Building strategies for tsunami scenarios databases to be used in a tsunami early warning decision support system: an application to western Iberia

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One of the most challenging goals that the geo-scientific community is facing after the catastrophic tsunami occurred on December 2004 in the Indian Ocean is to develop the so-called "next generation" Tsunami Early Warning Systems (TEWS). Indeed, the meaning of "next generation" does not refer to the aim of a TEWS, which obviously remains to detect whether a tsunami has been generated or not by a given source and, in the first case, to send proper warnings and/or alerts in a suitable time to all the countries and communities that can be affected by the tsunami. Instead, "next generation" identifies with the development of a Decision Support System (DSS) that, in general terms, relies on 1) an integrated set of seismic, geodetic and marine sensors whose objective is to detect and characterise the possible tsunamigenic sources and to monitor instrumentally the time and space evolution of the generated tsunami, 2) databases of pre-computed numerical tsunami scenarios to be suitably combined based on the information coming from the sensor environment and to be used to forecast the degree of exposition of different coastal places both in the near- and in the far-field, 3) a proper overall (software) system architecture.

The EU-FP7 TRIDEC Project aims at developing such a DSS and has selected two test areas in the Euro-Mediterranean region, namely the western Iberian margin and the eastern Mediterranean (Turkish coasts). In this study, we discuss the strategies that are being adopted in TRIDEC to build the databases of pre-computed tsunami scenarios and we show some applications to the western Iberian margin. In particular, two different databases are being populated, called "Virtual Scenario Database" (VSDB) and "Matching Scenario Database" (MSDB). The VSDB contains detailed simulations of few selected earthquake-generated tsunamis. The cases provided by the members of the VSDB are computed "real events"; in other words, they represent the unknowns that the TRIDEC platform must be able to recognise and match during the early crisis management phase. The MSDB contains a very large number (order of thousands) of tsunami simulations performed starting from many different simple earthquake sources of different magnitudes and located in the "vicinity" of the virtual scenario earthquake. Examples from both databases will be presented.