

Search for gravity signals preceding direct seismic waves in Hi-net tiltmeter data

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Seismic waves radiated from an earthquake rupture induces density perturbations of the medium, which in turn generates prompt gravity changes at all distances before the arrival of seismic waves. Recent research of Vallee et al. (2017) reported the identification of such signals during the 2011 Tohoku-Oki earthquake using broadband seismometer data in the vertical component. Here we search for such signals from the event in data recorded by Hi-net tiltmeter array. Tiltmeters can be regarded as horizontal acceleration seismometers, and we used 706 stations and 1412 channels in two components. Applying a band-pass filtering, we significantly reduced the ambient microseism noise, which is approximately the same procedure as in Vallee et al. Because each single channel did not show any signal, we additionally conducted multi-station stacking of the filtered data. Then we found a significant signal beyond the noise level. This result may support the signal identification of Vallee et al. (2017). We need the verification of the stacked signal with theoretical modeling as done in the previous study.