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Tsunami Alert Center at the INGV; analysis performance of the currently operating procedure for tsunami early warning

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Fast, accurate and reliable earthquake source characterization (epicenter, depth and magnitude) is crucial for seismologically based tsunami early warning procedures. It should be obtained within a few minutes after event origin time when coastlines in the near-field of the seismic source are potentially threatened.

Thus there is no time for a detailed analysis and accurate revision of the automatic solution, and only a quick validation/rejection of the results may be performed in most of the cases by a seismologist. Within this contest it would be important to have a reliable estimate of the uncertainties of the earthquake epicenter location, depth and magnitude.

Early-Est (EE) is a software currently installed at the Istituto Nazionale di Geofisica e Vulcanologia in Roma (Italy) since march 2012 and implemented into the tsunami early warning procedure of the Centro Allerta Terremoti (CAT) installed at the INGV for the mediterranean and nord est atlantic regions.

The EE operates continuous-realtime seismic waveform data to perform trace processing and picking, phase association, event detection, hypocenter location, and event characterization. This characterization includes mb and Mwp magnitudes, and the determination of duration, T0, large earthquake magnitude, Mwpd, and assessment of tsunamigenic potential using Td and T50Ex (Lomax and Michelini 2009a, 2009b, 2011).

In order to test the if the full automatic locations and magnitude estimations provided by EE can be used in the tsunami early warning procedure, we compare the epicenter locations and magnitudes provided at global scale by different agencies for events with magnitude Mw >= 5.5. We then compare the measured empirical uncertainties with the differences between the EE system and the reference catalogues.

Then we analyze the performances of the automatic procedure running at the CAT for the events occurred in the Mediterranean region and at the global scale to test the tsunami alert messages generated from the decision matrix (ICG-NEAMTWS, 2011).

Our analysis shows that our automatic procedure produce fast and consistent message based on the

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above mentioned decision matrix and that EE is suitable for the purpose of the CAT since provide fully automatic reliable localization and magnitudes within the uncertainties statistically expected from the analysis of the reference catalogs.

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