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The recent movement and the future plans of the JMA EEW

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We sometimes reported our efforts to improve the JMA EEW system and we will make a presentation about the recent movement of the JMA EEW and the future plan to improve the system.

In the case of the 2011 off the Pacific Coast of Tohoku Earthquake (Mw9.0), the warning of the EEW was disseminated 30 s after the Mw9.0 event occurrence, which was 8 s after the first detection. The estimated magnitude was 7.2 at the time and the warning was issued only for Tohoku. We could provide the warning before the arrival of S-waves for all warning areas. However, the actual magnitude was 9.0 and the wide area was ruptured. The under estimate of the magnitude and the extent of the source region caused the under estimate of intensities. Especially, in Kanto, we observed 6-upper, but we could not provide the warning for the public. The warning was provided for the public only once, but the updated information was provided only to the limited users. We issued the EEW totally 15 times for the event. Finally the EEW estimated M8.1 105 s after the first detection. Moreover, aftershocks sometimes occurred simultaneously over the wide region. Then, the system became confused and did not always determine the hypocenter parameters correctly. In 49 days after the main shock to April 28, 2011, 70 EEWs were announced to the public, but actual observed intensities did not exceed 2 at any stations in 17 cases.

To overcome those problems, we will introduce the real-time pseudo seismic intensity by Kunugi et al. (2008), by which we will be able to monitor the extent of the strong motion field (the simplest version of Hoshiba, 2013) and to evaluate the calculated hypocenter parameter. The current JMA EEW system is based on the calculated hypocenter parameter. We have the idea of a hybrid method using the conventional method and the real-time intensities (Kotera et al, 2014). Furthermore, Tamaribuchi et al. (2014) developed a new method to classify multiple concurrent events for EEW. Their approach used the particle filter method and the method estimated location, origin time and magnitude in the probabilistic framework, using trigger time, maximum amplitude, epicentral distance and incident angle of the waveform for the likelihood function. We have a plan to use the method additionally.

Moreover, JMA began to provide long period ground motion information, using the observed waveform at each station, on JMA web site March, 2013 (Aizawa et al., 2014). We have just begun to investigate the long period ground motion forecast aiming at establishing an earthquake early warning for long period ground motion (Ogami et al., 2014).

References: Aizawa et al., 2014, the abstruct of this meeting. Hoshiba, 2013, DOI: 10.1002/jgrb.50119. Kotera et al., 2014, the abstruct of this meeting. Ogami et al., 2014, the abstruct of this meeting. Tamaribuchi et al., 2014, Zisin 2, submitted.

Keywords: EEW, long-period ground motion, JMA, seismic intensity, intensity scale on long-period ground motion, hypocenter determination