



MEGURO LAB.

[Comprehensive Disaster Management By both Structural and Non-structural Countermeasures]

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Civil Engineering

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in Information Studies

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Urban Earthquake Disaster Mitigation Engineering
Strategy for International Disaster Management

<http://risk-mg.iis.u-Tokyo.ac.jp/>

Japan has entered a high seismicity period. Within the next 30 to 50 years, magnitude 8 (M8) class earthquakes may happen 4, 5 times and M7 class earthquakes may strike 40 to 50 times in Japan. Typical one with magnitude 7 is Tokyo Metropolitan inland earthquake and those with magnitude 8 are Tokai, To-Nankai and Nankai earthquakes along Nankai-Trough. The Central Disaster Prevention Council, Japan, estimated their damage in 2003 and 2005 and total damage reported was over 200 trillion yen, including 2 millions of collapsed / burnt buildings and houses. But based on the 2011 Great East-Japan Earthquake and Tsunami Disaster, the Council revised the estimation results and reported that the total economic loss would be over 300 trillion yen by magnitude 9 gigantic earthquake along Nankai-Trough (over 220 trillion yen) and Tokyo Metropolitan inland earthquake (over 95 trillion yen). The total number of collapsed buildings and fatalities estimated were over 3 million and over 350 thousands, respectively.

Can you protect your important persons and things, and yourself from these earthquakes? The most important point for disaster management is "How to increase the number of people who can really imagine the situation around them as time goes since the hazard attack considering regional characteristics, season, weather, and the time of occurrence of the earthquake". An appropriate countermeasures requires disaster imagination. Our research group has been studying the strategy for implementation of disaster resilient society by both structural and non-structural countermeasures.

Structural measures (Hardware, Physical Analysis)

Retrofitting Method for Masonry Structures

Proposal of highly effective method which is easy and cheap for retrofitting masonry in the area where there are many earthquakes



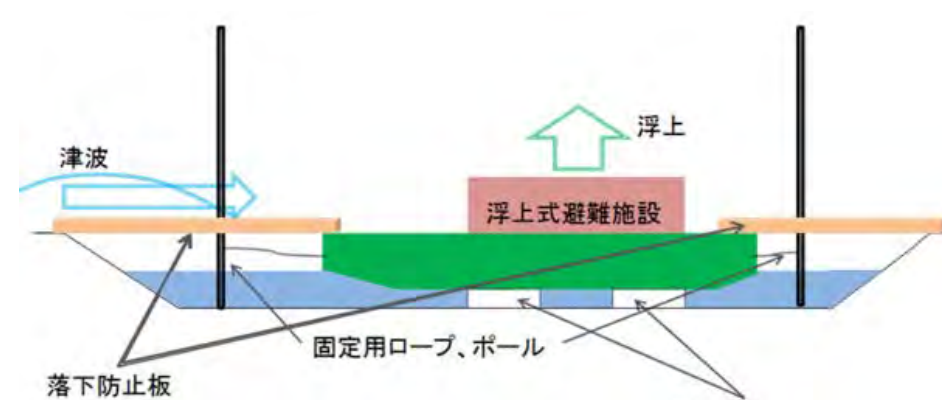
Building Collapse Analysis

Building collapse simulation using AEM which enables high-accurate analysis from continuum to non-continuum.



Self-Floating Evacuation Facility

Facility that protect people who have evacuated from the tsunami by floating itself. Verifying of feasibility of structure by model experiment and numerical simulation



Development of furniture fall prevention equipment and verification of its effect

Conducting Vibration experiments using various periods and seismic intensity earthquake motions and verifying the effect of invented fall prevention equipment



Non-structural measures (Software, Social Analysis)

Social Promotion System for Masonry Retrofitting

Research for the system of promoting seismic retrofitting of unreinforced masonry houses



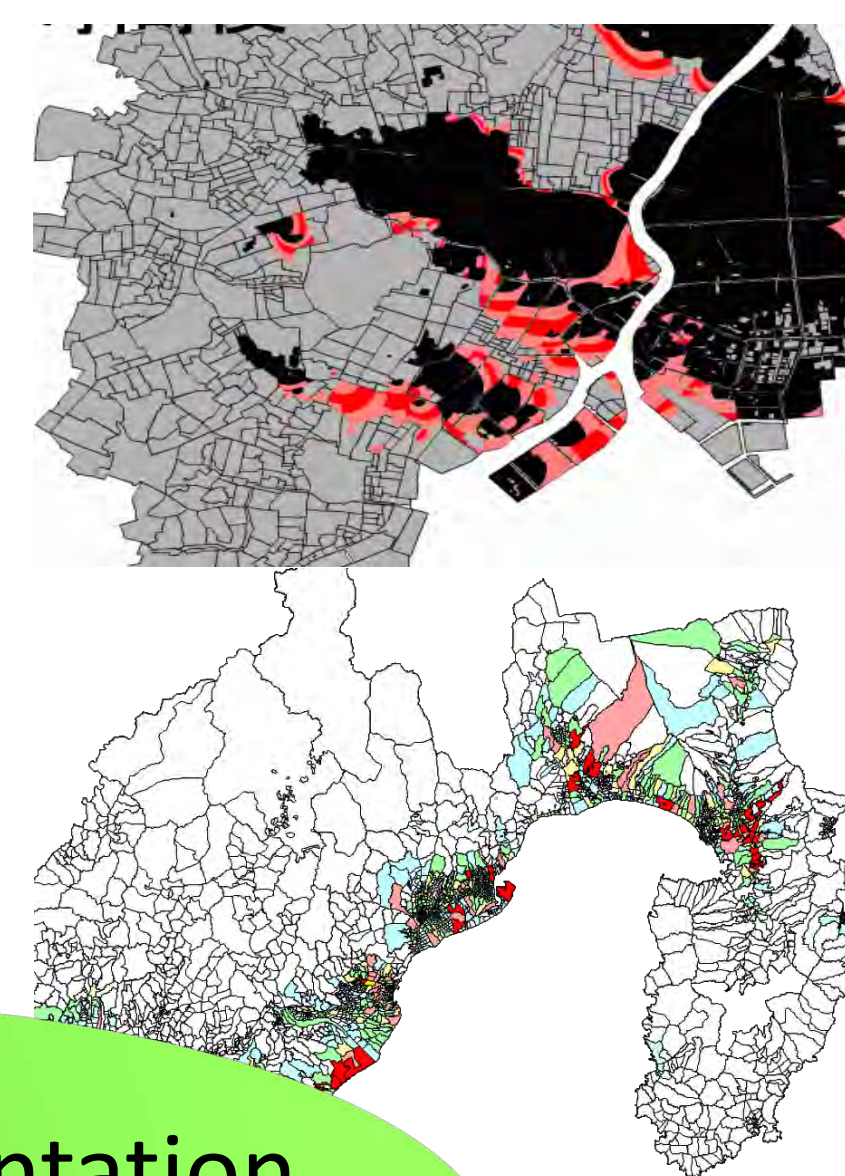
Content analysis of disaster management plan

Content analysis of disaster management plan through literature review and interview survey. Clarification of problems that are aimed at revisions

TIME	DM Action	Activities	Social Promotion (0/1)	Foreign Affairs (0/1)	Home Affairs (0/1)	Defense (0/1)	Border State Affairs (0/1)	Countermeasures (0/1)
Initial assessment	Assess disaster affected area		○	○	○	○	○	○
	Assess amount of disaster victims		○	○	○	○	○	○
	Assess damage to infrastructures and other facilities		○	○	○	○	○	○
	Assess disturbance to functions of public and government		○	○	○	○	○	○
	Assess capacity of resources		○	○	○	○	○	○
	Make decisions to set up disaster		○	○	○	○	○	○

Analysis of Fire Spreading

Damage caused by fire spreading was analyzed. Figure shows the situation 12 hours after the Great Kanto Earthquake.



Effect of Evaluation of Countermeasures

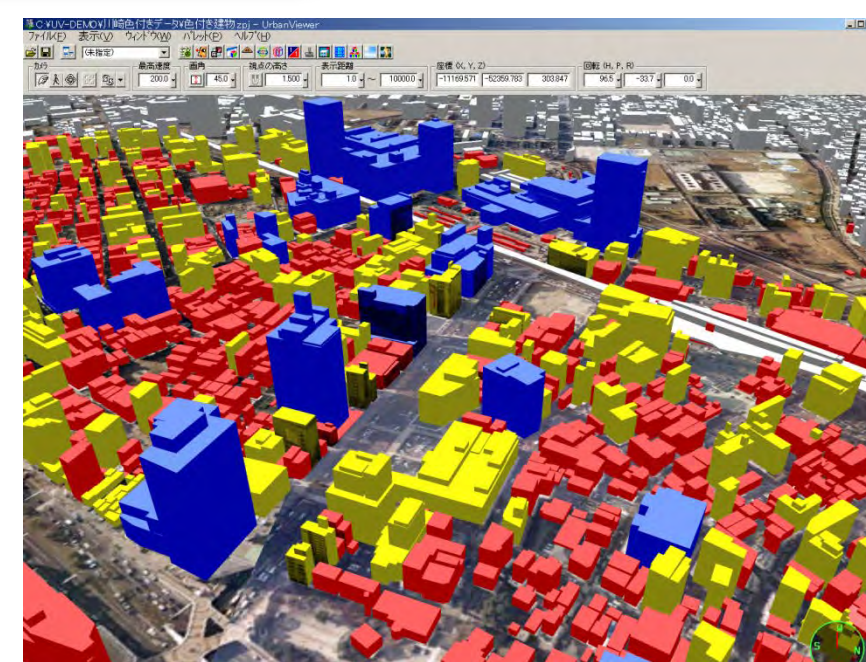
Research of adopting incentives for retrofitting vulnerable buildings. Effect of "Seismic Retrofitting Encouraging System", in case of Shizuoka prefecture, was evaluated.

Towards Implementation of Comprehensive Disaster Management Strategy

Disaster Information Archive

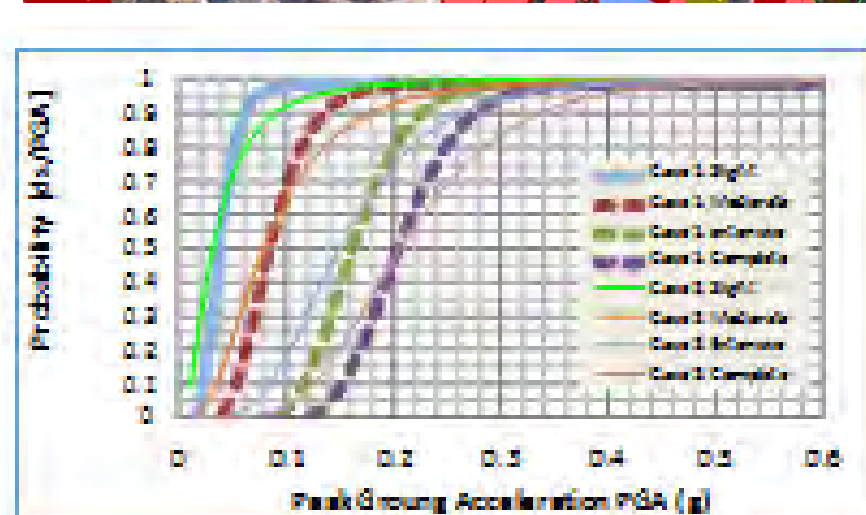
Hazard Map Management

For the management of real-time earthquake disaster prevention, damage estimation and evaluation result, hazard maps are organized and accumulated systematically.



Earthquake ground motion distribution estimation based on damage situation in earthquake stricken area

Estimating of earthquake ground motion distribution in earthquake disaster area with few observation points, based on damage detection result by satellite image and earthquake damage function



Disaster Investigation Report

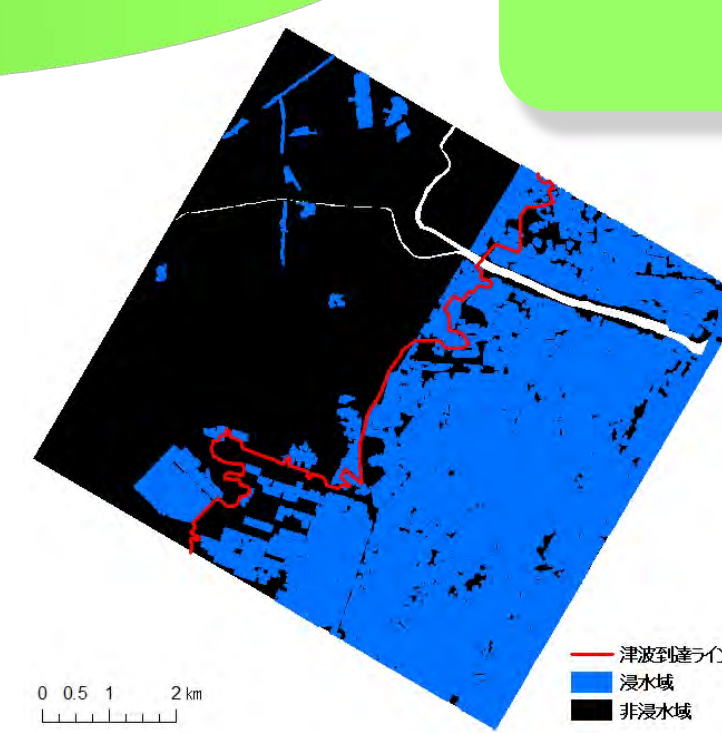
Organize, accumulate and make use of the knowledge from the past disasters.



Disaster Information Delivery

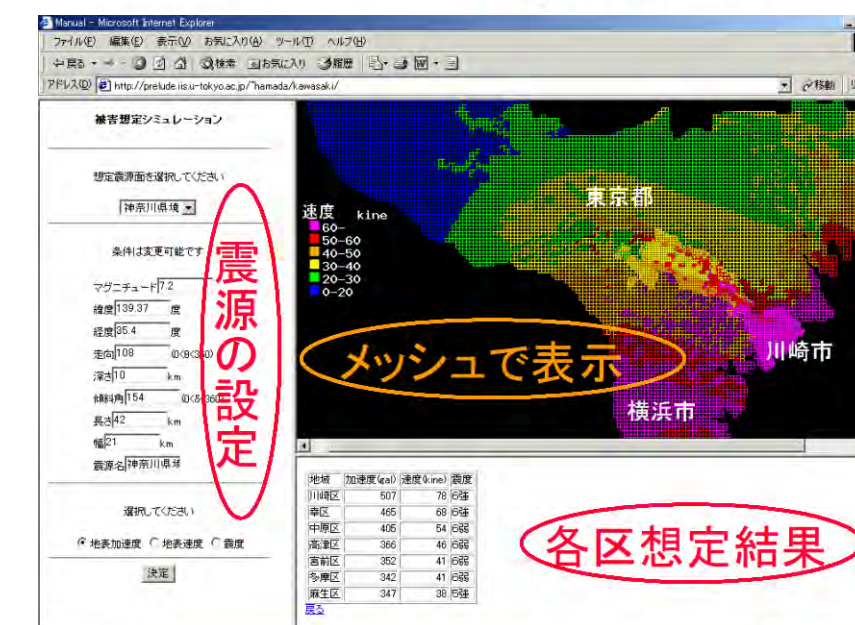
Application of Disaster Remote Sensing

Construct a mechanism to utilize disaster information obtained by remote sensing for support activities at time of disaster



Next Generation Disaster Management Manual

This is a system that supports efficient disaster management countermeasures at all phases from before to after the hazard. It evaluates the effect of pre-event measures and navigates the efficient disaster response activities by estimating response period and showing personnel arrangement based on the magnitude of the damage.



Meguro-method/maki

A tool for improving disaster imagination. Create a story of your own by setting a situation around you during the disaster.

