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The mapping of teleseismic epicenter errors into errors in estimating casualties in real time due to earthquakes worldwide.

Max Wyss (1), Goran Trendafiloski (1), Mikheil Elashvili (2), Nato Jorjiashvili (2), and Zurab Javakhishvili (2)
(1) WAPMERR, Geneva, Switzerland (max@maxwyss.com), (2) Seismic Monitoring Centre, Ilia Chavchavadze State University

For estimating fatalities and injured within minutes after an earthquake worldwide, we rely on real-time teleseismic determinations of epicenters. To estimate the teleseismic location errors, we computed the difference between the local epicenters of the dense seismograph networks of Japan, Italy, and Taiwan with those given by the PDE, those distributed in real-time by the USGS and the EMSC. The average difference is 16 km and 8 km between PDE teleseismic epicenters and those by the local networks for Japan/Taiwan and Italy, respectively. For EMSC epicenters, the average difference is 13 km for Italy. The average difference between real-time parameters and those listed in the PDE is 12 km (median 9 km) for 30 earthquakes in Japan. Comparisons of real-time USGS epicenters and JMA locations yield an average difference of 31 km (median 26 km). Estimates indicate that the epicenter errors in the local catalogs are typically 1 and 3 km for Japan/Italy and Taiwan, respectively. Assuming that the differences are mostly due to teleseiseismic errors, we conclude that the mean errors in real-time epicenter solutions are in the range of 25 to 35 km. This implies that for earthquakes of M[U+F0BB]6.7 in the vicinity of a medium sized city (80,000) the fatality estimates in real-time have to range from near zero to 10,000 in the developing world and from zero to 500 in an industrialized country. These results were verified by comparison with observed numbers of fatalities in the cases of the 2003, M6.7, Bam and the 2008, M6.9, Iwate-Miyagi earthquakes.