

GEOCHEMISTRY

New Data on the Platinum Potential of Plutonogenic Gold Deposits in the Upper Amur Region

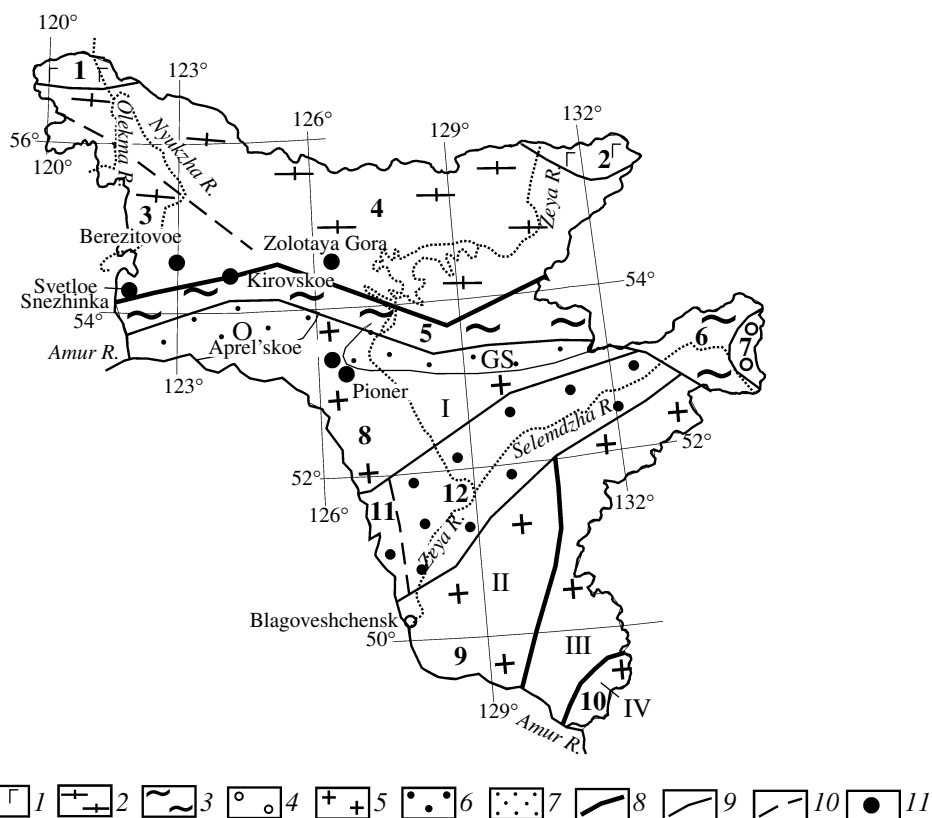
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Received February 27, 2007

DOI: 10.1134/S1028334X07060177

In the Russian Federation, economic-grade concentrations of platinum group elements (PGE) have been detected in many gold deposits, such as Natalka [1],

Zun-Kholba, Irokinda [2], and Sukhoi Log [4]. However, the platinum potential of gold deposits in the upper Amur region has been investigated insufficiently



Positions of Pt-bearing gold deposits and occurrences in geological structures of the Amur region [8]. (1, 2) Megablocks: (1) Aldan; (2) Stanovoi; (3–6) fold and fold–thrust systems: (3) Mongol–Okhotsk; (4) Vandashan–Sikhote Alin; (5) composite massifs: (I) Kerulene–Argun–Mamyn, (II) Sunnen–Turan, (III) Turan, (IV) Bureya–Tsyamus–Khankai; (6) Dasinanlin–Selendzha; (7) marginal troughs: (O) Ol'doi, (GS) Gag–Sagayan; (8) boundaries of mobile belts and platforms; (9) boundaries of shields, megablocks, plates, massifs, and foldbelts; (10) boundaries of blocks, members, and megazones; (11) Pt-bearing gold deposits and ore occurrences. Blocks, megazones, and members: (1) Olekma block, (2) Aldan block, (3) Selenga–Stanovoi block, (4) Dzhugdzhur–Stanovoi block, (5) Yankan–Dzhagda megazone, (6) Galam–Shantar megazone, (7) Badzhal–Gorin megazone, (8) Huma He–Gonzha–Mamyn block, (9) Mukhe megazone, (10) Bureya–Tsyamus–Khankai block, (11) Heiluntszyan member, (12) Selemdzha member.

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Distribution of Au and PGE in hydrothermally altered rocks and ores from plutogenic deposits and occurrences in the upper Amur region

Ore type (number of analyses)	Average content, g/t								
	Au	Pt	Pd	Ir	Os	Ru	Rh		
	Berezitovoe deposit								
Quartz-sulfide aggregate (7)	0.65-1.31	0.07-1.24	0.001-0.47	0.01-0.04	0.01-0.02	0.002-0.004	0.002-0.003		
Vein quartz with sulfides (3)	0.67-2.45	0.11-1.12	0.01-0.19	0.01-0.012	0.01-0.012	0.002-0.004	0.003-0.004		
Garnet-quartz-sericite metasomatite (6)	0.76-2.22	0.22-1.26	0.01-0.21	0.01-0.02	0.002-0.02	0.002-0.004	0.002-0.003		
Quartz-sericite-K-feldspar metasomatite (6)	1.22-4.55	0.55-1.45	0.01-0.14	0.02-0.023	0.02-0.022	0.002-0.005	0.002-0.004		
	Pioner deposit								
Quartz-sulfide aggregate (7)	0.55-1.31	0.54-1.24	0.08-0.47	0.01-0.045	0.01-0.04	0.002	0.0015		
Quartz-carbonate breccia with sulfides (3)	0.85-2.16	0.31-3.32	0.12-0.19	0.01-0.015	0.02-0.025	0.002	0.003		
Vein quartz with sulfides (6)	1.14-2.51	0.22-1.16	0.02-0.21	0.01-0.015	0.01-0.017	0.002	0.002		
Quartz diorite with sulfides (5)	0.22-2.91	0.13-0.744	0.01-0.04	0.01-0.023	0.01-0.022	0.002	0.0021		
	Zolotaya Gora deposit								
Granite gneisses with sulfides (6)	0.22-1.36	0.22-1.13	0.21-0.42	0.01-0.05	0.01-0.02	0.006	0.01		
Biotite gneisses with sulfides (11)	0.78-2.81	0.42-0.58	0.11-0.26	0.01-0.015	0.01-0.02	0.005	0.008		
Vein quartz with sulfides (3)	0.28-1.36	0.21-0.71	0.28-0.35	0.01-0.012	0.02-0.03	0.005	0.002		
	Aprel'skoe ore occurrence								
Quartz diorite with sulfides (6)	0.25-2.86	0.23-0.82	0.01-0.42	0.02-0.04	0.02-0.022	0.002	0.022		
Vein quartz with sulfides (8)	0.14-2.55	0.22-1.16	0.02-0.28	0.01-0.024	0.01-0.012	0.002	0.002		
Vein quartz with sulfides (6)	0.25-1.86	0.31-2.32	0.12-0.19	0.01-0.11	0.02-0.026	0.002	0.003		
	Snezhinka ore occurrence								
Vein quartz with sulfides (6)	2.22-4.47	0.21-0.62	0.11-0.61	0.02-0.051	0.03-0.039	0.002-0.006	0.002-0.004		
Beresite along porphyry dike with sulfides (5)	0.83-2.62	0.09-0.31	0.02-0.12	0.02-0.024	0.04-0.045	0.002-0.004	0.004-0.009		
Granodiorite porphyry dike with sulfides (7)	1.61-3.61	0.11-0.37	0.09-0.15	0.01-0.014	0.01-0.024	0.003-0.0051	0.001-0.0023		
	Svetloe ore occurrence								
Beresitized granite with sulfides (7)	0.75-1.94	0.22-0.42	0.02-0.54	0.01-0.02	0.02-0.11	0.002-0.004	0.002-0.003		
Granodiorite with sulfides (5)	0.22-2.38	0.25-0.74	0.10-0.14	0.01-0.02	0.01-0.032	0.001-0.003	0.002-0.004		
Granite porphyry with sulfides (4)	0.52-1.53	0.45-1.28	0.11-0.36	0.01-0.03	0.01-0.025	0.002-0.004	0.003-0.004		
Quartz-carbonate breccia with sulfides (5)	1.22-4.21	0.21-2.83	0.15-0.36	0.02-0.09	0.01-0.04	0.003-0.009	0.003-0.005		

* The PGE contents were determined by the inversion voltametric analysis of samples in the laboratory of the Tomsk Polytechnic Institute, Tomsk (G.A. Novikova, Z.S. Mikhailova, and E.V. Yagovkina, analysts). Sensitivity $1 \cdot 10^{-8}$ to $1 \cdot 10^{-7}$ wt %; reproducibility 90%; sample weight 5g.

so far. Although economic-grade PGE concentrations have not been discovered here, the abundance of signs of Pt concentration suggests that gold deposits of this region can also incorporate PGE mineralization [3, 5].

In the eastern part of the Central Asian mobile belt (figure), we studied plutogenic gold deposits (Kirovskoe, Berezitovoe, Zolotaya Gora, and Pioner) and ore occurrences (Svetloe, Snezhinka, Aprel'skoe, and others) [8]. The results showed that hydrothermally altered rocks and ore-bearing vein quartz of the region contain nearly economic-grade PGE concentrations.

Thus, the detection of platinum potential in gold deposits associated with plutonic rocks indicates that the Pt concentration in these rocks should be revised and complex Au–PGE deposits can be discovered in this region. The presence of PGE resources can enhance significantly the economic feasibility of such deposits.

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