



Achievements of SIP Social Resiliency against Natural Disasters

M. Hori⁽¹⁾, T. Sugano⁽²⁾, Y. Usuda⁽³⁾, I. Takahashi⁽⁴⁾,
T. Osaragi⁽⁵⁾, K. Yamori⁽⁶⁾, M. Ichikawa⁽⁷⁾, K. Tsukahara⁽⁸⁾,

⁽¹⁾ Director General, Japan Agency for Marine-Earth Science and Technology, horimune@jamstec.go.jp, +81-45-778-5970

⁽²⁾ Professor, Disaster Management Institute, Kanto Gakuin University, sugano@kanto-gakuin.ac.jp, +81-45-786-5831

⁽³⁾ Project Director, National Research Institute for Earth Science and Disaster Resilience, usuyu@bosai.go.jp, +81-29-863-7553

⁽⁴⁾ Director, National Research Institute for Earth Science and Disaster Resilience, ikuo@bosai.go.jp, +81-29-863-7816

⁽⁵⁾ Professor, Tokyo Institute of Technology, osaragi.t.aa@m.titech.ac.jp, +81-3-5734-3162

⁽⁶⁾ Professor, Disaster Prevention Research Institute, Kyoto University, yamori@drs.dpri.kyoto-u.ac.jp, +81-774-38-4024

⁽⁷⁾ Associate Professor, Shibaura Institute of Technology, m-ichi@shibaura-it.ac.jp, +81-48-720-6233

⁽⁸⁾ Professor, Disaster Risk Reduction Research Center, Graduate School of Engineering, Kyushu University, tsukahara@doc.kyushu-u.ac.jp, +81-92-802-3409

Session Abstract

Japan Government launched a largest research program of five years, called Strategic Innovation Promotion Program (SIP), in 2014, and selected the enhancement of social resilience against natural disasters such as earthquakes and tsunami. More than 30 research agencies were involved, and the total budget exceeded 200 M US dollars. The SIP Social Resilience focuses the development of innovative technologies to more quickly recover from damages induced by earthquakes and other natural disasters and the implementation of the technologies in relevant government organizations. In this invited talk session, we present achievements of the SIP Social Resilience, such as a multi-ministry disaster information sharing system, a decision-supporting system for local government on natural disasters, an integrated liquefaction prevention system, the enhancement of emergency medical services via a versatile telecommunication system, a tsunami observation and warning system, a nation-wide real-time earthquake hazard and disaster estimation system, and the development of sophisticated applications to enhance smooth evacuation at emergency situations. Researchers in wider areas, such as ICT, sensing and monitoring, mathematics and data science, have been contributing this program to realize the innovative technologies, together with well-experienced experts of the technology implementation. Some innovative technologies developed have been already implemented in Japanese Government, and some of them are planned to be authorized as a global standard and to be transferred to earthquake-prone countries. Based on the summary of the achievement, perspectives of future researches on the enhancement of social resilience against largest-scale earthquakes will be discussed in this session.

Keywords: SIP, Innovative technology, Social implementation, Social Resilience, ICT

Session Type

Invited Talk Session (ITS), 120 minutes, Innovative Technology



LOCAL DISASTER MITIGATION TECHNOLOGY WITH TRAVEL SUPPORT APPLICATION

T. Osaragi⁽¹⁾, T. Suematsu⁽²⁾, T. Oki⁽³⁾, A. Kakizaki⁽⁴⁾

⁽¹⁾ Professor, Tokyo Inst. of Technology, Tokyo, Japan, osaragi.t.aa@m.titech.ac.jp

⁽²⁾ CEO, Vector Research Institute Co., Ltd., Tokyo, Japan, suematsu@vri.co.jp

⁽³⁾ Associate Professor, Tokyo Inst. of Technology, Tokyo, Japan, oki.t.ab@m.titech.ac.jp

⁽⁴⁾ Research Engineer, Vector Research Institute Co., Ltd., Tokyo, Japan, kakizaki@vri.co.jp

1. Introduction

At the time of occurrence of a disaster, prompt responses to rescues, relief, and requests for assistance are required. However, it is difficult to foresee when and where such demand will be required. Moreover, there may be instances where it is not possible to respond to this demand because the person in charge of the disaster response is also adversely affected or resides in a distant location [1]. Previous disasters have seen imbalances and delays in the assignment of responders to demanders, and this is regarded as an issue to be addressed.

2. Travel Support Application

We formulated the problem of a limited number of workers traveling efficiently to a large number of tasks in the aftermath of a disaster for rescue/relief as a regional travel problem, and then proposed a solution to the regional travel problem [2]. Also, we proposed a practical, real-time system constructed in cloud server for collecting, sharing, and using disaster information [3]. This system could contribute significantly to reducing human and physical losses by collecting, sharing, and using disaster information immediately after the major earthquake in a quick and precise manner. We then developed a Web application incorporating the proposed solution (travel support application), and evaluated it through field experiments, which showed that (1) using the application can significantly shorten travel completion time compared to using an existing SNS (LINE), and (2) neither omissions nor duplications occur, thereby indicating that efficient regional travel can be achieved when the application is used. Furthermore, we performed a demonstration experiment assuming a flood disaster at the crisis management office of a local government, and demonstrated that the Web application system incorporated the proposed methods was of great potential for local disaster mitigation technology.

3. Acknowledgements

This work is supported by Cross-ministerial Strategic Innovation Promotion Program (SIP). The authors wish to express their sincere thanks to Japan Science and Technology Agency (JST).

4. References

- [1] Hisada Y, et al. (2019): Disaster Response and Mitigation Support Technology for All-Hazards in Tokyo Metropolitan Area. *Journal of Disaster Research*, Fuji Technology Press Ltd., **14** (2), 387-404.
- [2] Osaragi T, Kimura M, Oki T (2019): Efficient Regional Travel for Rescue and Relief Activities in a Disaster. *Computational Urban Planning and Management for Smart Cities*, Springer, Cham, 425-441.
- [3] Osaragi T, Niwa I (2018): Development of System for Real-Time Collection, Sharing, and Use of Disaster Information. *Geospatial Technologies for All, Lecture Notes in Geoinformation and Cartography*, Springer, 211-229.