EARLY WARNING

Earthquake early warning (EEW) can provide a few seconds to tens of seconds warning prior to ground shaking during an earthquake. Several countries, such as Japan, Taiwan, Mexico have adopted this methodology based on the fact that such warning can (1) rapidly detect the initiation of an earthquake, (2) determine the size (magnitude) and location of the event, (3) predict the peak ground motion expected in the region around the event, and (4) issue a warning to people in locations that may expect significant ground motion[1].

A collapsed reinforced concrete building in Bhuj earthquake, India

Source:
http://home.iitk.ac.in/~javed/bhuj%20earthquake%20photographs.htm

Earthquake Early Warning (EEW) uses existing seismic networks to detect moderate to large earthquakes very rapidly so that a warning can be sent before destructive seismic waves arrive to locations outside the area where the earthquake begins[2]. These warnings allow people to take protective action and can also triggering automatic responses to safeguard critical infrastructure.

Prediction of earthquake is still a subject of speculations yet several schools of thoughts are available. In the effort to predict earthquakes, people have tried to associate an impending earthquake with such varied phenomena as seismicity patterns, electromagnetic fields, weather conditions and unusual clouds, radon or hydrogen gas content of soil or ground water, water level in wells, animal behavior, and the phases of the moon[1].

Earthquake Early Warning System

Earthquake early warning provides an alarm that strong shaking is due soon to arrive, and the more quickly that the magnitude of an earthquake can be estimated,

the more useful is the early warning[1]. Receiving a warning, a person may have a few tens of seconds at longest to take actions, but if the focus is too close there may be cases in which strong tremors come ahead.

The earthquake early warning is aimed at mitigating earthquake-related damage by allowing countermeasures such as promptly slowing down trains, controlling elevators to avoid danger and enabling people to quickly protect themselves in various environments such as factories, offices, and houses and near cliffs[3].

Earthquake Early Warning system in Japan

Source: http://www.jma.go.jp/jma/en/Activities/eew1.html
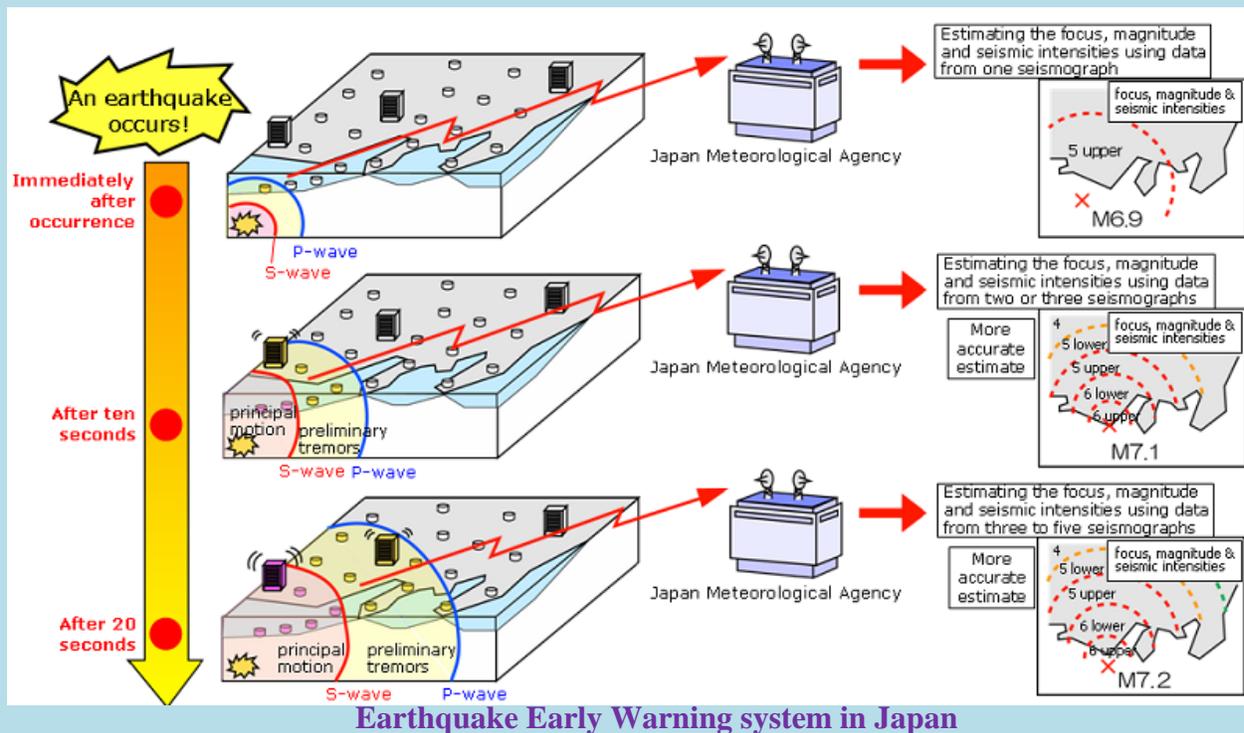
Limitations of the Earthquake Early Warning[3]

• Timing

The window of time from the announcement of an Earthquake Early Warning until the arrival of the main tremors is very short, i.e. a matter of seconds (or between several seconds and a few tens of seconds). In areas that are close to the focus of the earthquake, the warning may not be transmitted before strong tremors hit.

- **False alarms**

When using data from only one seismograph, false Earthquake Early Warnings may occur as a result of noise from accidents, lightning or device failure.

- **Magnitude estimation**

There are limits to the accuracy of estimating magnitude, especially for large earthquakes. It is difficult to separate earthquakes and provide accurate warnings when multiple earthquakes occur almost simultaneously or in close proximity to each other.

- **Seismic intensity estimation**

There are limits to the accuracy of estimating seismic intensity by statistical attenuation formula, as well as limits to the prediction of land surface amplification.

References

[1] http://www.saarc-sadkn.org/earthquake_early_warning.aspx
[2] http://earthquake.usgs.gov/research/earlywarning/
[3] http://www.jma.go.jp/jma/en/Activities/eew1.html