THE PRELIMINARY REPORT ON THE TSUNAMI OF NOVEMBER 29, 1975
IN HAWAII

Harold G. Loomis
Joint Tsunami Research Effort
Pacific Marine Environmental Laboratory
National Oceanic and Atmospheric Administration

ABSTRACT

Wave runup heights for the tsunami of November 29, 1975 are reported for locations on the Island of Hawaii.

Loomis

1. Description

At 0448 local standard time on November 29, 1975, an earthquake of magnitude 7.2 on the Richter scale with epicenter at lat. 19°20' N., long. 155°01'45" W., generated a tsunami that did considerable damage in shoreline areas of the southern two-thirds of the Island of Hawaii. The damage from the earthquake and tsunami combined was estimated by Hawaii County to be $3-3/4 million and of that about $1-1/2 million damage could be described to the tsunami alone. About a dozen dwellings were totally or partially destroyed and a dozen boats were severely damaged.

The largest wave was 20 feet high and overran the shoreline seconds after the earthquake at locations near the epicenter which was 2-1/2 miles southwest of Kalapuna or right at the shoreline at an unpopulated place called Kupaalau. In spite of the fact that the coastline was well populated with fishermen, campers, and surfers, it being a Saturday morning; there were only two persons killed. One of these was killed by a rockslide and the cause of the other death is unknown because the body has not been recovered. These fatalities were from among a group of 36 campers at Halape in the Hawaii Volcanoes National Park. Most of these people were caught in the incoming wave but survived the ordeal and managed to scramble to higher ground. By daylight of November 29, it was clear that the ground had subsided about 10 feet at Halape and lesser amounts elsewhere along the coast.

Persons farther from the epicenter had more time to escape the tsunami.

Tables and most figures are not included in this cut copy. Contact Mr. Loomis in Honolulu for a final copy of his report.

-DJL
The small loss of life was due mainly to two factors. The earthquake awakened everyone and many people were aware that a tsunami could occur. The first wave was smaller than the second and was not breaking so that the initial flooding was a clear warning for the second wave which followed in minutes and was the largest wave forming a bore in most places.

I talked to about two dozen people who "witnessed" the tsunami insofar as one can see at 5 a.m. with a clear sky and a sliver of waning moon. The sea was relatively calm and the tide was about midtide on the ebb tide. Along the coast near the epicenter initial high water was observed immediately after the earthquake. The sea appeared agitated or choppy. At Kalapana this initial rise was about 3 feet and at Halape 6 feet or more. I attribute this to the subsidence of the ground as well as the short period waves caused by the earth's shaking. The longer period waves (i.e., 2 to 3 minutes crest to crest) followed at times appropriate to the distance from the area of generation.

Several people reported a severe recession of the water as their first indication of a tsunami. This was accompanied by an absence of normal wave noise and a rushing sound like the wind. This I believe to be the sound of water draining out of crevices after the ocean has receded. At Hilo, the recession was reported by two independent observers on boats in Radio Bay to be 5 feet followed by a rise in water to 3 feet above the normal level at that time. Many people heard stones rumbling as a large number of stones were moved about and were deposited throughout the inundation area. Also, the stones carried by the water scarred trees and undoubtedly added to the damaging force of the water.

This tsunami is similar to, but smaller than, that of 1868 when waves of 60 feet occurred and is of the type that represents a particular danger to Hawaii since little or no warning is possible to persons near the source of the wave.

On Sunday, November 30, a very careful survey of the affected coast was begun which consisted of measuring the elevation of high watermarks with a level and staff, beginning at Hilo and working around the southern part of the island to Kawaihae (Figure 5). In addition, I took photographs and talked to everyone with firsthand experience of the tsunami that I could locate. This work took 5 days and established the importance of actual measurements, since guesses of observers and even my own estimates of wave heights proved upon measurement to be very far wrong at times.

The measurements were always taken to sea level at the time of the measurement and were then corrected for the tide so that wave heights at the time of the tsunami are reported here. In some cases the elevation was found from a topographic map by identifying limits of inundation. This was done at Punaalua where the contractor's elevation maps were used, at Kanoa campground in the National Park where the cliffs were too high to get down to sea level and at the painted church at Kalapana where the distance to the water's edge was rather great and the elevation could be taken more accurately from a map. At Kaimu Beach, Kalapana, Kanoa, and Halape there is a problem in that it is not certain whether the wave hit before or after the subsidence of the land. I am reporting high

1The Hawaii Natural History Association Guide 1 notes that the Kanoa campground was the site of an ancient village which was destroyed by the 1868 tsunami.
water marks at elevations above sea level as they existed on the date taken and tend to believe that for the most part the land subsided at the time of the earthquake and the reported wave heights are accurate.

2. Runup Measurements

All wave heights are corrected to actual wave height at the time of the tsunami. The information is presented in Tables 1-6 and with reference to figures. Figure 1 shows what was measured. Figures 2-5 show locations of measurements. Tide gage records from Hilo, Honolulu, Kahului, and Nawiliwili are shown in Figures 6 and 7.

![Diagram of runup measurement]

Figure 1. Diagram of runup measurement.

3. Qualitative Impressions

I talked with dozens of eyewitnesses who mostly report that the second wave was about one-third larger than the first. In Hilo and on the Kona coast a big draw down is reported, sometimes it was the first thing noticed and others report a big recession between first and second waves. Successive crests are reported as being 2-3 minutes apart. Campers at Haleape reported wave after wave in quick succession (10-15 second intervals) each larger than the preceding.

Many people were kind enough to help with measurements including Charles Garcia, Masaichi Iyo, Henry A. Keliikoa, and several others gave occasional help. I interviewed the following eyewitnesses. From Hilo:

Steven Hammeke, Coast Guard; Mr. and Mrs. Roger Anderson, sailboat Valkyrie; Mr. Morales, sampan fisherman; Bob Lee and Cliff Collins, pilots who flew the coast immediately after the tsunami; Charles Garcia, tsunami observer; Mr. Thibadeau, Hilo Terminal and Transit Company.

From Kapoho: Bernard Mendonca; Mr. Gibson. From Kalapana: the duty ranger and the tide gage technician; Steve Garcia, surfer. From Punalu'u:

Joe Wood, contractor; Ed Crook, Jim Reed, and Doug Evans, C. Brewer Co.; Ernest Kalani, camper; "Honey Chile," resident; Mr. Cachalia, resident; some fishermen at South Point; Tad Hashimoto who was at Kaaluau. From Haleape: Brad Jones, Keith Stratton, Beverly Wellman, campers. From Niloli: Mr. Kaupiko, resident; two others groups of residents who were at their boats during the tsunami. From Napoopoo: Bill Hodgens, resident; Mrs. Kahele, resident; two other residents; From Keauhou Bay: Bill Cuccaro, dive shop owner; Burt Lang, sailboat The Eut. From Ka.lua-iona: Harbormaster and one boat captain. From Honokohau: Captain Parker, skipper; two other boat owners. From Kawaihae: Curt Shoemaker, boat owner. From the Volcano Observatory: Dr. Robert Tilling.

I also talked to numerous others and here and there pressed strangers into service holding a staff for measurements. Cliff Collins of Hilo piloted me along the coastline for a visual and photographic survey. I want to thank them all along with Louise Lembek who assisted with this report.
Figure 5. Maximum measured wave heights on the Island of Hawaii.