

Temporary observation of micro earthquakes in the northern Ibaraki prefecture by using commercially-supplied IC recorder

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In case of estimate focal mechanism solutions by using P-wave first-motion polarity data, a dense seismic observation network is required. In this study we propose a new seismic observation system to record a P-wave first-motion polarity. The system consists of a seismometer with a vertical component that price is approximately ten thousand yen and a commercially-supplied IC recorder that price is approximately ten thousand yen. According to the specification of the IC recorder, the recordable frequency band is from 60 to 3400 Hz. We compare frequency characteristic of waveforms recorded in stations of National Research Institute for Earth Science and disaster Prevention (NIED Hi-net) and those recorded by using IC recorder. As a result we find that the IC recorder is able to record seismic waves that frequency band is from about 20 to 3400 Hz.

In this study, we conducted a temporary observation of micro-earthquakes for one month from August to September 2012 in the northern Ibaraki prefecture where many normal-faulting type events occur, and we addressed the effectiveness of the seismic observation system. The 29 seismic stations were deployed along a road so that it allows a deployment of many stations for a short time. After collecting the temporary stations, based on the P-wave first motion polarity, we estimated the focal-mechanisms by using HASH program (Hardebeck and Shearer, 2002). As a result, we obtain the 87 focal-mechanisms for micro-earthquakes occurred in the study area.

To test the accuracy of the focal mechanisms obtained in this study, we compared those with focal-mechanisms determined by Earthquake Research Institute, The University of Tokyo (ERI) temporary stations. We compared focal-mechanisms determined by ERI and Hi-net stations and focal-mechanisms determined by using IC recorder and Hi-net stations. We compare P axis and T axis for focal-mechanisms determined by ERI and Hi-net stations and determined by using IC recorder and Hi-net stations. As a result, nothing is difference of accuracy about focal-mechanisms between determined by ERI and Hi-net stations and determined by using IC recorder and Hi-net stations, because of P axis T axis has almost same distribution on the focal sphere. We conclude that focal mechanisms determined by using IC recorder stations has almost same accuracy as those determined by a traditional three component seismometer.