Construction of the seismic observation network around Shimokita Peninsula (4)

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1.Association for the Development of Earthquake Prediction

In Japan, dense seismic observation networks have been installed including high-sensitivity seismograph network (Hi-net) operated by NIED. Although, these networks were relatively thin around northern Tohoku and southeastern Hokkaido. It decreased the earthquake detection capability in this region compared to other regions. We installed high-sensitivity seismic network (AS-net) in this region, Shimokita, Tsugaru and southeastern Hokkaido, and started real-time monitoring for earthquake activity (Sekine et al. (2014) and other). We report the result of manual hypocenter relocation using data derived by AS-net, in addition to the analysis using manual pick data.
The hypocenter location is conducted at the region from Aomori prefecture to southwestern Hokkaido using data from 134 seismic stations including 36 stations of AS-net in addition to networks operated by JMA, NIED, Hirosaki University, Tohoku University, Hokkaido University and Aomori Prefecture. We intend the events occurring during 16 months from September 2014, just after we finish the installation of AS-net, to the end of 2015. 5726 events are detected automatically in the region during the period. Then we check and relocate these events by means of manual pick. 2880 natural earthquakes are determined by manual pick. 40 % or more of events determined automatically are natural earthquakes, ~40 % are artificial events like a blast and the other are false detection. 10 % or less of natural earthquakes determined manually are determined based on JMA catalogue, because they have not detected automatically. JMA catalog has 1404 events in this region during the period. It means that the earthquake detection capability increased 2 times or more by using AS-net in terms of the number of events. Especially, around 5 times number of events are determined around Wakinosawa, almost the center of the region AS-net installed.
Then we calculate the average of O-C time, the average of the difference between manual pick for P- and S-wave arrival time and theoretical arrival based on 1D structure, to estimate the station correction of travel time at each AS-net station. The averaged O-Cs for each station show various tendency at sub-regions. The averaged O-C for P and S phase arrival show the same tendency. The stations which show lower noise-level estimated by ambient noise record tend to show smaller and negative O-C. Low noise level indicate that the basement of the site is shallower and the site amplification is weaker. Small O-C indicates that the delay of P and S arrival due to soft surface layer is smaller at the station. Thus, the relationship between O-C and noise level confirms that the averaged O-C reflects the site characteristic around the station. It shows the adequacy to estimate the station collection of travel time based on these averaged O-C.

Reference
Sekine, S., S. Sawada, K. Kasahara, S. Sasaki, Y. Tazawa, H. Yajima, 2014, Construction of the seismic observation network around Shimokita Peninsula, Jaman Geoscience Union Meeting 2014, Yokohama, STT57-P09, April 2014.

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In this research, we use the seismic observation data which are observed and distributed by JMA, NIED, Hokkaido University, Tohoku University, Hirosaki University and Aomori Prefecture. We use the hypocentral data by JMA catalogue.

Keywords: Seismic observation network, Shimokita peninsula, Earthquake detection

