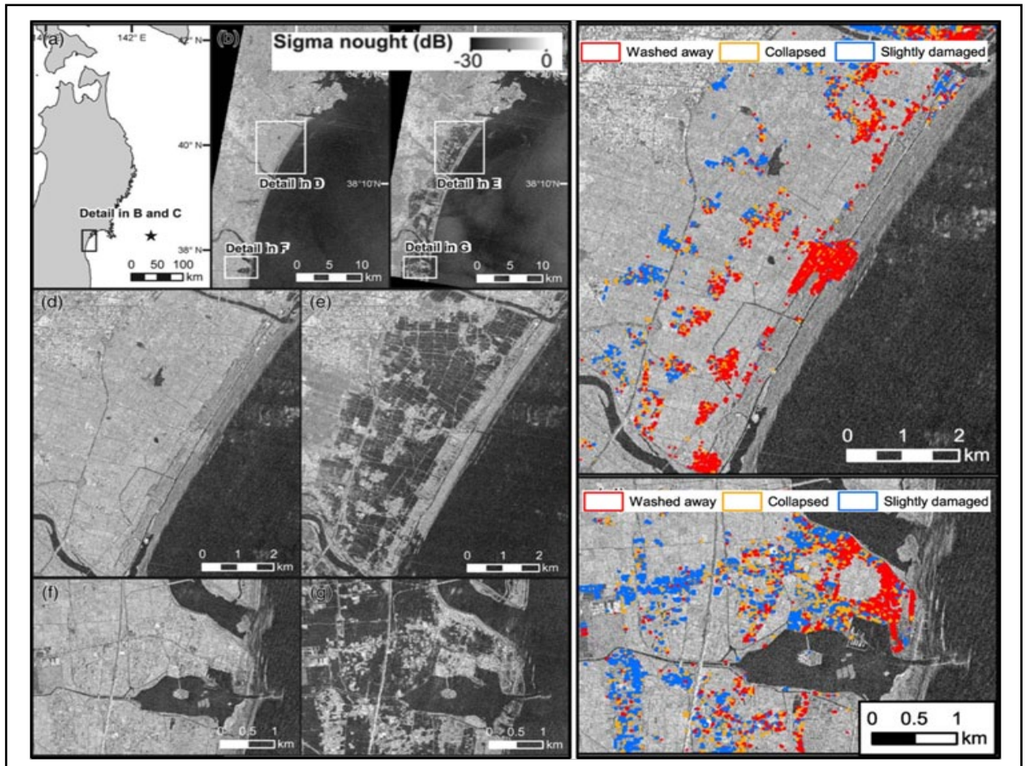
Mapping Tsunami Disaster Impact Using Earth Observation Satellites

Global targets, Priority for Action 1, 4.



TerraSAR-X pre and post event data set and mapping results of building damage from the 2011 Tohoku Tsunami

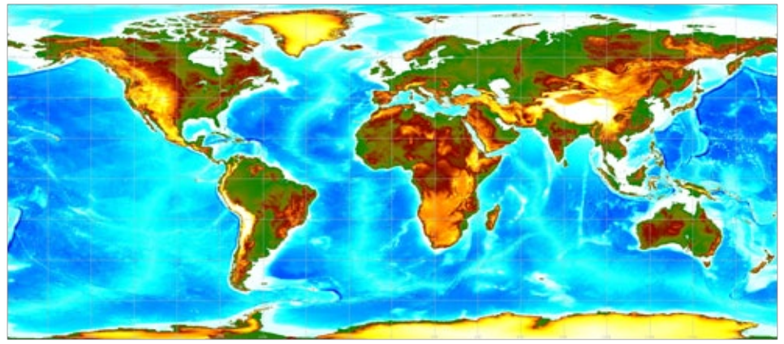
In the aftermath of catastrophic natural disasters, such as earthquakes and tsunamis, our society tends to experience significant difficulties in assessing disaster impact within the limited period of time available. In recent years, however, the quality of satellite sensors and access to, and use of satellite imagery and services, has greatly improved. More and more space agencies have embraced data-sharing policies that facilitate access to archived and up-to-date imagery. We developed a semi-automated method to estimate building damage using high-resolution synthetic aperture radar data. The damage function we developed examines the relationship between changes in the sigma nought values of pre- and post-event TerraSAR-X data, and the damage ratio of washed- away buildings.

Global Partnership using Space-based technology applications for disaster risk reduction – GP-STAR

Enhancement of Earth Observation and Modelling for Tsunami Disaster Response and Management

Application status: Service.

Area of application: National to global level.



Background: By bringing together state-of-the-art high-performance computing, remote sensing and spatial information sciences, we have established a method of real-time tsunami inundation forecasting, damage estimation, and mapping; to enhance disaster response. We are able to perform a real-time tsunami inundation forecasting, with the aid of high-performance computing platform. Given the maximum flow depth distribution, we carry on quantitative estimation of exposed populations using census data, and the **num**ber of damaged structures, by applying the tsunami fragility curve. After the potential tsunami-affected areas are estimated, the analysis focuses on to the “detection” phase which uses remote sensing to assess tsunami affected areas and structural damage. A semi-automated method, to estimate building damage in tsunami-affected areas has been developed using high-resolution SAR (Synthetic Aperture Radar) data. The method has been verified in the case studies of the 2011 Tohoku tsunami and recent coastal hazards.

Key publications:

Koshimura, S., Establishing the Advanced Disaster Reduction Management System by Fusion of Real-Time Disaster Simulation and Big Data Assimilation, Journal of Disaster Research, Vol.11 No.2, pp.164-174, 2016. doi: 10.20965/jdr.2016.p0164

Gokon, H., J. Post, E. Stein, S. Martinis, A. Twele, M. Mück, C. Geiß, S. Koshimura and M. Matsuokam A Method for Detecting Buildings Destroyed by the 2011 Tohoku Earthquake and Tsunami Using Multitemporal TerraSAR-X Data, IEEE Geoscience and Remote Sensing Letters, IEEE, doi: 10.1109/ LGRS.2015.2392792, 2015.

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