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Tools for real time automatic detection of sudden oscillations of sea level

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Two independent sets of software for the automatic detection of tsunami-like signals have been developed within the context of the TRANSFER (Tsunami Risk And Strategies For European Region) project. One set has been written at the Puertos del Estado in Spain and is a web tool with two main components or layers. The first, the detection layer running 24/7 on a server machine, detects anomalous oscillations and sea level change and sends alert messages by email or/and SMS. There are two different operational algorithms implemented and tested: an AutoRegressive model with CUSUM error and a variance of residuals based algorithm. The second layer, a Java based web visualization layer, provides easy on-line access to data and alerts. The detection algorithms have been evaluated with historical tsunami records and Puertos del Estado network data. The final product combining visualization and alerts is currently implemented at Puertos del Estado and is being used to monitor REDMAR network tide gauge stations. The second set of software has been written in Matlab at the Proudman Oceanographic Laboratory based on operational codes developed at the National Aquatic Resources Research and Development Agency warning centre in Sri Lanka. The code tests for anomalous changes in sea level, sea level rate of change, or sea level variance and provides local alerts as well as email and SMS warnings. Like the first set, this software has also been tested on real data from Indian Ocean tsunamis, and in preliminary mode has been applied to the detection of tsunami-like oscillations from ships in 1 Hz data from dedicated tsunami gauge sites at Holyhead and Lerwick. As a consequence of these developments, there are two sets of software, either one of which can be easily exportable to other institutions and implemented in, for example, a European Tsunami Warning System.