

## Change of the near-surface geophysical properties along levee systems before and after the 2011 East Japan Earthquake

INAZAKI, Tomio<sup>1\*</sup>

<sup>1</sup>PWRI, Geology and Geotechnical Engineering RG

Levee systems in Kanto Region, central Japan, were severely damaged at many places caused by the long-lasting strong ground motion of the magnitude (Mw) 9.0 East Japan Earthquake, which occurred at 14:46 JST on Friday, 2011 March 11, even located more than 200 km far from the epicenter. Since 2005, we have conducted integrated geophysical surveying for the safety assessment of levee systems at 39 actual levee sites in Japan. Among them, severe damage took place in two sites by the East Japan Earthquake just at the anomaly part delineated by the survey. The anomaly part in one site was characterized as low S-wave velocity and low resistivity both for levee body and substrata. After the Earthquake, we conducted comparative surveying on the same levee but the damaged part of which had been soon repaired. As a result, the characteristic low S-wave velocity and low resistivity zone was again identified just at the damaged or repaired part where substantial top subsidence had occurred. This suggests a physical model that nonlinear loosening of underlying clay layers had caused the ground failures and resulted in the damage of levee systems. The other site, where large sliding had taken place on a river side levee slope during the earthquake attack, was featured by the existence of high resistivity anomaly in the levee body. The anomaly was also identified by the comparative surveying at the same part where the slope sliding had occurred. A different type of levee failure mechanism was interpreted as resulting from high contrast of physical properties in levee body, based on our integrated geophysical surveys. Thus the corresponding survey results lead us to the usefulness of the integrated geophysical surveying for understanding levee failure mechanism and for the assessment of present conditions of levee systems attacked by the Earthquake.

Keywords: East Japan Earthquake, geophysical survey, levee system, change in geophysical properties