# Development of teaching materials on earthquakes by using waveform data provided from Hi-net

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http://rikyoa.sci.utsunomiya-u.ac.jp/hi-net/hi-net.html

Earthquake phenomena are instructed as a part of the unit on Activity of the Earth in the science education program at junior high school in Japan. It consists of topics on the propagation of seismic waves from the hypocenter, S-P times which is proportional to the distance between hypocenter and observation point, the difference between earthquake magnitude and intensity, causes of earthquakes and its relation to the interior of the earth, and so on.   The instruction about earthquakes is, however, considered as one of difficult subjects to teach in science education at junior high schools.   This is because that there is no suitable experiment in the laboratory for students with respect to earthquakes, and then, it is difficult to arouse students' interests and sufficient understandings of the phenomena.   It was also difficult to provide seismic wave data of recent earthquakes those occurred in students' own backyard.

After the 1995 Kobe earthquake, a dense national seismological observation network called Hi-net is established gradually. There is an observation station at each 20 km in whole of Japan.   Waveform data observed Hi-net is available for everyone through the Internet.   Therefore, we are considering that Hi-net has great possibilities to provide useful teaching materials for the education about earthquakes in junior high schools.

It is necessary, however, to develop some computer applications in order to get available Hi-net data for junior high school students and some modifications of raw seismic data, because the system of Hi-net is not designed with any educational applications in mind. First of all, waveform data are provided in WIN format in Hi-net, the most popular format of seismic data in Japan.   There is no application to use WIN data under Windows environments, which is common environment in junior high schools in Japan.   Therefore, we developed an application program by which we can use WIN data on Windows computers.   The application is written in the Java language and it has functions to download seismic data from Hi-net WEB site, to display seismic waves on CRT, to pick onset of P and S wave arrivals, and to align them according to epicentral distances.

In addition, seismic data of Hi-net have another potential to provide useful teaching materials to show seismic wave propagations from hypocenters.   We are developing various teaching materials such as animations to show expanding wave front by using Hi-net data.   We are planning to evaluate the effectiveness of those materials through actual trials in junior and senior high schools.