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Prediction of Tsunamis Forecast and Probability

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4 Prediction of Tsunamis Forecast and Probability

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Abstract: Tsunamis can be genarated by several mechanisms. It is known that the explosion of an underwater volcano can cause one (Ogawa, 1924), or an island exploding, such as Krakatoa (Wharton and Evans, 1888). Most tsunamis are associated with submarine seismic disturbances. But many submarine seismic disturbances, although large, have not caused tsunamis. The North Marmara region belongs to the North Anatolian Earthquake faulth and it will researched the tsunamis probability after the

earthquake at the north coastal district where the heavy industry areas are situated.

The term tidal wave, which is often used for the water gravity waves associated with submarine seismic disturbances, is now seldom used in the technical literature as the waves are not related to the tides. The Japanese word “tsunami” is usually used. Leet (1948) states that a catalog made in 1861 reported only 124 tsunamis during the interval that 15.000 earthquakes were observed along coastlines. There is probably two reasons for this event: not all earthquakes result in tsunamis; secondly small tsunamis probably go unnoticed. It has been found that earthquakes which have been accompanied by tsunamis are always followed by aftershocks that the earthquakes have a magnitude in excess of about 6, and that they have a relatively shallow focal depth (Iida, 1958, 1963 b).

Table.1 Some Initial Periods and Maximum Heights of Tsunami originating near Kamchatka on 1952, as obtained from Tide gauge records (after Zerbe, 1953)

Tide station	Initial wave period first to second crest (min)	Initial rise (ft)	Maximum rise (or fall) (ft)
Adak, Alaska	48	1.4	6.9
Tolfino, B. C., Canada	28	0.6	2.0
Crescent City, Calif.	25	1.7	6.8
Avila, Calif.	20	1.4	9.5
Los Angeles Harbor	55	0.4	3.6
La Paz, Mexico	38	0.2	1.6
Salina Cruz, Mexico	35	0.3	4.0
Apra Harbor, Guam	53	0.5	0.9 (fall)
Wake I.	12	1.2	1.7
Midway I.	8	1.9	6.6
Hilo, Hawaii	20	4.0	7.9 (fall)
Johnson I.	29	1.2	1.4 (fall)
Yap I.	55	0.2	0.4 (fall)
Canton I.	13	0.3	0.7
Pago Pago, Samoa	18	0.9	6.0 (fall)
La Libertad, Ecuador	33	1.5	6.2 (fall)
Antofugasta, Chile	17	1.3	4.7 (fall)
Caldera, Chile	20	2.0	9.3

Tsunamis associated with large earthquakes with focal depths greater than 80 km can

hardly be observed and are small for shocks with focal depths between 50 and 80 km. Most tsunamis that have been observed were associated with earthquakes with focal depths between 0 and 40 km. It was found by Wiegel (1964) that for noticeable tsunamis to occur the magnitude of the earthquake, M, must be greater than 6.3 + 0.01 H, where H is the focal depth in kilometers. It was also found that for disastrous tsunamis to occur, M must be greater than 7.75 + 0.008 H.