The New Tolbachik Fissure Eruption in Kamchatka, 27.XI 2012-2013. Earthquakes Preceding the Event and First Estimates of its Duration

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Magmatic feeding system and mechanisms of activity of the Kliychevskaya Group of Volcanoes (KGV) are considered. The KGV is one of the most significant volcanic center in subduction zones. It is located in the northern part of the Kuril-Kamchatka volcanic belt and consists of: the Kliychevskoi basaltic stratovolcano (the largest erupting volcano in Eurasia), the Bezymianny andesite volcano, the basaltic Hawaiian-type Plosky Tolbachik volcano (PT) with summit caldera, the Tolbachinskaya zone of cinder cones and fissure eruptions (TZ) and the Ushkovsky volcano.

In 1975-1976 the Great Tolbachik Fissure Eruption (GTFE) in TZ produced 2.2 km3 of basalts.

Development of the New Tolbachik Fissure Eruption (NTFE) started 27.XI 2012 is analysed, including: the location of the feeding fissure and the two eruptive centers on it in TZ; effusive nature of eruption with lava flows of liquid alumina basalts produced during the first two months covering an area of more than 27 km2.

Remarkable features of the process of local seismic activation preceding the NTFE are considered. Increase in the number of earthquakes under PT (at a depth of about 4 km near the peripheral magmatic chamber of PT) has started in mid-2012 and continued up to the beginning of NTFE. It has culminated during the last two days before NTFE in the form of a large swarm of small earthquakes that propagated towards to the surface. The swarm was the forerunner of the impending eruption and highlighted the position and depth of magma origin of the NTFE .

It is demonstrated, that during the first months, until January 20, 2013, NTFE was the large fissure lava eruption, slowly decreasing over time. Quantities of produced material and duration of such eruptions are subject for theoretical estimations. The first rough estimates have been given for the NTFE on December 15, 2012 and on January 22, 2013 respectively.

The initial forecast has assumed continuation of the NTFE while the amount of volcanic products will not exceed the amount of alumina basalts (500 million tons) potentially accumulated in the peripheral magmatic chambers of the PT volcano. Thus in this case, an exponential decay of the eruptive activity could last up to 110 days.

According to preliminary estimates of volumes of erupted lava in the NTFE, available by mid-January 2013, the number of produced basalts significantly exceeded the volume of excess magma, potentially located in the peripheral magma chamber of the PT volcano. For the next forecast the redundant magma volume accumulated up to the NTFE in magmatic systems throughout the KGV (2,100 million tons) has been considered as a possible upper limit of the volume of eruptive products. In this case, the volume of lava produced by the NTFE may exceed 1 km3 and reach the amount of lava erupted in the Southern breakthrough of the GFTE in 1976. Thus, the NTFE may continue for up to 300 days.