EARLY TSUNAMI HAZARD ASSESSMENT BY GENERATING RANDOM SLIP SCENARIOS WITH GEOLOGICAL RESTRICTIONS

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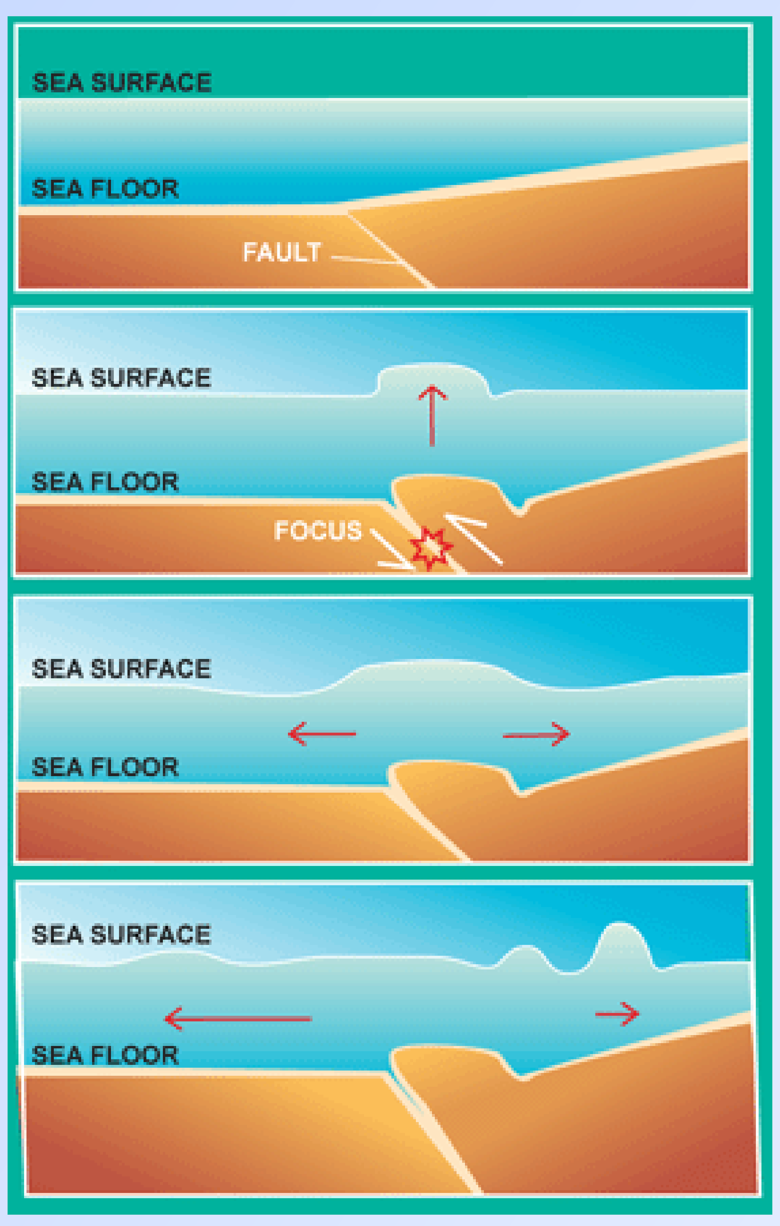
MOTIVATION

Massive tsunamis can destroy coastal cities and towns. Recent catastrophic events include the 2004 Indian Ocean tsunami and the tsunami generated by the 2011 off the Pacific coast of Tohoku earthquake (the 2011 Tohoku earthquake), which caused a large number of fatalities, damage to infrastructure, and huge economic loss.

To mitigate tsunami risk for coastal communities and built environments and to implement effective warning and evacuation protocols, accurate and reliable tsunami hazard assessments are essential. Techniques and methods for tsunami simulations have greatly advanced over recent years, and this has facilitated the development of operational tsunami early warning systems.

HOW TSUNAMIS ARE GENERATED?

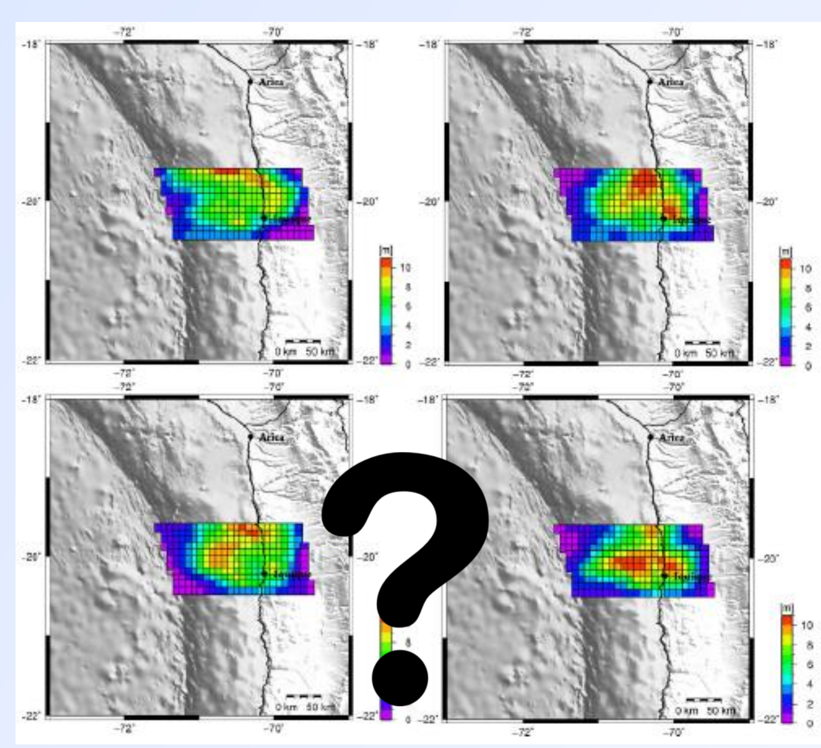
- The most destructive tsunamis are generated from shallow earthquakes with an epicenter near the ocean floor. These usually occur by tectonic subduction faults.
- The high seismicity of such regions is caused by the collision of tectonic plates.
- The sudden vertical displacements over such large areas, disturb the ocean's surface, displace water, and generate destructive tsunami waves.
- The waves can travel great distances from the source region, spreading destruction along their path.



THE MAIN PROBLEMATIC

In particular, earthquake slip has significant influence on the tsunami wave profile and the extent of inundation and run-up.

But it's known, that the slip along the fault area is not homogeneous. So, given an earthquake, **is it possible know how the distribution was**?



Source: Ortega, 2017

The answer is NO. current technology does not allow interplate measurements.

The uncertainty associated with earthquake source properties for future events is large, and thus, the assessment should include multiple scenarios that are likely to occur in light of available scientific evidence of past events.

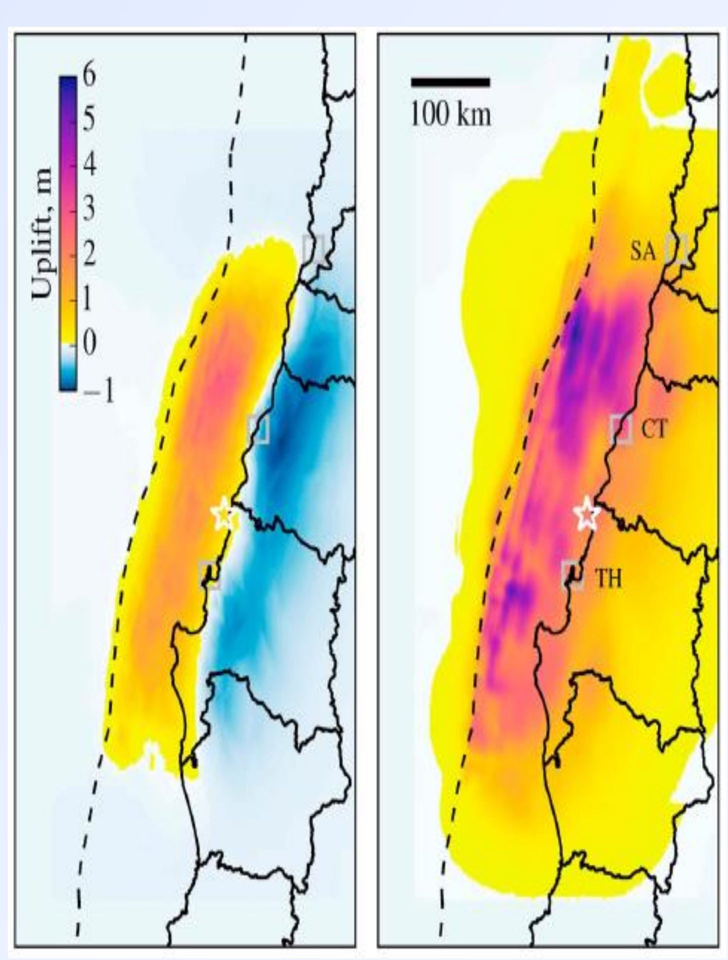
INVESTIGATION OBJECTIVES

MAIN GOAL

- In the context of early warning system, incorporate uncertainty to the seismic slip scenarios generated by inversion fault models.

SPECIFIC OBJECTIVES

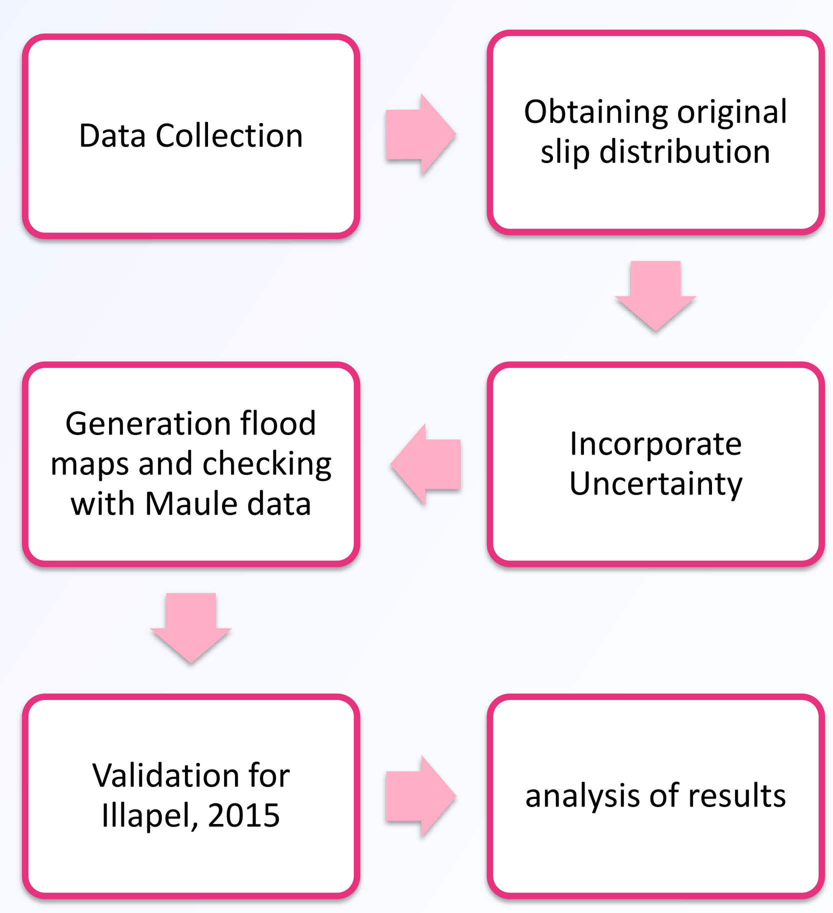
1. Obtain an original slip distribution from inversion fault model for Maule, 2010.
2. Incorporate uncertainty to the slip distribution.
3. compare results with observed flood maps for Maule
4. Validate model with uncertainty for Illapel, 2015.



Source: Cienfuegos et al (2018)

METHODOLOGY

The methodology followed in the current investigaction is outlines below:



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