DEFORMED DUNITES FROM THE UDACHNAYA PIPE

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The deformed ferruginous dunites from the Udachnaya pipe in contrast to magnesian dunites from the same pipe which together with harzburgites are sometimes diamond-bearing, are practically not studied.

Ferruginous dunites from the Udachnaya pipe exhibit characteristic deformed structures with preserved large olivine porphyroclasts in fine-grained (< 0,2 mm) neoblast olivine matrix. Porphyroclasts and matrix ratio varies in different samples from 2:8 to 8:2. Olivine in porphyroclasts and in matrix is greyish-brown, brownish, honey-yellow in colour and contains 84-90% Fo. Sometimes ilmenite occurs in rocks in the form of veinlets usually marginating olivine porphyroclasts. Ilmenite segregations are of fine-grained polycrystalline structure. In two studied samples 12/83 , 247/82 (Table 1) ilmenite is represented by picroilmenite in which about one third of iron is ferric.

More magnesian variety occurs along with deformed ferruginous dunites in the Udachnaya pipe. Neoblastic olivine aggregate in deformed dunite xenolith 219/87 compose no more than 20% of volume surrounding large (0,8-3,5 cm) partially clastic olivine crystals (Fo_{92}) in the form of cementing coronated structures. Porphyroclasts (Ol_1) and neoblasts (Ol_2) have the same composition (Table 1). Rounded garnet grains in wide kelyphitic rims and oval, sometimes regular grains of subcalcic clinopyroxene are located within olivine megacrystals. Ti-rich pyrope is also rich in Cr (10,6 wt% Cr_2O_3). Subcalcic clinopyroxene (Ca / (Ca+Mg)=0,404) contains 0,36 wt% TiO_2 and 2,29 wt% Cr_2O_3. Chemistry of minerals from this dunite is the most similar to Cr-rich megacrysts from Colorado-Wyoming (Eggler et al., 1979). Garnet with similar composition is recognized in dunite from kimberlites of Montana (Hearn, McGee, 1984) and an analogous garnet occurs in zonal crystal nuclei from Ti-bronzite megacryst in Weltevreden pipe, U.A.R. (Meyer et al., 1979) and in zonal garnets from the Mir and Udachnaya pipes (Sobolev, 1974; Egorov et al.,1986). Chemically inhomogenous spinel forms submicroscopic grains into external kelyphite on garnet and it is essentially oxidized (Sp_1, Sp_2, Table1).

Dunite xenolith 275/87 represents a glomerogrowth of large practically undeformed olivine crystals Fo_{92} (from 1 to 2 cm) which shows a cleavage jointing and traced retranslation. They include rounded pyrope grains bordered by kelyphite and subcut clinopyroxene, orthopyroxene and chromite grains. Titanic chromite from this sample belongs to poorly oxidized variety and correlates chemically with chromites of diamond paragenesis.

Thus, dunites from the Udachnaya pipe represent a rock subsequence from ferruginous mineral type to magnesian one, the latter being similar to mineral type in diamondiferous dunites from this pipe (Pokhilenko et al., 1979; Sobolev et al., 1984). It is significant that olivines from ferruginous dunites correspond chemically to ferruginous branch of olivine megacrysts and those from magnesian dunites correlate with magnesian branch of olivine megacrysts from the Udachnaya pipe. Significantly more weak deformation marks in magnesian dunites compared to ferruginous ones are possibly related to lesser magnesian olivine capacity to retranslation gliding and to recrystallization. Reduced formation regime resulted possibly in magnesian and chromous mineral chemistry and in diamond and graphite crystallization in magnesian dunites whereas the presence of oxidized ilmenite in the most ferruginous dunites indicate predominantely oxidized formation regime.

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Table 1. Mineral analyses for dunites from Udachnaya pipe. Weight percent.

	Ol	Il	Ol	Il	Ol_1	Ol_2	Gnt	Cpx	Sp_1	Sp_2	Ol	Gnt	Cpx	Opx	Chr	Sp
Sample No	12/83	12/83	247/82	247/82	219/87	219/87	219/87	219/87	219/87	219/87	275/87	275/87	275/87	275/87	275/87	275/87
SiO_2	40,24	-	40,66	-	40,30	40,65	40,80	55,62	0,08	0,20	40,95	41,93	54,96	58,01	-	0,47
FiO_2	0,03	48,76	0,01	48,10	0,01	0,03	1,81	0,36	2,16	2,85	-	0,08	0,19	0,07	1,24	0,28
Al_2O_3	0,01	0,48	0,04	0,52	-	0,02	13,03	1,57	13,69	27,51	-	19,06	3,19	0,58	10,23	45,07
Cr_2O_3	0,01	1,34	-	0,83	0,04	0,09	10,62	2,29	51,38	33,96	-	4,90	2,55	0,27	57,73	17,63
Fe_2O_3	-	11,97	-	14,12	-	-	2,52	-	3,76	5,07	-	0,30	-	-	2,46	7,24
FeO	13,88	28,28	12,46	27,53	8,24	8,03	5,00	2,94	15,50	13,60	7,88	8,10	1,73	4,89	16,61	9,42
MnO	0,11	0,19	0,05	0,22	0,10	0,08	0,38	0,08	0,58	0,54	0,07	0,53	0,02	0,11	0,50	0,40
MgO	45,32	9,17	46,11	9,12	50,86	50,67	18,65	18,00	13,14	16,10	50,90	19,20	14,52	35,63	11,62	19,09
CaO	0,02	-	0,06	0,02	·0,02	0,07	7,17	16,99	-	-	0,02	4,91	19,44	0,26	-	-
Na_2O	-	-	-	-	-	-	0,13	2,04	-	-	-	-	2,84	0,05	-	-
K_2O	-	-	-	-	-	-	-	0,04	-	-	-	-	-	-	-	-
NiO	0,17	0,11	0,25	0,08	0,37	0,34	-	0,03	0,09	0,01	0,40	-	0,03	0,09	0,07	0,02
total	99,79	100,30	99,64	100,54	99,94	99,98	100,11	99,96	100,38	99,84	100,22	99,91	99,47	99,96	100,46	99,62