Towards a Global Seismic Environmental Impact Model

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Typical indicators of seismic risk include economic losses, business interruption, fatalities, injuries, and population left homeless. Those metrics do describe earthquake-induced consequences in economic and social terms. However, in the current climate change emergency, the environmental impact due to earthquake damage and consequent repair (or reconstruction) activities cannot anymore be neglected, especially in regions with a high level of seismic hazard. Nevertheless, the quantification of the impact that destructive earthquakes have on the environment is far from being an easy task today, and it is still part of ongoing frontier interdisciplinary research. Only a few research works have proposed consequence functions for buildings' structural and non-structural components in terms of environmental impact, to be used in single-building seismic loss assessment procedures. However, now more than ever, environmental impact is expected to be considered as a relevant seismic risk metric as well. In this context, this paper presents two novel environmental consequence models, in terms of embodied carbon, developed for residential reinforced concrete (RC) buildings in Italy by following different approaches. The critical comparison between the two models is preparatory towards the quantification of the environmental impact of earthquakes at a global scale, leveraging on the global seismic risk model supported by the Global Earthquake Model Foundation.

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