

Visualization of Loss and Recovery of Inter-enterprise Transaction by the Great East Japan Earthquake Using the Inter-enterprise Transaction Big Data

Yuki Akiyama

Earth Observation Data Integration and Fusion Research Institute, The
University of Tokyo, Japan

Abstract. Giant tsunami by the Great East Japan Earthquake in March 2011 caused great damage on the Pacific coasts in east Japan. Various detailed investigations and analyses of physical damages for buildings, roads and so on and human damages by the tsunami have been already developed. However there are few studies on effects for “enterprises” located in tsunami-devastated areas. Now, some Japanese local governments plan to relocate enterprises from lowland to upland in case of giant tsunami in the future. The result of this study is meaningful for policy planning of these local governments.

Therefore, this study aims to monitor and visualize loss and recovery of inter-enterprise transaction by the tsunami spatio-temporally using the “Inter-enterprise Transaction Big Data (IETD)” which is becoming available recently. The IETD used in this study includes approximately 5.9 million transactions between 2008 and 2013 by approximately 1.6 million enterprises throughout Japan. In addition, all enterprises are given coordinate information, i.e. longitude and latitude by the address geocoding because this data contains addresses of all enterprises. This is much bigger data than census and data about inter-enterprise transactions used in previous studies.

First, approximately 7.2 thousands enterprises damaged by the tsunami were detected to integrate the IETD with polygon data of tsunami-devastated areas. Second, approximately 35 thousands inter-enterprise transactions related these enterprises were detected between 2010 and 2013. Finally, visualization of spatio-temporal lose and recovery of inter-enterprise transactions was realized to accumulate into 1km square grid based on locations of enterprises how much these transactions were lost and reduced by the tsunami in 2011 and recovered after that. The result shows that enterprises to conduct transactions with enterprises located in tsunami damaged areas were located throughout Japan. In addition, it shows that the recovery in Fukushima prefecture affected by nuclear accidents strongly is slow.

Keywords. Inter-enterprise Transaction, Big data, the Great East Japan Earthquake, Tsunami, Spatio-temporal analysis