An innovative tsunami detector operating on a multiparameter seafloor observatory

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During the cruise of the Italian research vessel URANIA on August 2007, a new tsunami detector was successfully deployed at 3200 b. s. l. in the Gulf of Cadiz, Portugal. The new detector is installed on board the multi-parameter abyssal observatory GEOSTAR.

This activity is a task of NEAREST EC Project (http://nearest.bo.ismar.cnr.it/).

Among other tasks, the NEAREST project will produce and test the basic parts of an operational prototype of a near field tsunami warning system. The warning system includes an onshore warning centre based on the seismic and tide gauges monitoring networks which are already operating in the area of Gulf of Cadiz and connected in real time with many warning receiving shore stations, a buoy equipped with meteo-station and two way acoustic and satellite links, and the tsunami detector installed on board GEOSTAR. The warning centre is in charge of collecting, integrating, and evaluating data recorded at sea.

In the observatory at the sea bottom, data are recorded and processed by the tsunami detector which includes a pressure sensor, a seismometer and two accelerometers. The observatory communicates acoustically with a surface buoy in two-way mode. The buoy is equipped with meteo station and GPS and it is connected to the shore station via satellite dual-link.

The prototype is designed to operate in tsunami generation areas for detection-warning

purpose as well as for scientific measurements during long term monitoring. The pressure data are processed in real time on the sea floor observatory by a tsunami detection algorithm able to detect small tsunami waves, less than one centimetre, in a very noisy environment. At the same time the seismic data are analysed using a STA/LTA algorithm.

The tsunami detector sends a near real time automatic alert message when a seismic or a pressure signal exceeds a selectable threshold indicating a strong local earthquake or a tsunami wave event. After the detection of an event, the seafloor observatory will start sending updated pressure data to the shore station. Our objective is to combine a novel approach to the tsunami warning problem, with a study of the coupling between the water column perturbations and sea floor motion, together with the long term monitoring of geophysical, geochemical and oceanographic parameters.