Designing of Three Stage Seismic Intensity Meter Supported by Earthquake Early Warning

Takao Kagawa (Tottori University Graduate School of Engineering) kagawa@cv.tottori-u.ac.jp

INTRODUCTION

A concept and designing of three stage seismic intensity meter is suggested. The seismic intensity is based on Japan Meteorological Agency (JMA) standard. The system broadcasts three kinds of seismic intensities, 1) seismic intensity estimated from initial stage of observed P wave on site (P wave sensor), 2) seismic intensity estimated from source information broadcasted by Earthquake Early Warning (EEW) network, 3) seismic intensity calculated from observed strong ground motion at the site. Suppositious flow chart of the system and changes that are brought by the system are shown in the following figures.

COMPOSITION OF THE SYSTEM

The system consists of general JMA seismic intensity meter and EEW receiving terminal. Hitherto, the two systems are installed separately for different purposes. Furthermore, P wave sensors are mainly installed for controlling industrial plants. A combination of the three implements is expected to produce new demands for earthquake disaster mitigation.

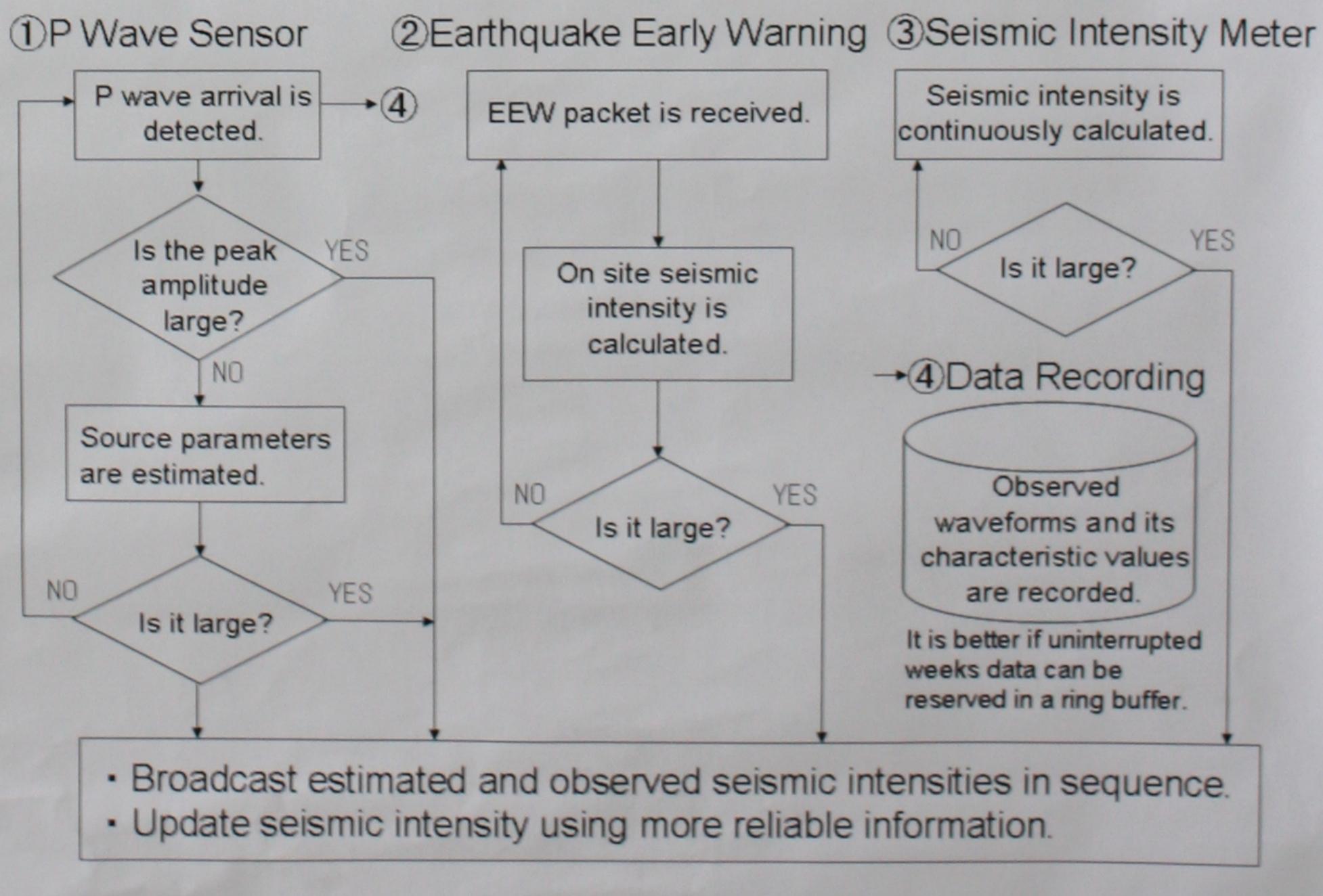
For P wave sensor, not only acceleration records generally used in seismic intensity meters but also high records velocity quality are recommended, because of detecting P arrival noisy even wave environment. Internet connection is required for catching information and also for transferring the estimated seismic intensities to a control center.

ADVANTAGES INSTALLING THE SYSTEM

Installing the three stage seismic intensity meters, 1) post broadcasting area of EEW network is expected to be trimmed, 2) people around the seismic meter can be ready for strong ground shaking beforehand, 3) estimated seismic intensity is confirmed with observed intensity. The system is suitable at city halls, schools, amenity facilities, industrial plants, and so on. In case of installing them to primary schools that are expected to be emergency evacuation areas, observed seismic intensity can be used for safety information for the facilities beforehand information can be useful for preparing aftershocks.

With Three Stage Seismic Intensity Meter — Current Condition -[First Stage] [Seismic Intensity Meter] Estimates local seismic intensity from magnitude Records local seismic intensity and hypocentral distance of earthquake roughly and reports it promptly. supposed from initial P wave. (Records waveform.) Estimates local seismic intensity simply from P wave amplitude. Quickly reports information to local site and [EEW terminal] observation center if the estimated intensity is Quickly estimates local large. seismic intensity triggered by [Second Stage] information from JMA (before Estimates local seismic intensity with EEW strong ground shaking). information from JMA. Revises the previous report if necessary. [Third Stage] Seismic Intensity is Estimates local seismic intensity from recording reported after strong ground motion and report it promptly as a measurement. normal seismic intensity meter. EEW may not be in time P-wave estimation and EEW functions are in strongly shaking area. added on normal seismic intensity meter.

Changes Brought by Three Stage Seismic Meter



Flow Chart of Three Stage Seismic Intensity Meter

CONCLUSION

It is expected to create the three stage seismic intensity meters in low cost, to install them to many facilities, and to make network of the meters for advanced Earthquake Early Warnings. It is within our reach, because the individual technologies required are already exists.