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Calibration of a Tsunami Early Detection Algorithm (TEDA) for the sites of Catania and Tremestieri in Sicily, Italy.

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TEDA is a real-time algorithm for the detection of potentially dangerous long period waves like tsunamis (Bressan and Tinti, 2011) and it is formed by two simultaneous algorithms built to work at a station level, i.e. on sea level data from a single station: the tsunami detection is designed to identify impulsive long period waves as tsunamis and it triggers a detection when the detided sea level slope exceeds a dynamic threshold that varies according with the previous background sea level slope, while the secure detection triggers an alert when a filtered sea-level signal passes an amplitude threshold.
To make TEDA operational in a tide gauge station, both the thresholds of the detection conditions and the temporal parameters in the definitions of TEDA functions should be carefully determined to improve the algorithm efficiency, especially for coastal tide gauge stations that are usually characterized by a local background spectrum and a site dependent tsunami response. This is accomplished by a performance evaluation study, called calibration, which consists in the analysis of the performance of TEDA tested a posteriori with different settings on available data, both on background condition and in case of tsunami event. The study of the background signal and in particular of the potential dangerous events that can affect the site is very important, especially in case of no tsunami records available, where synthetic tsunami signals produced by numerical simulations of known and possible tsunamigenic sources should be used. The calibration of TEDA in a specific site allows not only to optimize, but also to evaluate its efficiency in different possible situations.
In this work we present the results of TEDA calibration for two Italian sites, Catania and Tremestieri, both on the eastern coast of Sicily, where coastal tide gauges are installed, with synthetic tsunami signals from tsunami scenarios, including seismic and landslide sources (Tonini et al, 2011).

References

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