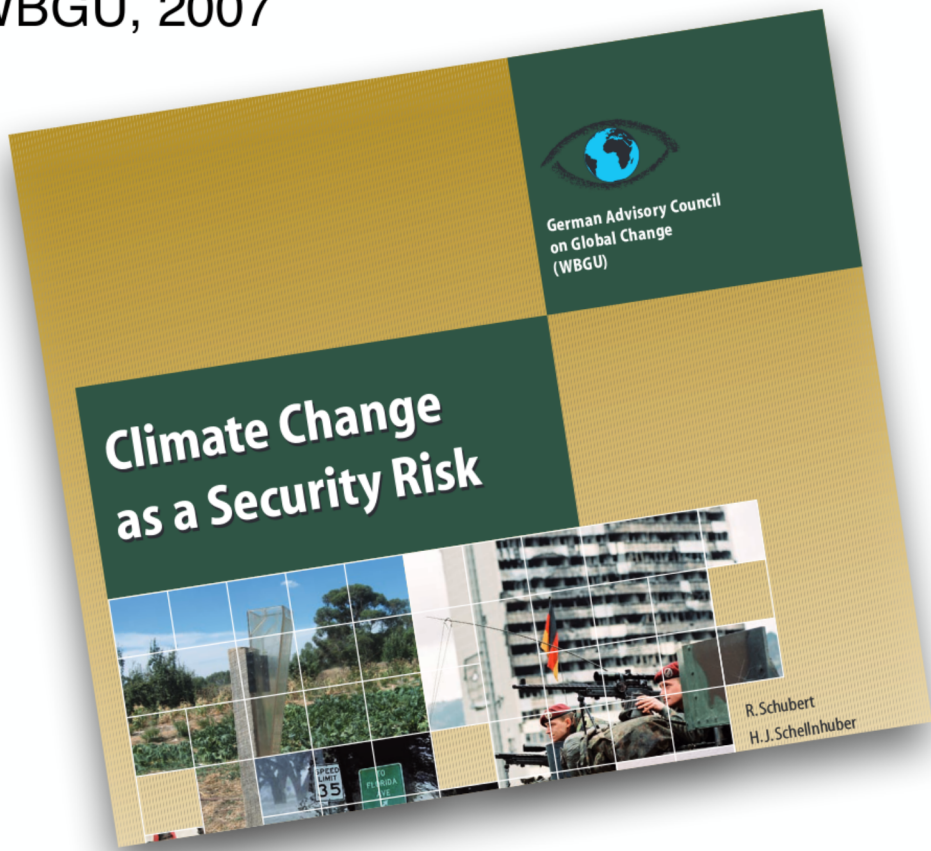


# Armed-conflict risks enhanced by climate-related disasters in ethnically fractionalized countries

Jonathan F. Donges, Carl-Friedrich Schleussner,  
Reik V. Donner, John Schellnhuber





Time Magazine, 2015

IDEAS CLIMATE CHANGE

# Climate Change Is the 'Mother of All Risks' to National Security

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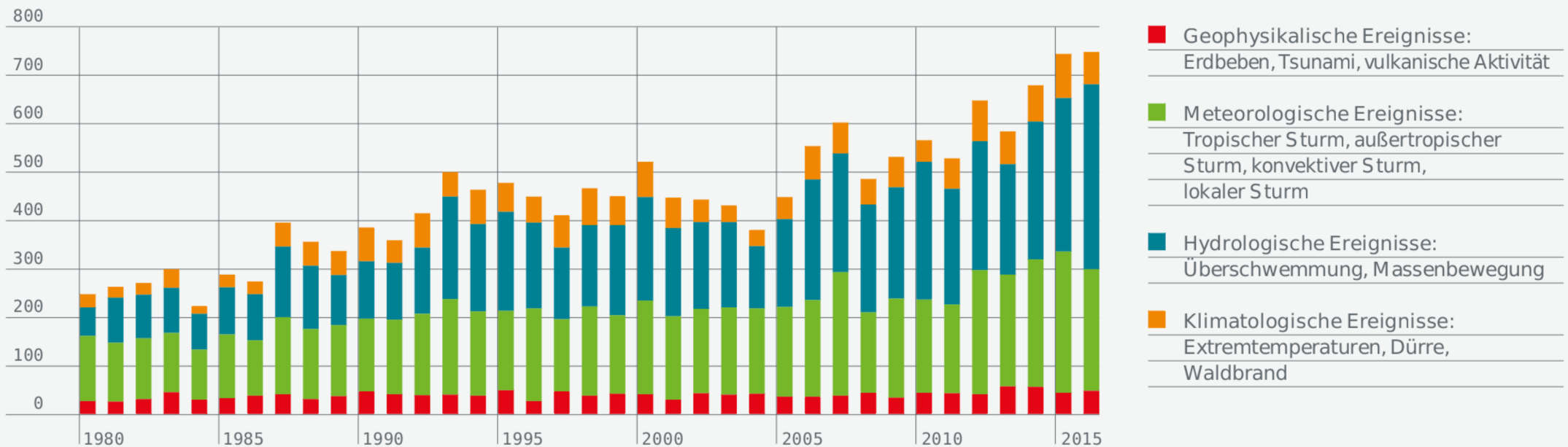
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**Climate change**

## Military experts say climate change poses 'significant risk' to security

# A Trend in Climate Extremes

Anzahl der Schadenereignisse 1980 bis 2016



# Database

## Civil Conflict:

- Uppsala Conflict Data Program
- Timespan: 1945-2009
- Counts events with >25 battle related deaths



## Extreme Events:

- Munich Re NatCatService
- Timespan: 1980-2011
- good data quality for the economic impacts of extreme events



# Method: Event coincidence analysis

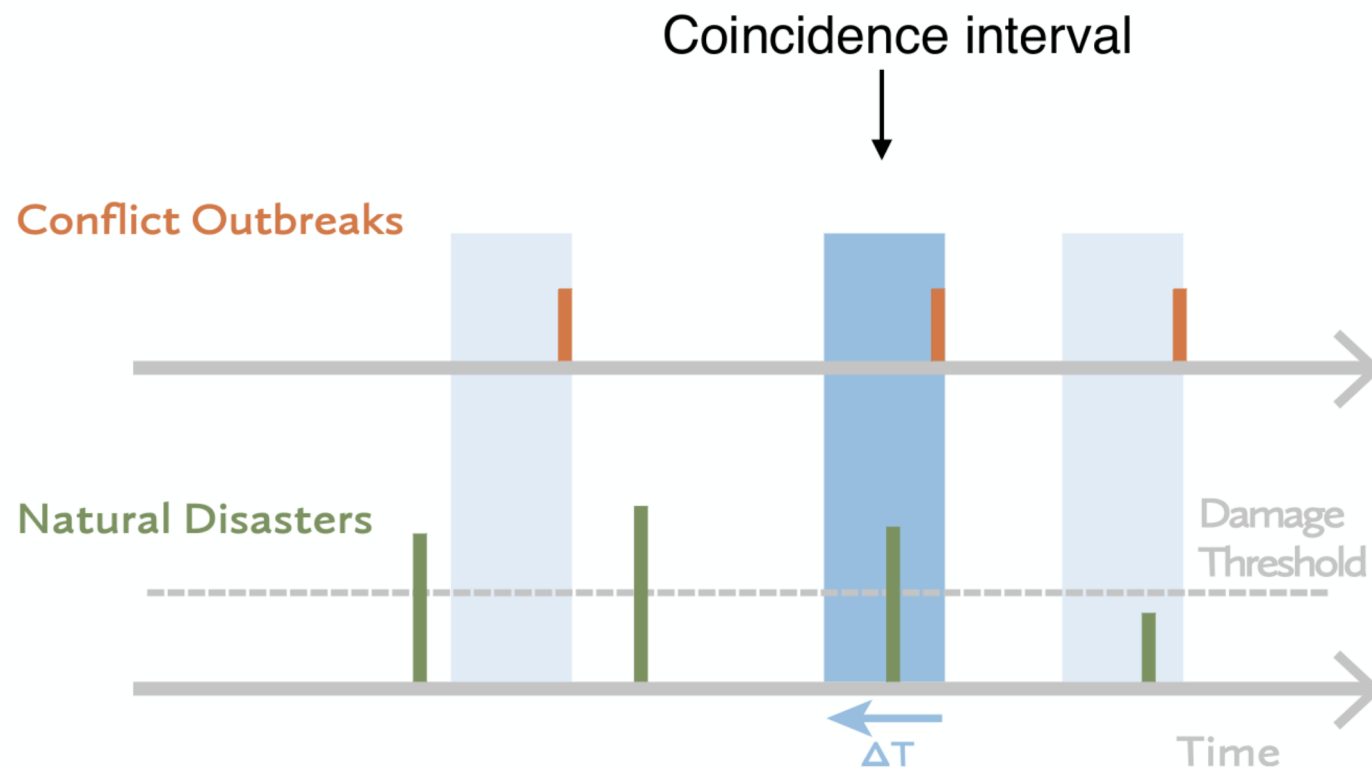


Fig. 1. Illustration of the methodological approach of event coincidence analysis for the risk enhancement test based on armed-conflict occurrence. An armed-conflict outbreak (orange) is counted as coincident with a natural disaster (green), if it co-occurs with or is preceded by such an event exceeding a prescribed damage threshold within a given coincidence interval  $\Delta T$ .

# Hypotheses from literature regarding vulnerability factors for countries

- Conflict frequency (CONFL)
- Ethnic fractionalization (EF)
- Economic inequality (GINI)

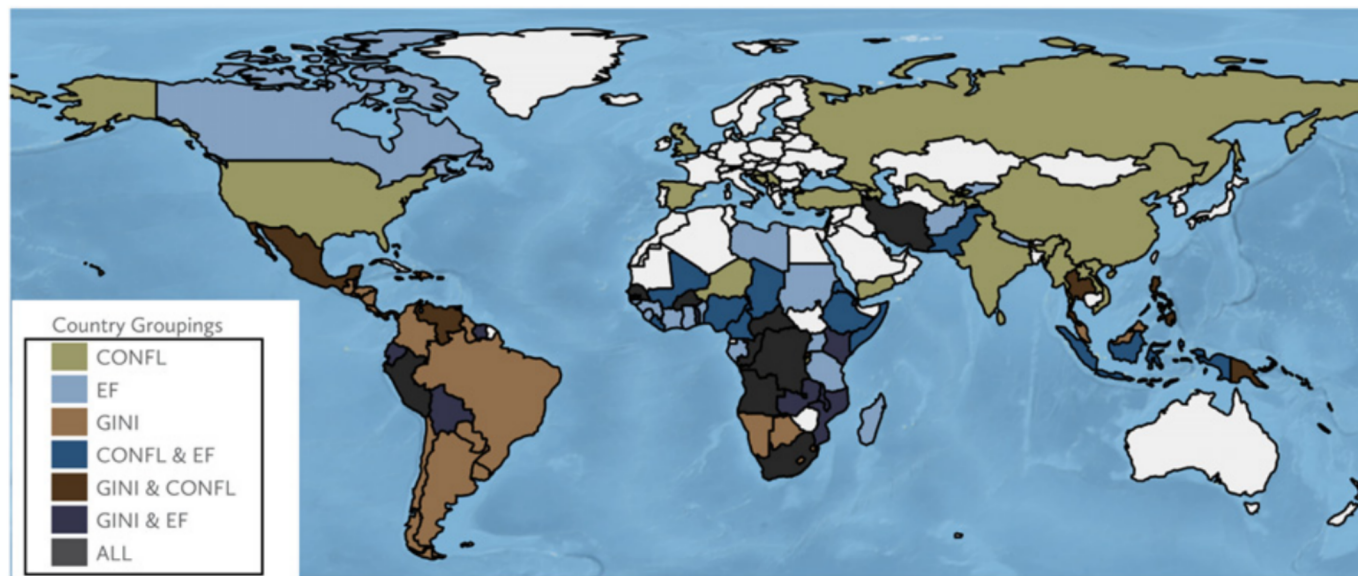


Fig. 2. Mapping of countries according to different analysis criteria including countries with more than one conflict (CONFL), the 50 countries with the highest Gini coefficient (GINI), as well as the 50 countries with the highest ethnic fractionalization (EF).

# Result: armed conflict risk particularly enhanced by climate-related disasters in ethnically fractionalized countries

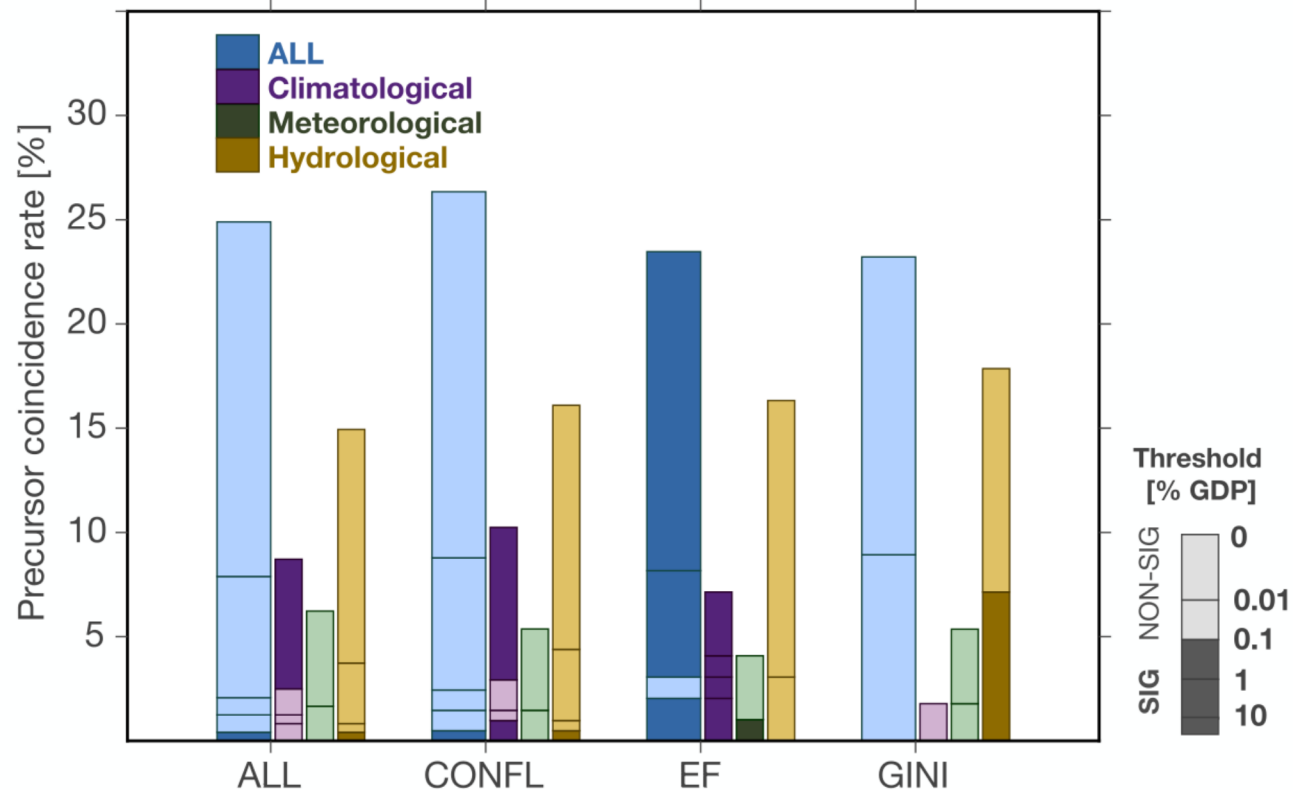


Fig. 3. Results of ECA for the risk enhancement test: the percentage of armed-conflict outbreaks that coincide with a climate-related natural disaster within the same month (Materials and Methods). We resolve different country groupings, disaster types (color coding), and disaster damage levels. Damage levels are indicated by segments of the individual bars and are assessed relative to the country's GDP in the year of the event. Segmenting starts with zero threshold from the top and the number of segments with nonzero coincidences can differ between country groupings and disaster types. Filled segments indicate coincidence rates that are significant at the 95% level. Results shown are for coincidences between events occurring within the same month (see [SI Appendix, Fig. S3](#) for results for coincidence intervals of up to 12 months).

# Conclusions

- Increasing evidence that environmental factors, particularly climate-related disasters, can significantly increase the risk for armed conflict outbreak (see recent PNAS paper by von Uexkull et al. [2016] confirming our results).
- Taking the social-economic context of this process into account is essential (e.g. ethnic fractionalization).
- More research on factors determining social-ecological resilience wrt outbreak of climate conflicts is needed.





Thank you:

See our 2016 study in PNAS for more

PNAS



# Armed-conflict risks enhanced by climate-related disasters in ethnically fractionalized countries

Carl-Friedrich Schleussner<sup>a,b,c,1</sup>, Jonathan F. Donges<sup>a,d</sup>, Reik V. Donner<sup>a</sup>, and Hans Joachim Schellnhuber<sup>a,e,1</sup>

<sup>a</sup>Potsdam Institute for Climate Impact Research, 14473 Potsdam, Germany; <sup>b</sup>Climate Analytics, 10969 Berlin, Germany; <sup>c</sup>Integrative Research Institute on Transformations of Human–Environment Systems, Humboldt University, 10099 Berlin, Germany; <sup>d</sup>Stockholm Resilience Centre, Stockholm University, 114 19 Stockholm, Sweden; and <sup>e</sup>Santa Fe Institute, Santa Fe, NM 87501

Contributed by Hans Joachim Schellnhuber, May 20, 2016 (sent for review February 5, 2016; reviewed by Yoshito Hirata and Jürgen Scheffran)

Social and political tensions keep on fueling armed conflicts around the world. Although each conflict is the result of an individual context-specific mixture of interconnected factors, ethnicity appears

geographical clustering of ethnic groups and strong interethnic social ties (21). These two factors may contribute to societal fissures along ethnic boundaries in case of rapidly emerging societal