

The impact of earthquake-induced landslides in terms of loss of life

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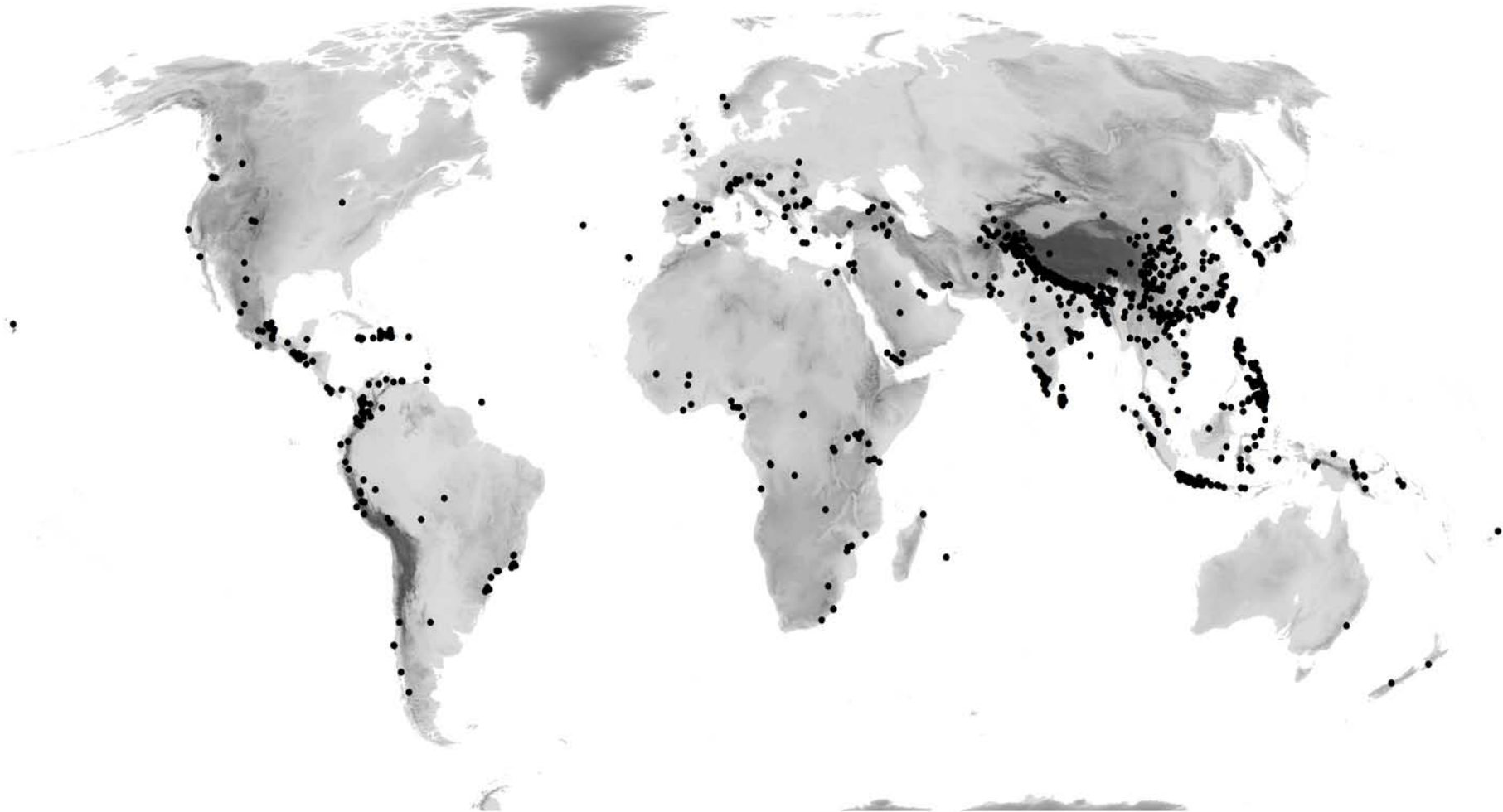


Loss of life in earthquake-induced landslides

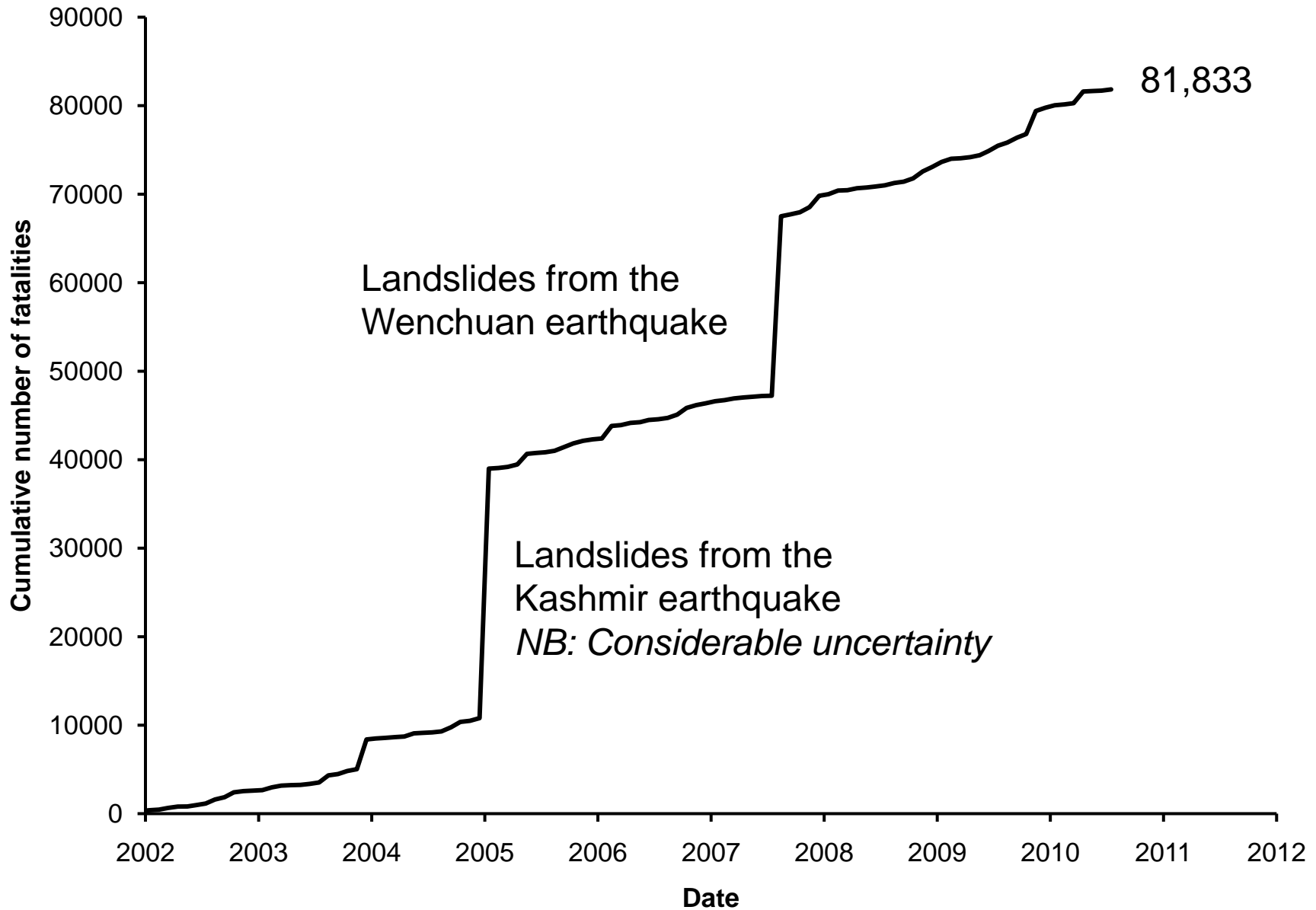
- Landslides kill people in earthquakes in two ways:
 - Direct impacts
 - Prevent rescue of buried people / provision of medical assistance
- There have been few attempts to quantify losses of life in coseismic landslides
- This is problematic from three perspectives:
 - It is hard to know how much resource to invest in this area
 - It is difficult to know the optimum strategies to reduce losses
 - It is hard to justify investment in research



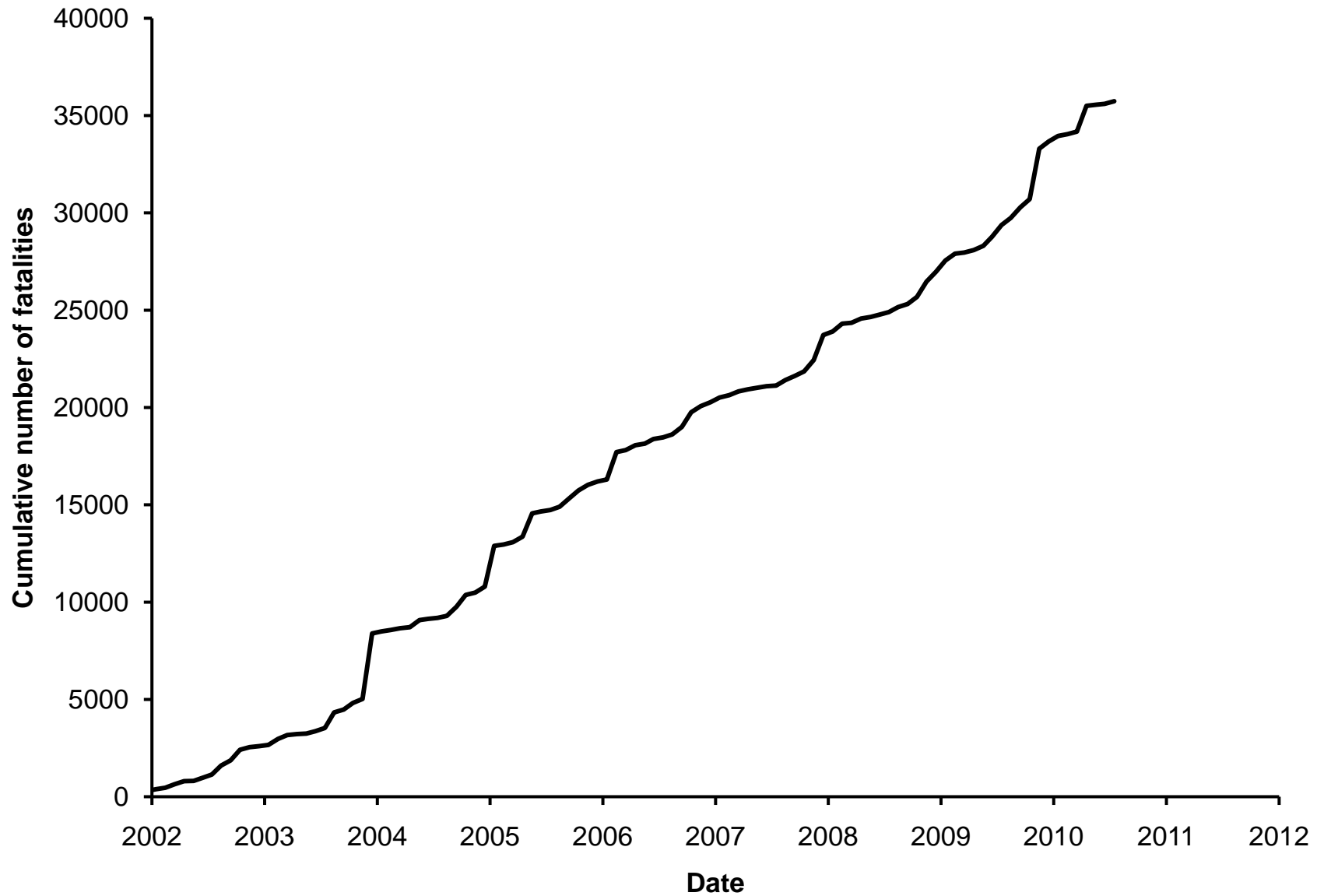
Global fatal rainfall-induced landslides – 2006 to 2009



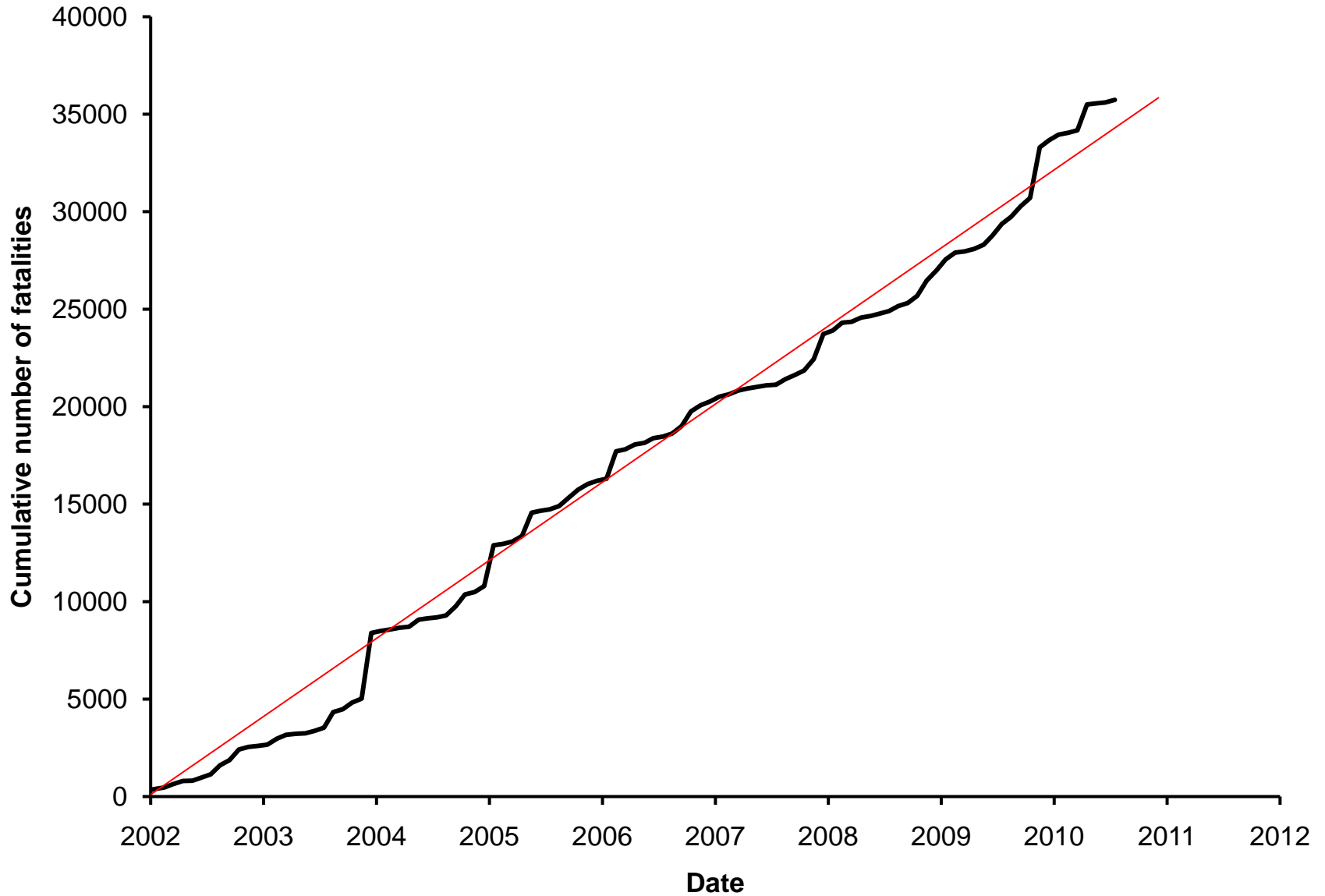
The human cost of landslides



Non-seismic landslide fatalities



Non-seismic landslide fatalities

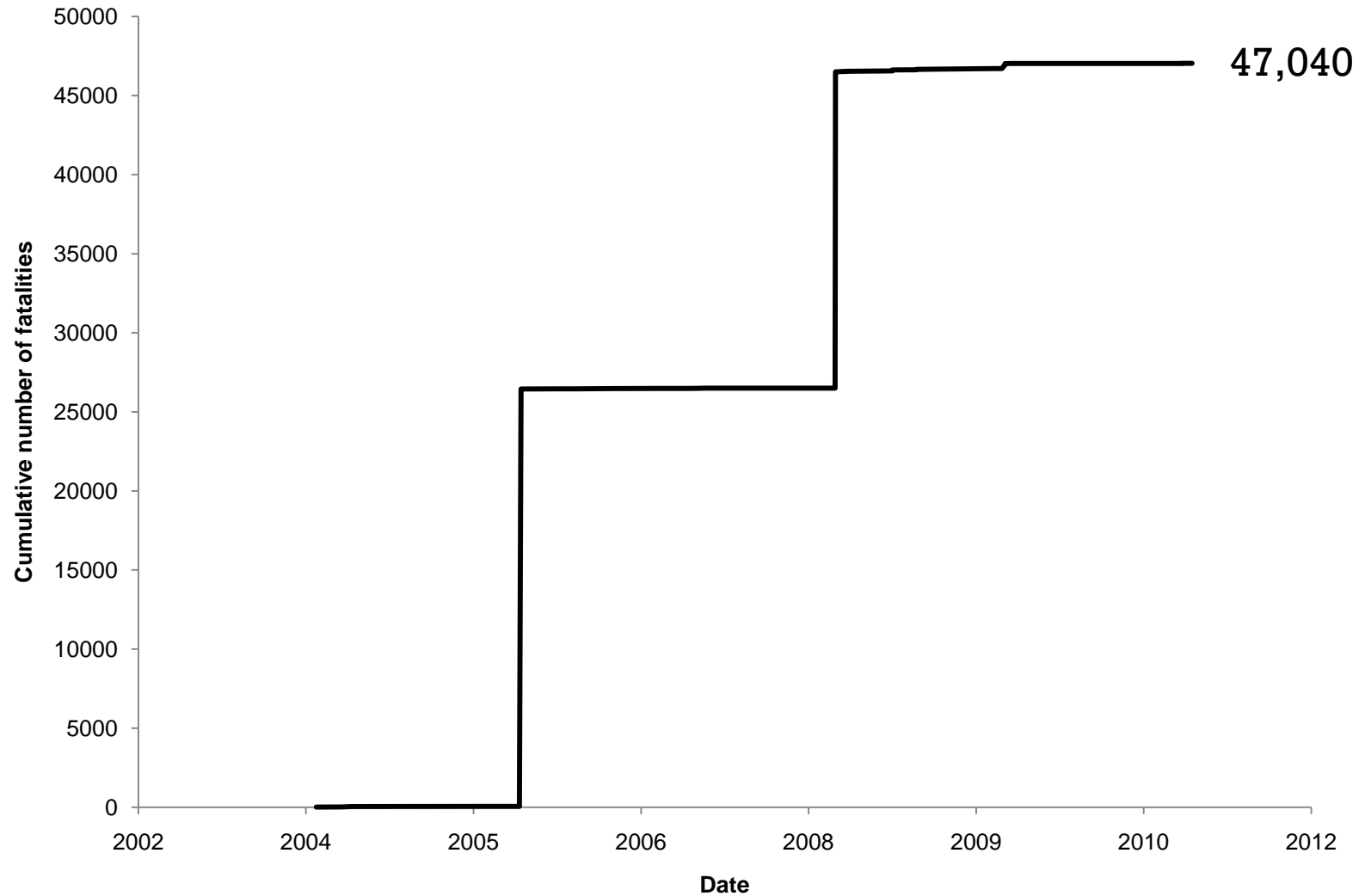


Landslide-inducing earthquakes from September 2002 to December 2010

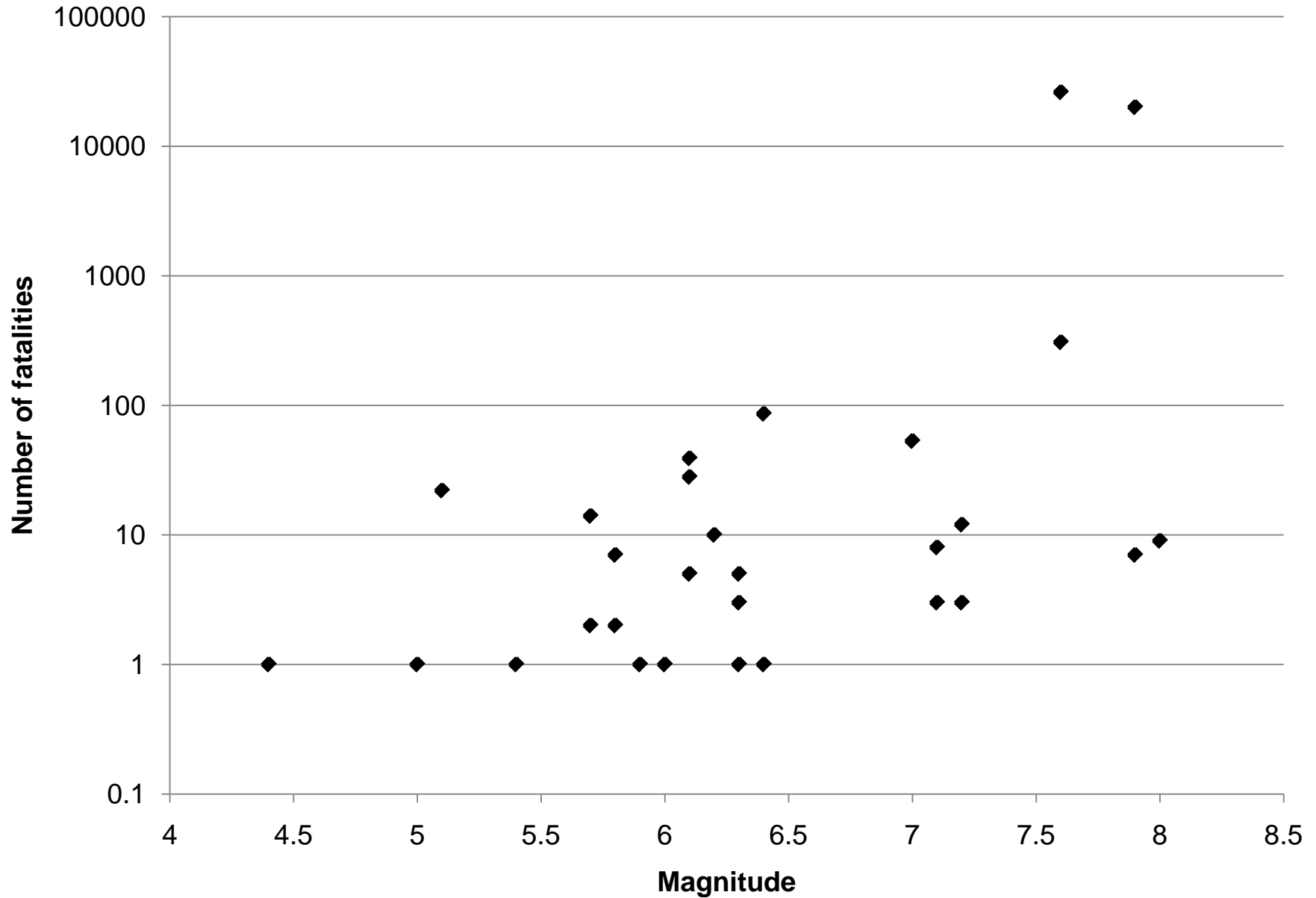
- 32 earthquakes induced landslides that killed people
 - Certainly an under-estimate
- Number killed = 47,040 people
 - High level of uncertainty, probably a small underestimate
- Dataset dominated by Wenchuan earthquake and Kashmir earthquake



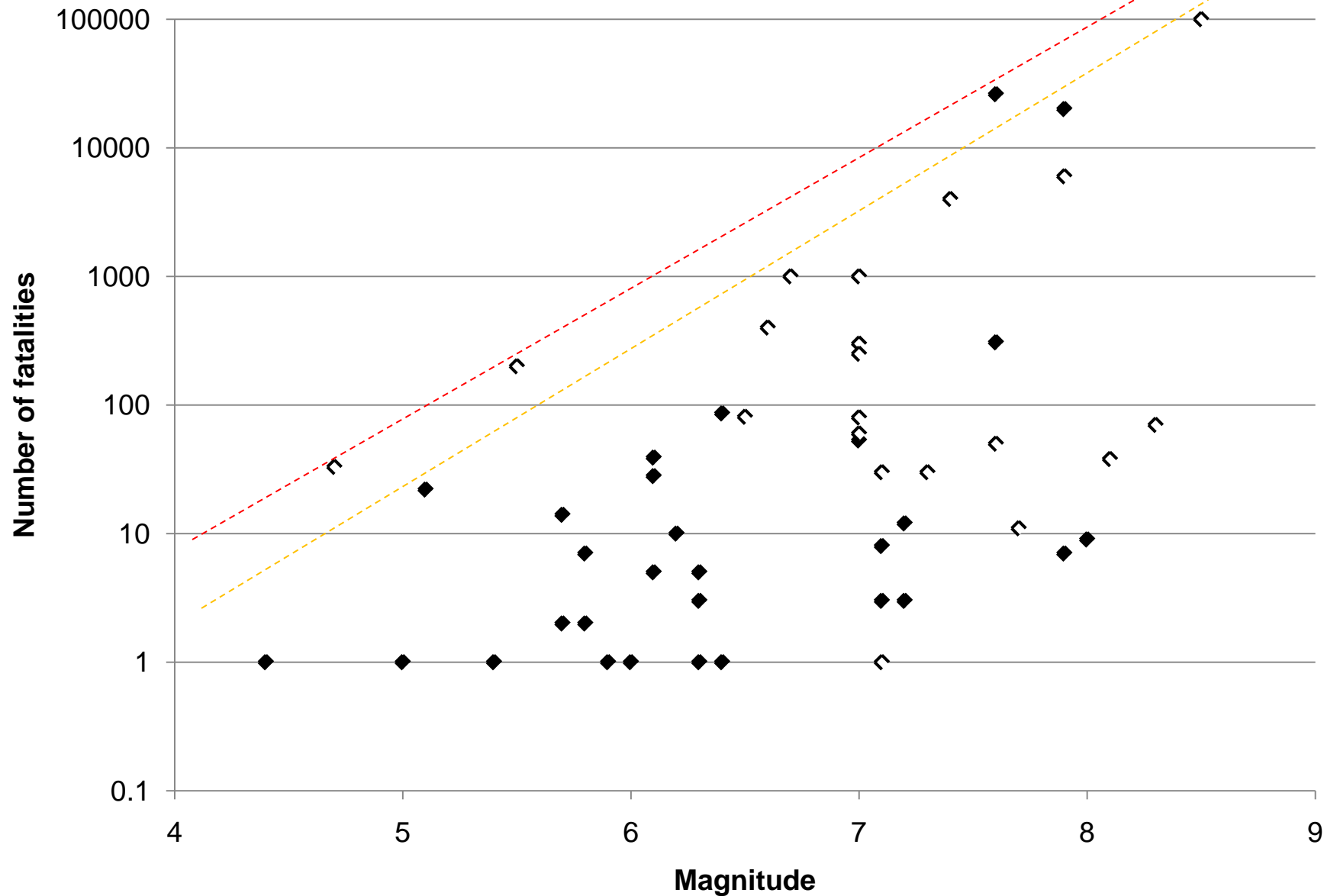
Earthquake-induced landslide fatalities since 2002



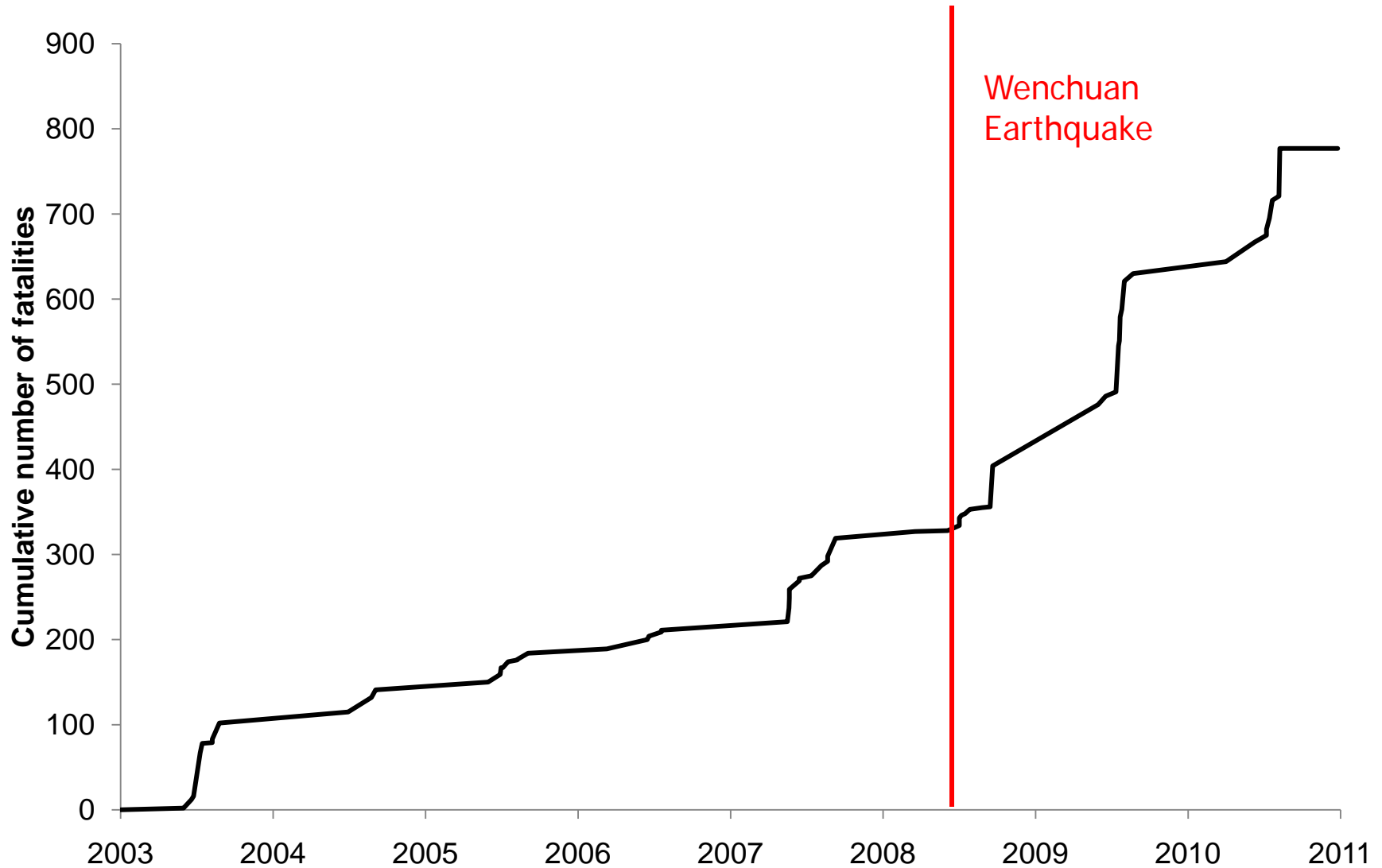
Fatality – magnitude relationship 2002-2010



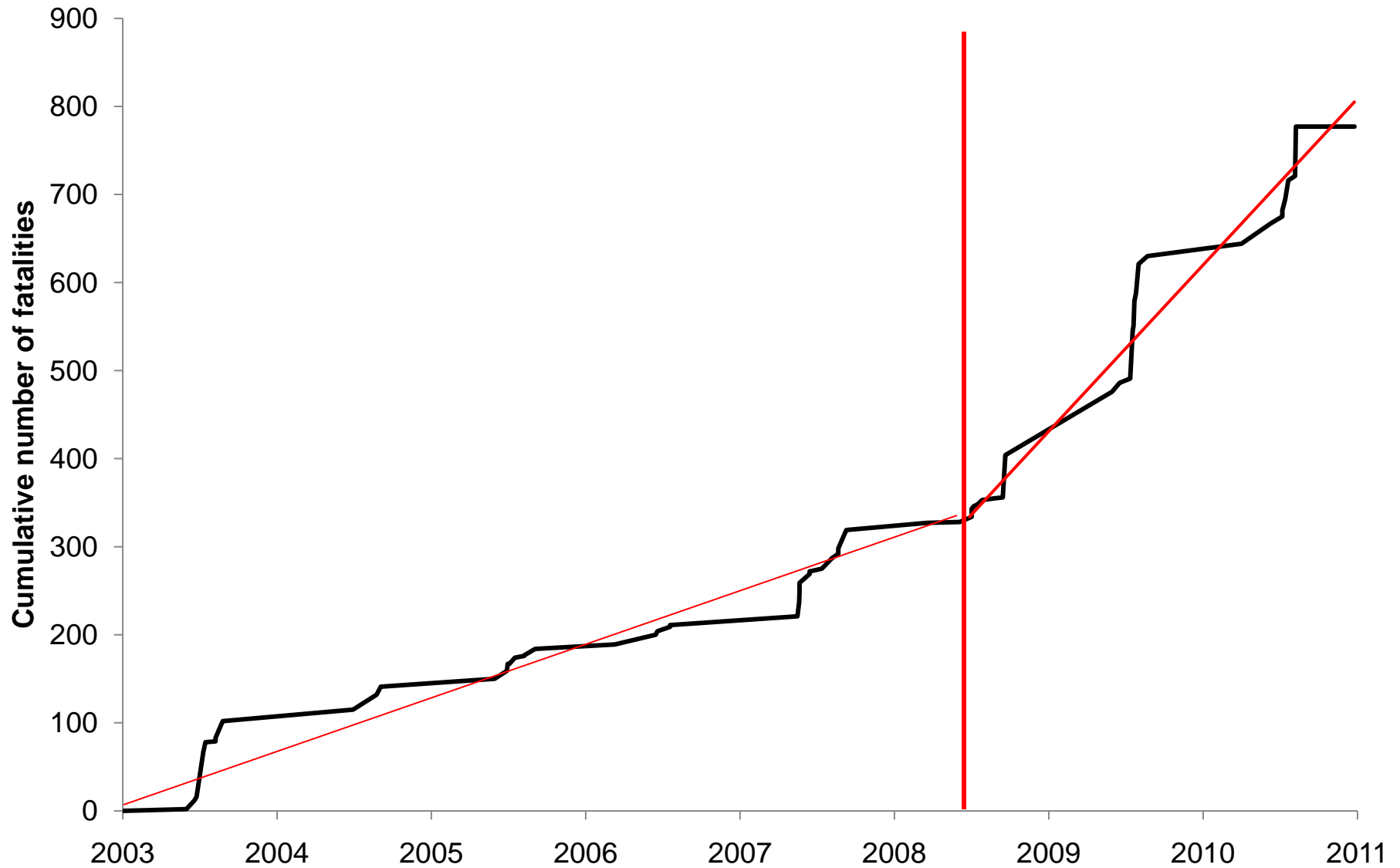
Fatalities – magnitude relationship for all landslides in database



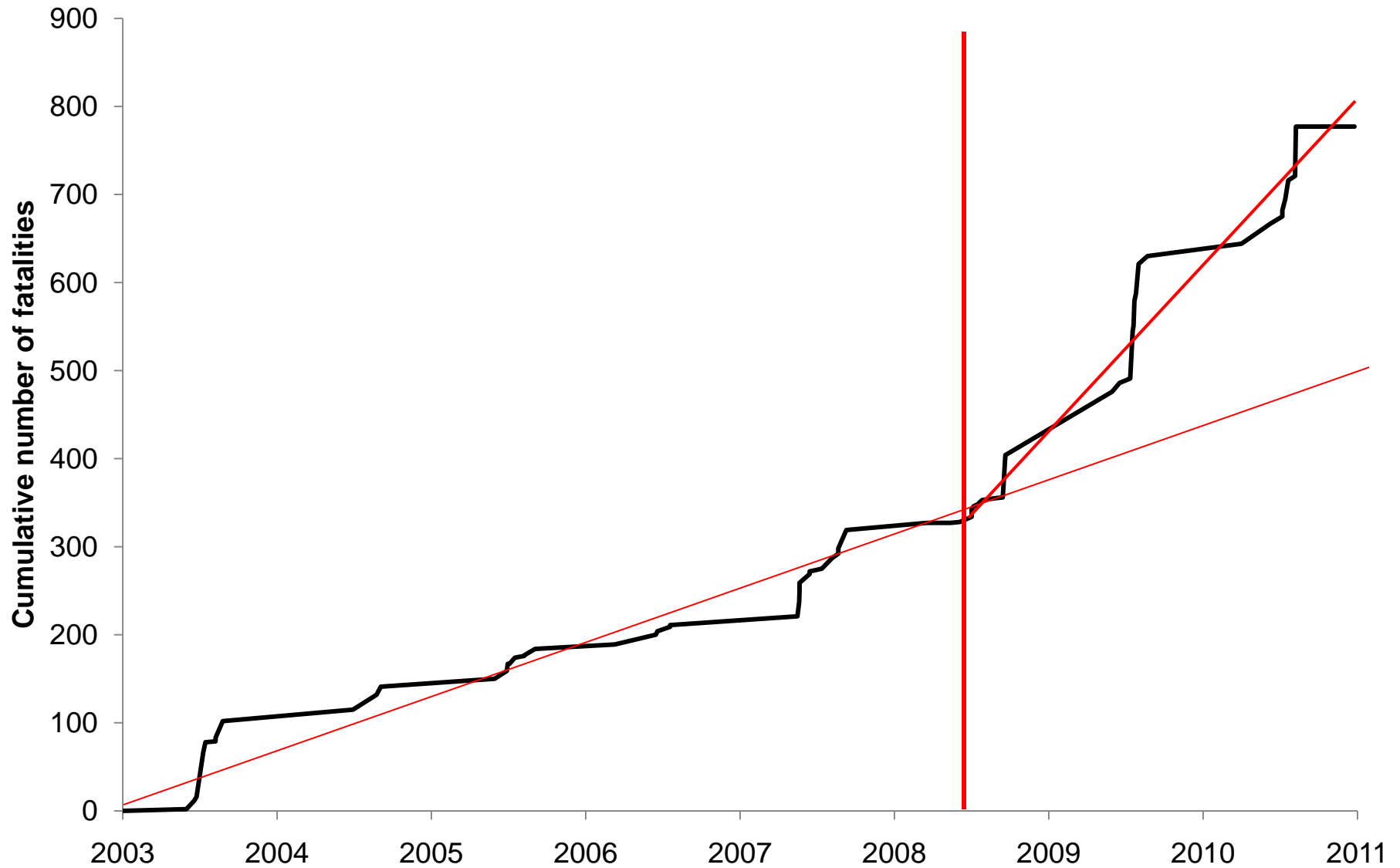
Post seismic effects: cumulative fatalities from non-seismic landslides in Sichuan Province



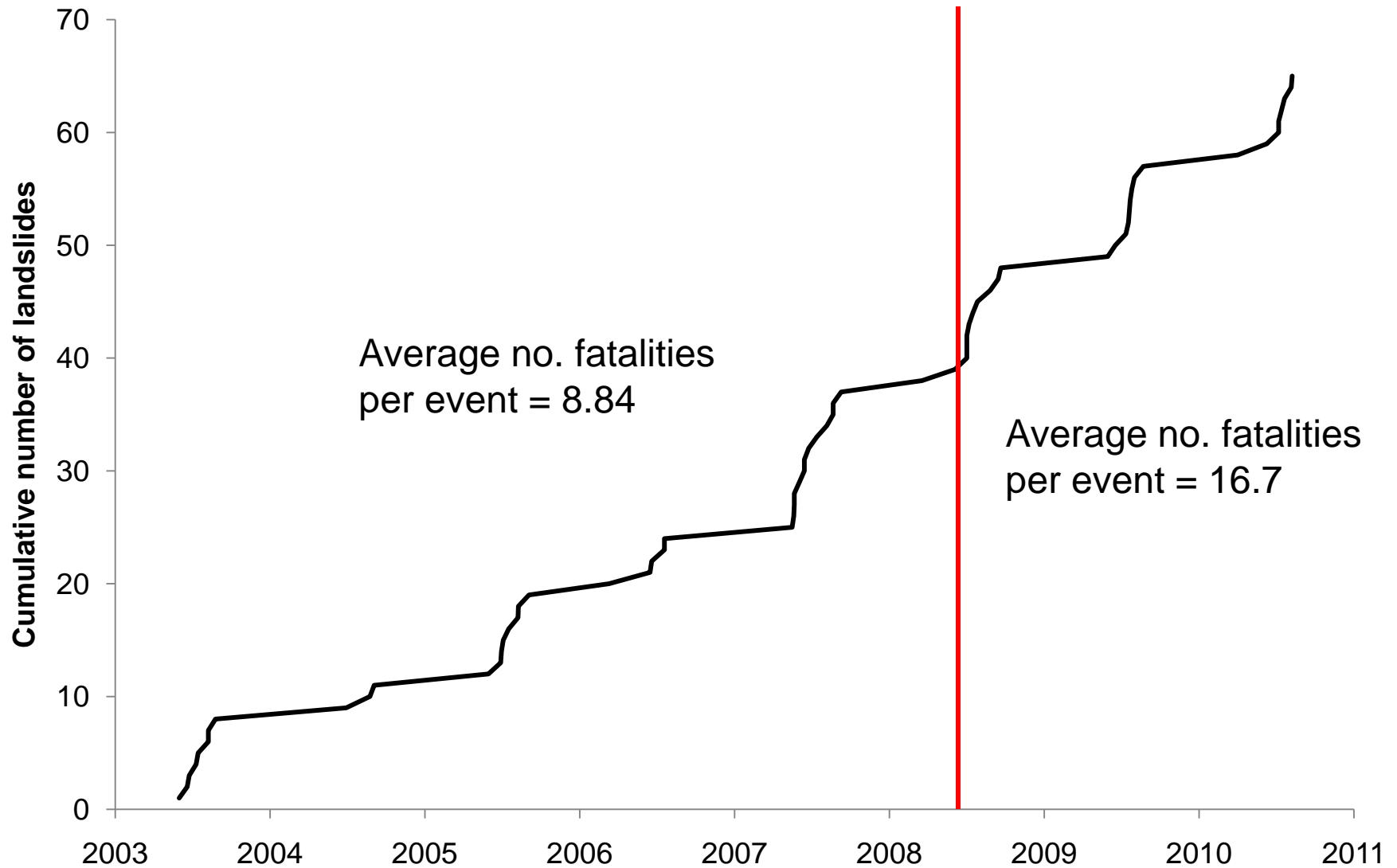
Post seismic effects: cumulative fatalities from non-seismic landslides in Sichuan



Post seismic effects: cumulative fatalities from non-seismic landslides in Sichuan



Number of recorded landslides – data problem?



Conclusions

- Role of earthquakes in creating and destroying topography is now unclear
 - Wenchuan had a net effect of reducing the volume of the Longmenshan
- Earthquake-induced landslides are a very important, and over-looked, component of seismic hazard in mountains
- Given these losses, there is an urgent need to improve understanding of seismically-induced landslides

