Comparison of hypocenter parameters between the NIED Kanto-Tokai network, Hi-net and JMA catalog

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The Kanto-Tokai observation network (KT-net), performed by the National Research Institute for Earth Science and Disaster Prevention (NIED) particularly to detect microearthquakes, has observed seismic activity in the Kanto and Tokai areas over 20 years. Recently the NIED Hi-net and the seismograph network of the Japan Meteorological Agency (JMA) have also been processing a large number of small earthquakes. In this study, we examined the difference of hypocenter parameters, such as location and magnitudes, between the KT-net, Hi-net and JMA catalog. First, we compared the KT-net catalog with the Hi-net catalog and identified same events in terms of the origin times and hypocenter locations. Then we calculated mutual differences in origin time, latitude, longitude, depth and magnitude for the paired events. In this way we also examined differences between the KT-net catalog and JMA catalog. Further we used reading data of each station to investigate details of the differences in magnitudes between the KT-net and Hi-net. The main results are as follows:

The differences in latitude and longitude of hypocenters between the KT-net and Hi-net, or between the KT-net and JMA are small (more than 90% are within 5 km). The differences of the hypocenter depths are larger than horizontal differences. In particular, in the region off Ibaraki Prefecture, the discrepancy of hypocenter locations between the KT-net and Hi-net are considerable while the differences in magnitudes are rather small. As for the magnitude differences between the KT-net and Hi-net, we found a strong dependence of magnitudes at each station on hypocentral distances. Thus the arithmetic mean of magnitude obtained at each station change systematically depending on the number of station data used and on the range of hypocentral distances. This may be a reason for the non-linear relationship between the KT-net and Hi-net magnitudes in the wide ranges. There are also a clear tendency that the discrepancy of magnitudes between the KT-net and Hi-net, and between the KT-net and JMA, increase with focal depth. Especially the magnitude differences between the KT-net and JMA shift largely with depth; mean differences are about -0.3 at around 10 km depth and change to about +0.2 at about 80 km depth. These observations imply that relative seismic activities between shallow and deep earthquakes or at specific magnitude ranges strictly depend on the catalog used.