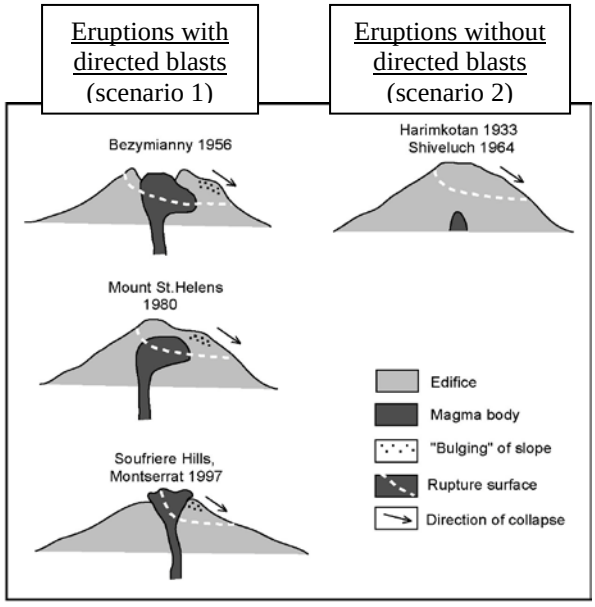
Alexander Belousov [1,2] , Barry Voight [3] and Marina Belousova [1]

1. *Institute of Volcanology and Seismology, Petropavlovsk-Kamchatsky, Russia.*
2. *Institute of Marine Geology and Geophysics, Yuzno-Sakhalinsk, Russia. (belousov@mail.ru)*
3. *Penn State University, University Park, PA 16802, USA*

THE 1956 ERUPTION OF BEZYMIANNY AND SIMILAR EVENTS WORLDWIDE: ERUPTIVE SEQUENCES, DEPOSITS AND MECHANISMS.

The most common cause for structural destabilization of stratovolcanoes and dome complexes is intrusion of volatile-rich, viscous silicic magma prior to the forthcoming eruption. In this situation, rapid landslide-induced decompression provokes a strong explosive eruption. Observational data and stratigraphic relationships show two main scenarios of such eruptions. *Scenario 1* includes: moderate pre-climactic explosive activity; edifice failure; catastrophic directed blast; (sub)plinian or vulcanian eruption, and fountain-collapse with generation of pyroclastic density currents. Recent examples are Bezymianny 1956, Mount St. Helens 1980, Soufriere Hills, Montserrat 1996. *Scenario 2* includes: edifice failure; moderate phreatic explosion; (sub)plinian eruption and fountain-collapse with generation of pyroclastic density currents. Recent examples are Harimkotan 1933 and Shiveluch 1964.

Prehistoric debris avalanches of Kurile-Kamchatka region (10 studied cases) were associated mostly with *Scenario 2*, which thus seems more common. The causes of two scenarios relate to different levels of magma intrusion with respect to the detachment surface at failure, and magma depressurization conditions. That level, in turn, depends on the intensity of destabilizing effect of the intruding magma, and degree of initial (pre-eruptive) instability of the volcanic edifice.



Sketches illustrating positions of shallow magma bodies inside volcanic edifices before the blasts: Bezymianny - combination of dome and cryptodome; Mount St.Helens - cryptodome; Soufriere Hills, Montserrat – dome. Positions of bulged slopes and rupture surfaces of large-scale landslides relative to the magma bodies are indicated. Situation before large-scale landslides of Harimkotan (1933) and Shiveluch (1964), where magma was much deeper in the moment of landslides and thus blasts did not occur, is given for comparison.

In *Scenario 1*, a magmatic directed blast immediately follows collapse, with the direction influenced by dip of the detachment. *Scenario 1* occurs if the detachment intersects the magma body. *Scenario 2* occurs if, at failure, the magma body is notably deeper than the detachment surface(s). In *Scenario 2*, only a moderate phreatic explosion first occurs, due to decompression of the superficial hydrothermal system; a vertical magmatic eruption can follow with delay because rising magma needs time to reach the ground surface inside the landslide scar.