



UNIVERSITY OF THE PHILIPPINES

Master of Science in Meteorology

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The transport process and deposition of ashfall over CALABARZON and National Capital

Region during the January 2020 eruption of Taal Volcano, Philippines

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ABSTRACT

On January 12, 2020, after 43 years, Taal Volcano erupted that resulted in ashfall incidents in several communities in Luzon island, Philippines. This study aims to describe the transport process and deposition of ashfall during the eruption over CALABARZON and National Capital Region by using eruption data, meteorological parameters, ashfall images and air quality data on January 12-16, 2020. It was identified that various wind speed and direction at different atmospheric pressure levels contributed to transport of ashfall at different areas. On January 12, high ash plume was influenced by southerly winds based from NOAA HYSPLIT trajectory and dispersion models as supported by ERA-5 reanalysis data, sounding data, and satellite images. Same data was used to analyze the transport of low volcanic ash plumes on January 13-16 which was generally influenced by northeasterly winds as prevailing winds. Ashfall incidents were identified in the Provinces of Cavite, Laguna, Batangas, Rizal, and Cities of Quezon, Marikina, Muntinlupa, Taguig, Parañaque, Mandaluyong, Las Piñas and Pasig based from the ashfall images collected that underwent image analysis. Based on image analysis, highest ashfall area was identified in Batangas Province. Moreover, 24-hour concentration of total suspended particulates from January 13-14 in Lipa City, Batangas reached acutely unhealthy level. Emission flux on January 13 reached 399, 168 ug m^{-2} which can be linked to the particles released during the eruption. From January 12-16, 2020, PM_{10} and $\text{PM}_{2.5}$ concentration on January 12 from the Lung Center of the Philippines air quality monitoring station had the highest total emission flux equivalent to 17,460 ug m^{-2} . On January 12, long range transport of high ash plume was observed while low volcanic ash plume affected the southwestern part of the volcano during the succeeding days. The study can serve as supplementary data in disaster risk reduction and management and forecasting future events.

Keywords: ashfall; deposition; eruption; Taal; transport