

## 【Grant-in-Aid for Scientific Research (S)】

### Integrated Disciplines (Complex Systems)



**Title of Project : Fusion of sensing and simulation of tsunami damage assessment towards innovation of disaster medical system**

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Research Area : Natural Disaster

Keyword : Tsunami, Disaster Medicine, Simulation, Sensing

#### 【Purpose and Background of the Research】

More than 150 of preventable disaster death at medical institutions were reported in the areas affected by the 2011 Great East Japan Earthquake and Tsunami. Devastating damage, lack of disaster information, insufficient resources in the hospitals, disrupted lifelines and transportations, and delayed medical intervention constituted the major contributing factors of preventable death. On the basis of the lessons from the 2011 event, there have been many new findings, insights, and progress on disaster observation/monitoring, simulation, modeling, and damage assessment methods. This project aims to utilize these advanced technologies towards enhancement of disaster medical system.

#### 【Research Methods】

To achieve the goal of innovating disaster medical support system, five issues are addressed:

- (1) Nation-wide real-time tsunami inundation and damage forecasting and advanced sensing for assessing tsunami impact with particular regard to the damage on medical facilities.
- (2) Establishing a quasi-real-time estimation of the number of affected people in the affected areas and clarifying the relationship between the exposed population and medical demand.
- (3) Clarifying relationship between the damage amount and medical demand from the medical records in the 2011 event, and developing a statistical model to estimate the medical demand using the damage data obtained immediately after the event occurs.
- (4) Developing a multi-agent system with Markov Decision Process to simulate the medical activities in the affected areas with use of damage information, medical demands, and resources in the medical facilities to provide better guidance for decision making of medical response.
- (5) Developing multi-agent-based medical support system by fusion of real-time tsunami inundation forecasting and simulation, and implementation as disaster medical support

system.

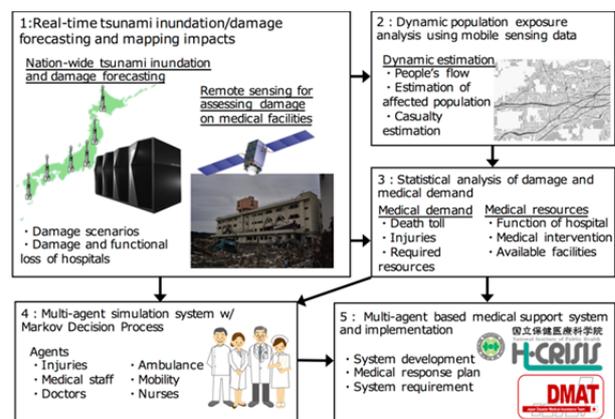


Fig.1 Structure of Research

#### 【Expected Research Achievements and Scientific Significance】

The key outcome expected from this project is to create an innovative disaster medical support system to reduce preventable disaster death. To accomplish the goal, researchers in the fields of earth science, engineering, and medical science are working together to enhance the society's resilience against future catastrophic tsunami disaster.

#### 【Publications Relevant to the Project】

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

【Term of Project】 FY2017-2021

【Budget Allocation】 156,900 Thousand Yen

#### 【Homepage Address and Other Contact Information】

<http://www.regid.irides.tohoku.ac.jp>