

MIS036-P147

Room:Convention Hall

Time:May 27 14:15-16:15

Application of chemical analysis to measurement of tsunami inundated area

Takumi Yoshii^{1*}, Masafumi Matsuyama¹, Masahiro Imamura¹, Toshinori Sasaki¹, Shunichi Koshimura², Masashi Matsuoka³, Erick Mas⁴, Cesar Jimenez⁵

¹CRIEPI, ²Tohoku University, ³AIST, ⁴Tohoku University, ⁵Universidad Nacional Mayor de San Marcos

Quasi-periodic occurrence of earthquake keeps coastal cities under threat of tsunami hazard. Tsunami has caused catastrophic damage to coastal regions many times in history. Fortunately, since a period of earthquake occurrence can be estimated from historical records, the time of the next earthquake and its magnitude are roughly estimated. Therefore, accumulation of field survey data and knowledge is the most basic but steady way to prep for future tsunamis. Numerous field surveys have been conducted after tsunami occurrences. The measured tsunami run-ups were utilised as a validation data for numerical simulations and contributed to improvement of the models. Moreover, the obtained data set of tsunami run-ups and the record of tide gages enabled an inference of size of earthquakes and its seismic parameters. However, field survey points on tsunami disaster, especially in tsunami run-up height and tsunami inundation height, are limited since it depends on visual evidences and witnesses. Thus, in this paper, we validated the applicability of chemical analysis of soil to field survey on tsunami inundated area to obtain more objective and reliable data set.

The field survey on the disaster damages due to the tsunami was conducted near Talcahuano in Chile after the severe earthquake of Mw 8.8 occurred on 27 Feb. 2010 at the center of Chile. The soil samples were obtained from both the inundated and the non-inundated position. The stirred solution was made by the soil and ultrapure water, then, the content of water-soluble ions, electric conductivity (EC), and pH were measured. The soil obtained in the tsunami inundated area contains much water-soluble ions (Na^+ , Mg^{2+} , Cl^- , Br^- , SO_4^{2-}) compared to the samples obtained in the non-inundated area. The discriminant analysis of the tsunami inundation was conducted using the amount of ions in the soil. High discriminant accuracy (over 90%) was obtained with Na^+ , Mg^{2+} , Cl^- , Br^- , SO_4^{2-} and EC. Br^- , Cl^- , Na^+ are believed to be suitable for the discriminant analysis about tsunamis considering the contaminant of these ions in the soil and in the sea water.

In the presentation, we are planning to show the preliminary survey results conducted after the 2011 Japan earthquake and discuss the applicability of this method and the task for the future.

Keywords: tsunami, soil, water-soluble ion, inundated area, tsunami deposits