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DEVELOPMENT AND UTILIZATION OF NANKAI TROUGH EARTHQUAKE DISASTER INFORMATION PLATFORM

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Abstract

The Nankai Trough Earthquake Disaster Information Platform has been developed as a web service that aggregates information related to the Nankai Trough earthquake and can transmit it in real time. Various types of geospatial information, historical documents, real-time data such as strong motion and water pressure gauge data, information from seismic and tsunami hazard assessment, risk assessment and other research results can be integrated and transmitted to users. This information can be viewed and used by the public.

In order to reflect the opinions of the users, information contents and functions are evaluated in verification experiments by persons involved in public aid, mutual aid, and self aid. Especially in 2018, prior training using information from the Nankai Trough earthquake disaster information platform was useful in responding to actual disasters that occurred in Osaka Prefecture (earthquake in northern Osaka Prefecture and storm surge damage caused by Typhoon 21). Various information was used to quickly dispatch management supporters in the prefecture and to decide their local activity plan.

Keywords: Nankai Trough, Earthquake, Disaster, Information Platform, Tsunami

1. Introduction

As one of the initiatives of the “Nankai Trough Wide Area Earthquake Disaster Prevention Research Project” [1] commissioned by the Ministry of Education, Culture, Sports, Science and Technology, the “Nankai Trough Wide Area Earthquake Disaster Prevention Information Platform” (hereinafter “Disaster Information Platform” [2, 3]) was developed. (Fig. 1). The Disaster Information Platform integrates and distributes various geospatial information, historical data, real-time data of observation facilities, survey results of other research subjects, research results, hazard assessment, risk assessment, etc.

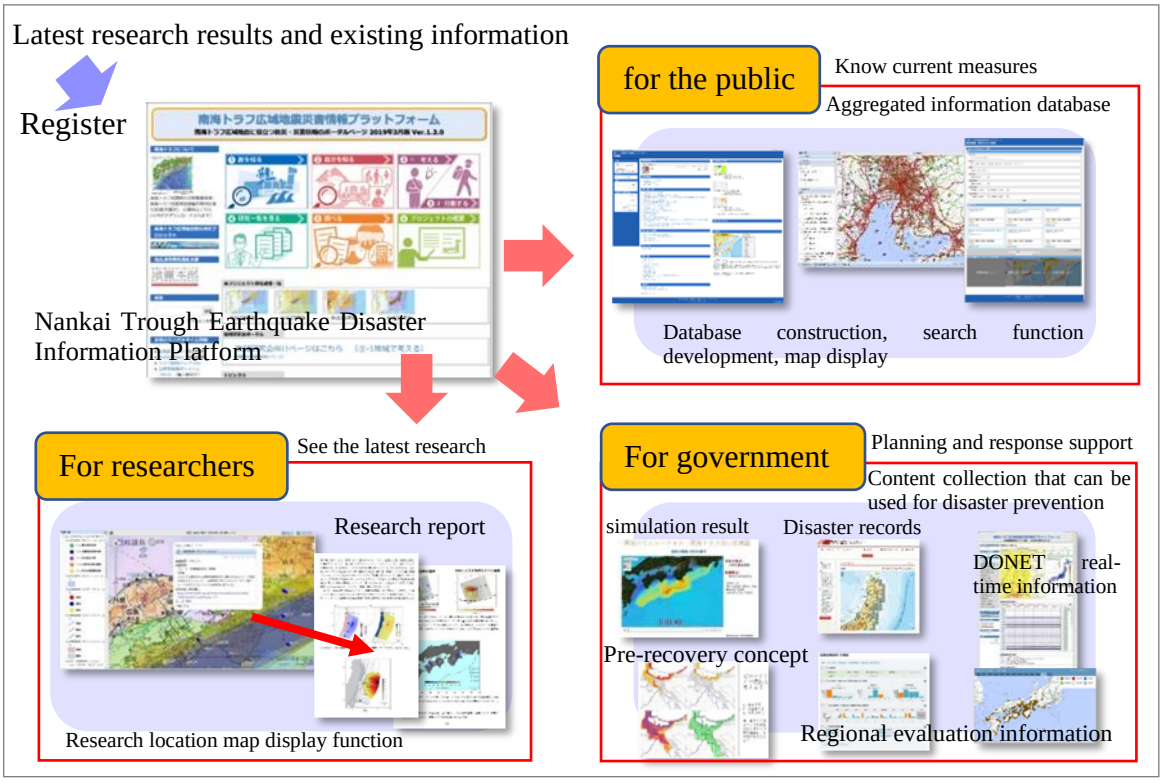

Fig. 1 – Nankai Trough Earthquake Disaster Information Platform (URL https://nankai-bosai.jp/v1.2/)

2. Structure and information of disaster information platform

First, we designed a disaster information platform. We collected and registered various existing data, such as various regional data owned by local governments and the latest research results in the project, and examined a system that was easy to use. Created Top page and local government pages. From this page, you can browse information about possible earthquakes, tsunamis, and liquefaction at various places on the map, and browse the text and link URLs of disaster prevention activities and publicity information published on local government websites You can.

3. Validation in model district

In order to not only build a disaster information platform, but also to improve the type of content and the browsing function, actual usage experiments were conducted by users. Users are municipal staff, local organizations, and local residents responsible for disaster prevention. This section describes training for those who need assistance in the event of a disaster by the Social Welfare Council of Social Welfare , which was able to conduct a detailed verification, and how to utilize it in a disaster.

3.1 Use in case of normal time

3.1.1 Provision of disaster information through training

In Osaka (Fig. 2), where damage from the Nankai Trough earthquake and tsunami is expected, the staff of the Council of Social Welfare, who is in charge of those who need assistance in the event of a disaster, has verified the effectiveness. In cooperation with the Osaka Prefectural Council of Social Welfare, a training session was held for 41 municipalities' Social Welfare Councils. At the workshop, they learned what disaster

information was available(Fig. 3). We explained how to use the tools to improve the operation, and aimed to improve the skills of the staff so that they could be used easily even in the event of a disaster. The disaster information includes information on the current state of major facilities such as anticipated ground motions, tsunami inundation areas, evacuation shelters, and transportation infrastructure (Fig. 4).

It also provides information on DONET (Dense Oceanfloor Network system for Earthquakes and Tsunamis) installed off the Kii Peninsula and off eastern Shikoku. We also conducted a disaster response survey that considered the potential for damage if the epicenter was divided into west and east. In that case, Osaka Prefecture may be hit by a large earthquake with a time difference of several days to several years. It is necessary to consider two measures: sudden response, and a plan for when there is time.

3.1.2 Participating organizations

Table 1 below provides a list of participation in training activities. These organizations are considered to be mutual and public assistance personnel who are expected to work in the area in the event of a disaster. As of February 2020, demonstration experiments are being conducted in Matsubara, Kawachinagano, Hannan, and other cities.

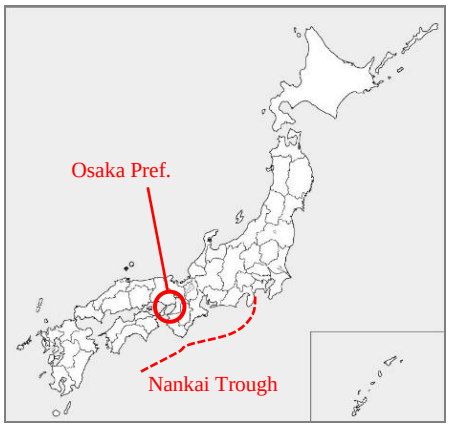

Fig. 2 – Osaka and Nankai Trough locations

Fig. 3 – Training in Osaka Pref.

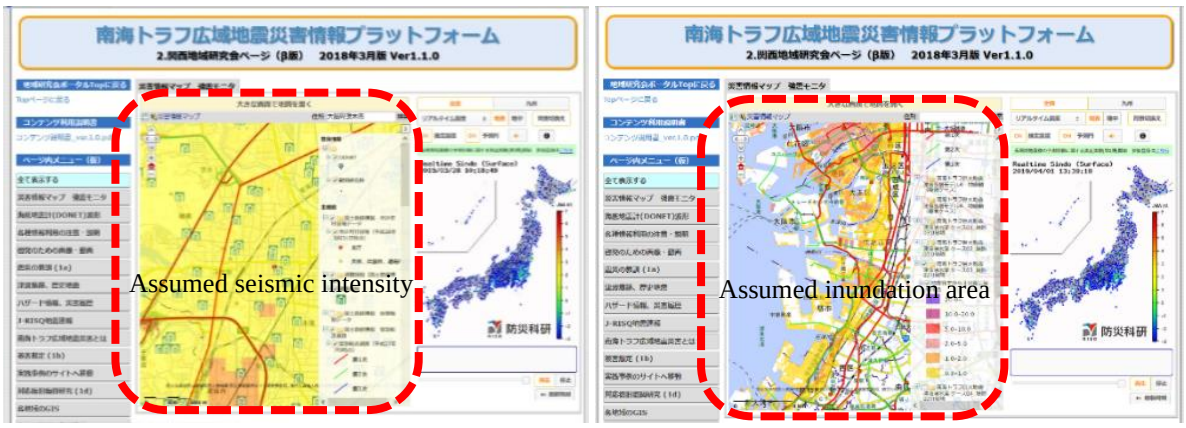

Fig. 4 – Information on assumed seismic intensity distribution and assumed tsunami inundation area

Table 1 – Organizations participating in the training

Organization name	**Overview of activities**
Osaka Pref. Council of Social Welfare	Coordination and training in Osaka on community welfare and disaster prevention
Council of Social Welfare (41 municipalities)	Community welfare and disaster prevention
Social welfare facilities	Welfare facilities for people who need assistance during a disaster
Social Welfare Promotion Committee	Social Welfare Council support activities
welfare commissioner	regional protection
Voluntary disaster prevention society	Collaboration of local residents for disaster prevention
fire fighting party	Cope with fire
women's association	Elderly support
senior citizens club	Elderly mutual support
Residents' association	Cooperation of local residents
NPO	Disaster relief activities
University student volunteers	Operation support for evacuation centers and disaster volunteer centers
High school student volunteers	Support for various activities
Municipalities	Sharing information

3. 2 Use in case of disaster

In the M6.1 earthquake that occurred at 7:58 on June 18, 2018, disaster volunteer centers (hereinafter referred to as disaster VC) were opened in the Hokusetsu region of Osaka Prefecture from June 19 to 22. We contacted the Osaka Prefectural Council of Social Welfare to understand the situation immediately after the disaster and made adjustments.The estimated seismic intensity distribution and the aerial photograph before the disaster were posted on the disaster information platform [4], and a large-format map was printed and used to enable effective activity judgment. The notice was posted on the disaster VC, and the operator grasped the damage situation and communicated it to disaster volunteers who participated from inside and outside the area (Fig. 5).

Typhoon No. 21 (Osaka Prefecture: maximum instantaneous wind speed 58.1 m / s, high tide 329 cm) that passed through western Japan on September 4, 2018 caused the effects of storm surges and strong winds on the coast of Osaka Bay. Information on the tsunami inundation caused by the Nankai Trough along the Osaka coast was provided to Osaka Prefecture and the Social Welfare Council in the affected area using large-format printed maps and WebGIS tools [5]. Since the disaster was not a tsunami, information on tsunami inundation assumptions was not directly useful. However, information was used to raise awareness of flood damage from the sea (Fig. 6). Storm surge damage to Kansai International Airport was unexpected, but fortunately there was no noticeable storm surge damage on the Honshu land side of the Senshu area, located in southern Osaka Prefecture.

4. Effects of utilizing disaster information

4.1. Streamline local operations

Local staff understood through regular training that the benefits of using information quickly in the event of a disaster occurred. As a result, there was no resistance in incorporating disaster information into management decisions, and smooth cooperation between the sender and the receiver was made possible. There were eight places in northern Osaka that provided information. Osaka Prefecture, Hirakata City, Takatsuki City, Ibaraki City, Minoh City, Toyonaka City, Suita City, Settsu City, the respective Social Welfare Councils.The maximum seismic intensity was 6-lower. Ibaraki City used the estimated seismic intensity distribution information to determine the priority of the areas that needed assistance to the victims (Fig. 7). Typhoon 21 provided information to 14 locations. Seven cities and one town in the southern part of Osaka Bay: Hannan, Sennan, Izumisano, Kaizuka, Kishiwada, Izumiotsu, Izumi, and Kumatori. There are five areas inland, Kawachinagano, Tondabayashi, Ibaraki, Toyonaka and Suita, which are affected by strong winds. In these areas, disaster information was also used to prioritize support activities.

4.2. Implementation of prefecture wide area management support

In the case of the earthquake in northern Osaka Prefecture, prior training helped and judgment was made based on estimated seismic intensity distribution and building damage estimation information (Fig. 8). Based on the decision, management supporters were sent to the affected area, eliminating the shortage of human resources.

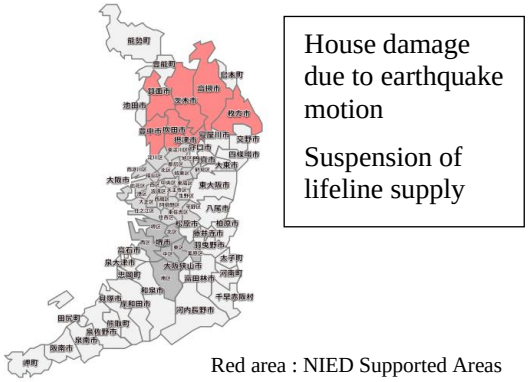

Fig. 5 – (left) Earthquake, Supported regions

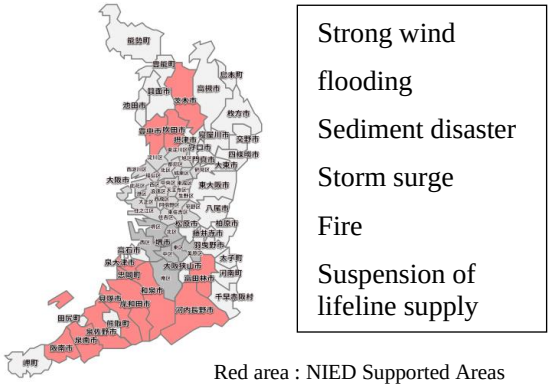

Fig. 6 –(right) Typhoon, Supported regions

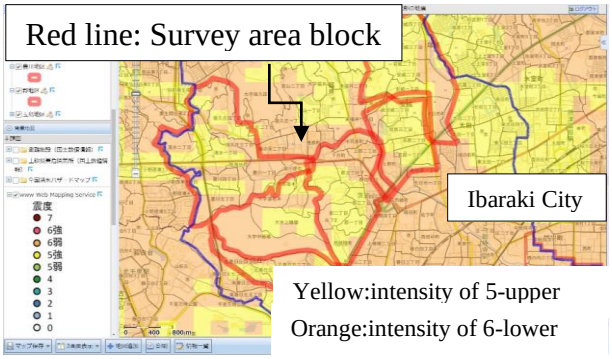

Fig. 7 –(left)Judgment of damaged area investigated using estimated seismic intensity distribution

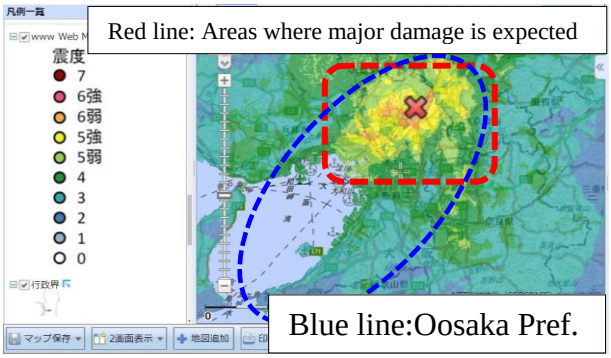

Fig. 8–(right)Judgment Estimated seismic intensity distribution was used to determine the wide area damage

5. Conclusion

The disaster information platform was used for wide area disaster response planning.For 2018 disasters, training has increased the ability to understand disaster information and made management decisions more efficient. It was used to predict where the most affected areas would be, the priorities of the areas where support would be provided, and the number of people required for support activities. However, in order to use disaster information voluntarily, it is necessary to develop core human resources who understand the information. In the future, we will continue to develop human resources in addition to developing information and tools.

Acknowledgements

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