Study on site amplification factor using attenuation formula of maximum velocity

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For seismic intensity estimation using attenuation formula of maximum velocity on stiff ground, site amplification factor which has great effects on intensity of ground motion is essential. We made a study on the effectiveness of seismic intensity estimation for the earthquake early warning, by applying station correction which is calculated by attenuation formula of maximum velocity and observed seismic intensity.

Seismic intensity data used in this study were observed with seismic intensity meter of JMA, local authorities and NIED (K-NET) from May, 1996 to July, 2007. The magnitude range was 4.0 or more and the depth range was 60 km or less.

Station correction was weighed mean depended on hypocentral distance, which is difference (o-c) calculated by common logarithm of maximum velocity on stiff ground (c) [Shi and Midorikawa, 1999] from that on surface of the ground (o) [Midorikawa et al., 1999]. Maximum velocity, fault distance, and Mw were calculated by the same way of the earthquake early warning system of JMA. The analyzed data was limited the same hypocentral distance as the attenuation formula [Shi and Midorikawa, 1999] was derived. We compared the accuracy of seismic intensity estimation by applying station correction obtained in this study and that by applying amplification factor used in the earthquake early warning system.

The o-c obtained by observed small seismic intensity 1 or 2 tended to be smaller than the one obtained by observed large seismic intensity such as over 5 lower independently of fault distance and depth. Therefore if station correction obtained by observed seismic intensity data including small intensity with a lot of numbers applies to larger seismic intensity, it results in underestimated. To solve this problem we calculated station correction by observed seismic intensity over 3, and it applied to observed seismic intensity over 4, which each period of the data don't overlap. As a result, station correction obtained in this study improved the accuracy of seismic intensity estimation compared with applying amplification factor. Station correction on the plains was relatively large.