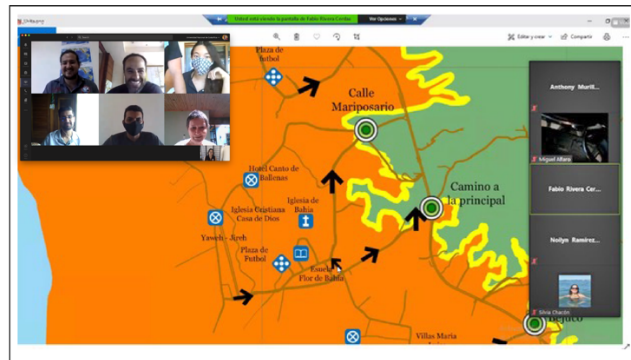
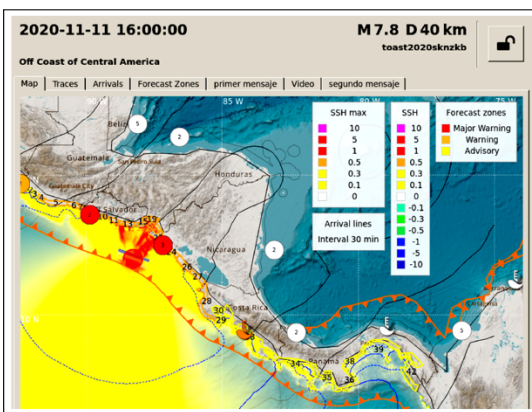


CATAC REGIONAL TSUNAMI EXERCISE, 11 NOV 2020

In Central America, the Central America Tsunami Advisory Center (CATAC) conducted its second regional exercise with the NTWCs. The exercise simulated a “slow” earthquake off the Gulf of Fonseca in the Pacific Ocean that impacted El Salvador, Nicaragua, and Costa Rica, as well as Mexico and Ecuador. The scenario was similar to the deadly tsunami of 1 September 1992 on the Pacific coast of Nicaragua and the dangerous tsunami of 26 August 2012 in El Salvador and Nicaragua. In both cases, the lack of strong shaking led people living in coastal areas to mistakenly believe that the risk of tsunamis was low. During the simulation, Costa Rica issued a warning to the beachside community of Bahia at Osa, Puntarenas, who followed their tsunami preparedness and response plan and evacuated.



Left: PacWave20 CATAC regional exercise scenario. Right: Costa Rica NTWC staff (right) virtually simulated tsunami evacuation for Bahia at Osa, Puntarenas.

Credits INETER, S. Chacón-Barrantes

Summary

On November 11, 2020, starting from the second regional tsunami drill for Central America (Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama) will be held, which was prepared by the Central America Tsunami Advisory Center (CATAC).

In the last 10 years, tsunami preparedness in Central America is improving a lot. Seismic monitoring institutions have significantly increased the number of stations, improved the quality of equipment, and also used more sophisticated methods for earthquake processing; the monitoring and alert centers exchange their information in real time. However, certain situations that require good preparation are possible.

This exercise will simulate a strong tsunami caused by a magnitude 7.8 Mw earthquake off the Gulf of Fonseca in the Pacific Ocean of Central America. It is assumed the breaking of a huge fault along the subduction zone of the Cocos and Caribe tectonic plates and that due to certain geological conditions the movement occurs more slowly than normal. This would result in a so-called "slow" earthquake that is characterized by generating little seismic but large tsunamis.

The disastrous tsunami, on September 1, 1992, on the Pacific coast of Nicaragua, and the dangerous tsunami, on August 26, 2012, in El Salvador and Nicaragua had this deceptive characteristic. Due to the lack of strong shaking, people on the beaches do not obtain the natural alert about a possible tsunami. Also seismic networks tend to initially underestimate the danger because traditional seismic processing methods give too low magnitudes for these earthquakes and therefore the initial tsunami prediction also fails.

CATAC uses - like the PTWC, other regional centers and some national tsunami warning centers - special methods to quickly determine the correct magnitude for “slow” earthquakes. In case of slow earthquakes, the initial magnitudes that the CATAC publishes will be too low but they increase in one or two steps until reaching the correct value in the following messages. Civil protection institutions and the population in Central America need to understand the possibility of slow earthquakes and not question the predictions of a tsunami just because no strong shaking was felt.

In the Tsunami-CA-20 drill, the first message that CATAC will send to the countries automatically a few seconds after the earthquake is detected stipulates a magnitude of only 5.3. About three minutes after the beginning of the earthquake, the CATAC will send a correction in which the magnitude rises to 6.8 and finally, about 5 minutes after the earthquake, the final magnitude of 7.8 obtained with the Tsunami Tensor Moment method is sent. The earthquake data and the prediction of the arrival times of the tsunami waves and the maximum amplitudes for the different segments of the coast will be provided. About 45 minutes after the earthquake, the data recorded by the tide gauges in the region will be provided. This will be the last message of the drill.

On the afternoon of November 11, 2020, after the drill, CATAC will conduct a first evaluation of the drill through a virtual meeting together with the institutions participating in the drill.

Background

On August 19, 2019, the first regional tsunami drill for Central America (Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama) was conducted, using information prepared by the Central America Tsunami Advisory Center (CATAC) , see CATAC (2019). This demonstrated that Central America had acquired the ability to characterize tsunami-generating earthquakes in real time and to forecast the parameters of the tsunamis and the possible impact on the different countries of the region.

Since 2016, INETER had developed with the support of Japan the Tsunami Advisory Center for Central America (CATAC) based on the national tsunami warning center in Nicaragua, Furukawa et al. (2018). As of 2019, CATAC has the ability to emit tsunami products based on the earthquake seismological assessment and the numerical tsunami prediction.

The design of the 2019 exercise, like the 2020 one prepared with this document, reflects the experience of a tsunami processed by an advisory center located in the affected region. The seismologist on duty may feel the shaking caused by the generating tsunami earthquake while monitoring the automated system and processing the seismic data. The first results are sent to

recipients in Central American countries before the rupture that caused the earthquake has ended. This brings with it the need to update and correct the first results at the time of having more complete information on the situation. Participants in the exercise must understand these dynamics. An important objective of this exercise is to discuss, before and after the exercise, with the participants from the Central American institutions, how in the future the CATAC information can be provided in a way that facilitates this awareness of the changing situation in real time. .

Motivation justification

This regional tsunami exercise is being conducted to aid tsunami preparedness efforts in the Central American region. Recent experiences in other parts of the world, such as the Indian Ocean (2004), Samoa (2009), Haiti (2010), Chile (2010, 2014, 2015) and Japan (2011), attest to the importance of proper planning of the tsunami response.

Central America lies between two oceans, the Pacific and the Atlantic across the Caribbean Sea. The tsunami catalog based on historical references for Central America lists more than 50 tsunamis (Molina, 1997; Figure 1). A couple of tsunamis on both coasts have caused damage and victims at the end of the 20th century: 1991 in Costa Rica-Panama and 1992 in Nicaragua. At least two "tsunami earthquakes" have affected the Pacific coasts of Central America: 1) 1992 in Nicaragua with waves (runup) of up to 10 meters, more than 170 deaths (Kikuchi and Kanamori, 1995); 2) 2012 in El Salvador and Nicaragua, with wave heights of about 4 to 5 meters (Tenorio and Strauch, 2012; Borrero et al., 2014).

Since the most recent destructive tsunami, in 1992 in Nicaragua, there has been a population growth in Central America and an increased influx of tourists along the Pacific and Caribbean coasts, increasing the region's vulnerability to tsunamis. In addition to tsunamis, the region also has a long history of destructive earthquakes. The question is not whether another major tsunami will occur, but when it does: will the region be prepared for the impact?

In the last 10 years, tsunami preparedness in Central America is improving a lot. Seismic monitoring institutions have significantly increased the number of stations, improved the quality of equipment, and also used more sophisticated methods for earthquake processing; the monitoring and alert centers exchange their information in real time. The number of tide gauges in the region increased, with more progress in Honduras and Nicaragua. El Salvador, Nicaragua, and Costa Rica already have national tsunami warning systems.