KONAGAI LAB.

[Implication of earthquake-induced landform changes]

Department of Fundamental Engineering

http://shake.iis.u-tokyo.ac.jp/home-new

Earthquake Engineering

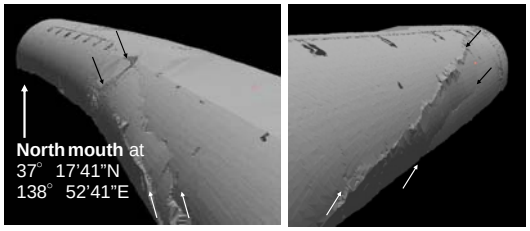
Department of Civil Engineering

Measuring landforms for better rehabilitations

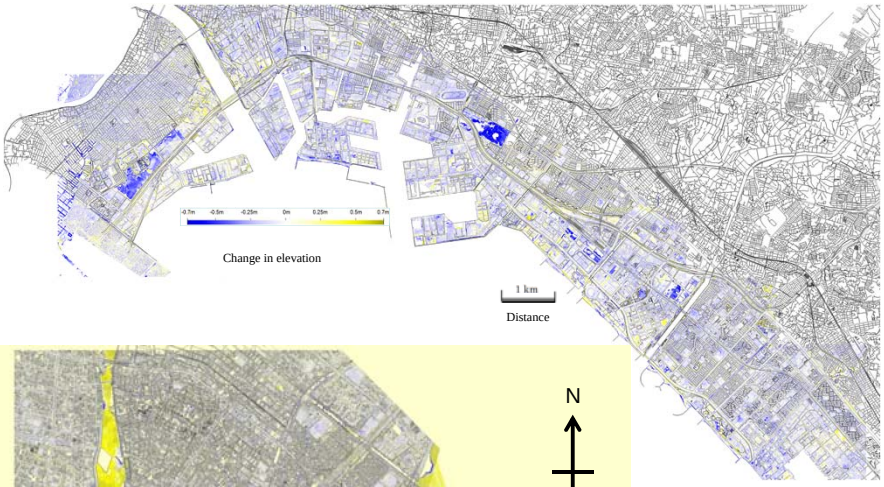
A large earthquake can trigger long lasting geotechnical problems, which pose serious issues on both rehabilitations and land-conservations. Therefore one of what required of us is to deduce as much hidden signs as possible from observable changes of landforms.

Mid-Niigata Earthquake of 2004

Fig.1 Laser-scanned Kizawa tunnel: Kizawa tunnel was obliquely intersected by a shear plane with its 40–80m long northern end segment, and the other 220–260m long southern part being embedded, respectively, in the lower intact and upper disturbed rock masses. There was a concern that the rock mass above the shear plane would move in snow-melting time frustrating all attempts for rehabilitations.



East-Japan Earthquake of 2011



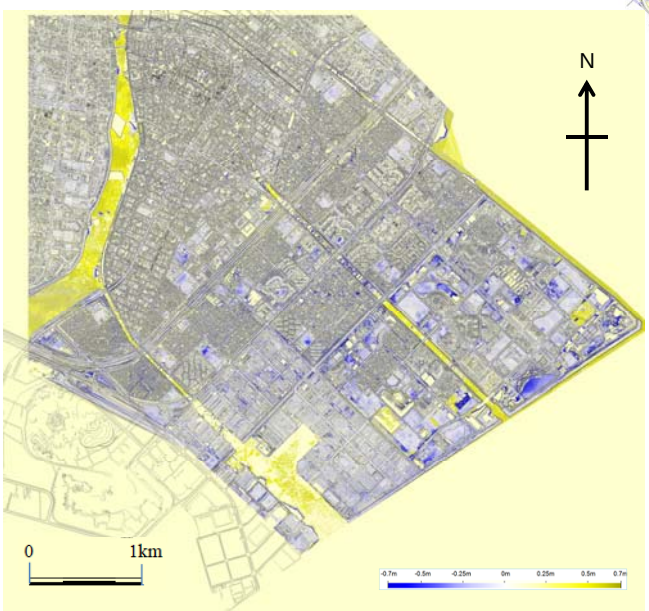


Fig.2 (left) Soil subsidence map of Tokyo Bay area:
Both Konagai Laboratory, IIS, University of Tokyo and Aero Asahi Corporation jointly surveyed Tokyo Bay area, which suffered serious liquefactions. An airborne LIDAR images were obtained on April 20th, 2011 for Urayasu, Sept. 6th and Dec. 28th for Ichikawa-to-Chiba areas, and compared with the digital surface model (DSM hereafter) in December 2006, and pixel-wise-defined change in elevation was obtained over the entire reclaimed lands in the Tokyo Bay area.

Fig.3 (below) Onagawa town was one of the most seriously tsunami-engulfed towns/cities along the Sanriku coast line. It was shocking that buildings with pre-stressed high-strength concrete piles were uprooted at several locations in Onagawa, all the more pile-supported RC and/or steel-frame structures had been considered to be possibly good for tsunami shelters.