

A Mag 9+ TSUNAMI GENERATED IN THE TONGAN TRENCH Charles Mader, Mader Consulting Co.

The generation and propagation of a tsunami by an earthquake in the Tongan trench was modeled. The tsunami wave was generated from an earthquake 210 kilometers wide, 1100 kilometers long and 50 meters uplift located at 20 S, 175 W which approximates the size of the 12/26/2004 Indian Ocean earthquake.

The modeling was performed using the SWAN code which solves the nonlinear long wave equations.

The tsunami generation and propagation was modeled using a 20.0 minute ETOPO grid for the Pacific ocean.

The tsunami wave had a period of 1000 to 3000 seconds and maximum amplitudes in deep water of 2.5 meters in the Gulf of Alaska, 2.0 meters off Japan, 3.0 meters off New Zealand, 12.0 meters off Australia, 3.2 meters off Oahu, and 4.5 meters off the California coast. These values are upper limits as the long wave equations do not include dispersion which would reduce the wave amplitude with distance from the source.

The amplification of a tsunami wave when it interacts with the shore is two to three times the deep water wave amplitude.

CALCULATED
DEEP WATER WAVE HEIGHTS
FOR Mag 9+ TONGAN TRENCH TSUNAMI

No	Depth	Location	MAX	Amplitude	MIN Amp	Arrival
1	3703	Gulf of Alaska	+2.5	-2.0	12.5 hr	
2	5989	Japan	+2.0	-2.0	10.3 hr	
3	4685	Australia	+12.0	-6.0	3.3 hr	
4	4787	Lima, Peru	+1.8	-3.0	12.8 hr	
5	3001	New Zealand	+3.0	-1.5	2.8 hr	
6	4321	Hawaii	+3.2	-4.0	7.2 hr	
7	3556	California	+4.5	-2.0	11.7 hr	

10^7)

1. min, INC= ****









