

Modeling the Tsunami of 27 February 2010 in Chile Preliminary Results

Shunichi Koshimura and Fumihiko Imamura
Disaster Control Research Center, Graduate School of Engineering
Tohoku University

8 March 2010

Table 1: Fault parameters

Mo	2.0×10^{22} Nm[ref.1]
Fault Length / Width	450 km / 100 km
Source Mechanism (Strike, Dip, Slip)	(16, 14, 104)[ref.1]
Dislocation	15 m

Table 2: Tsunami model descriptions

Governing equations	Non-linear shallow water equations
Numerical scheme	Leap-frog finite difference method
Spatial resolution	30 arc-seconds (GEBCO)[ref.2]
Population data	LandScan2008[ref.3]

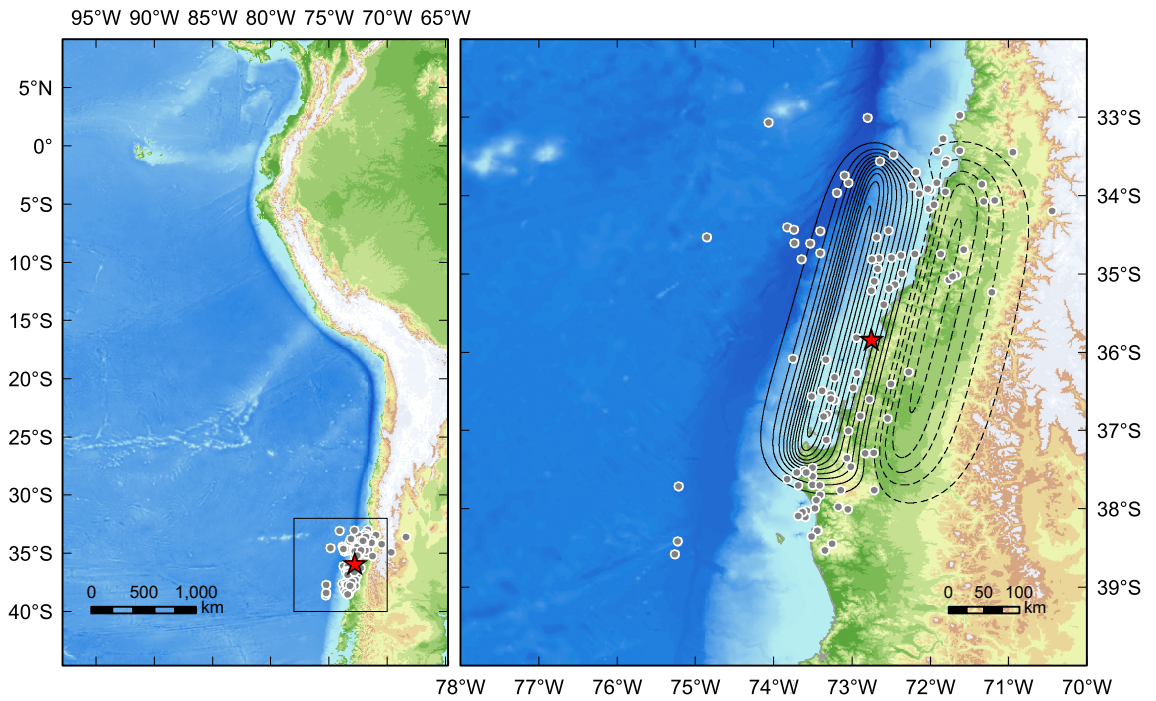


Fig. 1: Tsunami source model. Seismic deformation by the fault rupture[ref.4]. Maximum uplift was estimated to be 5.7 m and 2.6 m for subsidence. The contour interval is 0.5 m. The solid lines for uplift and the dashed lines for subsidence. The gray dots indicate the epicenter of aftershocks within 28 hours since the mainshock occurred.

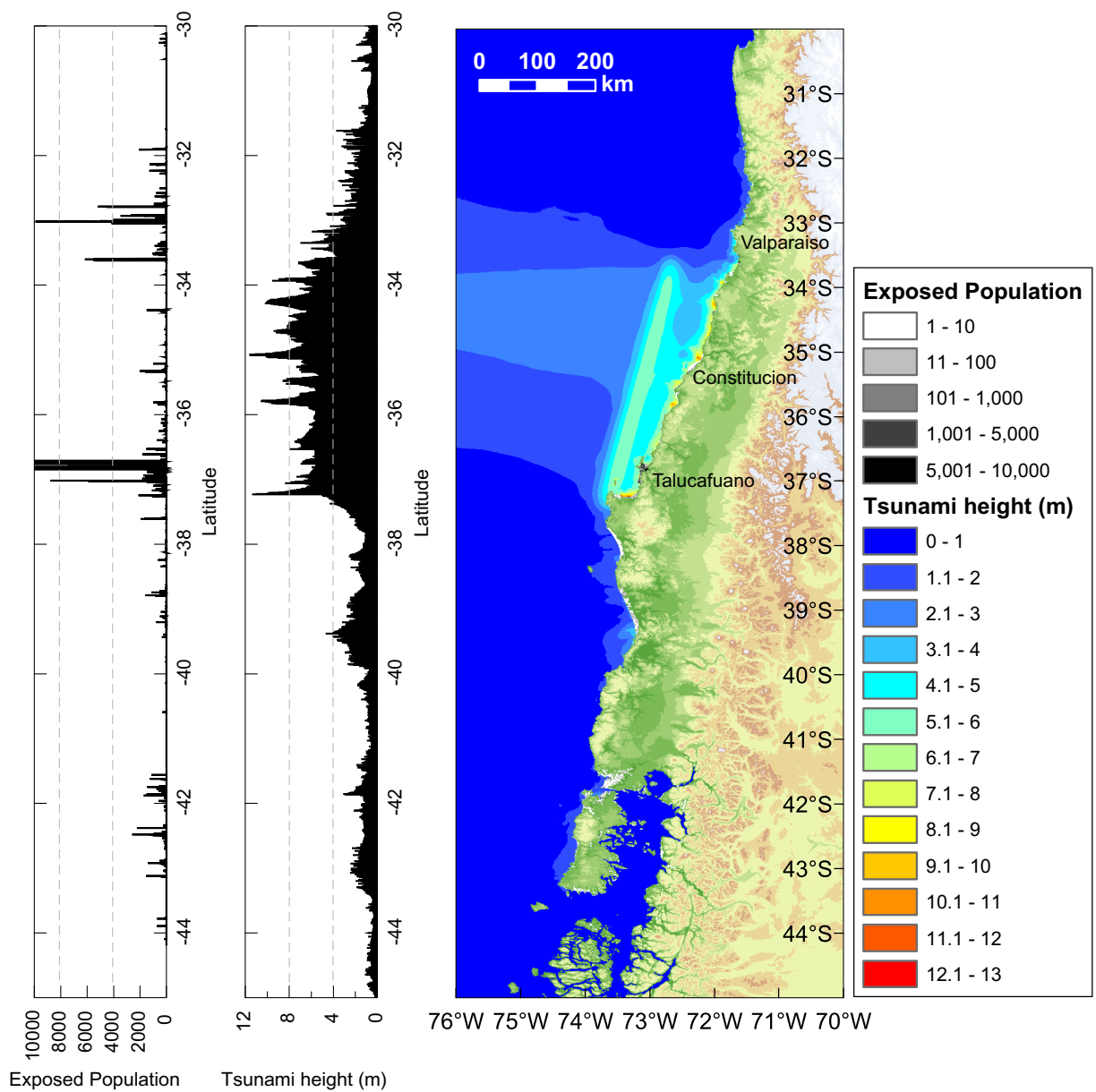


Fig. 2: Modeled tsunami height and exposed population[ref.5]. Exposed population is counted using LandScan2008[ref.3], searching the population below 30 m of land elevation.

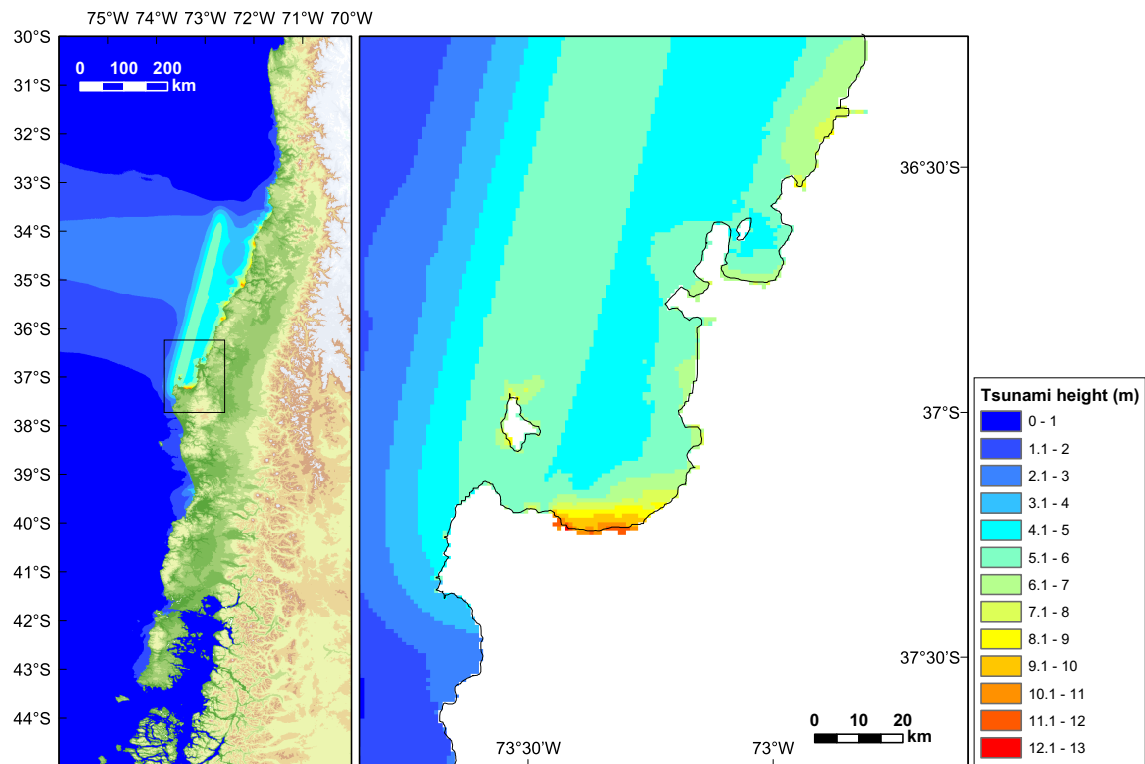


Fig. 3: Modeled tsunami height along the coast of Talcahuano.

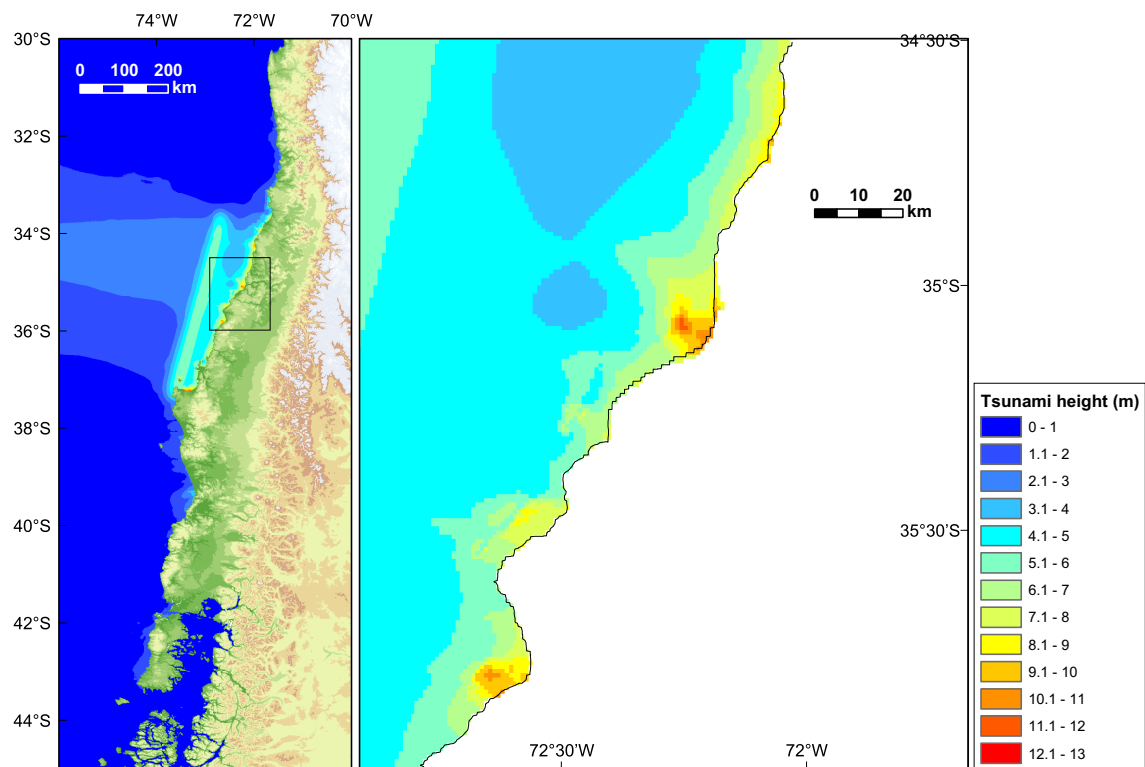


Fig. 4: Modeled tsunami height along the coast of Constitution.

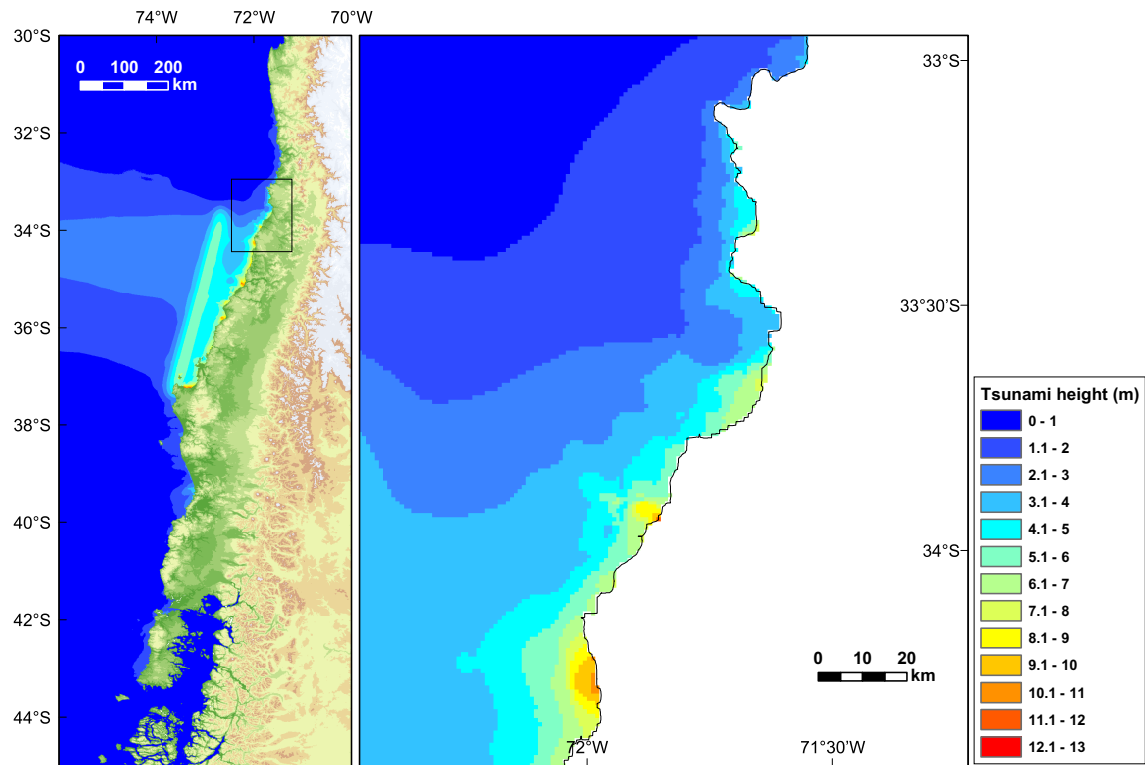


Fig. 5: Modeled tsunami height along the coast of Valparaiso.

References

- [ref.1] USGS Earthquake Hazards Program, 2010
http://neic.usgs.gov/neis/eq.depot/2010/eq_100227_tfan/neic_tfan_wmt.html
- [ref.2] The General Bathymetric Chart of the Oceans (GEBCO)
<http://www.gebco.net/>
- [ref.3] Oak Ridge National Laboratory, LandScanTM, <http://www.ornl.gov/sci/landscan/>
- [ref.4] Okada, Y., Surface Deformation due to Shear and Tensile Faults in a Half-space, Bulletin of the Seismological Society of America, 75(4), 1135–1154 ,
- [ref.5] Koshimura, S., M. Matsuoka and S. Kayaba, Integrated approach to assess the impact of tsunami disaster, Safety, Reliability and Risk of Structures, Infrastructures and Engineering Systems, Furuta, Frangopol & Shinozuka (eds), Taylor & Francis, London, pp.2302–2307, 2009.