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**Experimental Studies for Modeling the Explosions of Basaltic Volcanoes**

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In order to study the processes taking place within feeding systems of basaltic volcanoes during the ascent of magmatic melt to the surface, the Complex Apparatus for Modeling Basaltic Eruptions (CAMBE) has been developed. The purpose of the experiment is to study the processes taking place during the formation and ascent of gas-liquid mixtures within vertical conduits as an analogue to the flow of liquid basaltic magmas within volcano feeding systems. CAMBE has been assembled at the Institute of Volcanology and Seismology RAS (Petropavlovsk-Kamchatsky, Russia). The device is 18 meters high, and consists of two major systems – modeling and recording. For the convenience of discussion of experimental studies, components of the model system are named according to volcanic terminology. The modeling system includes a "chamber zone" (tank for preparing gas-saturated model liquid), a "feeding conduit" (transparent hose), and "crater area" (unit for accepting the supplied model liquid). Processes occurring within the volcano feeding conduit are modeled in this part of the device. The ratio of working section of the hose's inner diameter to its height is about 1:1 000, which is close to actual parameters of volcanic feeding channels. The recording system consists of several devices for dynamic video observations; electronic altimeter, speedometer, video-recording unit, acoustic recording unit, synchronizing device, and shut-down system. For the first time during physical modeling, conditions have been created for the supply of moving model gas- saturated liquid into the conduit, which allowed the study of bubble nucleation, growth and coalescence, as well as the formation and transformation of gas structures, and the kinetic peculiarities of gas phase evolution. The experiments resulted in detecting and describing a new, never before known, mode of gas-liquid two-phase flow in a vertical column – defined here as cluster regime, which is characterized by regular alteration of dense gas bubble clusters separated from each other by the liquid not containing free gas phase. The mechanism of the cluster regime formation is conditioned by the processes of blocking of the hose working section by one big bubble or several smaller ones. It has been demonstrated that liquid, bubble, cluster and slug regime are regularly sequential and present polymorphic modifications of gas-saturated liquids migrating within vertically oriented conduits. The surface (crater area) manifestation of cluster or slug regimes leads to basaltic explosions typical both for Strombolian and Hawaiian eruption types. Analysis of available data on explosions at basaltic volcanoes, given the obtained experimental data on the mechanism of this process, allows rendering the genesis of basaltic explosions from a new viewpoint. Polymorphic gas-hydrodynamic transformations within a vertical volcano feeding conduit result in the development of cluster and slug regimes, accounting for the mechanism of basaltic explosions.

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