

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

David Petley

Durham University, United Kingdom

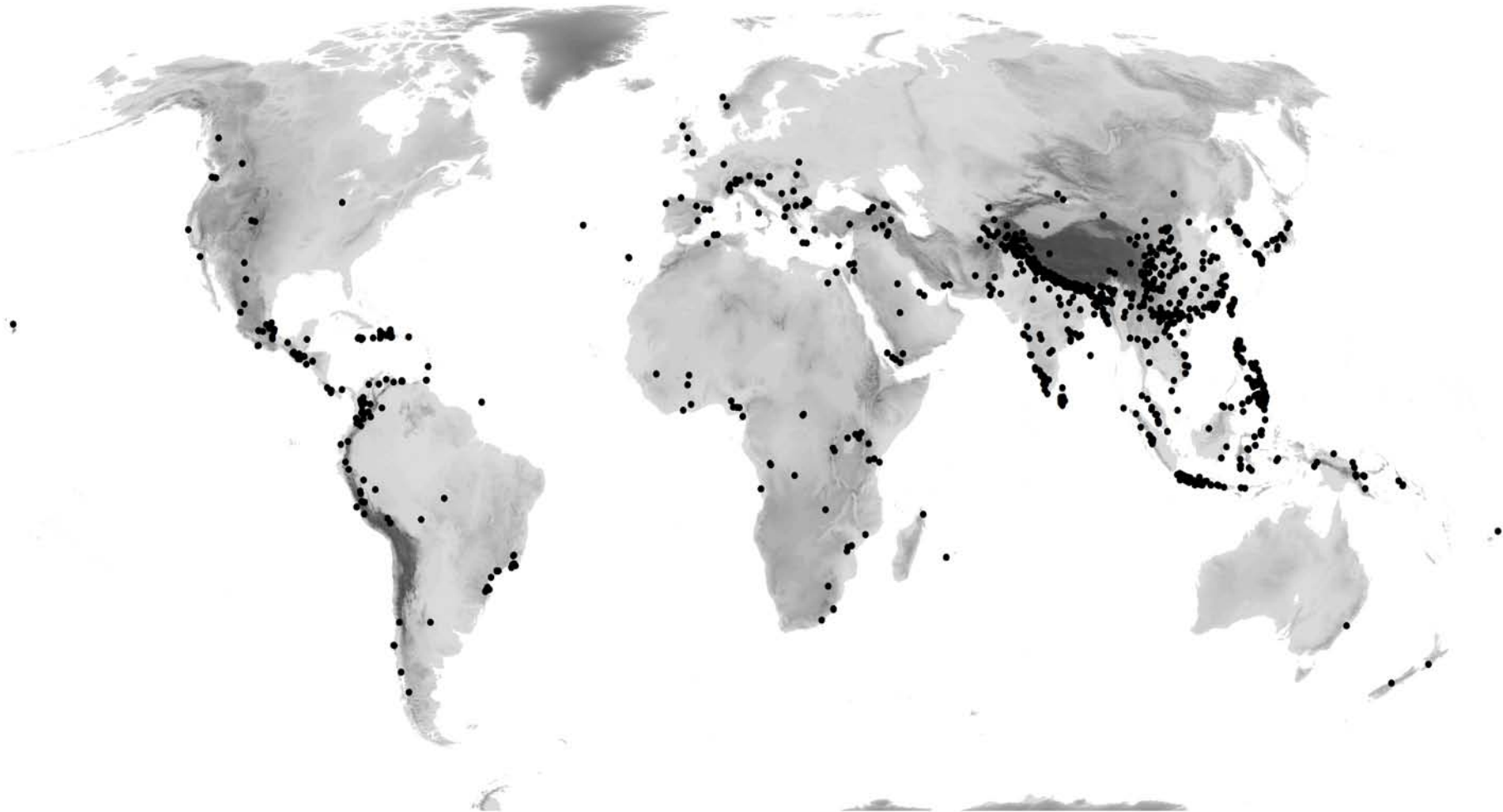


# Loss of life in earthquake-induced landslides

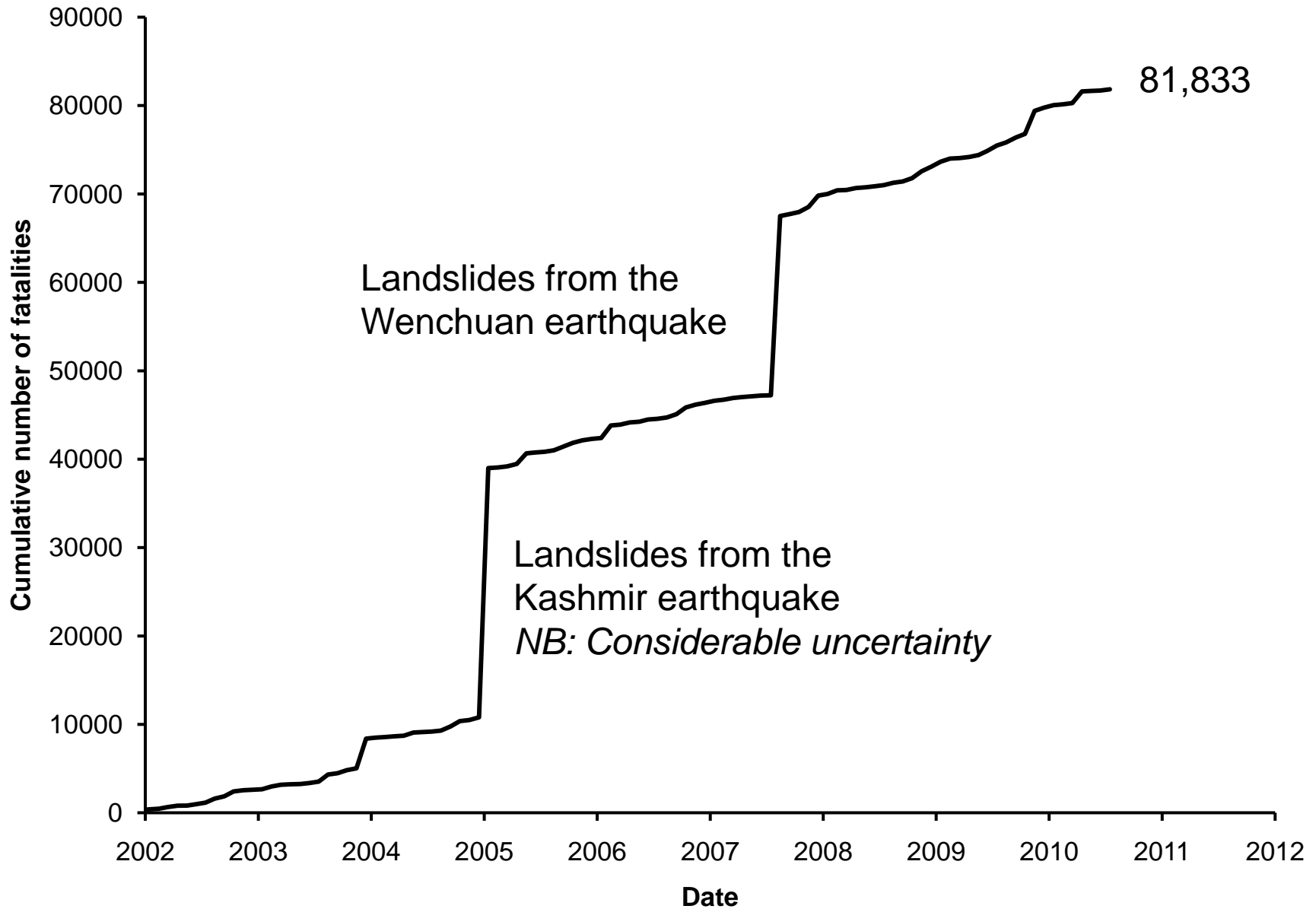
- Landslides kill people in earthquakes in two ways:
  - Direct impacts
  - Prevent rescue of buried people / provision of medical assistance
- There have been few attempts to quantify losses of life in coseismic landslides
- This is problematic from three perspectives:
  - It is hard to know how much 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



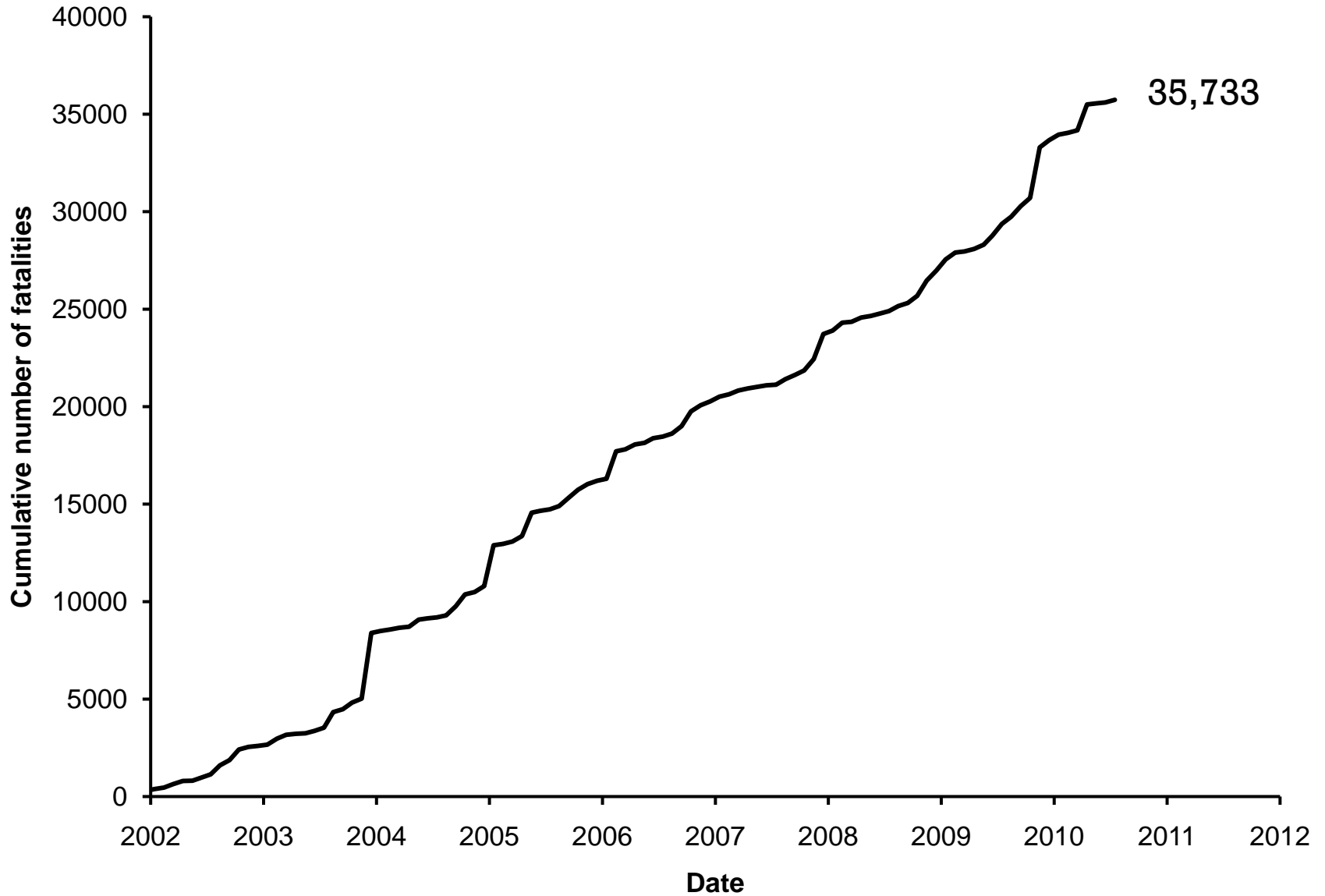
# Global fatal rainfall-induced landslides – 2006 to 2009



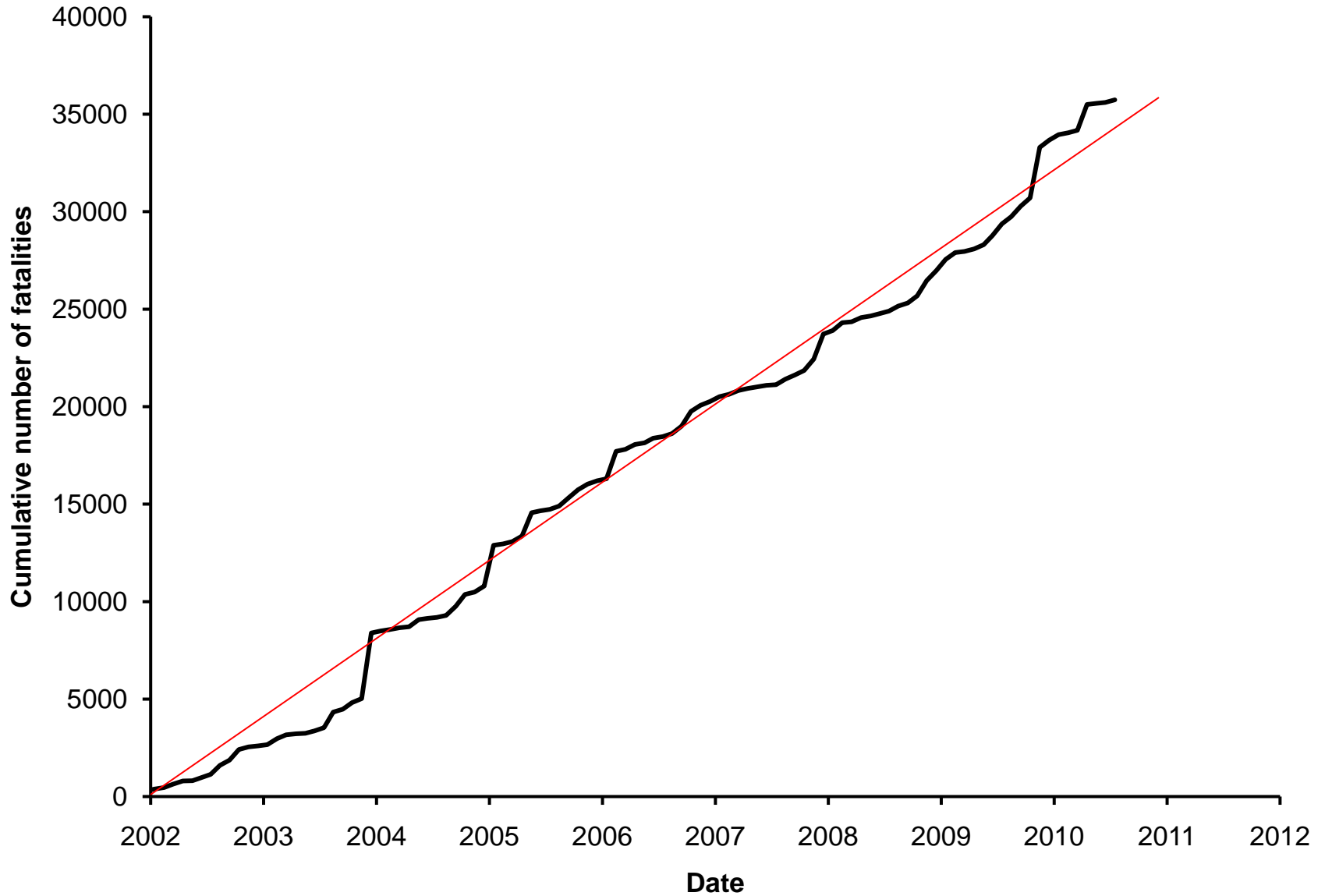
# The human cost of landslides



# Non-seismic landslide fatalities



# Non-seismic landslide fatalities

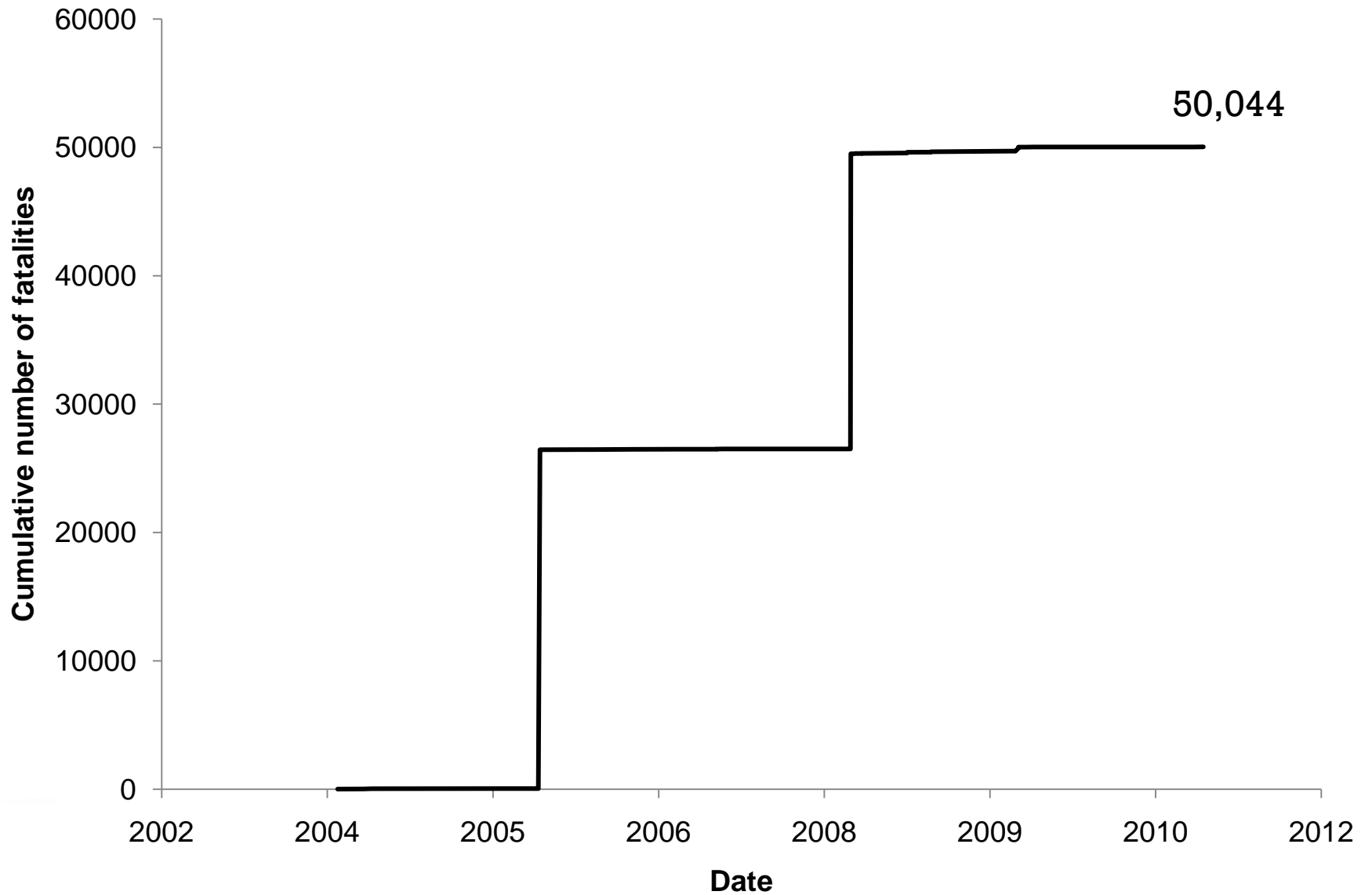


# Landslide-inducing earthquakes from September 2002 to December 2010

- 32 earthquakes induced landslides that killed people
  - Certainly an under-estimate
- Number killed = 50,044 people
  - High level of uncertainty, probably a small underestimate
- Dataset dominated by Wenchuan earthquake and Kashmir earthquake

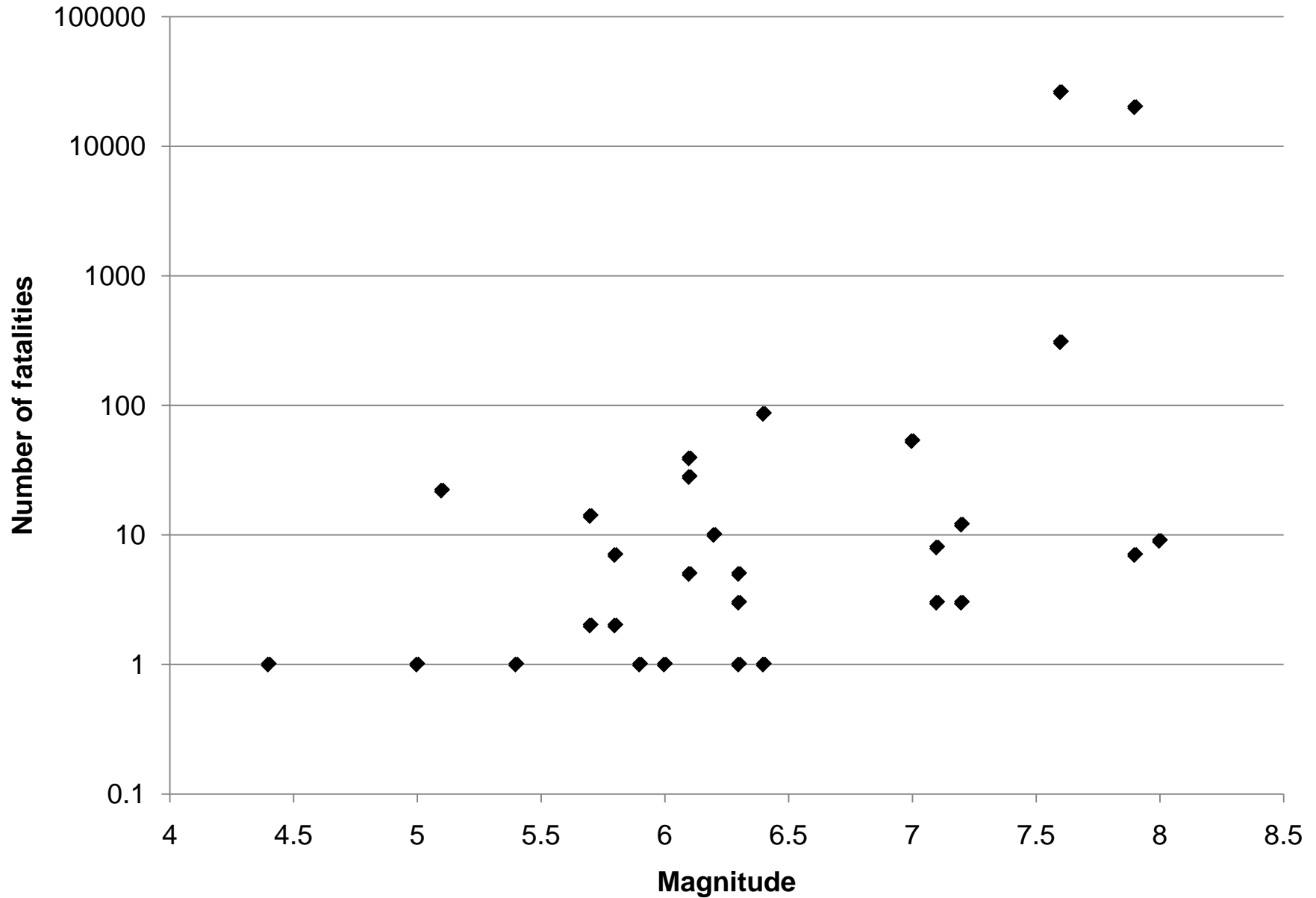


# Earthquake-induced landslide fatalities since 2002

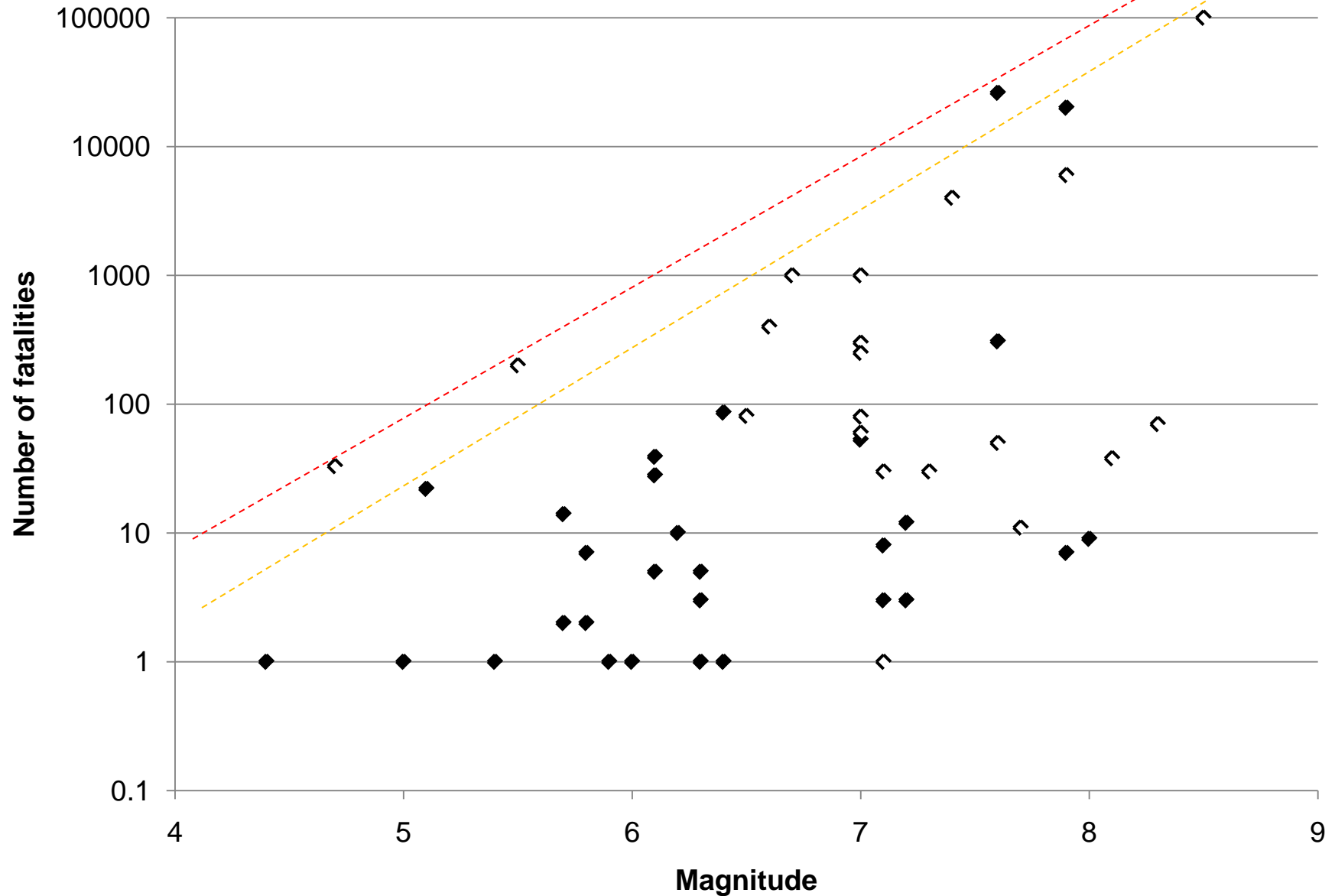




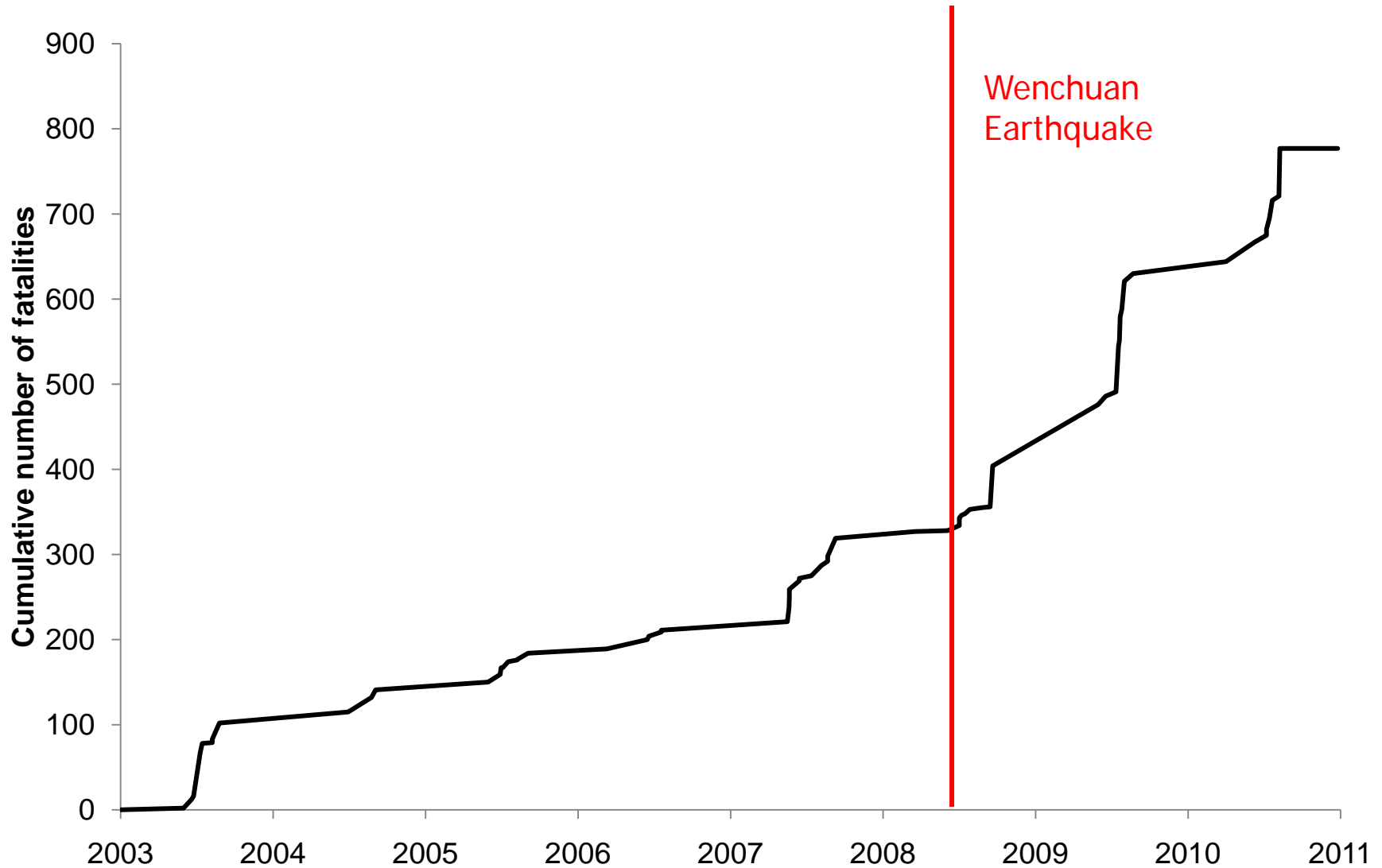
# Fatality – magnitude relationship 2002-2010



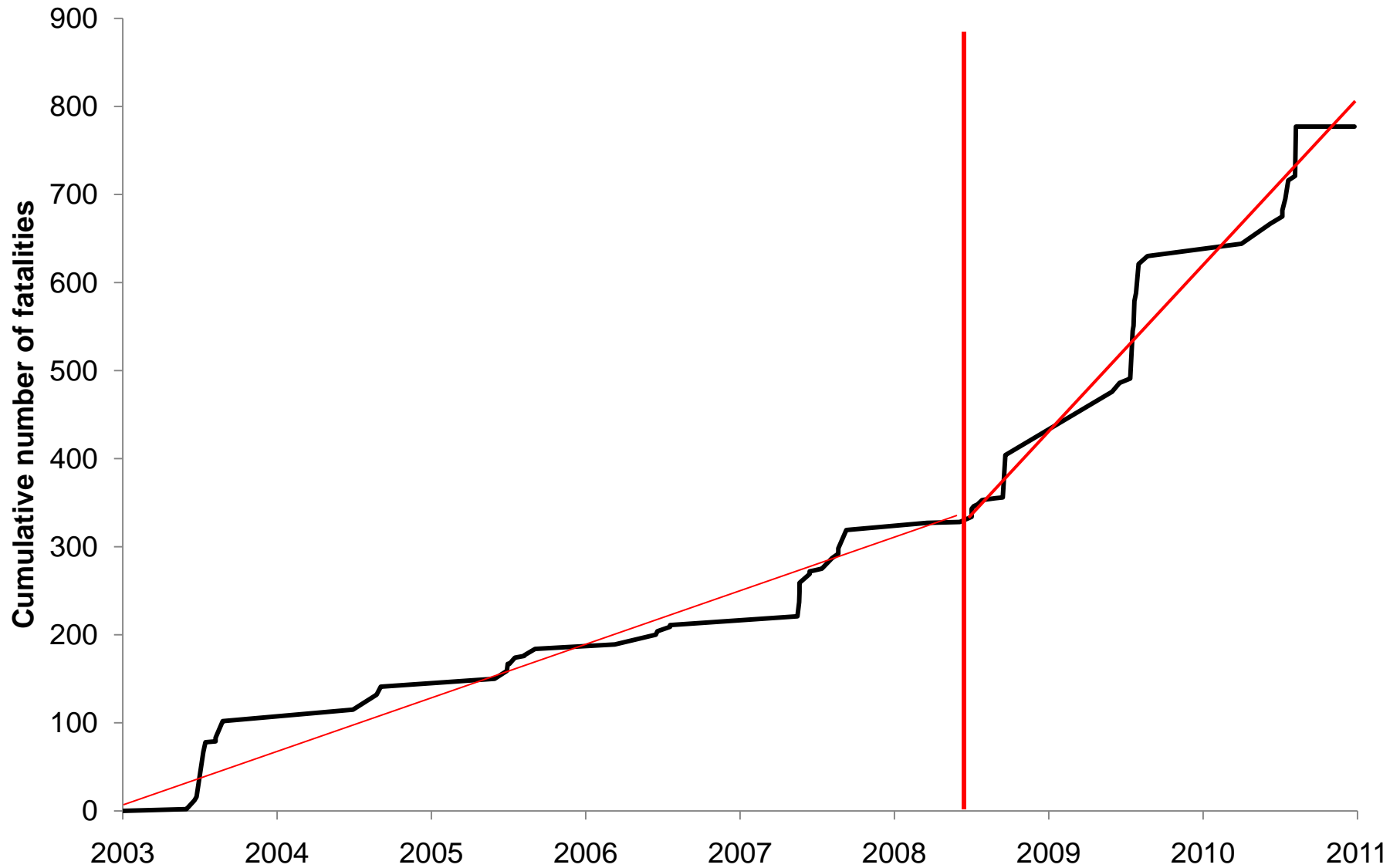
# Fatalities – magnitude relationship for all landslides in database



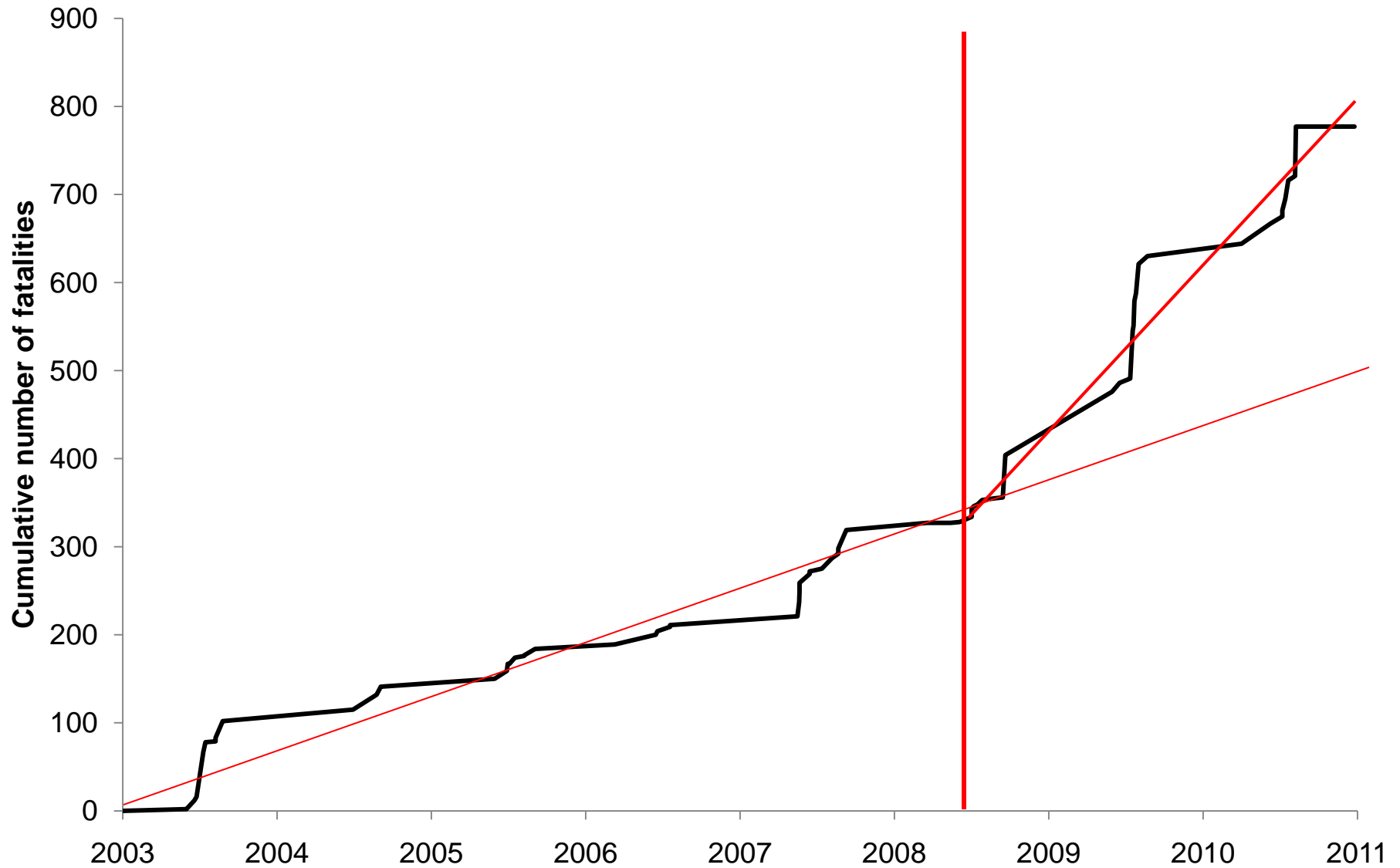
# Post seismic effects: cumulative fatalities from non-seismic landslides in Sichuan Province



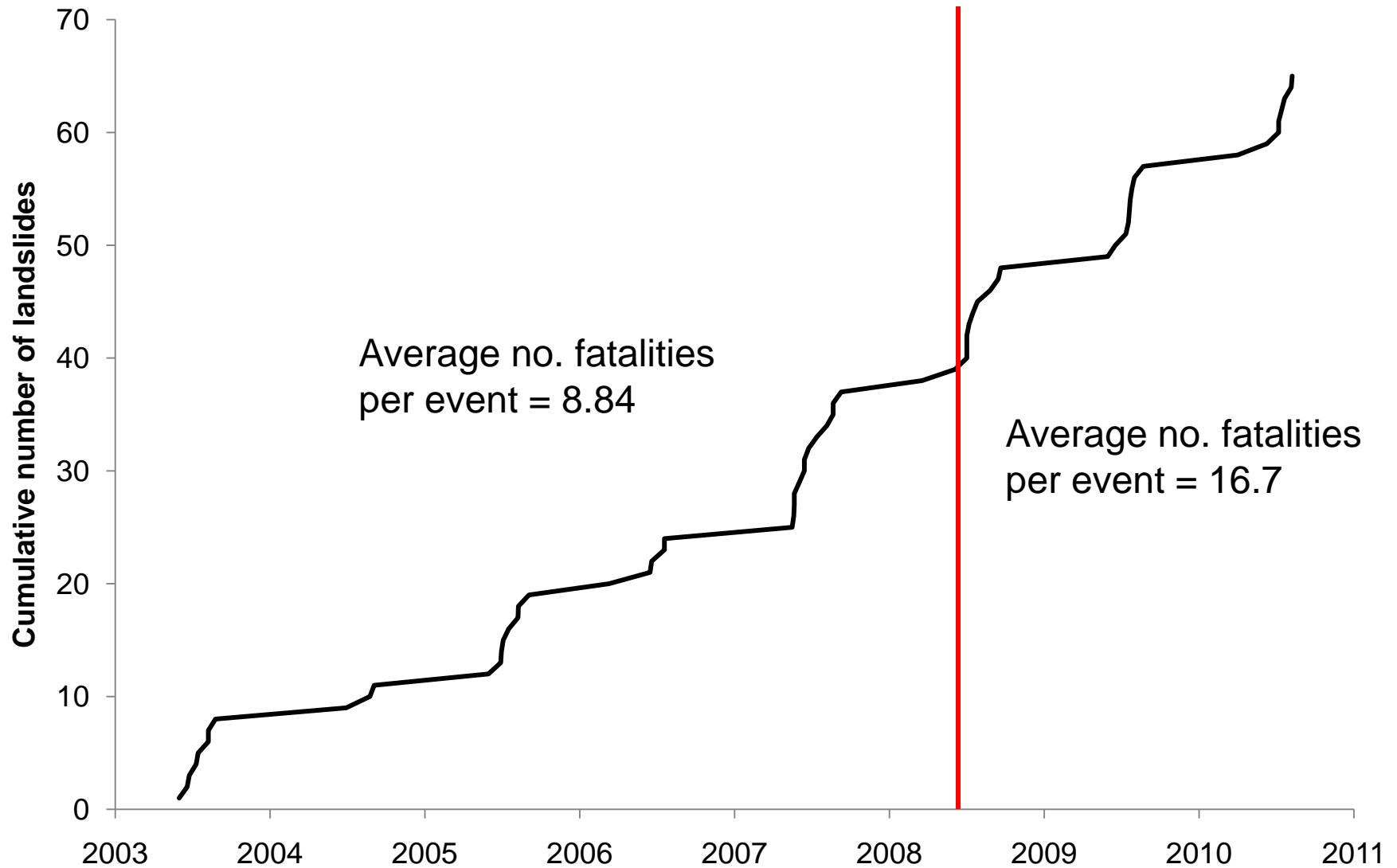
# Post seismic effects: cumulative fatalities from non-seismic landslides in Sichuan



# 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

