UJNR Panel on Wind and Seismic Effects

Panel Update

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NATIONWIDE EARTHQUAKE EARLY WARNING IN JAPAN: INFORMATION BEFORE STRONG GROUND SHAKING

Just before an earthquake strikes a population center, a new Japan Meteorological Agency (JMA) earthquake communication system warns the public about the hazard. The warning is called "Earthquake Early Warning" (EEW). This innovative new warning service has been initiated nationwide in Japan. For example, when the warning is received at railway centers, the control room of the railway company gives an emergency notice to train drivers to stop their trains immediately. In buildings, elevators stop at the nearest floor and automatically open their doors. In hospitals, surgeons are alerted to temporarily suspend their surgical operations to avoid risk to patients on the operating table.

The hypocenter and magnitude of the earthquake are rapidly determined using available data at stations near the hypocenter and distribution of strong ground shaking is quickly predicted. The information is immediately delivered to the population. Although it is currently impossible to predict earthquakes before they occur, it is possible to warn people in the vicinity of the hypocenter before they experience strong ground shaking

An M7.2 earthquake occurred at Tohoku district, Japan, on 14 June 2008 (Iwate-Miyagi Nairiku Earthquake). The first warning was disseminated 3 seconds after the first detection of the *P* wave at the closest seismic station. Although the dissemination was later than the arrival of the large amplitude *S* wave at the cities closest to the epicenter, it was earlier by approximately 15 seconds at Sendai city, the largest city of the Tohoku district. People were aware of the earthquake before the city experienced strong ground shaking.

Even though the interval – relatively short (counted in seconds) – between the time when the EEW alerts the population and when the population actually experience strong ground motion the EEW is an important and powerful warning tool to reduce loss of lives and human injuries from earthquakes by alerting the citizens within sufficient time to take appropriate safety measures in advance of strong ground shaking.

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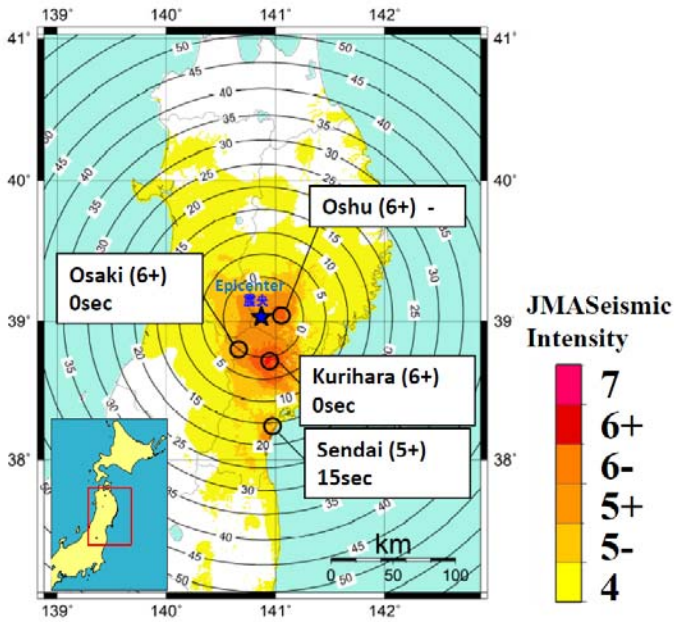
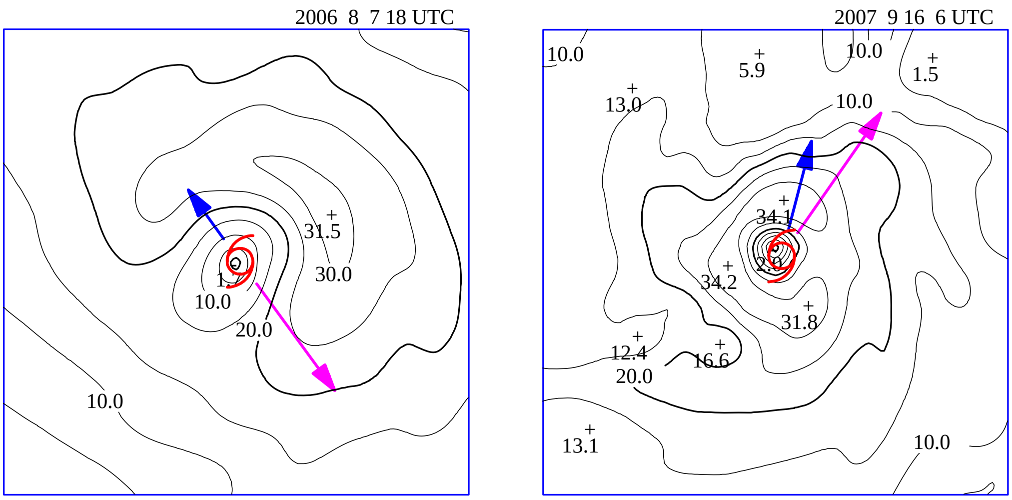


Figure 1: Arcs represent elapsed time (in seconds) from EEW to *S* wave arrival for Iwate-Miyagi Nairiku Earthquake on 14 June 2008 (M7.2). The differences of color show the observed seismic intensity on JMA scale.

ENVIRONMENTAL WIND SHEAR MAY CONTROL NEAR-SURFACE WIND DISTRIBUTIONS IN TYPHOONS

Traditionally, typhoon wind fields are approximated by adding its movement velocity to the associated swirling winds, which results in stronger winds on the right side of the storm track. However, recent studies revealed that environmental vertical wind shear (i.e., large-scale wind difference between upper and lower tropospheric levels) also could contribute to the typhoon-related wind asymmetries. Generally shear tends to affect near-surface wind fields in such a way that azimuthal winds increase (decrease) on the left (right) side of the shear vector (looking down on the typhoon). Figure 2 shows an example of such a shear contribution taken from the JMA meso-scale analyses.



T0607 (MARIA) **T0711 (NARI)**

Figure 2: Isotachs for near-surface winds of Typhoons MARIA in 2006 (left) and NARI in 2007 (right) along with shear vector (pink-colored arrow) and storm motion (blue arrow).

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