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Platinum group minerals (PGM) and gold nuggets from the Uktus Ural-Alaskan type complex (Central Urals, Russia)

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We report results of detailed mineralogical investigation of platinum group minerals and gold nuggets from the Uktus complex. The Uktus massif covers an area of about 50 Km2, and is situated at the periphery of the city of Ekaterinburg. It crops out about 50 km to the east of the southern end of the Ural platinum belt. The studied nuggets were sampled in alluvial-delluvial deposits from 3 small valleys with temporary water flows. The volume of the washed samples varies from 30 to 80 dm3 and a few tens of PGM nuggets have been collected. According to their chemical composition, the most abundant PGM are alloys in the Pt-Fe-Cu-Ni system, iridium and osmium. The following less abundant PGM have been also recognized: sulfarsenides of the irarsite-hollingworthite-platariste serie, sulfides such as laurite, cuproiridiste, kashinite and the sulfantimonide tolovkite. One alloy corresponding to the formula Au2Cu3 has been also analyzed. It shows a distinctive reflectance spectrum, different from those of tetrauricupride. The nuggets of Uktus have a size variable from about 100 microns up to about 2 mm. In some cases, they have a polygonal shape. However, most of them have an irregular morphology and they are characterized by porous rims and zoning. The analyzed nuggets occur as single phase crystals or they are part of polyphase grains, composed of different PGM, such as Pt-Fe alloys + tulameenite + osmium, irarsite + osmium, irarsite + tolovkite and iridium with inclusions of laurite. One nugget is characterized by a very complex texture, being composed of a Pt-Fe alloy associated with osmium and the Au2Cu3. These minerals are in contact with quartz that contains minute blebs of hollingworthite and platarsite. The presence of faceted morphologies on some of the Uktus PGM nuggets suggests that they were mechanically liberated and transported for relatively short distances from their lode deposits. The similarity of the PGM nuggets with the PGM previously reported from the Uktus chromitites, indicate that they are probably the source rocks. The nuggets characterized by a rounded shape and occurring in association with quartz and the Au2Cu3, minerals that have never been found in the chromitites, were probably reworked during some hydrothermal activity.