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The role of GPS observations in a Tsunami Early Warning System suitable for near-shore tsunami detection and forecast.

Stefano Tinti, Alberto Armigliato, and Gianluca Pagnoni

University of Bologna, Department of Physics, Sector of Geophysics, Bologna, Italy (stefano.tinti@unibo.it, +39-(0)51-2095025)

Tsunami Early Warning Systems have been given great attention especially after the great 26 December 2004 catastrophic tsunami in the Indian Ocean, and great efforts have been put in improving the already existing systems and in implementing new systems in the ocean areas that were found to be uncovered. The basic monitoring systems of the today's TWSs are seismic networks to detect tsunamigenic earthquakes and sea-level (offshore or coastal) station networks to detect the generated tsunami. Generally seismic signals are used to launch the first alert of a possible tsunami generation, while sea-level signals are used for alert validation or cancellation. GPS signals are not systematically and routinely used in TWSs apart from some exceptions (see the GITEWS as part of the InaTEWS in Indonesia). In this work it is stressed the relevance of GPS networks for the real-time (or quasi real-time) identification of the co-seismic deformation pattern of big coastal earthquakes capable of producing disastrous tsunamis. They can contribute to inverting the slip distribution on the fault, which is known to be usually far from being homogeneous especially for large earthquakes. In turn, the quick determination and quantification of the patches of major slip on the fault can help assess the main features of tsunami generation and of tsunami propagation in the near-field, which is an essential knowledge to launch appropriate warning to the population living on the coasts for near-shore sources. This is illustrated through cases relevant for the European coasts. This work has been carried out in the frame of the ongoing project TRIDEC, that is funded by the European Union and concerns the design of appropriate Decision Support Systems to handle evolving crises related to natural as well as industrial hazards.