

The 1931 eruption of Aniakchak Volcano, Alaska

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One of the largest Aleutian Arc eruptions of the 20th century was the 1931 intracaldera eruption of Aniakchak Volcano, with an erupted volume of 0.3 to 0.5 km³. The eruption, which varied in intensity, style, and composition, persisted for approximately 6 weeks, dispersing ash as far as 600 km to the north. The eruption was first noticed when a large plume was seen over the volcano on May 1 and persisted for 10 days. A particularly large explosion was followed by a few days of quiescence and then resumed explosive activity for over a week. Six weeks after the initial eruption, observers described lava apparently flowing from 2 vents and steam from 3 additional vents. Four of those vents form an arc that parallels the caldera rim. Our detailed fieldwork has refined our knowledge of the dynamics of the eruption. The 2 effusive vents erupted volumetrically small rhyodacitic flows prior to and after the explosive phases of the eruption. The main crater contains 40 m of pyroclastic deposits that most likely record an early plinian phase of the eruption. This section contains 9 rhythmic packages of thick lithic-rich surge layers, which indicate a significant phreatomagmatic component to the eruption. This section is overlain by 40 m of alternating spatter agglutinate and lithic-rich, highly stratified layers, which represent the strombolian eruptive phase. The eruption ended with lava fountaining to form spatter agglutinate, which covers the inner wall and floor of the main crater. The composition of all the erupted products ranges from the initial rhyodacitic lavas to the last-erupted andesitic spatter agglutinate, which suggests emptying of a zoned magma chamber. The tephra from the main crater wall changed gradually in composition from dacite to andesite. Despite the abrupt transition from the plinian to strombolian eruptive phases, an abrupt compositional change is not apparent.