

# Mantle carbonatization and potassium alkaline member of the CKD (Kamchatka) subduction magmas

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Magmas erupted from volcanoes of Central Kamchatka Depression can be represented as a mixture of 1) magmas of subduction origin 2) adakitic products of the lower crust melting<sup>1</sup> and 3) alkaline potassic magma. Existence of the third component is proven by occurrence of absarokite dyke at Harchnsky volcano<sup>2</sup>, rare mellilitic xenoliths and melanitic garnet inclusions in olivine. Periodically high potassium basalts were erupted in Tolbachik and Plosky volcanoes in Holocene. We present experimental data demonstrating that melting mediated by the dry reduced carbonic fluid leads to the enrichment of the melt with K<sub>2</sub>O, Rb<sub>2</sub>O and LREE. In our experiments fluid was generated at the decomposition of natural siderite placed in the small capsule within welded large one with the source basalt. CO<sub>2</sub>-CO fluid effectively transfers Al<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O and other elements to form Ol-Spl aggregate with alkaline melt replacing oxides remaining after siderite decomposition in the small capsule. Melt show highly fractionated REE patterns La/Yb is up to 76. Potassium content attains up to 10 wt.% of K<sub>2</sub>O. Potassium and sodium separation factor (K/Namelt)/(K/Nasource) = 25-30. Our results support concept of the strong link between potassium and carbon in magmas<sup>3</sup>. Experiments were performed at P=2-5 kbar and T=900-1000°C, we suggest that this mechanism will work at the mantle PT parameters too. It is expected that mantle wedge under CKD was locally carbonatized during accretion of the Kronotsky paleoarc about 5 Myrs ago. At the overstepping of islands by subduction zone large blocks of silicified carbonates and coals can be dragged under mantle wedge as envisaged by numerical modeling<sup>4</sup>. Large masses of sedimentary rocks presumably had ascended under Central Kamchatka ridge and are moving eastward in the slow wedge counterflow. Silicified carbonates rising to approximately 100 km depth react to form CO<sub>2</sub> and pyroxene. Reduced carbonic fluid is involved in the potassium magma formation. Work was supported by RFBR grants #13-05-00397 and 13-05-00994.

[1] Gorbach and Portnyagin, 2011, *Petrology*, **19(2)**:134. [2] Volynets et al., 1999, *Volcanol. Seismol.*, **1**: 31(in Russian) [3] Gupta, 2015, Springer. 4 Simakin, 2014, *Terra-Nova*, **26(1)**:22