

## **PGE-rich chromitite bands in the Mesoarchean Nuasahi and Sukinda Massifs, Singhbhum Craton (India)**

SISIR K. MONDAL<sup>1\*</sup>, HAZEL M. PRICHARD<sup>2</sup>

<sup>1</sup>Department of Geological Sciences, Jadavpur University, Kolkata-700032, India \*E-mail: sisir.mondal@gmail.com

<sup>2</sup>School of Earth and Ocean Sciences, Cardiff University, Cardiff, UK

The layered Archean Nuasahi and Sukinda ultramafic-mafic complexes of the Singhbhum craton are located in the Orissa state India. These igneous complexes host India's major chromium ore resources and are sill-like bodies within the early Archean Iron Ore Group (IOG) greenstone belts. A Ni-Cu-sulfide and PGE-rich breccia zone is present at the interface between the lower ultramafic and upper gabbro units in the Nuasahi Massif. The Sukinda Massif shows similar breccias in the Katpal area. The upper gabbro unit of the Nuasahi Massif hosts magnetitite ore bands showing a PGE-rich zone. Six chromitite bands in the Sukinda Massif and three chromitite bands in the Nuasahi Massif are interlayered with serpentinized dunite. Based on modal abundances of silicate minerals chromitites bands are massive, clot-textured, schlieren, spotted and anti-nodular in appearance.

Detailed PGE and PGM analyses across the chromitite bands reveal high PGE rich zones within the lodes, for example, chromitite bands from the Sukinda Massif contain total PGEs in the range of 129 ppb (Pd/Ir = 0.03) to 875 ppb (Pd/Ir = 0.45), whereas, the Nuasahi Massif chromitites have PGE concentrations in the range of 147 ppb (Pd/Ir = 0.44) to 552 ppb (Pd/Ir = 0.01). In both the igneous complexes the lower most chromitite band shows higher average PGE contents than the upper level chromitite bands e.g., Sukinda Massif:  $\approx$  467 ppb (n=7); Nuasahi Massif:  $\approx$  414 ppb (n=6).

The PGM grains were identified in the chromitites and found to be dominated by Os-Ir-Ru alloys having varying element ratios from Os-rich to Ir-rich to Ru-rich. Overall the PGM assemblage is sulphur-poor. Laurite grains are located within chromites and also along the cracks. Irarsite and sperrylite grains occur, all associated with cracks in chromite grains. All the As-bearing PGM grains are associated with cracks in the chromite suggesting introduction of As during alteration that altered primary PGM to PGM-arsenides.