

PERSPECTIVES FOR DISCOVERING KIMBERLITIC AND LAMPROITIC MAGMATISM IN THE RUSSIAN FAR EAST.

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The Aldan-Stanovoi geoblock which is the south-eastern end of the Siberian Platform, and the Amursk geoblock representing the north-eastern part of the Chinese Platform determine the geotectonic nature of the Far East which has a complicated geologic structure and a long history of evolution. The Yakutsk and North-Chinese diamond-bearing kimberlitic provinces occur in the adjacent areas.

Archean cratons composed of Archean intrusive-metamorphic complexes and Phanerozoic paleorift structures represented by terrigenous and terrigenous - volcanogenic overlapping depressions and basins are recognized in the region.

From the position of T. Clifford rule, rifting, and plate tectonics, perspective areas corresponding to the rank of a kimberlitic or a lamproitic region were identified. They are within the limits of Archean cratons, at the intersection of paleorift structures by cross (transform) deep faults.

On analogy with ore regions in Yakutiya, North-East China, and Western Australia a forecasting-prospecting image of a field of kimberlitic and lamproitic magmatism was elaborated for geologic forecasting and prospecting stages of works. On the whole, it corresponded to kimberlitic magmatism in peripheral zones. Minerals-indices of kimberlitic (lamproitic) magmatism are the most informative features of the field forecasting-prospecting image.

The specialized works carried out in the Far East determined individual findings of chrome-pyrope, picro-ilmenite, chrome-spinellid, chrome-diopside, and olivine. Their compositional peculiarities are suggestive of kimberlitic or lamproitic nature.

Chrome-pyrope was found in the Dambukinsky and Oktyabr'sky blocks and in the north-eastern rim of the Khankaisky massif. In a CaO-Cr₂O₃ diagram a major portion of grains corresponds to lherzolitic paragenesis, three grains to eclogitic, and one grain to a diamond association.

Picroilmenite was determined in a number of sites of the Bureinsky massif and in the Alchan structural-formational zone representing the north-eastern margin of the Khankaisky massif superimposed by Mesozoic volcanogenic-terrigenous deposits. In

picroilmenite the content of MgO ranges from 5 to 9%, and TiO₂ from 45 to 53%. In some cases the content of Al₂O₃ is 1.38%, however in some varieties the content of Al₂O₃ is less than 0.5%.

TABLE 1. Picroilmenite of the Russian Far East

N	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	Fe ₂ O ₃	FeO	MnO	MgO	Total
1	47.28	1.38	.23	16.47	25.60	.18	9.41	98.92
2	49.15	.21	.00	13.85	27.65	1.91	8.21	100.98
3	57.67	.05	.00	.00	28.56	1.15	11.91	99.34
4	46.57	1.08	.00	15.90	29.61	.29	6.72	100.17
5	46.57	.92	.28	16.88	26.67	.42	8.33	100.07
6	47.64	1.00	.37	28.36	14.47	.34	7.67	99.85
7	47.05	1.04	.11	29.66	15.40	.33	6.94	100.53
8	47.72	.85	.77	13.91	29.44	.29	7.43	99.03
9	49.09	.22	.22	11.80	30.87	.00	7.44	98.47
10	48.93	.50	.32	14.05	29.98	.36	7.71	100.46
11	50.11	.80	.41	11.13	31.55	.22	7.49	100.60
12	49.15	.86	.46	13.08	30.47	.36	7.56	100.64
13	49.44	1.02	.20	12.75	30.68	.43	7.55	100.80
14	48.85	.76	.01	11.96	30.74	.48	7.13	99.93
15	49.81	.83	.37	11.69	31.00	.37	7.55	100.46
16	48.87	.98	.72	12.60	28.80	.31	8.37	99.40
17	48.28	1.08	.05	13.50	29.34	.36	7.69	100.30
18	49.22	1.12	.07	13.10	29.58	.29	8.12	100.20

Note: 1-7 - picroilmenite of the Bureinsky massif,
8-18 - picroilmenite of the Alchan structural-formational sone

Chrome-spinellids were met in practically all the blocks and structural-formational zones of the region. The Far Eastern chrome-spinellids were divided into two groups by discriminant analysis worked over on typical compositions of chrome-spinellids from kimberlites of Yakutiya, NE China, West Australian lamproites, and ultramafic rocks of various formational types. For the first group (840 analyses) the kimberlitic nature is excluded or hardly probable. The second group chrome-spinellids (204 analyses) can have kimberlitic or lamproitic nature with the probability of 50%. Based on compositional peculiarities they are divided into three types: the diamond association chrome-spinellids analogous with chrome-spinellids from aggregates with diamond, the kimberlite type chrome-spinellids analogous with the Lower-Olenyok region chrome-spinellids, and the lamproite type chrome-spinellids analogous with

chrome-spinellids from the West Australian lamproites. The first and second type chrome-spinellids were mainly determined in the Oktyabr'sky block of the Bureinsky massif and in the south of the Khankaisky massif, and the third type - in the Bikinsk, Badjalsk, West and Central Sikhote Alin structural formational zones bordering the Bureinsky and Khankaisky massifs from the east.

TABLE 2. Chrome-spinellids of the Russian Far East

Type	Statis.	TiO ₂	Al ₂ O ₃	Cr ₂ O ₃	Fe ₂ O ₃	FeO	MnO	MgO
I (n=19)	\bar{x}	0.17	8.90	60.63	2.46	16.04	0.31	11.25
	σ	0.08	3.17	3.62	2.06	2.84	0.08	2.12
	min	0	4.55	52.38	0	11.38	0.10	8.35
	max	0.23	15.85	66.18	6.15	19.90	0.42	15.59
II (n=84)	\bar{x}	0.29	29.16	38.10	3.92	11.64	0.21	16.54
	σ	0.21	5.81	5.60	1.45	1.85	0.07	1.41
	min	0.01	19.04	22.11	1.16	7.77	0.04	12.70
	max	0.99	46.58	49.42	8.36	17.40	0.50	20.46
III (n=101)	\bar{x}	2.32	14.27	44.44	8.46	16.69	0.24	13.61
	σ	0.79	3.76	2.93	1.72	3.14	0.10	1.31
	min	1.05	8.11	37.45	1.01	10.42	0	9.64
	max	5.15	22.43	51.53	12.10	25.48	0.68	16.82

Chrome-diopsides containing over 0.5% Na₂O and over 0.5% Cr₂O₃ which correspond to kimberlitic ones in Na₂O-Al₂O₃ and Cr-(50-Na) diagrams were met in the Kupurinsky and Dambukinsky blocks and in the Central Sikhote Alin structural formational zone. Chrome-bearing low calcium (CaO less than 0.5%) magnesia olivine was met only in the Khankaisky massif.

Areas where kimberlitic and lamproitic magma manifestations are most probable are recognized by complex analysis of the results of conceptual forecasting and abundance of signs of kimberlitic magmatism. In the Dambukinsky block Lower Paleozoic - Cenozoic kimberlitic magmatism is expected, in the Oktyabr'sky and Malo-Khingansky blocks both kimberlitic and lamproitic magmatism of primarily Mesozoic - Cenozoic age is predicted, and in the Khankaisky massif north there is expected mainly lamproitic magmatism of Mesozoic age.