

Investigation on the impacts of volcanic eruption on flight passengers and cargo  
: A case study of Sakurajima volcano

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In recent years, modes for passengers are more diversified. For example, a traffic rail line between Hakata Station and Kagoshimachuo Station was used to be newly constructed. As a result, entire Kyushu Shinkansen was completed in 2011, which leads to 4 hours or less for the trip between Shin-Osaka station and Kagoshimachuo station. In addition, the low-cost carriers are launched into service in recent years, attracting the passengers who require both time and cost reductions. Passengers can choose transportation of several modes for going to the destination depending on the situation.

If airports are closed by natural disasters or accidents, passengers and cargo flows have to be re-directed or stopped otherwise. As a result, the change may induce significant economic losses. Truly, there were the cases that significant economic damages were caused by closures of airports due to the volcano eruption. Eyjafjallajokull volcanoes in Iceland is the case which corresponds to such a case. This eruption caused a great amount of confusions, since many airports in Europe were forced to be closed by ash in the air. According to the International Air Transport Association, the airline's loss was estimated at \$ 200 million per day.

This study proposes a method to analyze changes in the flow of passengers and cargoes in the situation when the airport was forced to shut down due to a volcanic activity. Eruptions of Sakurajima volcano in Kagoshima Prefecture is selected as a case study.

One of the features of the focuses in this study is that the restrictions of flights change from day to day depending on the conditions such as wind or volcanic activities. In other words, the flight restricted area changes with time. Therefore, it is necessary to dynamically represent the flight restricted area and to analyze the change in the modes of transport.

Moreover, Passengers may move to their destinations by using alternatives such as Shinkansen even when the air has been interrupted (figure 1). In such a case, it is important to predict how passengers move based on the information of the routes and airports restricted by the distribution of volcanic ash.

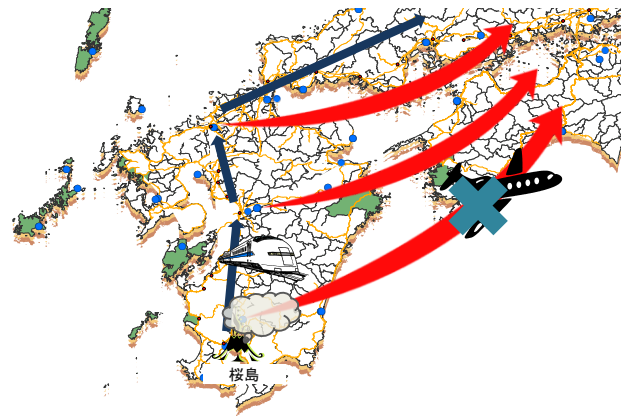


figure 1. Alternative routes in case the airport has closed