The Luch-2 Lava Cave in the Zvezda Crater, Tolbachik Volcanic Complex, Kamchatka Peninsula

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Studies of lava caves is essential for predicting the impact of future volcanic eruptions as well as for geotourism. It is also valuable for potential use of lava tubes on the Moon and Mars for space missions. A large number of lava tubes were formed as a result of the eat Great Tolbachik Fissure Eruption (GTFE) on the Kamchatka Peninsula. The GTFE territory is a UNESCO World Heritage Site, which is a specially protected area. However, the lava tubes of earlier eruptions have practically not been studied. For example, the lava tube "Luch-2" of the crater "Zvezda" on the territory of the Tolbachik volcanic complex is not a natural monument. To save it, it has yet to be assigned this status. For all lava tubes, it is not studied what their cave shape depends on. In the study, we carried out a topographic survey of the lava tube "Luch-2". A computer 3D model of this lava cave was designed from topographic survey data. The video with the 3D model was posted on the Internet. To find out the reasons for the cross-section shape diversity of the lava tubes we performed experimental simulations of lava flows using molten paraffin. The results of studies allow us to conclude what factors influence the shape of the lava tubes (like the relief and the temperature difference between the lava and the surface). The key factors in formation of "Luch-2" lava tube, the shape of which was predetermined by previous lava flows from neighboring lava tube "Luch-1". The study is important to maintain the condition of the natural monument objects as well as contribute to the generalization of knowledge about important geological objects of the world.

Awards Won:
China Association for Science and Technology (CAST): Award of $1,200