



## **Numerical simulation of the tephra fallout deposit of the 1913 Colima eruption, México: implications for hazard assessment**

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Volcan de Colima, located in the western portion of the Trans-Mexican Volcanic Belt, is considered one of the most active volcanoes of North America, with at least 25 explosive eruptions. Since 1576 A.D. Plinian or sub-Plinian events have shown a recurrence time of approximately 100 years: starting from 1606, 1690, 1818, and ending with the most recent eruption in 1913. The 1913 eruption represents the largest historic eruption of Volcan de Colima and it has been used, in literature, as a reference for volcanic hazard and risk scenarios especially focused on pyroclastic flows and lahars. Despite the abundant historic records of Plinian eruptions, and the well documented descriptions of the 1913 event, hazard assessment for volcanic ash fallout for a Plinian scenario. All emergency and evacuation plans at present, do not take into account the risk related to the ash fallout consequent to a Plinian eruption. As a matter of fact, volcanic ash fallout constitutes a serious hazard to communities settled around active explosive volcanoes and the assessment of such hazards is of a great importance for public safety in volcanic regions like the area around the Colima volcano, inhabited by thousands of people. In this work we present a volcanic ash fallout hazard assessment for a Plinian eruption scenario at Colima volcano. Tephra fallout deposits are modeled using HAZMAP, a model based on a semi-analytical solution of the advection-diffusion-sedimentation equation for volcanic particles. Based on a statistical study of different wind profiles at Colima region, we reconstructed ash loading maps and computed ground load probability maps for different seasons. The obtained results show that a Plinian eruption scenario at Volcan de Colima, could seriously damage more than 10 small towns and ranches and would potentially affect big cities including Ciudad Guzman and Tonila. These results may be used as a support for risk mitigation plans at the Colima area.