

## Activity at Usu Volcano, Hokkaido, Japan, March 2000: An EQECAT Technical Report

### Location

Latitude 42.53°N, Longitude 140.83°E; summit elevation 731 m

### Background

Mt. Usu is a stratovolcano located on Hokkaido Island, Japan. It lies at the southernmost extent of the Kurile Trench and formed as a result of the subduction of the Pacific plate beneath the Eurasian plate. Historical activity is characterised by initial explosive activity, followed by pyroclastic flows then the quieter extrusion of a lava dome in the summit crater.

### Previous Activity

Historical explosive of Usu is summarised in Table 1:

**Table 1: Historical Explosive Activity of Usu Volcano**

Date	Magnitude	Estimated Volume of Tephra Erupted
16 <sup>th</sup> August 1663:	5	0.05 km <sup>3</sup>
23 <sup>rd</sup> January 1769:	2	
9 <sup>th</sup> March 1822:	4	
25 <sup>th</sup> July 1910:	2	
23 <sup>rd</sup> June 1944:	2	0.05 km <sup>3</sup>
7 <sup>th</sup> August 1977:	3	
13 <sup>th</sup> January 1978:	2	

2 = moderate, 3 = moderate-large; 4 = large, 5 = very large;  
scale ranges from 0 (non-explosive) to 8 (very large).

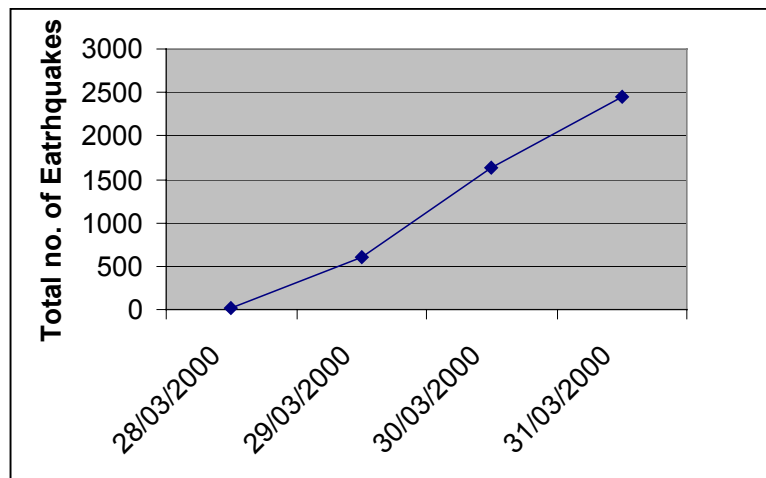
The most recent eruption began in August 1977 with a series of major explosions that were followed by rapid cryptodome growth. More explosions took place in November 1977, and these became more vigorous and frequent during the following summer, before ending in October 1978. Dome growth and seismicity continued for several years and ceased abruptly in 1982. The most recent (non-eruptive) activity at the volcano consisted of increased seismicity during May 1996.

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Precursory seismic activity has commonly begun only a few days before the occurrence of explosive eruptions.

## Current Eruption

The current eruption began with increasing numbers of earthquakes around the volcano beginning on the 27<sup>th</sup> of March. Daily earthquake frequencies in the days leading up to the eruption are plotted in Figure 1. The hypocentres of the earthquakes were located around the northwestern slopes of the volcano and defined a fault with a near-vertical slip plane.



**Figure 1: Daily Number of Volcanic-Related Earthquakes Leading Up to the March 31<sup>st</sup> Eruption of Mt. Usu.**

The increased seismic activity was accompanied by inflation of the volcano (as recorded by the GPS network surrounding Mt. Usu). By the 30<sup>th</sup> March, cracks up to 100m in length were observed along the northwestern rim of the summit crater. Smaller cracks near the foot of the volcano raised fears of a slope failure on the northwestern side of the volcano. The possibility of mudflows caused by melting of snow at the volcano's summit was also recognised.

On the 28<sup>th</sup> of March, warnings of an imminent eruption were and subsequent evacuation of people living near the volcano was carried out. In all, over 9000 residents from towns around the volcano and tourists staying in a resort to the north of the volcano were evacuated by the night of the 29<sup>th</sup> of March. The Usu Volcano Observatory has been relocated from the northern foot of the volcano to Date City, 8km to the south.

An eruption ensued at 13.11 on the 31<sup>st</sup> of March (local time) and lasted for about two hours. There was no immediate seismic precursor to the eruption. The start of the eruption was marked by production of an ash column that rose to 3000m; a westerly wind resulted in significant deposition of ash in the areas to the east of the volcano. The vent was located 1.5 km to the

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northwest of the summit, in the region where cracks and seismic activity were observed over the previous days.

Based on the history of the volcano, this event is unlikely to signify the end of the current period of activity.

## **General Information**

This report was prepared by J Toothill on behalf of EQECAT.

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