



Field survey of the 16 September 2015 Chile tsunami

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On the evening of 16 September, 2015 a magnitude M_w 8.3 earthquake occurred off the coast of central Chile's Coquimbo region. The ensuing tsunami caused significant inundation and damage in the Coquimbo or 4th region and mostly minor effects in neighbouring 3rd and 5th regions. Fortunately, ancestral knowledge from the past 1922 and 1943 tsunamis in the region along with the catastrophic 2010 Maule and recent 2014 tsunamis, as well as tsunami education and evacuation exercises prompted most coastal residents to spontaneously evacuate to high ground after the earthquake. There were a few tsunami victims; while a handful of fatalities were associated to earthquake induced building collapses and the physical stress of tsunami evacuation. The international scientist joined the local effort from September 20 to 26, 2015. The international tsunami survey team (ITST) interviewed numerous eyewitnesses and documented flow depths, runup heights, inundation distances, sediment deposition, damage patterns, performance of the navigation infrastructure and impact on the natural environment. The ITST covered a 500 km stretch of coastline from Caleta Chañaral de Aceituno (28.8° S) south of Huasco down to Lolleo near San Antonio (33.6° S). We surveyed more than 40 locations and recorded more than 100 tsunami and runup heights with differential GPS and integrated laser range finders. The tsunami impact peaked at Caleta Total near Punta Aldea with both tsunami and runup heights exceeding 10 m as surveyed on September 22 and broadcasted nationwide that evening. Runup exceeded 10 m at a second uninhabited location some 15 km south of Caleta Total. A significant variation in tsunami impact was observed along the coastlines of central Chile at local and regional scales. The tsunami occurred in the evening hours limiting the availability of eyewitness video footages. Observations from the 2015 Chile tsunami are compared against the 1922, 1943, 2010 and 2014 Chile tsunamis. The tsunami was characterized by rapid arrival within minutes in the nearfield requiring spontaneous self-evacuation as warning messages did not reach some of the hardest hit fishing villages prior to tsunami arrival. The absence of a massive tsunami outside of the 4th region may mislead evacuated residents in the adjacent 3rd and 5th regions of Chile in potential future events. This event poses significant challenges to community-based education raising tsunami awareness. The team educated residents about tsunami hazards since awareness programs are essential to save lives in locales at risk from near-field tsunamis.