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Soil Liquefaction caused by the 2011 off the Pacific coast of Tohoku Earthquake at Tokyo Bay reclaimed land

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The 2011 off the Pacific coast of Tohoku Earthquake hit off the coast of Tohoku in The Pacific. In the area that left the epicenter of the earthquake, Soil Liquefaction occurred on reclaimed lands and alluvial plane in Tokyo and Chiba and Kanagawa and Ibaragi prefectures. The characterization and distribution of sand boiling at Tokyo Bay reclaimed land are reported in this study. Especially large amounts of sand boil occurred at Koto, Edogawa, Urayasu, Itikawa, Funabashi, Makuhari, Chiba city and distributed extending linearly along the coast.

The Tokyo Bay reclaimed land that liquefied is at least 40 square km, and a record-high scale all over the world.

Many kinds methods for the prediction of the occurrence of liquefaction have been developed from 1964. These methods have been introduced in seismic design code. However, there are still several problems to be solved. One of them is the estimation of liquefaction potential under large-scale earthquakes. Duration and amplitude of the big earthquakes must be considered carefully in the estimation for liquefaction. The other problem is the evaluation of liquefaction-induced deformation of structures. Performance-based design methods for liquefaction must be introduced in seismic design codes.

By this earthquake, disasters happened in areas outside of the Hazard map (liquefaction). We have necessity to reexamine an anti-liquefaction measure.

Keywords: the 2011 off the Pacific coast of Tohoku Earthquake, Tokyo Bay, soil liquefaction