

Present situation and problems of liquefaction hazard maps

*Hiroshi Une¹, Takayuki Nakano¹, Miharu Tanaka², Ryusuke Ando³, Naoyuki Yonekawa⁴

1. Geospatial Information Authority of Japan, 2. Tohoku Univ., 3. Osaka Univ., 4. Chiba Institute of Science

We collected the liquefaction hazard maps which local municipalities produced and published on Internet, extracted the elements such as indicated items and source information from the maps, summed up and categorized. Then we picked up some examples whose evaluation of liquefaction risk might be problematical while checking using other sources such as land condition maps, and concluded the problems of liquefaction hazard mapping.

According to "Hazard Map Portal Site" operated by Ministry of Land, Infrastructure, Transport and Tourism, total number of municipalities which have produced liquefaction hazard maps counts 317 among 1,718 of whole country (about 15 %). Preparation rates by prefectures are of uneven, suggesting that some guidance on production of liquefaction hazard maps for municipalities by prefectures with high rate might be performed. Most maps indicate evaluated liquefaction risks at 3-5 degree with an expression such as the liquefaction danger degree, a possibility of the liquefaction or tendency to liquefy. While 17 % maps indicate PL value as the indicator of liquefaction evaluation, one indicates PL value at 8 degrees. As for the unit of the hazard evaluation, polygon is 12 % where grid cell counts 87 %, among which cell size of 250 m is 41 % and of 50 m is 37 %. Concerning the main source information for evaluation, 34 % are using landform classification data, 27 % are based on core hole data and 40 % use both, where landform classification data are tend to be used in eastern Japan. As for the indicated items other than liquefaction risk, emergency transportation roads, organizations related disaster prevention such as municipality offices are fire departments and police stations, hospitals and shelters are typical. While maps of Hokkaido and western Japan tend to indicate liquefaction risk evaluation only, those of Hokuriku, Kanto and Tohoku tend to indicate much items, being more conscious of use after the occurrence of earthquake.

In the process of sum up and categorization, we checked the liquefaction risk evaluation by comparing with land condition maps, and picked out some examples with a possibility with the problem from the point of view of landform development. As a result, we found out that they include the following cases:

- * risk evaluation doesn't correspond to the land condition and land history at all;
- * random concentric high or low risk areas distribute in a part of an area where seems to have the same land condition;
- * risk evaluation changes suddenly on a meaningless discontinuous line;
- * evaluation of artificially modified land seems to be a problem:

We infer that one of the reasons of not high preparation rate of the liquefaction hazard map, unevenness of liquefaction risk evaluation and indicated items and problematic evaluation judged from land condition is that an appropriate manual for municipalities is not offered. Much of existing maps were produced based on "Liquefaction Area Zoning Manual" (the National Land Agency, 1999). However, the explanations such as the method for integration and coordination with the evaluation by core hole data and landform classification data and interpretation of landform classification and an artificially modified land on place are not sufficient. Besides, new liquefaction evaluation methods based on the later case studies have been proposed (e.g. Nakano et. al, 2015). Also, evaluation unit premises on 250 m grid cell. It seems necessary to create and provide new manual for production of liquefaction hazard maps from the angle of the recent technology trend.

Keywords: liquefaction hazard map, land condition, manual for creation of hazard map