Seismic activity of the metropolitan area and Philippine Sea plate obtained by MeSO-net

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The Japanese government has estimated the probability of earthquake occurrence with magnitude 7-class during the next 30 years as 70 %. This estimation is based on five earthquakes that occurred in this area in the late 120 years. However, it has been revealed that this region is lying on more complicated tectonic condition due to the two subducted plates and the various types of earthquakes which have been caused by. Therefore, it is necessary to classify these earthquakes into inter-plate earthquakes and intra-plate ones. Then, we have been constructing a seismic observation network since 5 years ago. Tokyo Metropolitan area is a densely populated region of about 40 million people. It is the center of Japan both in politics and in economy. So that human activities have been conducting quite busily, this region is unsuitable for seismic observation. Then, we have decided to make an ultra high dense seismic observation network. We named it the Metropolitan Seismometer Observation Network; MeSO-net. MeSO-net consists of 296 seismic stations. Minimum interval is about 2km and average interval is about 5km.

We picked the P- and S-wave arrival times manually. We applied double-difference tomography method to the data set and estimated the velocity structure. We depicted the plate boundaries from the newly developed velocity model. And, we referred to the locations of the repeating earthquakes, the distributions of normal hypocenters and the focal mechanisms. Our plate model became relatively flat and a little shallower than previous one.

Seismicity of Metropolitan area after the M9 event was compared to the one before M9 event. The seismic activity is about 6 times as high as before the M9 event occurred. We examined spatial distribution of the activated seismicity with respect to the newly developed plate configuration. The activated events are located on upper boundaries and they have almost thrust type mechanisms. Recently, a slow slip event has occurred on October. This observation suggests that shear stresses on the plate boundaries have increased due to eastwards movement of the eastern Japan driven by post-seismic slip of the M9.0 Tohoku-oki event.

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