Human Behavior Analysis in the Northern Osaka Earthquake for Countermeasures of Obstructed Homeward Commuters

Kaoru Honda
Graduate School of Informatics,
Kyoto University Uji, Japan

Michinori Hatayama
Disaster Prevention Research Institute
Kyoto University Uji, Japan

E-mail: honda.kaoru.42a@st.kyoto-u.ac.jp

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Abstract

In urban areas of Japan such as Tokyo and Osaka, transportation systems by railway and subway are used as transportation means for many people to commute and go to school. However, it has been known that if an earthquake strikes an urban area and the transportation system stops then, many stranded commuters will be generated.

On June 18, 2018, the Osaka earthquake hit the center of Osaka city, which is the largest population in Western Japan, occurred. In the Osaka city Kita-ku, Takatsuki-shi, Hirakata-shi etc, the maximum seismic intensity which is the first time in observation history was measured lower 6 on the Japanese scale of 7. According to the announcement of the Fire and Disaster Management Agency, the damage of this earthquake was 5 dead, 17 seriously injured, 12 total destroyed houses and 41459 partially damaged houses.

In this research, we analyzed the movement and retention of people, using Mobile Spatial Statistics estimating the population from mobile phone location information, the population distribution of each hour was plotted in GIS to visualize on the map, and to compare them. As a result, it became clear that the time zone and area where the stagnation of the population different from the normal situation was seen can be identified on the GIS. Also, in the center of Osaka city on the day of the earthquake, we could observe that the population of the day was significantly lower than usual because people could not flow in there. By analyzing these data, it is expected that more detailed simulation can be performed on the change of population distribution and the number of stranded commuters.

We will quantitatively clarify "where", "what kind of people who can not return home", and "on what scale can they occur" in the case of urban earthquakes from the viewpoint of analyzing these data. Based on those results, it will be possible to show useful findings and data that underpins the municipality who is developing measures for people who can not go home and evacuation action plans.