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Characterizing social vulnerability for climate impact assessment at global scale

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Every year, extreme events caused by climate-related hazards result in severe impacts globally. These impacts are expected to increase in the future due to both climate change and population growth in exposed locations. However, impacts are not only driven by exposure to extreme events, but also by the population's vulnerability to these hazards, determined by individual characteristics such as age, gender, and income. Thus far, global-scale climate risk assessments account for social vulnerability to a limited degree. To address this gap, we produce spatially explicit global datasets of variables that can be used for characterizing social vulnerability. We further combine these data into a globally consistent and spatially explicit Social Vulnerability Index (SoVI), which will be made publicly available along with the input variables. To explore the value of the SoVI in characterizing social vulnerability, we validate it with the observed impacts (e.g., fatalities, damages) of past extreme events. To do so, we overlay the spatial vulnerability characteristics with recently published flood maps of observed flooding events across the globe, also testing how each vulnerability variable performs individually in explaining the observed impacts. Our analysis helps to develop a more in-depth understanding of the characteristics that drive social vulnerability globally, along with their spatial distribution. Therefore, our results can support decision-making in developing strategies that reduce social vulnerability to climate-related hazards, for instance related to spatial planning, socioeconomic development, and adaptation.