

## Forecasting and controlling social impact and social decision making for weather control

### Progress until FY2022

#### 1. Outline of the project

**Background:** Evaluating the effectiveness of weather control requires more than just monitoring changes in meteorological variables such as intensity of tropical cyclones. It is crucial to estimate how changes in meteorological disasters affect society, which is called “impact-based forecasting”. The societal impact is greatly influenced by how citizens interpret the disaster information and make decisions. However, it is currently difficult to predict these social phenomena during disaster events. In addition, we should initiate the inclusive discussion towards installing weather control technologies based on a profound understanding of our society.

**Objective :** ① We will understand **how individuals interpret disaster information such as weather forecasts.** ② We will comprehend and predict how disaster information is transferred through social networks and how this information contributes to preparedness actions. Then, **we will explore methods to foster appropriate behavioral changes.** ③ **We will investigate Ethical, Legal, and Social Issues (ELSI) of weather control** and identify issues essential for social decision making regarding weather control.

**Methods (Fig.1):** ① To investigate the individual's perception of disaster information, psychological experiments will be conducted. ② We will analyze various social statistics to examine the relationship between the accuracy of weather forecasting and social preparedness actions. Subsequently, we will develop a mathematical model to simulate social dynamics in response to disasters. ③ We will identify ELSI through workshops involving citizen participation.

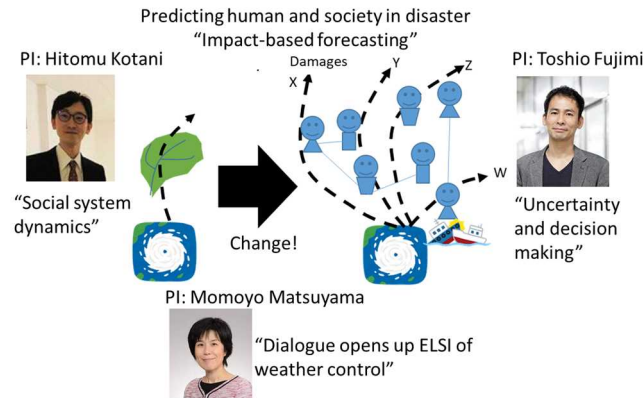


Fig. 1. Overview of this R&D theme. We aim to move beyond a regime where only a single forecast related to the natural scientific aspects of a disaster event conducted. Instead, we will predict numerous disaster scenarios as well as citizens behavior during meteorological disasters.

#### 2. Outcome so far

- ① As the preparation of the psychological experiment, we developed **a virtual reality simulation of meteorological disasters** (Fig. 2). By analyzing how these simulations prompt preparedness actions, we aim to understand how human process and respond to disaster information.
- ② We developed **a mathematical model that realistically simulates a cry wolf effect** in which many false alarms undermine the credibility of the early warning systems.
- ③ **Citizen participating workshops have been conducted in Kochi and Wakayama** (Fig 3) to identify ELSI related associated with weather control.



Fig. 2. An example of virtual reality of meteorological disaster. By showing these movies to participants, we will explore decision making processes in disaster events.



Fig. 3. Citizen participating workshop

#### 3. Future plans

We plan to collaborate with other R&D themes to deepen our understanding of how individuals and societies respond to disaster information, such as weather forecasts. Then, we will develop the methods to maximize the value of disaster information, thus promoting appropriate behavioral changes. This research will pioneer a new field of study aimed at maximizing the value of weather control technology. Questions like “what kind of weather control is appropriate?” and “how can we integrate weather control into society while maintaining effective communication with citizens?” will be discussed in Our R&D theme.