

New Field of Earthquake Early Warning and its Examples

Jun Saita¹, Tsutomu Sato¹, and Yutaka Nakamura^{1,2}

1. System and Data Research, Kunitachi, Tokyo, Japan
2. Tokyo Institute of Technology, Tokyo, Japan

There are two kinds of earthquake alarm. One is an “On-site Alarm” which is based on observations at the site of the objects under threat. The other is a “Front Alarm” which is the alarm based on observations near the epicentral area to spread the warning to potentially damaged areas. For each, there are two further kinds of alarm; one being the alarm exceeding a preset level (S-wave Alarm or Triggered Alarm), the other being the alarm during the preliminary motion (P-wave Alarm).

For P-wave Alarm, the new small instrument FREQL, Fast Response Equipment against Quake Load, has been developed to shorten the processing time for issuing the alarm and combine the functions of UrEDAS and Compact UrEDAS. Which is to say that FREQL can estimate the earthquake parameters on second after the P wave detection faster than UrEDAS, can judge the dangerousness of the earthquake motion minimum 0.2 seconds after P wave detection faster than Compact UrEDAS, and can output the information and alarm based on both acceleration and RI in real time same as AcCo. And the all components of seismometer, sensors, A/D converter, amplifier, CPU and so on, are put together in small aluminum die case vessel of almost 5 inches cube, and the system is electrical isolated. So the FREQL is easy to install and the structure of FREQL is noise proof.

FREQL also has functions to omit the influence of electrical thunder noise and to detect the P wave after rather small pre-shock. Thus it is able to say that FREQL solved the known problems of the ordinary earthquake early warning systems.

Because of the unique features mentioned above, FREQL is toward to the new field for the early warning system, as for the hyper rescue teams of Tokyo fire department under the severe situation with the risk of aftershocks. Hyper rescue teams made a miraculous activity but the activity was always in a risk of large after shocks. After the activity at the damaged area of Niigataken Chuetsu Earthquake, the Tokyo fire department approached us to adopt FREQL as a support system for the rescue activity, taking notice of the portability, rapidness and accuracy of the warning. FREQL for Tokyo fire department was consists of FREQL main body, power unit with backup battery for three hours, central monitoring system and the portable alarm instrument with more than 105dB loud alarm and rotary light.

Tokyo fire department has equipped the FREQL unit for two hyper rescue teams form 2005 spring.

At the time of their rescue activity after the 2005 Pakistan earthquake, they reported that FREQL works in right manner.

In this time, several fire departments in nation wide equip the portable FREQL to prevent earthquake hazards during their activities.



Portable FREQL



FREQL-Light



All-in-one FREQL