

Building an Integrated Database System of Information on Disaster Hazard, Risk, and Recovery Process – Cross-Media Database (4)

Norio MAKI, Hironori KAWAKATA*, Paul YOSHITOMI, Go URAKAWA**, Kelly CHAN, Hideki MATSUURA, Kenichi TATSUMI, Takeshi HARA***, Munenari INOKUCHI, Mitsuhiro HIGASHIDA, Haruo HAYASHI, and Yoshiaki KAWATA

* Department of Science and Engineering, Ritsumeikan University, Japan (presently)

** Institute of Sustainability Science, Kyoto University, Japan (presently)

***ESRI-Japan, Japan (presently)

Synopsis

During the 2006-2007 academic year, a recovery process monitoring system was installed into the XMDB as a subsystem. Daily images of disaster impacted area have been monitored as a basic datasets enabling to analyze recovery process from disaster. Three sets of digital images showing recovery process at the disaster impacted area such as Kobe-Japan, Chungliao-Taiwan and Miyake Island-Japan were also archived into the XMDB. Geo-int database concept framework using a geo-lactation as the key for relating all kinds of information were developed. Possibility of implementing the geo-int concept database was tested in disaster response of 2007 Noto Earthquake Disaster.

Keywords: Cross-Media Database (XMDB), recovery process, CCD camera, 1995 Kobe Earthquake, 1999 Chi-Chi Earthquake Disaster

1. Introduction

During the 2006-2007 academic year, a recovery process monitoring system was installed into the XMDB as a subsystem. Daily images of disaster impacted are available to analyze recovery process from disaster. Three sets of digital images showing recovery process at the disaster impacted area such as Kobe-Japan, Chungliao-Taiwan and Miyake Island-Japan were also archived into the XMDB and recovery process monitoring for Kobe-Japan has been continued. Geo-int database concept which use geo-lactation as the key for relating all kinds of information were developed. Possibility of implementing the geo-int concept database was tested in disaster response activities of 2007 Noto Earthquake Disaster.

2. Recovery Process Monitoring System

We have started continuous monitoring on recovery process at Kobe-Japan, and have collected the digital image on recovery process of impacted area twice a day using CCD camera system. Observation data of each day have been accumulated to data server in Kyoto University through the Internet. The outline of the system will be shown in Fig.1. This system was originally developed by Earthquake Disaster Mitigation Research Center (EDM), NIED (Higashida, M, et.al, 2001)

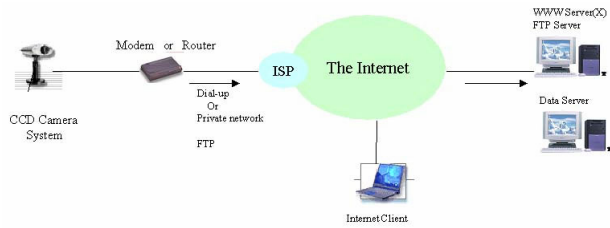


Fig.1 Outline of Recovery Process Monitoring

3. Continuous Recovery Process Monitoring at Nagata, Kobe

Continuous recovery process monitoring system has been set at Misuga-west of Nagata, Kobe. This area was severely impacted by the 1995 Kobe earthquake disaster; major damage and burnout - 242 buildings, moderate damage - 34 buildings among 334 buildings in this area. And severe damage (Major and Moderate) ratio is amount to 83%. The data of this area is distributed from two sets of CCD camera which was set on the roof of Mikuura 5, where the “Machi-communication” that is community based organization working for community development for this area locates. This building was reconstructed after the disaster. The data collection was started from March 19, 2001 by EDM, NIED. However, the monitoring has been stopped for a while. We resumed the monitoring again from this year. The location and the images of CCD camera system will be shown in Fig.2.

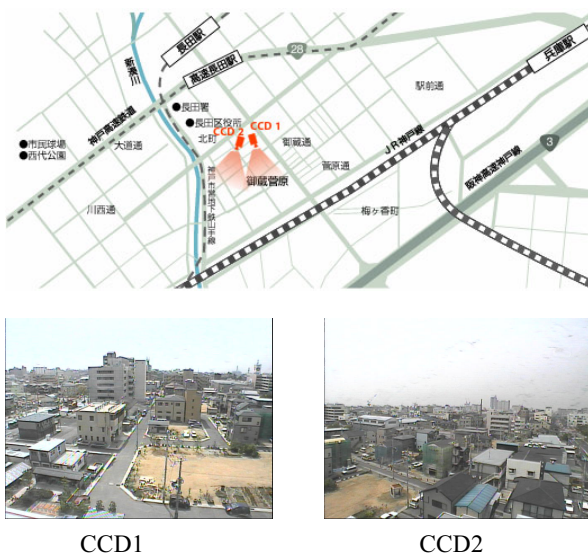


Fig.2 Monitoring at Nagata, Japan

3. Recovery Process Digital Images Archiving

Recovery Process Digital Images of Kobe-Japan, Chungliiao-Taiwan and Miyake Island-Japan are archive in the XMDB. Outline of archived digital images will be explained in this chapter. Those images were originally collected by EDM, NIED.

3.1 1999 Chi-Chi Earthquake Disaster

Chungliiao, Taiwan was severely damaged for 9.21 Taiwan earthquakes in 1999; 2,542 major damage buildings, 1,424 moderate damage buildings, and human death 179 peoples. The dataset was collected at Yunping village at Chungliiao. The community based reconstruction program, which include small business creation and rediscovering the regional heritage such as the canal that has not used for many years as well as the reconstruction of buildings, was progressed in this village. Temporary town including the village office, library, kindergarten, library, and dwellings were established at the other area where these official buildings located before the disaster, because all these official buildings were collapsed for the earthquake. The reconstruction of original area where these facilities were located before the disaster is still on the way. Digital image of both temporary town and reconstruction area were collected. Data collection was started from April 19, 2001. The location and the images will be shown in Fig.3, 4.



Fig.3 Location of collected digital images

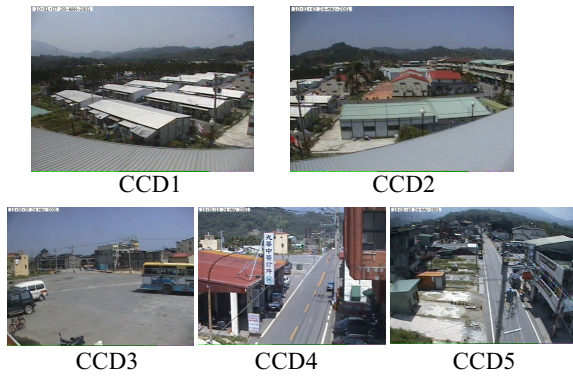


Fig.4 Examples of digital images

The recovery process was clearly observed by the system (Photo 1). All the digital images were archived in the XMDB.



April 19, 2001



February 27, 2003

Photo 1 Recovery Process from 1999 Chi-Chi Earthquake in Yunping village

3.2 2000 Miyake Volcanic eruption

Volcanic activities of Oyama Mountain in Miyake Island became active from June 26, 2000 and on Sep.1 of 2001, mandatory evacuation order was issued to all the residents of Miyake Island. They should have lived in outside of the island until February of 2005. Almost 3, 800 residents have been evacuated from the island.

EDM, NIED set CCD camera at the local government building to distribute information to evacuating residents about present status of the island in September of 2001. Monitoring had been continued until March 2006. All the digital images were archived in the XMDB.

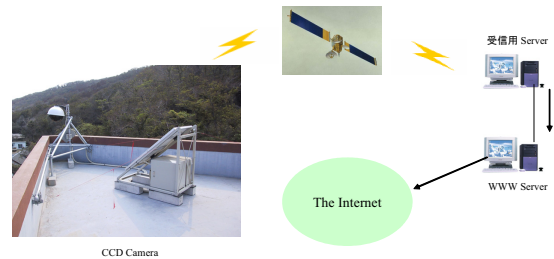
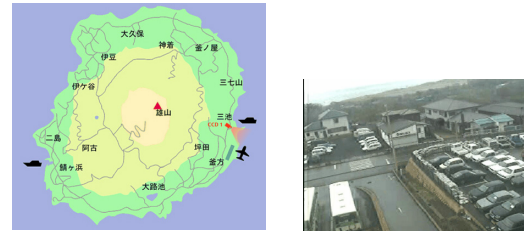


Fig.5 Location and System of Monitoring in Miyake Island

4. Geo-referencing for the Archived Digital Images

All the archived images have the time stamp but to be contents for the XMDB, those archived digital images need to have geo-reference data. Trial to convert observation image into GIS data has been done using digital images of Nagata area.

Monitoring at Nagata started from March 19, 2001, and we cannot get damage situation and recovery process before 2001 from the observation images. However, GIS database on damage situation and field survey results on recovery process were existed in this area. Fig.6 shows the damage situation in this area (CPIJ and AIJ field survey) and Fig.7 shows the situation at relief phase (Machi-community field survey). And Fig.8 shows the situation in 2001 (Machi-community field survey) which is the situation at the time of the observation starts. All those field survey data was converted into GIS data. Based on those GIS datasets GIS datasets showing physical recovery process of the area with digital images will be developed by deploying archived digital images into GIS data. Photo 2 shows recovery process during March 2001 to April 2007.

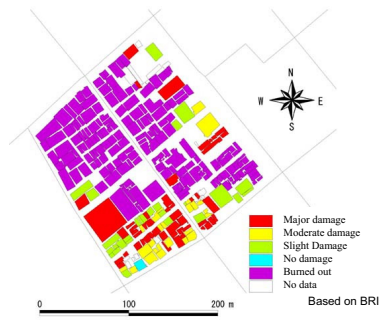


Fig. 6 Damage (survey by CPIJ and AIJ)

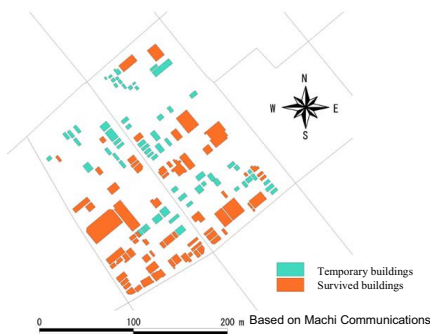


Fig.7 Relief Phase (Survey by Machi-com)

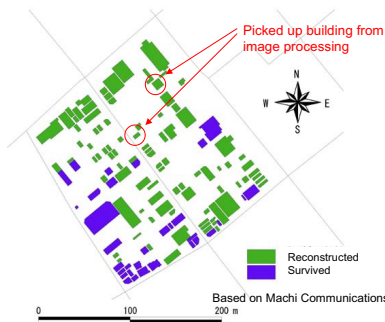


Fig.8 Situation in 2001 (Survey by Machi-com)



March, 2001



April, 2007

Photo 2 Recovery Process from the 1995 Kobe Earthquake in Nagata, Kobe

5. Remarks

Development of the Cross-Media Database (XMDB) for disaster reduction began in 2003. Goal of the XMDB project is to establish research data platform to support the interdisciplinary disaster research. The XMDB prototype has completed using data on the 2004 Niigata Prefecture Heavy Rain Disaster and the 2004 Niigata Prefecture Chuetsu Earthquake Disaster until end of FY2004. During the 2005-2006 academic year, the XMDB adopted the other digital library initiatives such as JHOVE, DSpace, Cannotea, and Dynamic Classification.

During the 2006-2007 academic year, a recovery process monitoring system was installed into the XMDB as a subsystem. And three sets of digital images showing recovery process at the disaster impacted area such as Kobe-Japan, Chungliao-Taiwan and Miyake Island-Japan were archived into the XMDB.

Development of the XMDB has moved into new phase from this academic year. Geo-int database concept which uses geo-lactation as the key for relating all kinds

of information were developed. Possibility of implementing the geo-int concept was tested in disaster response activities of 2007 Noto Earthquake Disaster.

Financial support by 21st Century COE Program to develop the XMDB project has ended in this fiscal year. However, we will continue to develop the XMDB as data platform to support the interdisciplinary disaster research.

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災害ハザード・リスク・復興過程等に関する情報の統合型データ・ベースシステム（クロスメディア・データベース）の構築（4）

牧 紀男・川方裕則*・ポール吉富・浦川豪**・Kelly CHAN・松浦秀起・辰巳賢一・原武士***・井ノ口宗成・林 春男
河田恵昭

*現 立命館大学理工学部

**現 京都大学生存科学研究ユニット

***現 ESRIジャパン（株）

要 旨

本年度はクロスメディアデータベースに新たに災害後の地域の復興プロセス・モニタリングシステムの追加を行った。このシステムにより、災害復興プロセスのモニタリングに不可欠な被災地の日々の画像を蓄積していく事が可能になる。また、システムの整備に加えて、神戸市長田区御蔵地区（阪神・淡路大震災の被災地）、台湾・中寮郷永平村（1999年台湾集集地震の被災地）、三宅村（2000年三宅島噴火災害の被災地）でこれまで観測されてきた復興プロセスのデジタルデータのアーカイビングも実施した。

キーワード:クロスメディアデータベース、復興過程、CCDカメラ、阪神・淡路大震災、台湾・集集地震