Geophysical Research Abstracts
Vol. 18, EGU2016-9164, 2016
EGU General Assembly 2016

Early Holocene volcanism in CKD (Kamchatka) as a mechanical probe of the stress level in the crust.

Alexander Simakin and Olga Shaposhnikova

Institute of Experimental Mineralogy RAS, Thermodynamics of minerals, Chernogolovka, Russian Federation (simakin@iem.ac.ru)

The last (late Pleistocene) glaciation in Kluychevskaya group of volcanoes (KGV) can be considered as a large scale mechanical experiment allowing evaluation of the level of the global geodynamic stresses in the crust of North Kamchatka. KGV is located in the Central Kamchatka depression (CKD). Formation of the CKD can be connected with accretion of Kronotsky paleoarc to the Kamchatka edge c.a. 5 Mys ago. At the compression stage zone of the contact was thickened so that lower part can reach PT parameters of basalt-eclogite transition. Suggested carbonates contamination of the mantle wedge during accretion (Simakin et al., 2015) can became a source of CO_2 facilitating eclogite formation. Dense eclogitic keel and trench retreat following accretion can be the driving forces of the CKD rift formation. Extension is partially accommodated (several mm/yr eastward motion) on the eastern border of CKD in the zone of the normal faulting (Kozhurin et al., 2006). And partially extension is accommodated by the formation of the series of dykes of submeridional direction marked by monogenic cones on the surface. At the last phase of the Pleistocene glaciation KGV was covered by the ice cap with 80 km diameter and above 1000 m maximum thickness on the slopes. After the fast deglaciation surface uplift has produced horizontal compression (Simakin and Muravyev, 2015; Pagli and Sigmundsson, 2008). Addition of the deglacial compression to the geodynamic extension turns s1 direction to the horizontal latitudinal one. Due to the horizontal compression areal of eruptions was expanded towards edges of the former glacier. Numerical modeling demonstrates that maximum level of the glacial stress is proportional to the ice gravity load and is estimated to be 5.8-7.5 MPa. Initially principle compressive stress due to the deglaciation was higher than geodynamic one $\mathrm{abs}(s_{1,glac}) > \mathrm{abs}(s_{1,geod})$. Time of the volcanism return to the basic submeridional direction marked the moment of viscous dissipation of the post glacial stresses: $\mathrm{abs}(s_{1,glac}) << \mathrm{abs}(s_{1,geod})$.

Literature. Kozhurin et al.(2006) Tectonophysics, 417(3-4), 285-304. Simakin et al. (2015) J.Volcanol.Geotherm.Res., 307, 210-221. Simakin and Muravyev (2015) Volcanology and Seismology, in press. Pagli and Sigmundsson (2008) Geophys. Res. Lett. 35. L09304.