Volcanic Ash Fallout Dispersion Estimation based on 1914 Sakurajima Taisho Eruption using PUFF Model

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The 1914 Taisho eruption of Sakurajima volcano was Japan's highest intensity and magnitude eruption of the twentieth century. This plinian eruption caused tremendous damage to its surroundings by releasing a lava flow, pumice, volcanic ash, and other eruptive substances of about 2 km^3 ejecta in total. Nowadays, Sakurajima volcano has been erupting with a series of ash Vulcanian eruptions, small to moderate-sized, short-eruptive burst. These volcanic ashes, apparently hampering not only the resident who lived near the volcano but also the other citizens in the farther area that can get indirect impact from that. A large amount of volcanic ash released by large-scale eruptions will cause various damage in many areas such as transportation, buildings, health, and others, depending on its thickness and intensity. Therefore, in order to prepare the upcoming large-scale eruption, especially on its ashfall hazard, this study investigates the estimation of Sakurajima volcanic ashfall distribution under eruption scenarios and weather scenarios. The eruption scenario was set based on the plume source of 1914 Taisho large-scale eruption, added with the calculation of the fall ash distribution in the various meteorological scenario for 3890 days, and finally, all the results are stored in ashfall hazard database. Then it used as the input data along with GPV forecast data in PUFF Model for calculating volcanic ash transport simulation to find each ash distribution. Furthermore, we also analyze the significant distribution trend of ashfall dispersion probability under the influence of westerly wind and strong wind, such as typhoons. The result shows that, although the distribution of ashfall dispersion is confirmed as stationary, there was a significant trend found in July and September where the ashfall probability is getting stronger under the influence of westerly wind and strong wind in a populated area in Kagoshima region. Moreover, due to the rapid change from the typhoon and strong wind, around 0.1 mm to 1 mm thick ash fall can be brought to distant places, such Kyoto and Tokyo, even in Tohoku and Hokkaido region, which the highest probability can be found in May, June, and October. This estimation aimed to predict where the ash fall will be dispersed along with its thickness, which further can be utilized for risk analysis on a specific field, such as an anticipation of collapsing building, airport and air transportation network, road network, and evacuation policy evaluation.

Key Words: *ash fall dispersion, estimation, Taisho eruption, PUFF Model*