Aftershock statistics: a parametric study

**Abstract**

Probabilistic aftershock hazard assessment (PAHA) is a methodology that addresses the problem of predicting the occurrence of aftershocks in terms of time, location, and magnitude. This technique is crucial for seismic risk assessment and emergency preparedness. PAHA is based on a statistical model that describes the aftershock process, integrates seismicity data, and accounts for the rupture mechanism of the mainshock.

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The probability of exceedance of certain PGV value at a given site is calculated using the following equation:

\[
P(G | x, m) = \int_{m_*}^{m} f_m(m) \cdot F(x | m) \cdot f_x(x) \, dm
\]

where:
- \( P(G | x, m) \) is the probability of exceedance of certain PGV value at a given site.
- \( f_m(m) \) is the probability density function of magnitude.
- \( F(x | m) \) is the cumulative distribution function of PGV.
- \( f_x(x) \) is the probability density function of PGV.

**Parametric study**

In this section, we compare PAHA maps for PGV obtained by the use of simulations with those utilizing attenuation relations. The results show that the PAHA maps based on simulations differ from those obtained by the use of attenuation relations. Therefore, for accurate estimation of the seismic hazard, it is necessary to use a combination of both methods.

**Discussion and Conclusions**

PAHA has the potential to improve earthquake risk assessment by providing a more comprehensive understanding of the seismic hazard. Further research is needed to improve the accuracy of PAHA and to develop new techniques for integrating various data sources. This will enable more effective planning and response strategies in the event of an earthquake.

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**Numerical Testing of Certain Features of Probabilistic Aftershock Hazard Assessment**

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