



## SAFETY RULES

Tsunamis can be detected using our senses.  
Recognize a tsunami's natural warning signs;

### **FEEL:**

Severely shaking of the ground for a long time. Big local earthquakes may cause tsunamis;

### **SEE:**

An unusual retreat of water, or an oncoming wall of water. Tsunamis may be preceded by a rapid fall in sea level, exposing reefs, rocks and fishes on the sea bottom. They often come ashore as a wall of water and quickly flood inland;

### **HEAR:**

A roar. An approaching tsunami creates a loud roaring sound similar to that of a train or jet aircraft.

### **RUN!!!**

If you sense the above, or see a tsunami coming. Move inland to higher grounds


Leave all properties and immediately leave low-lying coastal areas. Don't wait for official evacuation orders!


Mariners should move away from the coast to a location further out (400-meter depth) and not approach the harbor until an "all clear" message has been issued.



"Protecting lives and property against natural hazards"

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# Tsunami



## TSUNAMI

Tsunami waves behave differently than waves generated by the wind. The tsunami wave is difficult to detect over deep waters and travels with a much greater speed than wind driven waves. The speed of a tsunami is comparable to the speed of a jet airliner (around 800 km/h).

A tsunami is a series of ocean waves, caused by the vertical displacement of a large volume of water. Tsunamis are primarily caused by earthquakes occurring below or near the seafloor. Other phenomena that can generate a tsunami are underwater volcanic eruptions, landslides, slumps and falling meteorites. Tsunamis due to these events are however less frequent.

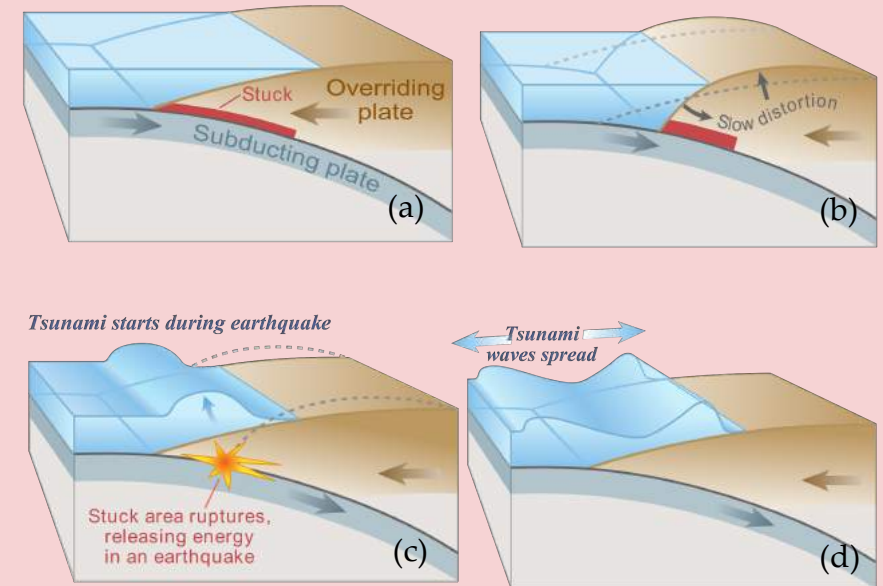
### Tsunamis in Curaçao

A study in the Caribbean tried to relate large rock deposits on Aruba, Curaçao and Bonaire to past tsunami events. During this investigation they studied debris deposits on these islands and tried to link these rocks to either a hurricane or a tsunami event. According to this investigation most of the coastal debris on these islands result from a tsunami. It would have taken a category 5 hurricane, which is unprecedented and unknown for these islands, to deposit debris of this magnitude on the coast and so far inland.

The tsunami events must have taken place around 500, 1500 and 3500 years ago. These events must have been of at least a regional scale. The most likely source for these events is related to seismic activity in the northeastern part of the Caribbean along the faults of the Caribbean plate boundaries or the Southern Caribbean Plate Boundary Zone along the northern Venezuelan continental margin, and in particular the region in the vicinity of Cumaná.

## HOW IS A TSUNAMI GENERATED BY AN EARTHQUAKE?

The Earth's crust is made up of several tectonic plates, moving relative to one another. Areas where these plates override one another are very prone to generating tsunamis. As one plate slides under the other the overlaying plate gets stuck and starts building up stress (a). While the underlying plate move forward, the stress builds up and the overriding plate deforms and bulges (b). At a certain point the stress build-up where the overlying plate is stuck on the underlying plate becomes too large and the plate becomes detached. This detachment is the occurrence of an earthquake (c). In case it's a strong earthquake, the plate moves in vertical direction, releasing its energy to the above lying column of water, and produces tsunami waves (d).



### TSUNAMI SPECIAL BULLETINS



**Information Statement** - *Be Alert!*-

No threat of a Tsunami for Curaçao



**Watch** ---*Prepare yourself!*---

An earthquake has occurred but it is not clear as yet whether a tsunami was generated.



**Warning** ---*Protect yourself!*---

A tsunami has been generated and confirmed. Inundation expected along the coastal region

## HAZARDS

### Inland Inundation -

As the tsunami reaches the coast and the waters become shallow, its speed decreases and the tsunami starts growing in height, reaching heights up to 15 m in extreme cases. These waves do not break and travel up the beach inland. The smashing force of this wall of traveling water at a relatively high speed can cause a lot of damage. This large volume of water carries all along its path with it inland, causing inundation. This, though the wave may not have looked large at the first instance.