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Geochemistry of the 2012-2013 Tolbachik Fissure eruption (Kamchatka, Russia)

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From November 27th, 2012, until the beginning of September 2013, a fissure eruption at the southern slope of Ploskiy Tolbachik volcano, Kamchatka, produced more than 0.52 km3 of lava (Dvigalo et al., 2014) and covered the area about 36 km2. The eruption was named as "The Institute of Volcanology and Seismology 50th Anniversary Fissure Tolbachik Eruption" (FTE-50). This is a manifestation of the ongoing high activity in Tolbachinskiy Dol (monogenetic zone around Ploskiy Tolbachik stratovolcano), which already produced in Holocene a lava field, covering more than 900 km2. FTE-50 lasted 9 months and exhibited some peculiar features, allowing us to distinguish it as a unique for Tolbachinskiy Dol: seismic activity only in the low energy class during 5 month prior to eruption (Kugaenko et al., 2013), the unusually high discharge rate at the beginning of the eruption (about 400 m3/sec), specific geochemical composition of the erupted lava. The eruption started from two vents, named after eminent Russian volcanologists as Menyailov (upper) and Naboko (lower) vents, and after three days all activity concentrated in the lower (Naboko) vent. All products of FTE-50 are richer in alkalis and TiO_2 than previously studied lavas of Tolbachinskiy Dol. After the drastic change in composition at the beginning of the eruption, associated with the shift of the eruption center from the Menyailov to Naboko vent, when silica content dropped up to 2 wt.%, the composition remained practically constant until at least May 2013. Lavas of the Menyailov Vent are more acid than any of the earlier erupted rocks of the monogenetic zone (SiO_2 up to 55.35 wt.%). Lavas of the Naboko Vent, at silica content close to the Southern Vent of the Great Fissure Tolbachik Eruption (1975-76) and other alumina-rich basaltic andesites of the Dol (52.5 wt.% in average in Naboko vent lavas vs. 51.8 wt.% in high-Al lavas from Tolb.Dol), have lowered concentrations of $Al2O_3$ (16.3 wt.% vs. 17.1 wt/%), CaO (7.5 wt.% vs. 9 wt.%), MgO (4.1 wt.% vs. 5.5 wt.%). Trace elements distribution in the FTE-50 lavas allows us to suppose that they are genetically connected to the sources of the Southern Vent of GFTE and other high-Al basalts. FTE-50 products are also similar to some of the high-K rocks of Ploskie Sopki massif (Churikova, 1993) and to the underlying Studyonaya river plateau basaltic andesites (unpublished own data) erupted 262 Ka ago (Calkins et al., 2004), and fit their evolution trends, but differ from them by several elements, most prominently by higher Ti content. The basaltic trachyandesites of FTE-50 have higher REE, Y, Nb, Hf, Zr, Ta, Ti than all previously studied GFTE rocks; Nb, Ta, Ti in them are also higher than in high-K volcanic rocks of Ploskie Sopki massif.