et al. (1995) *Int. Geol. Rev*. **37**, 335-360.