



Delay times of worldwide teleseismic earthquake alerts

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Quantitative estimates of the consequences of major earthquakes are needed as soon as possible. In the majority of earthquake-prone countries dense networks, and in some places the necessary experts, are not available to issue early warnings within seconds, so the earliest possible warnings must be based on teleseismic networks and international experts. Therefore the speed and quality of teleseismically developed information is crucial for an effective disaster response in many parts of the world. Earthquakes of interest to us are defined as those for which the Swiss international rescue team wishes immediate information (in most areas of the world $M \geq 6$). Agencies whose response-time we have analyzed are for source parameters: National Earthquake Information Center of the US Geological Survey (NEIC), the European Mediterranean Seismological Center (EMSC), Geophysical Institute-Russian Academy of Science, and Obninsk (RAS). For consequences of earthquakes the Pacific Tsunami Warning Center (TWC) issues assessments of the probability of tsunamis, the Joint Research Laboratory in Ispra (JRC) issues three-color alerts, and we (WAPMERR) distribute loss estimates. In February 2005, the USGS has reduced its median delay by a factor of 2 to currently 26 minutes, and they distribute information for 98% of the events of interest. Since February 2005, the median delay of EMSC is 51 minutes, with 48% of our target events reported. RAS reports after 78 minutes and 34% of the target events. The first tsunami assessments by TWC reached us on median 18 minutes after large earthquakes in the Pacific area. The median delay of alerts by the JRC is 32 minutes, for 40% of our target earthquakes. Our detailed loss estimates (map of mean damage to settlements, number of injured, number of fatalities) are issued after 41 minutes (median). Moment tensor solutions of the USGS, which can be very helpful for refining loss estimates, reach us in the median after 78

minutes and for 61% of the target events.