



Cities on Volcanoes 9
November 20-25, 2016
Puerto Varas, Chile

'Understanding volcanoes and society: the key for risk mitigation'



Development of air quality impact assessment method of potential volcanic hazard near the Korean Peninsula

Yoo Jung Kim¹, Doyoon Kim², Ki-Ho Hong³, Jae Eun Park⁴, and Young Sunwoo⁵

¹ Social Eco-Tech Institute, Konkuk University, Seoul, South Korea, siltalea@gmail.com

² Department of Environmental Engineering, Konkuk University, Seoul, South Korea, toyun84@gmail.com

³ Division of Interdisciplinary Studies, Konkuk University, Seoul, South Korea, khhong@konkuk.ac.kr

⁴ Disaster Scientific Investigation Division, National Disaster Management Research Institute, Ulsan, South Korea, jaeunpark@korea.kr

⁵ Department of Environmental Engineering, Konkuk University, Seoul, South Korea, ysunwoo@konkuk.ac.kr

Many volcanos are located within 1,500 km of Korea which implies that a potential disaster is always possible. Several eruption precursors were observed rather recently at Mt. Baekdu, which has sparked intensive research on volcanic disasters in Korea.

For assessment of potential volcanic hazard in Korea, we developed classification method of volcanic eruption dates using the Hybrid Single-Particle Lagrangian Integrated Trajectory model (HYSPLIT-4) regarding air quality impact. And, we conducted 3 dimensional chemistry transport modeling for selected eruption dates.

WRF-ARW(version 3.6.1) meteorological modeling was employed for high resolution HYSPLIT input meteorological data,. The modeling domain covers Northeast Asia including Korea, Japan, east China, and part of Russia.

Forward trajectories were calculated every 3 hours for 1 year (2010) and the trajectories were initiated from 3 volcanoes, Mt. Baekdu, Mt. Aso, and Mt. Tarumae. Selected eruption dates were classified into 5 classes using 4 parameters, PBL, trajectory retention time, initial trajectory altitude and exposed population.

The number of significant days for volcanic eruption impact were 7 for Mt. Baekdu (spring and fall), 7 for Mt. Aso (summer), 1 for Mt. Tarumae (spring), and these were classified as class A, with the highest risk of incurring severe air pollution episodes in the receptor area.

In addition, we analyzed the spatio-temporal distributions of these trajectories in the receptor area to help determine the period and domain of the volcanic eruption 3 dimensional chemistry transport modeling.

Using class A eruption dates, we conducted CMAQ(v5.0.2) modeling for calculate full chemical reactions of volcanic gases and ashes in troposphere.