Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SVC070-P25 Room:Convention Hall Time:May 23 16:15-18:45

Tephra fallout simulation of Kirishima Volcanoes, Shinmoedake using TEPHRA2

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The Shinmoedake, part of Kirishima volcanoes, has shown signs of volcanic activity after the date of January 26, 2011 and is sending ash over a wide range of southeastern part of Miyazaki prefecture. The effects are so severe that public transportations are disrupted and the evacuation of hundreds of residents is forced. On February 3, 2011, the Coordinating Committee for Prediction of Volcanic Eruptions (CCPVE) announced that they expected the hazardous eruptions of the Shinmoedake to continue. If the eruption persisted, further spreading of ash fall and volcanic mudflows could occur. Hence, it is necessary to predict the extent of damage in the different seasons, and also in the regions where the ash fall has not reached yet. Besides the key factor for the prediction is ”wind effect”.

In this report, we show the analytical result how the distribution of ash fall behaves under the same level of the eruption and the different wind profile by the simulation using TEPHRA 2.

We decided parameters by the information (erupted volume, eruption column height, etc.) released by several institutions like AIST, JMA and ERI, and also by the information of field research. We also use the JMA’s wind profiles of Kagoshima-area near Kirishima volcanoes. We use 4 data sets of wind profile as below:

(Data set 1) The data as at 9 a.m. on January 26, 2011 when Shinmoedake erupted.
(Data set 2) The monthly average data as at 9 a.m. from 1991 to 2000
(Data set 3) The daily data on February for 9 a.m. and 3 p.m. from 1999 to 2010 (which consists of 1214 files)
(Data set 4) The daily data on August for 9 a.m. and 3 p.m. from 1999 to 2010 (which consists of 1302 files)

What this report shows are following: First, by using Data set 1, we checked the robustness of parameters, and found the reliable parameters to duplicate the Kirishima-explosion. Second, we calculated the distribution of ash fall by using Data set 2. Finally, we calculated the stochastic distribution of the amount of ash fall is derived from the repeated computation with the randomly chosen from wind profile form Data set 3 or 4 and different eruption-column level.

Keywords: Kirishima Volcanoes, Shinmoedake, tephra fallout, simulation, TEPHRA2