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# The Chile tsunami of 27 February 2010: Field survey and modeling

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On 27 February, 2010 a magnitude Mw 8.8 earthquake occurred off the coast of Chile's Maule region some 100 km N of Concepción, causing substantial damage and loss of life on Chile's mainland and the Juan Fernandez archipelago. The majority of the 521 fatalities are attributed to the earthquake, while the tsunami accounts for 124 victims. Fortunately, ancestral knowledge from past tsunamis such as the giant 1960 event, as well as tsunami education and evacuation exercises prompted most coastal residents to spontaneously evacuate to high ground after the earthquake. The majority of the tsunami victims were tourists staying overnight in low lying camp grounds along the coast. A multi-disciplinary international tsunami survey team (ITST) was deployed within days of the event to document flow depths, runup heights, inundation distances, sediment deposition, damage patterns at various scales, performance of the man-made infrastructure and impact on the natural environment. The 3 to 25 March ITST covered an 800 km stretch of coastline from Quintero to Mehuín in various subgroups the Pacific Islands of Santa María, Juan Fernández Archipelago, and Rapa Nui (Easter), while Mocha Island was surveyed 21 to 23 May, 2010. The collected survey data includes more than 400 tsunami runup and flow depth measurements. The tsunami impact peaked with a localized maximum runup of 29 m on a coastal bluff at Constitución and 23 m on marine terraces on Mocha Island. A significant variation in tsunami impact was observed along Chile's mainland both at local and regional scales. Inundation and damage also occurred several kilometres inland along rivers. Observations from the Chile tsunami are compared against the 2004 Indian Ocean tsunami. The tsunamigenic seafloor displacements were partially characterized based on coastal uplift measurements along a 100 km stretch of coastline between Caleta Chome and Punta Morguilla. More than 2 m vertical uplift were measured on Santa Maria Island. Coastal uplift measurements in Chile are compared with tectonic land level changes from other events. Field observations, video recordings, satellite imagery and numerical modelling are presented. The team interviewed numerous eyewitnesses and educated residents about tsunami hazards since community-based education and awareness programs are essential to save lives in locales at risk from locally generated tsunamis.