# Estimation of epicenters of teleseismic events using Hi-Net as a large aperture array

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The Japan Meteorological Agency, JMA, has plan to take charge of tsunami warning for the northwest Pacific region from 2004, so that it is necessary for JMA to have appropriate techniques to determine precisely and promptly the epicenters of large teleseismic earthquake for the warning. JMA, however, does not have any seismic stations outside Japan at present, so it is quite difficult to apply the current technique, that is network operation used for epicenter determination of local earthquakes, directly for the teleseimic events. Recently the seismic observation network, which is called Hi-Net having approximately 600 stations all over Japan, is established by the National Institute for Earth Science and Disaster Prevention, NIED. Because the sensors of Hi-Net were installed in relatively hard rock sites in borehole in depth of more than 100 m and the distances to adjacent stations are approximately a few tens km, it is expected that the waveforms are well coherent among the stations. In this paper, array techniques and array operations are applied to data observed at Hi-Net stations for the epicenter determination of teleseismic events, instead of network operation. That is, Hi-Net is used as large aperture array. Semblance method is adopted here as one of the array techniques. Though S-P time is usually used to obtain information of epicentral distance in many array techniques, S-P time is not used in this paper not to wait S phase arrival, because it is aimed at prompt determination of epicenters. In place of it, apparent velocities are used for determination of the epicental distances. By combining the information of the epicentral distances and back azimuth obtained by the array technique, the epicenters are estimated. Compared with epicenters determined by United States Geological Survey, USGS, the precision of determination by using the Hi-Net array is a few hundreds km, which is less than that by current Matsushiro array whose ability is several hundreds km.