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Preliminary evaluation of the Chile February 27, 2010, earthquake TSUNAMI RUN-UP at Constitución

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On February 27th, the most populated region of Central Chile has been struck by a strong earthquake (USGS magnitude Mw 8.8). This megathrust event broke a ~500-km-long segment of the subduction plate boundary between Nazca and South America. Large cities as Concepción near the southern end of the rupture, Talca in the middle have been severely damaged by the earthquake. Santiago, capital of Chile, near the northern end of the rupture, and the main ports of Valparaíso and San Antonio also suffered strong shaking and destruction. An important tsunami has severely drowned towns along the coast of Central Chile, particularly the larger cities of Talcahuano and Constitución, and propagated across the Pacific ocean.

A special IPGP web page provides useful maps: http://www.ipgp.fr/pages/040115.php

Estimate of Tsunami run-up at Constitución :

High-resolution images acquired after the earthquake were made available through GoogleEarth (~38 cm pixel size, images acquired March 3rd and 5th). Using those images, we mapped the trace of the maximum flooding extension caused by the tsunami (run-up) in area of Constitución (35.3320°S, 72.4118°W, 50 000 inhabitants). (Figure 1). The run-up trace is particularly clear north of Río Maule and close to the local airfield (Figure 1b).

Our map can be overlaid on the *Carta de Inundación por Tsunami* established by Servicio Hidrográfico y Oceanográfico de la Armada (SHOA, scale 1:10000), which includes accurate topography (based on high-resolution photogrammetry) of which elevation contours have been drawn every 5m (Figure 2). The tsunami run-up has reached elevations of 4 to 5m above sea level (asl) in the Constitución area. The run-up can be precisely determined in the airfield area (~5m asl, Figure 2b).

According to the imagery, the permanent uplift or subsidence of the coastline associated with coseismic deformation in the Constitución area appears to be small, within the range of tidal fluctuations, thus probably less than 1m.

To retrieve enhanced versions of figures:
http://www.ipgp.fr/~lacassin/Chile2010Quake/Runup/

Figure 1 : Map of areas drowned by the 27/02/2010 tsunami (observed run-up in blue).
Red frame locates used post-earthquake high-resolution images.

Figure 1b : Enlargement of airfield area north of Río Maule.

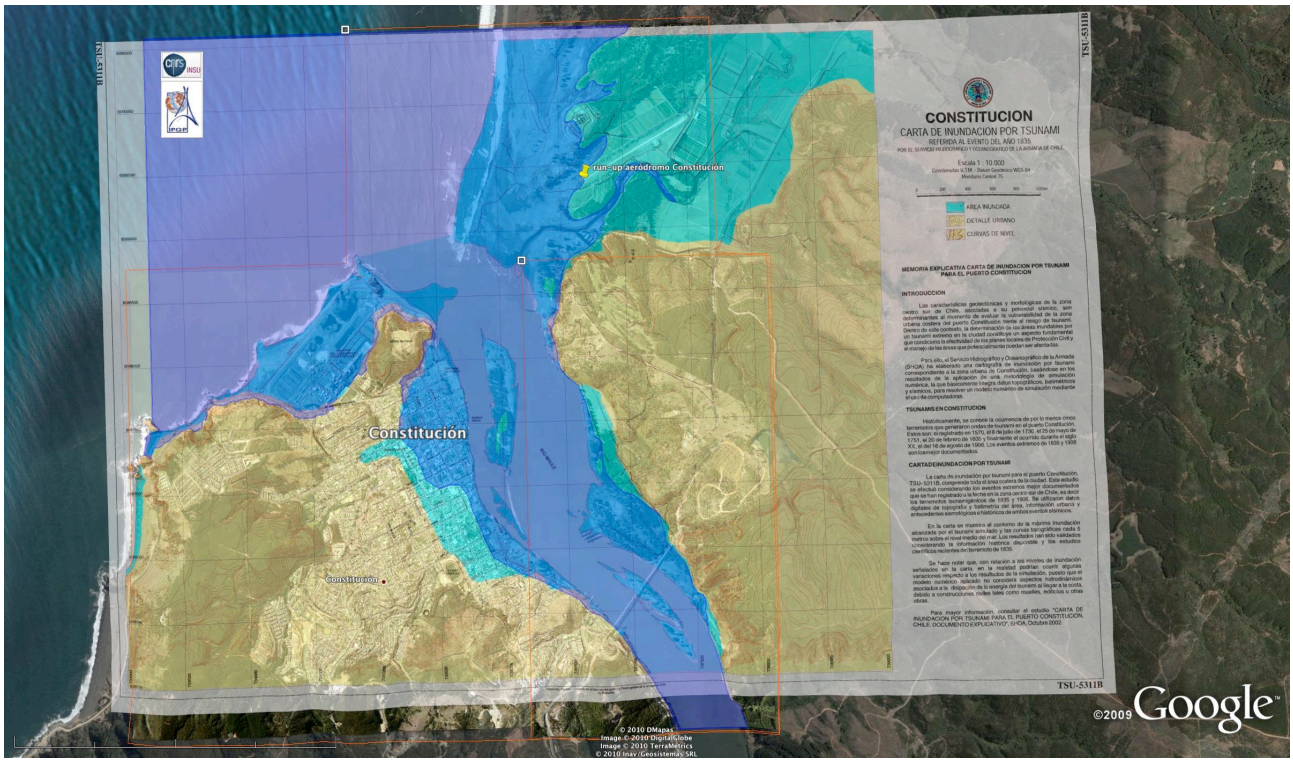

Figure 2 : Areas drowned by 27/02/2010 tsunami (observed run-up in dark blue) overlaid on *Carta de Inundación por Tsunami* established by Servicio Hidrográfico y Oceanográfico de la Armada (SHOA) Light blue indicates maximum potential tsunami run-up as determined earlier by SHOA

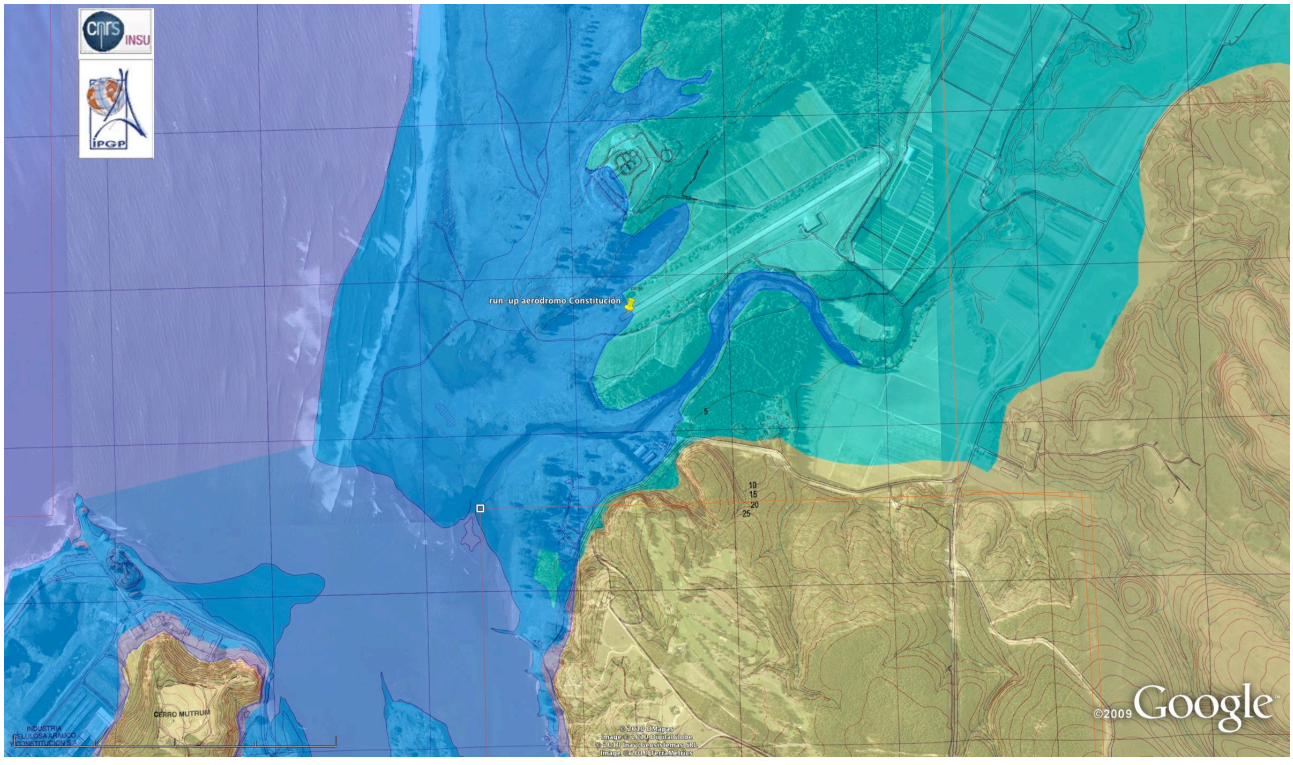

Figure 2b : Enlargement area north of Río Maule including airfield. Note that the 27/02/2010 tsunami run-up reaches the 5m elevation contour.