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Local site effects on worst-hit colonies on the 2004 Niigata-ken Chuetsu earthquake

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The October 23, 2004, Niigata-ken Chuetsu earthquake (Mw = 6.6), occurred on an active fold zone in the north central Japan, was the most suffering earthquake in Japan since the 1995 Kobe earthquake.

In this presentation we will focus on local site effects on six worst-hit colonies where we recognized no less than 20 percent of houses had been totally collapsed by shaking. Though the area of each worst-hit colony is around 1 square kilometer, clear contrast in severity of damage has been observed among subregions of each colony. We carried out landform classification by interpretation of aerial photograph and classification of damage of all houses or barns on worst-hit colonies by field survey.

Five worst-hit colonies of six have been located on areas with similar landforms: fan terrace, terrace and dissected valley. We found that heavily damaged structures by shaking had been concentrated on the fan terraces, especially in the subregions with steep slopes. On the contrary, damage by shaking on the terraces or the dissected valleys, in gross, have not been severe. These imply that the ground motion on the fan terrace might have been greater than that on the terrace and the dissected valley. In the other colony located on a flood plain with several old channels, we found heavily damaged structures had been widely distributed on the plain, and no clear difference in damage degrees among landforms. Since damage in this colony was significant compared with that in neighbor colonies located on terraces, the flood plain might have amplified ground motion.

Keywords: Niigata-ken Chuetsu earthquake; local site effect; landform; damage; fan terrace; terrace; strong ground motion

References

[1] Yoshimi, M., et al, *Earth, Planets and Space* submitted (2005).