



The Nordic Countries invite you to The 33rd IGC

INTERNATIONAL GEOLOGICAL CONGRESS OSLO 2008

August 6 - 14th

StatoilHydro
Main sponsor

[Home](#)

[Search Abstracts](#)

[Author Index](#)

[Symposia Programmes](#)

[Sponsors](#)

[Help](#)

[MPV-05 Volcanic eruptions: Chamber-, conduit-, and depositional processes and their implication for monitoring and hazard assessment](#)

Gas-hydrodynamic model of basalt explosions (based on experimental data)

[Alexey Ozerov](#), *Institute of Volcanology and Seismology (Russian Federation)*

The research problem - revealing of the reasons of occurrence of discrete volcanic explosions of basalt magma. Main method - experimental studying of gas-liquid two-phase flow kinetics in vertical pipes - from the moment of origin of the first gas bubbles to the occurrence of mature stable gas structures. In order to study the processes taking place within feeding systems of basaltic volcanoes during the ascent of magmatic melt to the surface, 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. For these purposes the Complex Apparatus for Modeling Basaltic Eruptions (CAMBE) has been developed. It consists of two major systems - modeling and recording.

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. CAMBE has been assembled at the Institute of Volcanology and Seismology (Kamchatka, Russia). The device is 18 meters high. During experiments gas-saturated model liquid acts from "chamber zone" to "feeding conduit" in which arising structures and its kinetics are studied. 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 batch 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 batch 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, batch 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 batch 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 batch and slug regimes, accounting for the mechanism of basaltic explosions.

CD-ROM Produced by [X-CD Technologies](#)