Earthquake Early Warning and Realtime Earthquake Disaster Prevention

Yutaka Nakamura[1,2]

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

Obviously, the basic of the earthquake disaster prevention is the strengthening against the earthquake load. The devastations caused by the Sichuan Earthquake in May 2008 were mainly based on the lack of the strength of the many facilities and structures. However, in case of the facilities functional with moving themselves as transportation system, because it will be unstable during the earthquake motion, it is necessary to escape from the situation as meeting with the large earthquake motion during the system working.

The earthquake early warning is one of the triggers of the realtime earthquake disaster prevention. UrEDAS is the first single station system for early warning in the world which is used actually at later 1980's. UrEDAS processes almost same procedure whether an earthquake occurs or not, so the system should not fail caused by the process enlargement and conflict because of the earthquake detections. The processing time become to less than one second now, our products can issue the alarm minimum 0.1 seconds after the P-wave detection if necessary. The data integration center can make the accuracy of the earthquake information higher with integrating the multiple UrEDAS data and it will be useful for the response after the earthquake. And the center does not need to analyze large amount of the waveform data so even small computer system can integrate many observation sites.

The EEW by JMA is issued from the integrated system of the multi station system of NIED and the single station system of JMA. According to the process time, 5.4 seconds in average, and telecommunication time, 1-2 seconds, it is almost impossible to issue the EEW by JMA for the possible epicentral damaged area before the large earthquake motion of the close earthquake including epicentral earthquake.

Exact earthquake information is the critical information to estimate the serious damaged area and also the information to realize the rational and quick response just after the event. Earthquake observation system for the scientific research will be useful for the estimation of the exact location of the events like CUBE. The reason that UrEDAS estimates roughly the earthquake parameter is

for the rational dissolving of the warning and the response reasonably after the earthquake. However the information included in the EEW by JMA is only the forecast so it is impossible to apply as the information for the response after the event.   Public organizations should deliver the information on the earthquake parameters of not only the main shock but also aftershocks in real-time.   From the viewpoint of the earthquake disaster prevention, it is more important to deliver the accurate earthquake information rather than to deliver the "later" early warning.   For the rational and quick response after the earthquake, the actual observed seismic intensity, not the estimated value, must be the important information.

The earthquake early warning is not information for disaster prevention to be provided exclusively as a national project.   The earthquake information can be realized in diverse ways and should be realized.   There is a high possibility for the catastrophic damaged area in focal region to be required the rescue activities of the local government around there and of national organizations.   Hence, what to do for national organizations is to estimate the catastrophic damaged area accurately and to go to rescue, and the responsible organizations must issue the information for this purpose in realtime.   The source of the information is not limited to JMA, and local universities and research institutes must be considerd.   Several regulations by JMA under a law for providing the earthquake information must be reconsidered from the viewpoints of the useful disaster mitigation.
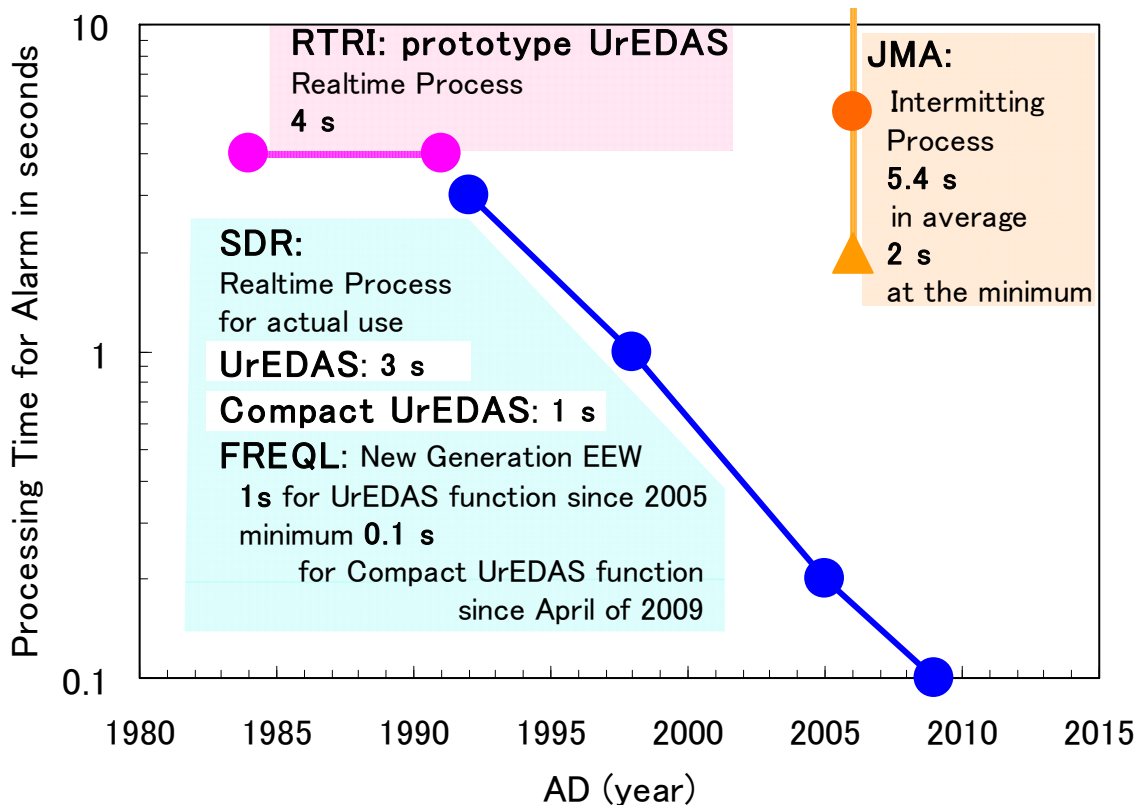
Comparison of Processing Times for Warning by several Institutes