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## The monitoring of the NIED Hi-net by using the mobile application

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For the geophysical research and the disaster prevention, monitoring the seismic activity is important. By monitoring of the seismicity, for example, we can detect the unusual event and know the fault plane. Monitoring of the real time wave filed is also important for the early warning. In order to correctly monitor the seismic activity, we have to monitor the seismic stations. The trouble of the station causes the decrease of the accuracy and the wrong interpretation. NIED runs the Hi-net seismic network which has more than 80 seismic stations with the average separation of 20 km all over Japan. NIED provides the waveform data and automatically detected earthquake information through the internet. All stations are always watched and the trouble information is reported. Usually, this watching is done by checking the individual waveform. The map information, however, is easier to understand the station condition than the waveform. In this study, we propose a method to monitor the seismic network by using the mobile device and develop the mobile application. Also we develop the applications to check the automatic hypocenter determination system.

First, we develop the application which shows the seismicity on the map. We plot earthquakes listed on the catalog determined by the Hi-net automatic system on the embedded map application. We also plot the cross section of the seismicity. We can enlarge, reduce and rotate the map. Corresponding to these gestures, the cross section is also changed. Therefore, we can see the subducting slab and the fault plane from arbitrary directions. By plotting the past seismicity on the background, we can check that the recent earthquake is usual or unusual.

Second, we develop the application which shows the wave traces of selected stations and the earthquake information on the same image in order to know whether the automatic hypocenter determination system works properly. On the Hi-net web site, we can see the 100-trace image of selected Hi-net stations. By looking this image, we can roughly know the location, the origin time and the magnitude of the earthquake. We can see some earthquakes are correctly determined but some earthquake is not determined by the automatic system by plotting the earthquake information on the trace image.

Finally, we develop the application for the manager of the Hi-net network, which shows the real time Hi-net records on the map. We get the real time data from the data server of the Hi-net and make the map image of the RMS (1s) velocity amplitude. We stock this image every second and download it from the mobile device. On the device, we can see the real time record of all stations of Hi-net every second. Hence, we can visually find abnormal behaviors of stations. By changing to the map application and showing the detail station information, we can check which station has some troubles. We also plot the information of the rapid source parameter determination system, named AQUA, on the real time map. We can see the wavefield and the source location at the same time. By comparing this information, we can check both AQUA system and station condition.

By using first two and third applications, we check the Hi-net automatically hypocenter determination system and stations, respectively. We can watch the Hi-net in terms of the wavefield, the waveform and the hypocenter by integrating three applications.

Keywords: Hi-net, mobile, real time