

Modelling moderate tsunami on the French coasts

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The 2003 Mediterranean tsunami generated by the Boumerdes-Zemmouri earthquake reminds us of the possibility for intermediate submarine earthquakes to generate moderately damaging tsunamis in the area of interest. A field survey allowed identifying several harbours in the French Riviera where disturbances related to local resonances have been reported during the tsunami (Fig 1). This new database illustrates well which kind of effects a moderate tsunami can imply on coastal infrastructures. To study in more details this effect, the French ANR Maremoti project is focusing on the tide gauge and field tsunami observations, and modelling and vulnerability studies for the Northeast Atlantic and western Mediterranean area. This project is carried out with ten scientific partners (nine French and one Portuguese). In this study, we discuss the effect of moderate earthquake-generated tsunamis on the French Atlantic coasts. To this aim, we use real tsunami events like the 1969 earthquake off Portugal and also the 1755 event for the Atlantic region, and the Boumerdes-Zemmouri event (2003) for the Mediterranean region. Available observed data are synthesized, and are compared to tsunami modeling results. We use a numerical tsunami simulation based on non linear shallow water equations and using imbricated bathymetric grids to simulate tsunami propagation from source to more detailed areas. This allows computing the tsunami effect in some harbours and bays, especially in terms of local resonances. High resolution grids, which are set up for the last grids level, are made from digitized, georeferenced and interpolated nautical bathymetric charts, and bathymetric soundings from SHOM. The objective is also to discuss the tsunami hazard for the French Atlantic coastline (taking account the tide parameters) and for the Mediterranean coastline, which is rather poorly known to date, and thus we use different earthquakes sources parameters for the Mediterranean and Atlantic coastline.

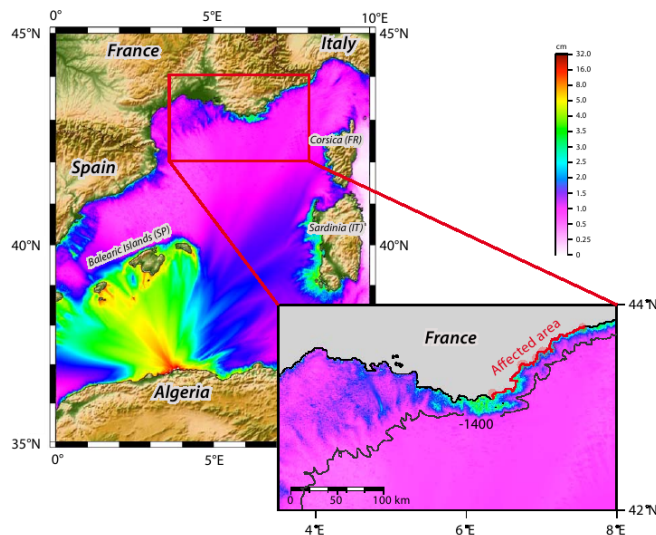


Figure 1: Modelling of the maximal sea elevation reached during the first 4h after the Boumerdes-Zemmouri earthquake and localisation of the affected area deduced by the field survey (red line) Sahal et al. (2009)

Reference

Sahal, A., J. Roger, S. Allgeyer, B. Lemaire, H. Hébert, F. Schindelé, and F. Lavigne (2009), The tsunami triggered by the 21 May 2003 Boumerdès-Zemmouri (Algeria) earthquake: field investigations on the French Mediterranean coast and tsunami modelling, *Natural Hazards and Earth System Sciences*, 9, 1823–1834.