

# A Preliminary Study on Attenuation Characteristics of PHA Recorded during the 2008 Wenchuan Earthquake, China

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## 1. Introduction

The Wenchuan earthquake occurred on 2008 May 12, caused over 87,000 people death or missing, more than 370,000 injured. For mitigation of damage in future earthquake, it is important to ascertain which factors caused such severely damage. In this study, we aim to clarify the characteristics of the strong motion, considered to be an important factor causing the damage during an earthquake, by evaluating the attenuation characteristics of peak horizontal acceleration (PHA).

## 2. Data

During the 2008 Wenchuan earthquake, the strong motion records including near-source ones were derived by the National Strong Motion Observation Network System (NSMONS) of China, which was formally operated from March 2008, just two months before the earthquake.

In this study, the strong motion records observed in Sichuan, Gansu and Shaanxi province are used. At present, however, since the digital data of the strong motion record are still not available, the PHAs are read from the report (reference 1) in which the waveform and the peak acceleration are published. All the waveform plotted in the report was checked to confirm if the SN ratio is larger enough. Moreover, 11 records derived on bed rock sites are multiplied by a factor of 1.4, regarded as the PHAs on soil sites. In this study, we define the PHA as the larger one among two maximum horizontal components. Finally, the records used in the analysis were 133 records, in which, a rupture distance covered from 3 km to 530 km, and the values of PHA were distributed from 9 cm/s<sup>2</sup> to 957 cm/s<sup>2</sup>. As for these data, baseline calibration was performed. In addition, the rupture distance was calculated by using the source model proposed by Ji et al. (2008).

## 3. Results

Figure 1 shows the comparison of the observed PHA with the attenuation relation proposed by Si and Midorikawa (1999). In the figure, data in Sichuan, Gansu, and Shaanxi province are plotted in red, black and blue circles, respectively. From the figure, it is shown that the observation data are consistent with that predicted ones by Si and Midorikawa(1999), implicated that the PHA observed in this earthquake show an average strength for a crust earthquake with an Mw of 7.9. However, the PHAs recorded in Shaanxi province show greater PHAs than the predicted ones. The stronger PHA may be caused by effects of the site amplification and the rupture direction, since most of the observation stations seem to be located in the thick sediment basin area, as shown in Figure 2, and along in the forward direction of the rupture propagation.

## Acknowledgments

Figures are plotted by GMT and Plots. Part of this work was supported by the Research Found from an incorporated administrative agency, Japan Nuclear Energy Safety Organization.

## References

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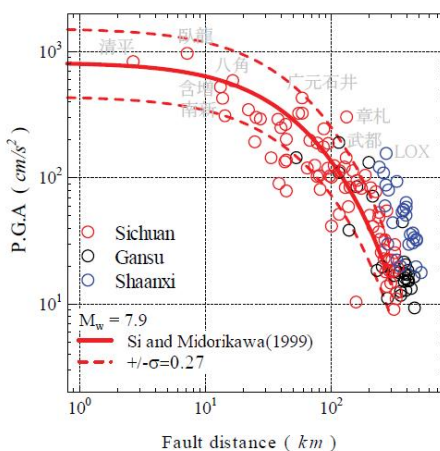


Fig.1 Attenuation characteristics of PHAs from Mw7.9 Wenchuan earthquake

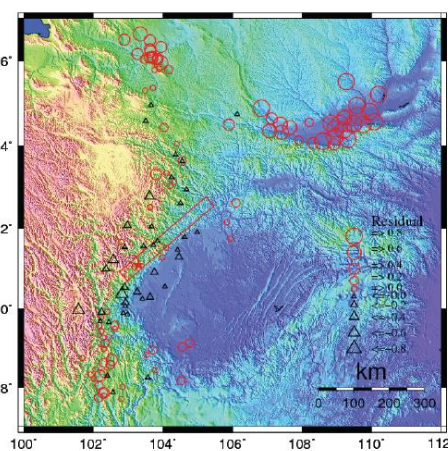


Fig.2 Distribution of the residuals (Obs./SM1999)  
(★: Epicenter, △:smaller, ○: Larger)