

## TSUNAMI RISK ASSESSMENT IN QUINTERO BAY CHILE

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### Resumen

The developing importance of Quintero harbour and the extensive land use in the bay have prompted the assessment of tsunami risk in order to better understand the phenomena and risks involved and to advise upon mitigating measures for the area. This report presents the theory and technique for the evaluation of the potential effects of tsunamis striking the area, as part of an extensive research commissioned by the Chilean Hydrographic and Oceanographic Service (SHOA) which is currently evaluating tsunami risk in the Chilean harbours.

To study tsunami hydrodynamics, TUNAMI-N code was used. This is a numerical facility for the modelling of near-field tsunamis, developed by Dr. Nuobo Shuto in Tohoku University, Japan (1997). It is based on a leap frog finite difference scheme and includes the generation, propagation and run-up of tsunami waves by means of the shallow water wave theory. The seismic events were selected from historical records of earthquakes occurred in the area. Results are presented as a tsunami flooding map, velocity fields and wave height time series, within 3-hours simulations. TUNAMI-N code in combination with Matlab 5.3 graphical facilities showed an efficient performance concerning time and memory consumption.

Results show that the North-eastern portion of the bay would be severely affected by potentially destructive tsunamis ( $Mo_{5 \times 10^{21}}$ ) with run-ups of up to 8 m and velocities of 8m/s. Downtown Quintero is relatively protected by Peninsula Los Molles and would not be very damaged by these events. Minor tsunamis ( $10^{21} Mo_{5 \times 10^{21}}$ ) signify negligible impacts with run-ups of about 2 m and maximum velocities of 1m/s. It is concluded that flooded areas are strongly dependent on the seismic moment of the triggering earthquake ( $Mo$ ) and, until improved information about seismic features in Central Chile is available, obtained results provide a good

approach to evaluate tsunamiflooding levels.

A site-specific set of mitigating measures includes soil stability improvement, storage tanks anchoring and the protection, or relocation of critical lifelines and buildings in Puerto Ventanas. Terminales Oxiquim require minor mitigating measures because of its safe location. Providing frictional characteristics to the coastline, by landscaping with tsunami forests or drainage nets, would be an economic and sustainable alternative to mitigate inundation risks in residential areas. It is recommended to prepare a communication plan in order to encourage public awareness of the tsunami threat.

**Descarga Aquí**