

CARBONATITIC MAGMATIC COMPONENT IN POST-COLLISIONAL NG-Q MAGMATISM OF KAPAN (S-E ARMENIA, LESSER CAUCASUS): MELT, FLUID AND CRYSTAL INCLUSIONS STUDY

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Post-collisional magmatism is a very important geological event for continental crust formation and sub-continental mantle evolution. A classic example of the post-collisional geodynamic environment is the Ng-Q Alpine-Himalayan Fold Belt, that is manifested in the contact zone of Arabian and Eurasian continental plates. Post-collisional magmatism is dominated by calc-alkaline and shoshonitic volcanic suites. Quaternary silica-unsaturated alkaline volcanic centers in the Alpine-Himalayan Fold Belt (volcano Kula in Western Turkey, Ceykhan-Osmaniye in Southern Turkey) and a few volcanic flows in Kapan area of South Armenia are also found.

Volcanic rocks from Kapan are strongly enriched in LILE and LREE but very depleted in HREE. They show large negative anomalies in K, Th, Ta, Nb, Zr and Hf. These unusual geochemical characteristics indicate contamination of silica-unsaturated alkaline parent magmas by a carbonatitic magmatic component. Possible scenarios are: 1) contamination of the silica-unsaturated alkaline primitive magmas with carbonatite liquids; 2) formation of primary magmas by partial melting of the garnet facies mantle peridotites previously veined by quenched carbonatitic liquids; 3) an alternative model magma generation may be contamination of asthenospheric silica-unsaturated alkaline primitive magmas by carbonate-bearing sedimentary rocks in the crust environment.

A direct indication of this interaction has been found in melt inclusions in olivine phenocrysts from investigated Kapan basanites. During the last decade, much attention has been devoted to "exotic" high-Si, Al, Na, K-bearing glass, named as "metasomatic mantle agent" and occurring as melt + fluid (CO₂, H₂O) inclusions in mantle xenoliths from various geodynamic settings, which could originate during reaction between mantle peridotite and alkaline melts. This type of melt has been found in Kapan olivine phenocrysts (Fo 90-85), which is magmatic in origin (CaO = 0.15 – 0.25 % wt.), but are not xenocrysts of mantle origin (CaO <0.1 % wt.). These melt inclusions correspond to primary (?), pseudo-secondary and pocket-type melt inclusions, occurring as recrystallized, glassy or multiphase inclusions and consist of high-Si, Al, Na, K glass, low-Si clinopyroxene, high-density CO₂ fluid and Fe-Ti oxides. The composition of the glass (SiO₂=57-61%; Al₂O₃=21-26%; Na₂O=4-11%; K₂O=1.5-12%; TiO₂<0.6%) and clinopyroxene from inclusions (SiO₂<46%; CaO>22%; TiO₂>1.5%) are similar to those found in "exotic" melt inclusions from upper mantle xenoliths. Some inclusions show direct evidence of immiscibility, consisting of carbonate aggregate (calcitic), silicate glass and clinopyroxene identical to those type inclusions. Table. Compositions of melt inclusions

	Unheated glassy melt inclusions							
SiO ₂	59.44	57.68	56.69	57.09	57.23	57.21	61.15	50.82
TiO ₂	0.37	0.28	0.52	0.21	0.91	0.36	0.56	0.10
Al ₂ O ₃	24.91	26.24	21.39	25.53	26.27	24.23	25.18	19.40
FeO	0.85	2.60	2.19	1.34	1.02	0.66	0.87	1.97
MnO	0.01	0.03	0.01	0.04	0.06	0.02	0.01	0.07
MgO	0.32	0.28	0.16	0.17	0.09	0.02	0.08	0.25
CaO	0.71	0.37	0.62	0.37	0.60	0.18	0.47	7.01
Na ₂ O	3.94	10.97	6.45	12.14	11.04	5.31	10.17	8.41
K ₂ O	6.73	1.70	9.54	3.08	2.87	12.34	1.40	6.17
P ₂ O ₅	0.33	0.13	1.09	0.20	0.27	0.19	0.22	5.78
Sum	97.61	100.28	98.66	100.14	100.36	100.52	100.09	99.96
	Dauter minerals of melt inclusions				Phases occure in one inclusion			
	Cpx	Cpx	Mt	Mt	Cpx	glass	Carb	Carb
SiO ₂	46.07	46.32	0.14	0.06	45.46	59.44	0.03	0.07
TiO ₂	1.73	1.6	4.04	4.72	2.25	0.37	0.003	0.03
Al ₂ O ₃	7.23	7.82	3.13	7.47	7.50	24.91	0.02	n.d.
FeO	8.26	8.36	71.7	68.93	10.28	0.85	0.37	0.36
MnO	0.10	0.1	0.3	0.6	0.15			
MgO	12.48	12.13	5.59	6.22	10.96	0.32	0.35	0.25
CaO	22.67	22.43	0.01	0.07	23.06	0.71	60.06	59.76
Na ₂ O	0.60	0.6	0.02	0.01	0.48	3.94	0.04	0.01
K ₂ O	0.02	0.03	0.02	0.02	0.03	6.73	0.002	n.d.
P ₂ O ₅	0.21	0.02	0.03	0.025	0.30	0.33	0.11	0.09
Cr ₂ O ₃	0.06	0.08	0.98	1.67	0.01			
SUM	99.42	99.49	85.96	89.80	100.49	97.60	60.99	60.57