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Azimuth verification of the MeSO-net accelerographs: towards the imaging of ground motions in the Kanto area

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In the Tokyo metropolitan area of Japan, large plate boundary earthquakes repeatedly occurred with intervals ranging from 200 to 400 years in the case of M 8 class, and with an interval of approximately 27.5 years in the case of M 7 class. Rapid prediction of damages on constructions due to such a large earthquake is important to quickly decide the priority order in recovery actions without waiting for on-site reports. Such a rapid prediction system requires an image of ground motion in the target area as an input, which is to be estimated from seismograms of dense seismological observation networks. A dense seismic array called MeSO-net (Metropolitan Seismic Observation network), in which 296 accelerometers are installed with several kilometer intervals, was established in 2007 for the purpose of the disaster mitigation for forthcoming large earthquakes. Whether the actual azimuths of MeSO-net seismometers newly installed after 2009 were really in the magnetic north or not have not been verified yet, while the azimuths of three of the seismometers installed before 2008 were already confirmed to be in the opposite direction. Since such obvious errors in the azimuths badly affect subsequent data processing, we evaluate the azimuths of all seismometers based on the cross-correlation with seismograms recorded at nearby Hi-net tiltmeters and F-net broadband seismometers. Our result suggest that the northward components at more than 80 % of stations are determined to be within 10 degrees from the magnetic north, while those at the three stations are reconfirmed to rotate more than 90 degrees as the previous study pointed out.

Keywords: MeSO-net, sensor azimuth, cross correlation, Hi-net, F-net