



Bogoslof Volcano in the Aleutian Islands, belonging to the United States. New lava heap in warm salt lagoon, surrounded by a ring of explosion debris, about June 28, 1928. The two older peaks are right and left outside the picture. Photo looking southwest, by Captain Roy A. Wheeler, Alaska Game Commission.

RECENT ACTIVITY OF BOGOSLOF VOLCANO

If the reader studies the map on the back hereof, he will find that nearly all of the steamship courses radiating from Honolulu either reach or pass by lands of active volcanoes. The northern course reaching Unalaska in a distance of 2,016 nautical miles, touches the middle of the Aleutian chain containing forty cones which have had historical eruptions. To the east this curve extends up the Alaskan Peninsula, to the west it goes through the Aleutian Islands to Attu, the whole length being some 1,500 statute miles. On the globe this is nearly a circular arc about the inner bight of the gulf of Anadyr as a center. None of these island volcanic arcs is truly circular; they are always somewhat straight at one end and hooked at the other. So in this case the curvature is greater at the western end. As in most of the island arcs, the active volcanoes tend to line the inner side of the curvature, toward the shallower ocean, in this case the Bering Sea. The same thing is true of the Caribbee Islands confining the eastern of the Caribbean Sea; and Martinique with its destructive volcano Pelee, is the gem in the middle of that volcanic necklace.

When the real meaning for this hook and curve alignment of volcanic islands has been discovered, we shall know much more about the globe than we know now. Underneath the volcanoes in the Aleutian Islands there are old granites and sedimentary rocks, exposed especially on

the Pacific side, which protrude from the Alaskan continent, folded and pinched along axes parallel with the island line, and falling off to a profoundly deep trench to the south. This trench is also straight on the east and hooked northward at the west. This trench is over 20,000 feet deep. A basin more than 10,000 feet deep extends into the southwestern half of Bering Sea, but the rest of this inland sea is very shallow. The Aleutian Islands are really a submerged peninsula extending westward from Unalaska with the mountain peaks rising above the waves. Just in the eastern corner of the deeper basin of Bering Sea, and 40 miles north of Umnak, the large island next west of Unalaska, some rocky pinnacles stand in the ocean where on either side the water is 6,000 feet deep. These rocks are sometimes connected into a single island called Bogoslof, and at other times a channel between two of them has been washed clear by the sea. They are of enormous interest, for they consist of nothing other than the peak of a 6,000-foot volcano which during the last two centuries has been squeezing up stiff lava like paste from a paste tube, to add to the volume of its apex.

The rise of the first rocky spine above the water at Bogoslof was reported by early navigators about 1768 and was called Ship Rock. Another stiff aa crag of andesite, Castle Rock, rose to the southeast of Ship Rock with much explosion and oceanic disturbance in 1796, alarming the natives of Unalaska. According to Krusenstern, who made



Sea lion herd at east end of Bogoslof, June 1928. Photo Wheeler

a map in 1826, Castle Rock was then two nautical miles long, 4,000 feet wide, and 350 feet high, without summit crater, and with pinnacles on top. Castle Rock was extensively washed away and made smaller during the nineteenth century. In 1883 a new eruption began and a huge tabular crag of lava rose precipitously from the sea more than a mile to the northwest of Castle Rock and enclosed Ship Rock in its debris in the space between, the bombs and gravel and sand beaches joining the two peaks to form an elongate island. For more than a decade the boiling continued at Grewingk, as the table rock was called, but the erosion of the arctic storms, and explosive outbreaks, destroyed Ship Rock, and opened a channel between Castle Rock and Grewingk, which were apparently dead at the beginning of the twentieth century.

In 1906 new lava monsters began to rear their heads from the squirming lava tangle inside the undersea volcanic mountain, and these first appeared as a steaming new heap about midway between the two older islands, connected with the northwest table Grewingk by a low flat ridge of debris but separated from Castle Rock by a channel seven fathoms deep. The new mound was conical in appearance, with sulphurous eruptive rocks emitting large volumes of steam, and showing at the summit a broken horn bending to the northeast like the famous Pelee spine in Martinique, and consisting of a mass which had been forced up through an aperture while in a plastic condition, with smooth and scored sides. The new hill was named Metcalf Cone. The heat of the steam jets varied from 94° to 224° F., and cracks in the rock were hot enough to light paper. Metcalf Cone measured 2,000 feet across the base and 400 feet high. There were the usual alternations of explosive eruption with rising stiff lava, and at the beginning of 1907 Metcalf Cone was broken in two, while the channel between it and Castle Rock had filled itself with a new steaming heap of lava, McCulloch Peak.

At this time the writer visited Bogoslof, and on August 7, 1907, landed in a dory in the midst of a herd of roaring sea lions. The precipitous cliffs were covered with millions of murrelets and herring-gulls, and the air was darkened by myriads of them in rapid flight. Bogoslof was now a continuous island two miles long, the two active cones were 400 and 500 feet high, McCulloch Peak was three-quarters surrounded by steaming salt water at 90° F., and it looked like a huge lumpy potato with the bulbous lumps split apart, and the whole jagged mass encircled by debris slopes that led down into the orange-colored warm water of the lagoon. Immediately adjacent to it was the Metcalf half-dome, with the central spine wonderfully revealed in cross section. The spire appeared in the cliff like an inverted fish horn, its base 360 feet across and its top rounded both in plan and profile like a beak. There were regular markings on the rounded surface horizontally, as though the horn has been shoved up at intervals. It was like a great worm rising from its burrow with its head turned toward the east. It was 400 feet high and at the top it was broken away through lack of support into a ragged 40-foot precipice, overhanging the back slope.

Bogoslof in 1907 was at its maximum of volume above the waves, for the period since the big island of 1796 had been eroded away. It was now four rocky hills, Castle Rock at the southeast, then McCulloch Peak fuming and tumbling and encircled by sand bars and lagoons, then the half-dome of Metcalf Cone with its spine, bordered by a dry lagoon on the north, and at the northwest the tabular rock Grewingk with gravel banks piled against it. Our party discovered elevated rock platforms backed by sea caves which had been at sea level a year before, so that everything indicated that the huge pressure inside the submerged volcano, which was pushing up McCulloch Peak, was also lifting the volcano on its back and carrying the chain of islets with it. This heaving of the older land was

particularly interesting, because the main island of Unalaska showed elevated sea benches, and now we know that at Kilauea, during the rising lava period of 1913-1922, the mountain top surrounding Kilauea Crater was lifted more than two feet, and carried the Volcano House up with it. In other words, the turtle-back of a volcano swells when the lava rises and flows out, and shrinks when the lava sinks back.

September 1, 1907, a dense black cloud rose from Bogoslof, ash and sand fell at Unalaska mantling everything with a snowstorm of rock powder a quarter inch deep, and there were rain and lightning and distant rumbling. McCulloch Peak had blown itself up. A steaming lagoon was left in its place, the rest of the island was piled high with fallen debris, and the backslope of Metcalf Cone had the smooth concave cone profile of a Vesuvius. There appeared to be a rhythmic sequence to the events whereby Metcalf Cone built itself up 400 feet high and 2,000 feet across, lived 10 months and exploded, then McCulloch Cone was built up 450 feet high and 2,000 feet across, lived 10 months, and was destroyed. It is probable that this means a pulsation of rise and fall of lava, and when the lowering comes, the sea water penetrates the hot voids below, under great pressure and by many inlets, generates steam, and the path of least resistance for the exit of the steam is through the crannies of the wall crack, around the crater edges of the risen lava column.

In July, 1908, the remains of Metcalf Peak had subsided and there had probably been another explosion the previous winter. There was renewed activity in the bay surrounded by beaches that lay between Castle Rock and Grewingk, in September, 1909. A new lagoon was formed shut off from the sea, and two small lava islands arose which in June, 1910, had united and reached a height 178 feet above the water. A survey September 10, 1910, made the island one and a half statute miles long and three-quarters of a mile wide. The old rocks were becoming smaller. A new explosion September 18-19 1910, sent up immense clouds of vapor, smoke, and ashes, flames were reported, and a true crater was opened in the top of the central peak. This was the first time that a real crater within one of the lava domes was ever seen and photographed by the Coast Guard officers who have done so much valuable work in making these reports on Bogoslof. In July, 1913, this crater had steam and smoke slowly issuing from it, but the following year all smoking had ceased. During the next eight years Tahoma Peak, as the new hill of 1910 was called, was eroded away, and a channel was again opened between Castle Rock and Grewingk so that a boat could sail between the two older islands. Grewingk had greatly diminished in size, and Castle Rock was now two rocky horns with a big accumulation of sand and gravel heaps piled against them, especially on the northern and eastern sides, these trailing off into a long sand spit at the north, and the whole of this larger island was surrounded by sand beaches.

The writer visited Bogoslof for the second time July 6, 1927, and found a new period of moderate lava activity inaugurated, with a pile of steaming lava rising from a warm lagoon in the midst of sand banks, and again these banks joined all of Bogoslof into one island with a complete ring-shaped salt water lagoon, surrounded in turn by a complete ring of sand permitting no connection with the sea except by seepage. The lagoon was at 70° F., there were the usual herds of sea lions and myriads of birds, the bottom sand and pebbles of the lagoon were all coated with orange colored ochre, the lagoon was everywhere only two or three feet deep, there were numerous skeletons of dead birds on the beach, and in the sand were impact craters made by newly fallen bombs having rough aa surfaces. There were blocks of pumice one to two feet in diameter. The central lava heap (see Page One) was about 200 feet high and 1,000 feet wide. Its crest consisted of uniform aa clinker, steaming much more heavily than in this picture of a year later. It made no noise, and it is characteristic of Bogoslof that during most of the visits reported noise has been absent. In September of 1910, however, a week before the explosive eruption, roaring steam jets were found. In 1927 the annular ridge of gravel, sand, and explosion products stood about 10 feet above tide.

The new activity had started in July of 1926 when there was open water between the two older rocks. An explosive eruption was then seen by a whaler, and the natives reported explosions July 17 as seen from nearby islands. The water was greatly muddied and the whaler on August 12 saw black smoke with darkness accompanied by thunder and lightning, ending with a cloud of white steam and "fire" about 2 p. m. There was also an explosion in December, 1926, and it is probable that the lava dome of 1927 emerged thereafter. Probably the eruption began with a series of lava pulsations, alternating with explosion. In 1928 the activity was mild as shown in our pictures. A landing party on Bogoslof July 27, 1929 reported all quiet.

T. A. J.

KILAUEA REPORT No. 949
WEEK ENDING MARCH 30, 1930

Section of Volcanology, U. S. Geological Survey
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Kilauea remains quiet. Halemaumau on March 26 exhibited a few fallen rocks at the north, and the pit seismograph showed some avalanche tremors. At 10:30 a. m. March 28 a little dust arose from the northeast wall, and such dust was seen occasionally March 30. At 3 p. m. March 30 there was fresh dust on the northwest wall and a triangle on the floor below was stained with dust. Otherwise the floor was mostly washed bare. A wide area of greenish-white solfataric stain has developed at the south edge of the floor. New boulders extend out on the eastern floor. The talus NNW has increased in height, and a deep notch in the wall above the north talus has been extended upward.

Four very feeble local seisms have occurred during the week showing tendency to east tilt accompanying the shocks. Nine tremors are recorded each lasting less than a minute. Microseismic motion has been very slight, and tilt was moderate NNE.