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Trends in global earthquake loss

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Based on the CATDAT damage and loss database we analyse global trends of earthquake losses (in current values) and fatalities for the period between 1900 and 2015 from a statistical perspective. For this time period the data are complete for magnitudes above 6. First, we study the basic statistics of losses and find that losses below 10 bl. US$ satisfy approximately a power law with an exponent of 1.7 for the cumulative distribution. Higher loss values are modelled with the General Pareto Distribution (GPD). The 'transition' between power law and GPD is determined with the Mean Excess Function.
We split the data set into a period of pre 1955 and post 1955 loss data as in those periods the exposure is significantly different due to population growth. The Annual Average Loss (AAL) for direct damage for events below 10 bl. US$ differs by a factor of 6, whereas the incorporation of the extreme loss events increases the AAL from 25 bl. US$/yr to 30 bl. US$/yr. Annual Average Deaths (AAD) show little (30%) difference for events below 6.000 fatalities and AAD values of 19.000 and 26.000 deaths per year if extreme values are incorporated.
With data on the global Gross Domestic Product (GDP) that reflects the annual expenditures (consumption, investment, government spending) and on capital stock we relate losses to the economic capacity of societies and find that GDP (in real terms) grows much faster than losses so that the latter one play a decreasing role given the growing prosperity of mankind. This reasoning does not necessarily apply on a regional scale.
Main conclusions of the analysis are that (a) a correct projection of historic loss values to nowadays US$ values is critical; (b) extreme value analysis is mandatory; (c) growing exposure is reflected in the AAL and AAD results for the periods pre and post 1955 events; (d) scaling loss values with global GDP data indicates that the relative size – from a global perspective – of losses decreases rapidly over time.