



## **Loss to residential buildings by a re-eruption of the Laacher See Volcano**

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We estimate damage and loss to the residential building stock by tephra fallout for a re-eruption of the Laacher See Volcano in Germany with similar volcanological features as compared to the 10.900 BC eruption (VEI = 6) but current population and wind conditions.

This eruption was the largest eruption north of the Alps since the Late Quaternary. It generated several fallout fans with proximal deposits of several meters of height. The main cities that would be affected today are Cologne, Bonn, Koblenz and Frankfurt with a total population of 2,2 mio. people. We derive possible wind fields from an analysis of 44 years of radiosonde observations provided by the Deutsche Wetterdienst (DWD). As they vary significantly with season the loss numbers and patterns reflect this dependency. We use the HAZMAP software to calculate the spatial distribution of tephra. HAZMAP simulates the tephra distribution using a 2D advection-diffusion-sedimentation model. The tephra pressure serves as hazard parameter that leads to roof and building damage. As the physical parameter for snow load damage is also pressure we utilize the available knowledge on snow load damage to buildings and derive vulnerability curves that are representative within a geo-cell of 1 x 1 km. Available information on the replacement values in each geo-cell allows estimating the loss. We find – dependent on wind conditions - a range of 18 to 27 billion Euros.