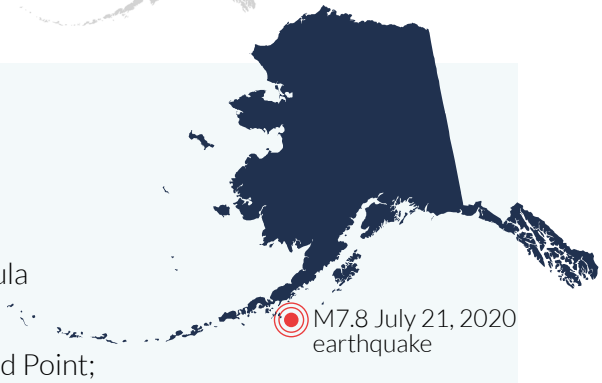
The M7.8 July 21, 2020 Simeonof Island Earthquake

ASHSC Alaska Seismic Hazards Safety Commission



Date and Time: July 21, 2020, 10:12 pm AKDT

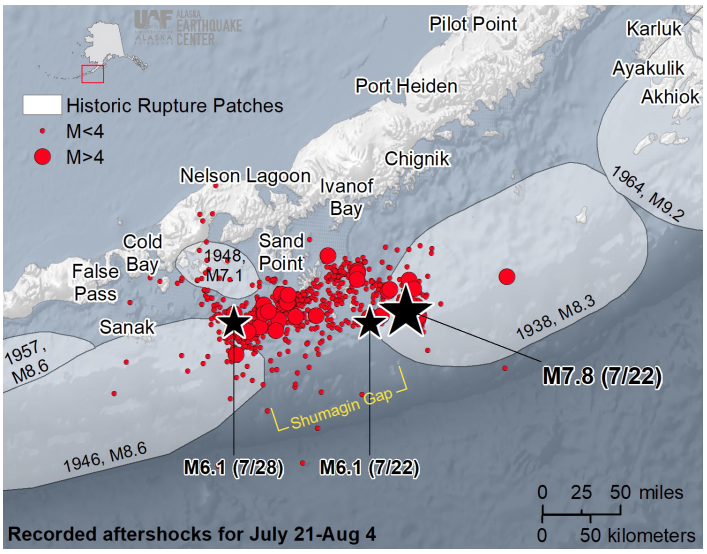
Location: N 54.890°, W 158.421°, 14 miles deep
(South of Alaska Peninsula, 70 miles south-southeast of Perryville)

Area of Effect: Strong to moderate shaking felt from Unalaska Island to Alaska Peninsula; light shaking felt on Kodiak Island and Kenai Peninsula

Fatalities: 0

Damage: Damage to a road in Cold Bay; Harbor and dock damage in Sand Point; Landslides and residential home damage in Perryville.

Tsunami: Tsunami warnings for Southern Alaska and the Alaska Peninsula were sent out by the National Tsunami Warning Center within 6 minutes of the earthquake. A 0.8 ft tsunami was observed in Sand Point ~50 minutes after the event.



General

The earthquake hypocenter was located within the westernmost edge of the 1938 M8.3 rupture zone under the Shumagin Islands, and the aftershock locations indicate that the rupture propagated westward into the Shumagin Gap and stopped near the eastern edge of the 1946 M8.6 earthquake rupture zone (see figure above). This was a megathrust-type rupture that we expect to occur on the plate interface. The rupture size was ~120 miles long by ~60 miles wide. Tsunami warnings rightfully went out to all coastal Alaska communities soon after the event but were eventually canceled. The earthquake did not generate a tsunami larger than a few decimeters because the source was deeper and the fault slip was less than what would be needed for consequential tsunami generation. Maximum slip on the fault itself was approximately 10–13 feet. Overall, this earthquake had a large rupture patch with a relatively small amount of slip and did not result in significant ocean floor deformation. However, strong shaking was widely felt in nearby communities and weak shaking was reported in some locations as distant as Anchorage. Aftershocks will continue for weeks and months. Thankfully there was relatively little serious damage for a M7.8 event.

The Shumagin Gap

The Shumagin Gap is the only area along the Aleutian Arc that did not rupture in a large megathrust earthquake between 1938 and 1965. GPS data suggest that the tectonic plates are poorly coupled in this region, and therefore "creep" along at a ~steady rate and preclude the strain accumulation necessary for large megathrust rupture. Recent seismic imaging in the Shumagin Gap revealed high-angle splay faults above the megathrust and re-ignited discussions about this area's ability to produce large earthquakes— the presence of splay faults suggests large ruptures. Additionally, high-angle splay faults increase tsunami danger because they cause more vertical seafloor deformation than movement on the lower-angle megathrust. Additionally, splay faults may be present but unknown. The tsunami hazard maps for King Cove/Cold Bay/Sand Point contain hypothetical Shumagin gap ruptures, but there was not significant consideration of splay faults in those models.

For more information contact:
Barrett Salisbury, DGGS | barrett.salisbury@alaska.gov
Natalia Ruppert, University of Alaska Fairbanks | naruppert@alaska.edu

– seismic.alaska.gov –

STATE OF ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

UAF UNIVERSITY OF ALASKA FAIRBANKS ALASKA EARTHQUAKE CENTER

The M7.8 July 21, 2020 Simeonof Island Earthquake

ASHSC Alaska Seismic Hazards Safety Commission

Tsunami Warnings

Ever wonder how the National Tsunami Warning Center (NTWC) decides when and where to issue tsunami warnings?

When an earthquake is detected below the Pacific Ocean, the NTWC issues an alert based on the initial, estimated size of the event. This is done before any tsunami is detected by ocean buoy or coastal town in order to provide a warning as quickly as possible.

After an alert is issued, the NTWC works to understand the potential tsunami impact based on continued seismic analysis, water-level measurements, tsunami modeling, and historical tsunami information. Alerts are updated as more information becomes available until the risk has passed or the alerts are canceled.

Estimated Magnitude	Tsunami Alert(s) Issued
Less than M7.0	Information statement released confirming that there is no tsunami risk.
M7.0 to M7.6	Tsunami Warning is issued for locations within 250 km (160 miles).
M7.6 to M7.8	Tsunami Warning is issued for locations within 500 km (310 miles). Tsunami Advisory for locations between 500–1,000 km (310–620 miles).
Greater than M7.8	Tsunami Warning is issue for locations within 3-hour wave travel time. A Tsunami Watch is issued for more distant locations potentially at risk.

(from www.tsunami.gov/images/procChartLargePacific.gif)

Tsunami Alert Definitions

Alert Level	Potential Hazard(s)	Public Action
Warning	Dangerous coastal flooding and powerful currents	Move to high ground or inland
Advisory	Strong currents and waves dangerous to those in or very near water	Stay out of water, away from beaches and waterways
Watch	Not yet known	Stay tuned for more information Be prepared to act
Information Statement	No threat or very distant event for which hazard has not been determined	No action suggested at this time

(from www.tsunami.gov/?page=message_definitions)

For more information visit: www.tsunami.gov

To sign up for SMS tsunami alerts, visit: www.tsunami.gov/?page=productRetrieval

– seismic.alaska.gov –

STATE OF ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

UAF UNIVERSITY OF ALASKA FAIRBANKS ALASKA EARTHQUAKE CENTER