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Population estimation in hazardous volcanic areas based on high resolution remotely sensed images

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Accurate mapping of population distribution is essential for efficient risk management in hazardous areas. However, in many countries, especially in developing regions, population data are not collected on a yearly basis and they are rarely available at a high spatial resolution. In this study we propose a remote sensing based approach to overcome these limitations by estimating population density from high resolution remotely sensed imagery. In our approach, it is assumed that the number of inhabitants per house and their socio-economic characteristics can be related to the type of dwelling and that population estimates at neighborhood level can be inferred from the morphological characteristics of the built-up area as obtained through remote sensing. This will enable an assessment of population at risk and vulnerability. The method presented is applied on the volcanic Ngazidja Island (Comoros) exposed to the regular eruptions of Karthala volcano. It makes use of 0.5 m Pléiades images as an input for object-based classification of built-up areas. This allows extracting the footprint of dwellings in areas with a low built-up density or delineating neighborhoods with similar morphological characteristics in areas with a higher built-up density. Morphological information extracted from remotely sensed data is combined with socio-economic data on households living in different types of dwellings. Calibration of the method is done using data from a field survey of 1000 households. Results obtained are validated based on independent census data. In this contribution, we will present the results obtained for the whole Ngazidja Island. This will provide spatially detailed information on population exposure which is an essential input for mapping volcanic risks.