Analysis of Seismic Activity during the Eruption of Redoubt Volcano,2009

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Abstract

Mount Redoubt erupted in March 2009, preceded by seismicity activities starting from September 2008. The precursory seismic activities were including seismic swarms, tremor, and long-period earthquakes, which also occured during the eruption sequence. This study presents the analysis of swarms and tremor preceding and during the eruptive period. The swarms varied in duration from hours to days, contained tens to over 7000 earthquakes dominated by low-frequency events. The repeating events within the swarms were calculated and classified into 3 families. Seismic tremor varied in frequency, duration, and amplitude accompanying different type of volcano activities. Uncommon harmonic tremor was observed preceding six consecutive explosions in March 2009. These tremor episodes had fundamental frequency glided upward from less than 1 Hz to as high as 30 Hz in less than 10 min, followed by a relative seismic quiescence of 10 to 60 s immediately before the explosion. The spectral analysis and synthetic studies show that the strongly upward gliding harmonic tremor is comprised by repeating earthquakes through the Dirac comb effect.

References

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