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



## Quantifying Populations in Proximity to Potentially Active Volcanoes

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Recent improvements in mapping human populations and development provide increasingly detailed perspectives on human settlement in proximity to potentially active volcanoes. Small and Naumann (2001) used a gridded compilation of census data circa 1990 to estimate that ~9% of the world's population lived within 100 km of a historically active volcano and ~12% within a volcano believed to have been active during the Holocene. Here we update the Small and Naumann (2001) results, using much more detailed census data circa 2010 from a preliminary release of the Gridded Population of the World version 4 (GPWv4) that will be distributed through NASA-SEDAC. Spatial analysis of these data in conjunction with the Holocene volcano database of Simkin and Siebert (1994) indicate that circa 2010 the estimated number of people living within 10 km ( $n=44,874,105$ ), 50 km ( $n=443,637,182$ ), and 100 km ( $n=853,108,062$ ) of a volcano active within the Holocene period is larger than the estimates of Small and Nauman (2001). We attribute the higher recent estimates to considerable improvements in the spatial resolution of GPWv4 compared to GPWv1 used in the earlier study. We are not able to determine if the population in proximity to volcanoes has increased since 1990 using census data alone. In addition to providing conservative estimates of current populations in proximity to potentially active volcanoes, we also use DMSP-OLS and VIIRS satellite observations of night light to quantify changes in lighted development in these areas. The new data provide considerably greater detail than those used by Small and Naumann (2001), though the global patterns do not differ significantly. While the quantified spatial relationships between global human population and recent volcanism can have both local and global utility, they may be most pertinent as a comparative study of population distributions in volcanic environments.