# CONFIRMATION AND CALIBRATION OF COMPUTER MODELS OF THE 1883 TSUNAMI PRODUCED BY AUGUSTINE VOLCANO, ALASKA

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## ABSTRACT

On the morning of October 6, 1883, a huge landslide traveled down the north side of Augustine Volcano and flowed into the waters of Cook Inlet, generating a tsunami. A contemporary eyewitness account from English Bay describes multiple waves up to 7 m high at distances of 80 km from the volcano. Oral history accounts, collected from Alaskan native people affected by the tsunami, tell of flooded coastal dwellings and kayaks washed away by the tsunami wave in the southern part of Cook Inlet.

Computer models of the 1883 volcanic debris avalanche and tsunami done by Prof. Kowalik's group at the University of Alaska in the 1980s suggested that tsunami waves ca. 15-20 m high were generated near Augustine Island (Kienle et al., 1987). Additional, higher resolution models of waves in more distal areas retrodicted wave heights similar to the observations of wave heights in historic accounts.

In contrast to the historic record and the computer modeling, Waythomas (2000) suggested that the 1883 Augustine tsunami was significantly smaller than the historic record and the computer modeling indicated, and may not have occurred at all.

Recent discoveries of tsunami deposits correlated with the 1883 tsunami from Augustine Volcano and from sites around Cook Inlet resolve this controversy, and provide key calibrations for new computer modeling of being developed to evaluate hazards related to landslide-generated tsunamis from Augustine Volcano, which started erupting in December 2005.

The 1883 debris avalanche traveled more than 4 kilometers into the sea, displacing huge amounts of water. Collapse of a large impulse wave displaced by the landslide may have generated the regional 1883 tsunami waves. In several locations around the current coastline of Augustine Island, paleo-tsunami deposits as much as 230 cm thick consisting of mud, shells, beach sand and rounded pumice, occur on hummocks around the margins of the 1883 debris avalanche. The 1883 tsunami deposits are found at elevations ranging from 12-15 m above the high tide line, in good agreement with initial wave heights determined by computer modeling.

Distal 1883 tsunami deposits occur at several localities around Cook Inlet. At English Bay the 1883 tsunami deposits occur at elevations virtually identical to the wave heights reported by eyewitnesses in 1883 and to waves modeled to determine the effects of local wave run up. At Cannery Creek, 1883 tsunami deposits from a wave ca. 9 m high are found just where computers show the greatest wave heights anywhere on the west side of Cook Inlet. And at Homer, the largest town in southern Cook Inlet, located ca. 100 km from Augustine Volcano, 1883 tsunami deposits occur in tidal lagoons near areas of extensive coastal development.