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Tsunami Inundation Simulations in the Bay of Concepción, Chile using TUNAMI and Delft3D models

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An earthquake with a strength of 8.8 on the Richter Scale occurred on 27th February 2010 at 03.34 local time (06:34 UTC) with an epicentre off the coast of the Maule region and generated a destructive tsunami. The destruction by both the tsunami and earthquake were extensive. Many people were killed and the total economic loss in Chile is estimated to be 20 billion US dollar. Repeated tsunami waves hit the Bay of Concepcion with a observed run-up of up to 6m in Penco, Talcahuano and Tumbes.

Numerical simulation of this event using Delft3D (Non-Linear SWE) and TUNAMI N2 (Linearised SWE) model has been carried out to produce flood maps. Two models, with identical initial conditions, were applied to test the difference in response of the models for the same event. For the comparison the tsunami heights and run-up at different locations from both models were compared. To complete the comparative analysis simulations of the 1835 and 1960 tsunami events were also conducted.

Unfortunately, comparison with observed water levels is only available at one coastal station and only for the duration of the first two hours after the earthquake event. Nevertheless the comparison reveals interesting distinctive differences between the models especially with respect to the propagation speed. The results of this comparative study can provide a valuable contribution towards evaluation and benchmarking of the tsunami models.