

Eruption scenario of Usu volcano, Japan

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The national research group on volcanic eruption forecasting is preparing the eruption scenarios (event trees with probabilities) for representative active volcanoes in Japan. At Usu volcano, the eruptive activity resumed in 1663 with the plinian and pyroclastic surge events after a sector collapse about 7 to 8 ka. Since then, five summit eruptions with the plinian columns had occurred, and three flank eruptions with phreatic to phreatomagmatic events had occurred. These eruptions were recorded in old documents or observed geophysically from the beginning of 20th Century; they occurred every 30 +/- 4 years. They ended with the formation of lava domes or cryptdomes, except for the 1663 eruption. Except for flank eruptions which are small in the scale, there is a good negative correlation between the erupted volume and frequency in log unit. The larger the erupted volume, the shorter the eruption duration. As a whole, the volume of eruption decreased with time. Seismic precursory continued generally for a few days in respective of eruption locations. The summit eruptions started, accelerating seismic activity, while the flank eruptions did after passing the peak of seismic activity. The probability of flank failure in future can be calculated about 1%, and those of the summit and flank eruptions are about 30 and 50 %, respectively. The summit eruption starts with the plinian event column in about 75% probability, while the flank eruption starts in about 70 % probability without magmatic eruption. Movement of the fault system suggesting a possibility of future failure of the volcano northern slope was observed during the last two eruptions. New eruption scenario not based only on the past eruption records may be required.

Keywords: Eruption Scenario, Event tree, Usu Volcano