

THE 2009 ERUPTION OF REDOUBT VOLCANO, ALASKA: A PROGRESS REPORT

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Redoubt Volcano is a stratovolcano that rises to 10,197 feet above sea level and is located on the west side of Cook Inlet, 170 km (106 mi) southwest of Anchorage and 82 km (51 mi) west of Kenai, within Lake Clark National Park. Since mid-August, the Alaska Volcano Observatory has observed increasing signs of unrest at Redoubt, initially with an increase in H₂S emissions noted during field-work in mid-August and reports of a strong H₂S odor downwind during September 2008. Starting in late September, observational overflights revealed the beginning and continued melting of the Drift glacier in the summit region, and evidence for melt water-related lahars traveling down the flanks. In conjunction with increased fumarolic steaming, gas measurements from this time period showed elevated H₂S (≤ 9 t/d) and CO₂ (~1800 t/d) emissions. On November 5, 2009, the Alaska Volcano Observatory (AVO) raised the aviation color code to Yellow and alert level to Advisory. Beginning at 19:11 AKST, January 23, 2009, seismicity intensified at Redoubt, consisting of a mixture of tremor bursts and discrete, low frequency to hybrid events and prompting AVO to raise the color code to ORANGE and alert level to WATCH. Over the next 6 weeks seismicity waxed and waned, an estimated 5-6 million m³ of ice were lost due to melting, and CO₂ emissions had roughly doubled. SO₂ emissions remained relatively low. At 13:05 AKST, March 15, during a gas and observation overflight, a vigorous steam plume containing some ash was emitted from the volcano and rose to ~15,000 ft. asl. The alert levels were raised to Orange/Watch, although within 48 hours the seismicity decreased and levels were lowered again to Yellow/Advisory. The plume deposited minor ash on and south of the summit over an approximate 2.8 million m² area, and consisted of broken crystal fragments, and no juvenile ash, likely the result of a phreatic explosion. Between Sunday March 22nd 22:38 AKDT and March 23rd at 19:41 AKDT Redoubt produced a series of six large explosive eruptions, lasting between four and thirty minutes each. The largest of these events produced an ash cloud that reached altitudes of 18 km (~60,000 feet), with the bulk of the ash emission at 8-9 km (25,000 to 30,000 feet). Over the following two days, there were a couple smaller explosions, producing ash to less than ~5 km (15,000 feet). The activity re-invigorated again the morning of March 26th, with two eruptions at 08:34 and 9:24 AKDT, with the second event producing a plume measured by the National Weather Service to >18 km (~65,000 feet), and at the time the abstract was being written, ash fall had started at Silver Salmon Creek, approximately 35 miles south of the volcano. This presentation will give an overview of the Redoubt 2009 eruption, including the precursory period of unrest, a description of the eruptive activity, and an overview of the geological observations made from the eruption deposits to date.