

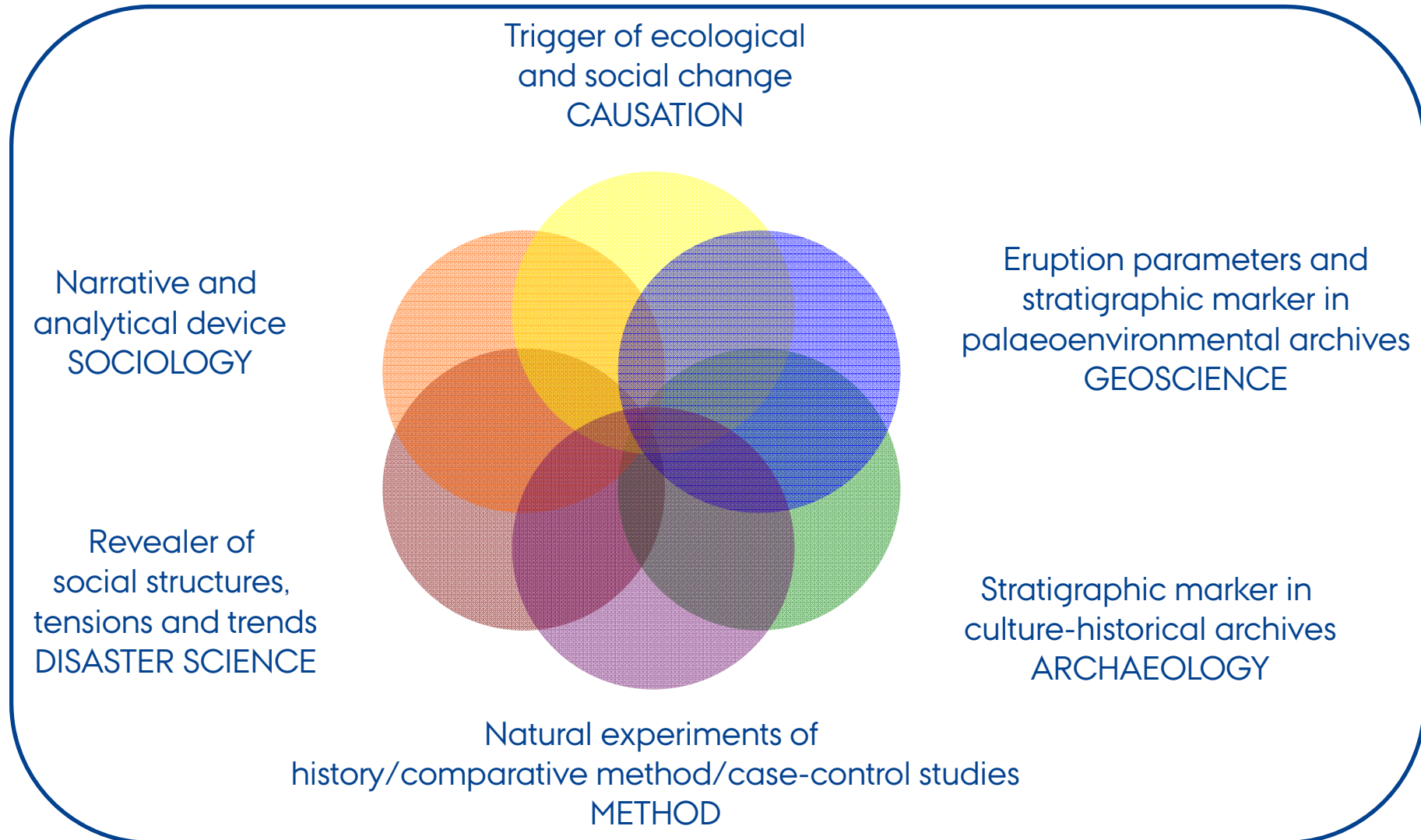
**LaPaDiS**  
The Laboratory for Past Disaster Science

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## TOWARDS AN APPLIED SCIENCE OF PAST DISASTERS.

Felix Riede, Aarhus University, DK.  
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## Climate change archaeology (van de Noort 2011; 2013).



## INTRODUCTION.

### CLIMATE CHANGE <> NATURAL DISASTERS.

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- o “We are living in a climate of fear about our future climate. The language of the public discourse around global warming routinely uses a repertoire which includes words such as ‘catastrophe’, ‘terror’, ‘danger’, ‘extinction’ and ‘collapse’. To help make sense of this phenomenon the story of the complex relationships between climates and cultures in different times and in different places is in urgent need of telling. If we can understand from the past something of this complex interweaving of our ideas of climate with their physical and cultural settings we may be better placed to prepare for different configurations of this relationship in the future.”

Hulme (2008:5)

## INTRODUCTION.

### TOWARDS AN APPLIED SCIENCE OF PAST DISASTERS.

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- ① What is at stake?
- ② 'Natural experiments of history' – the two-step case-control methodology.
  - Synchronic effects > diachronic effects > composite effect predictions.
- ③ Revealing vulnerability & response patterns.
  - Far field/cascade effects.
  - Migration as adaptation.
  - Religious coping responses.
- ④ Conclusion – potential of an applied science of past disasters.
  - Past events as 'warning scenarios'.
  - Cultural heritage as participatory resilience/communication resource – European value added.

## WHAT IS AT STAKE?

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- › 12+% of the world's population (850+ million people) live in current zones of volcanic hazard (Small et al. 2001).
- › General warming – *especially in Europe* – correlates with increased volcanism, i.e. current trends may lead to more frequent eruptions (Nowell et al. 2001; Pagli & Sigmundsson 2008; Sigmundsson et al. 2010).
- › c. 30 disciplines involved in disaster research, with 95% of funding goes to STEM subjects (Alexander 1995; 1997).
- › Climate change may be catastrophic in the future & is perceived as catastrophic in the present (e.g. Hulme 2008).

## ‘NATURAL EXPERIMENTS OF HISTORY’. THE CASE-CONTROL METHODOLOGY.

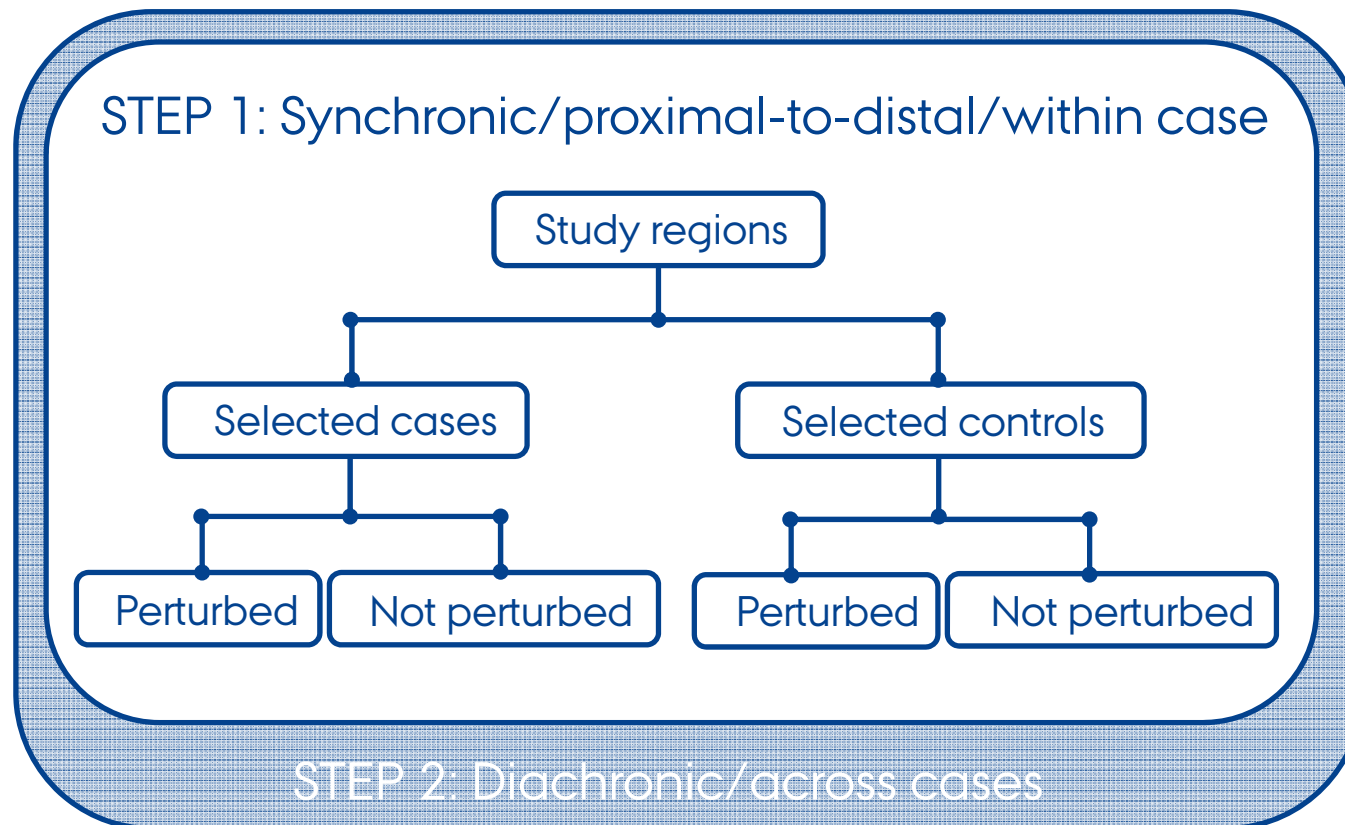
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- Since disasters serve as social laboratories, revealers, and sometimes triggers of critical preexisting situations, emphasis should be placed on understanding the surrounding and prior sociocultural context and vulnerability to the effects of a certain hazard.”

Garcia-Acosta (2002: 65).

- Historically-based & evidence-based ‘retrodictions’ of actual societal climate impacts.
- Vastly enlarged event–society database.
- Adds human dimension – immediacy – to studies of past environmental events.

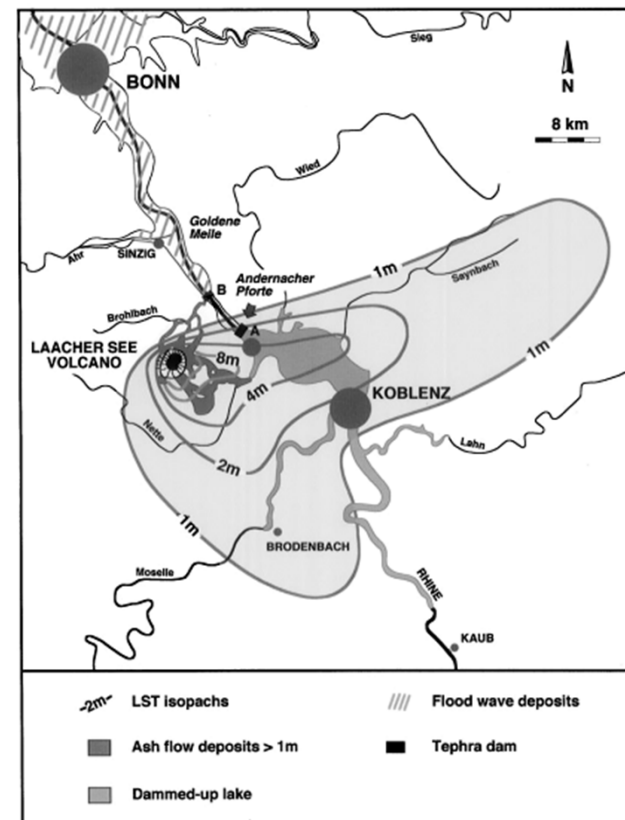
'NATURAL EXPERIMENTS OF HISTORY'.  
THE CASE-CONTROL METHODOLOGY.



## STEP 1: LAACHER SEE ERUPTION. 13,000 YEARS BEFORE PRESENT (BP).

- Large ( $M= 6.2$ ) and intense ( $I= 11.6$ ) Plinian eruption.
- 20+ km<sup>3</sup> of material ejected over several days to months.
- Rhine dammed – later flood waves.
- 20-40 km tall ash column.
- 1,400 km<sup>2</sup> covered in near-vent tephra deposits between 50-1m.
- Animal tracks, including various birds, *Ursus* sp. and *Equus* sp.
- Burned forests & other macro-botanical remains.
- Plethora of archaeological sites of all sizes.

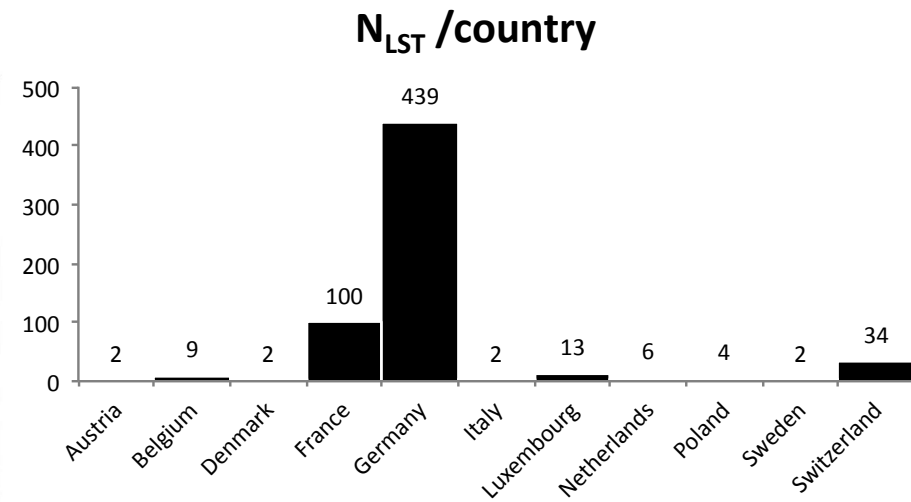
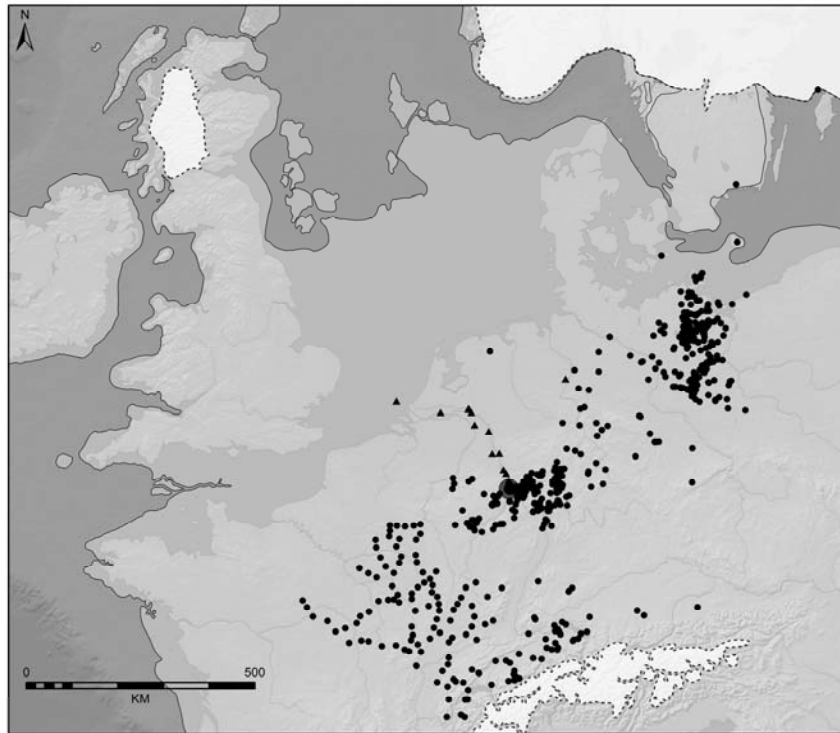
*Season: late spring/early summer*



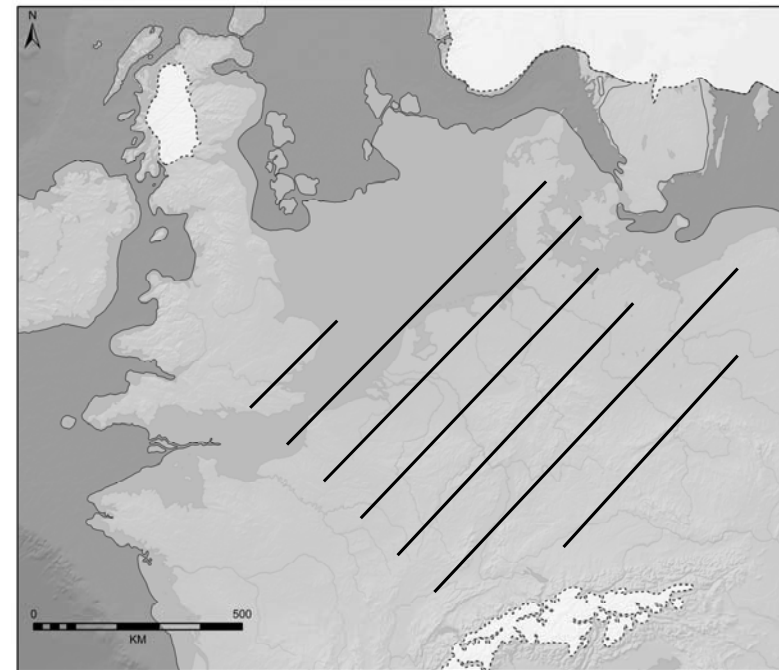
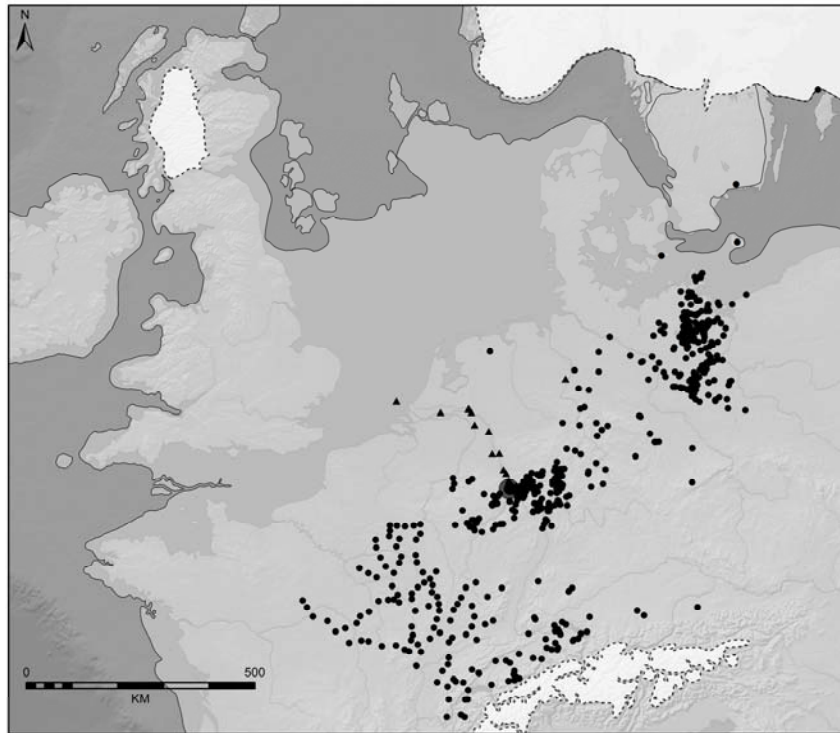
Schmincke et al. (1999)



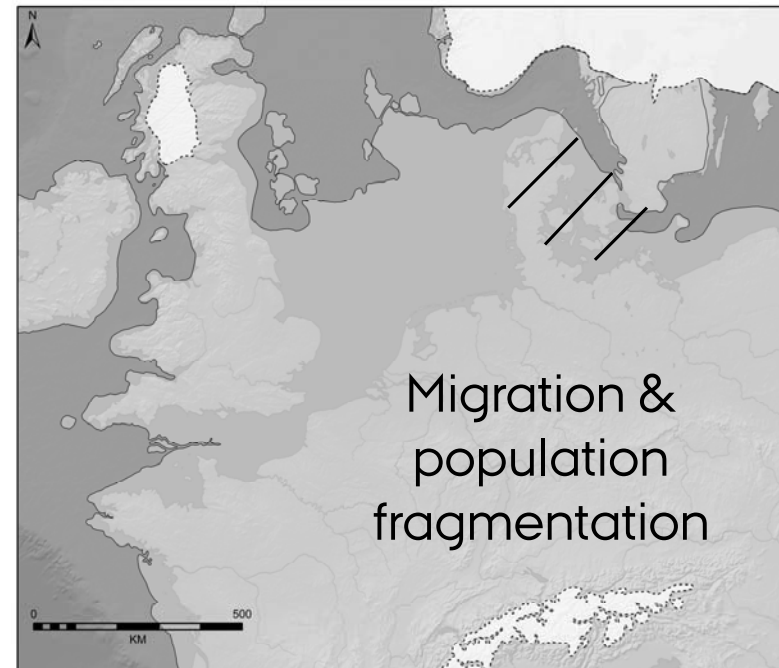
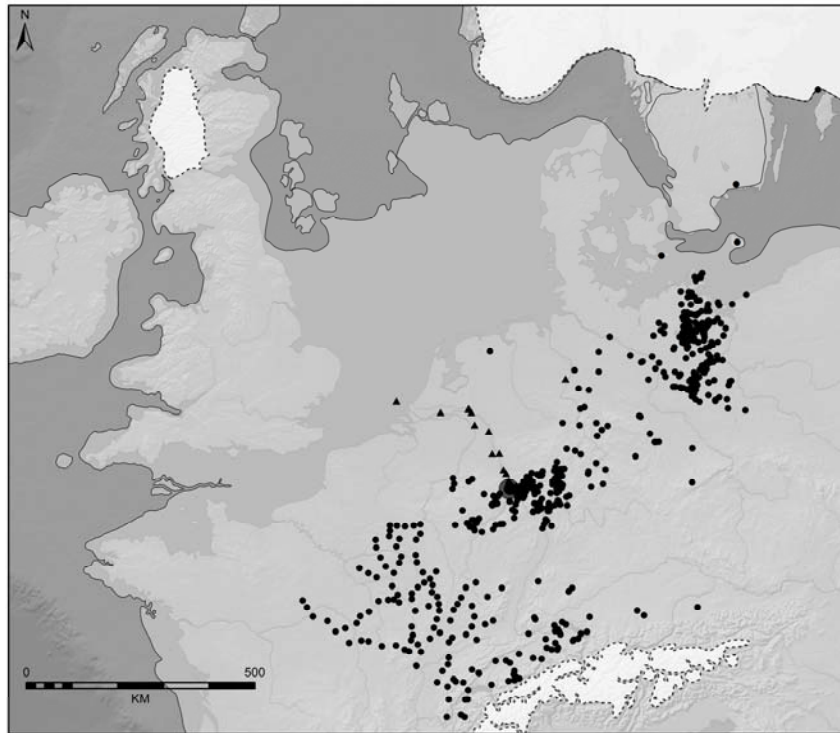
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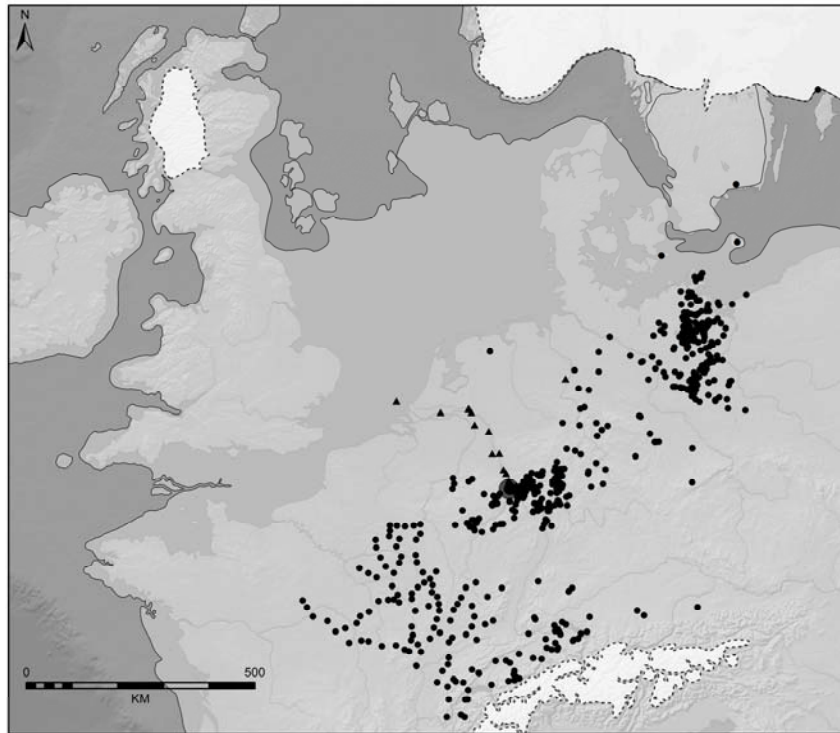
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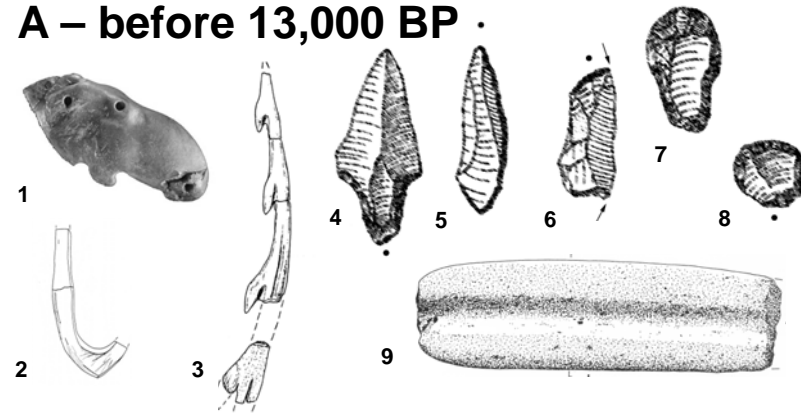
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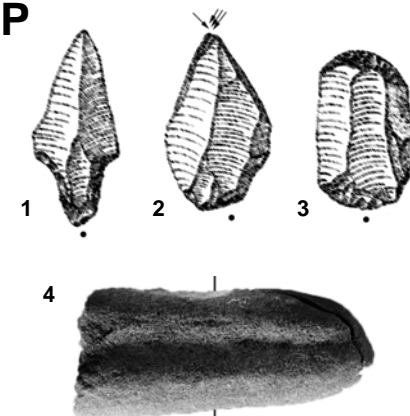
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### A – before 13,000 BP .



### B – after 13,000 BP



## STEP 2:

3600 BP THERA, AD 536 ILOPANGO, 2010 EYJAFJALLAJÖKULL ERUPTION, ...

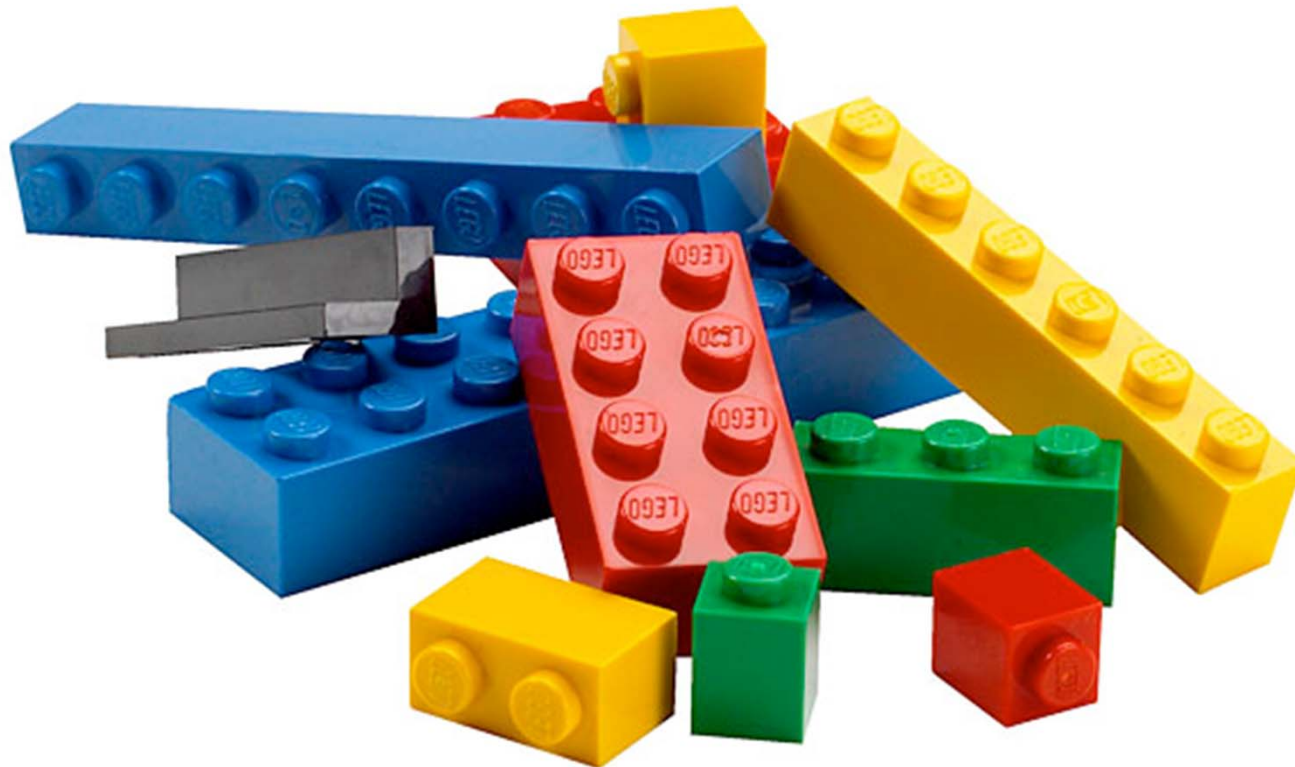
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- ① Impact, esp. in the far-field, related as much or more to societal than geological parameters.
- ② Connectedness of affected populations.
- ③ Indirect political effects stand clear.
- ④ Religious worldviews and institutions always appear to play some role.
- ⑤ Household-level crisis management strategies reflect resilience/vulnerability.

## STEP 2:

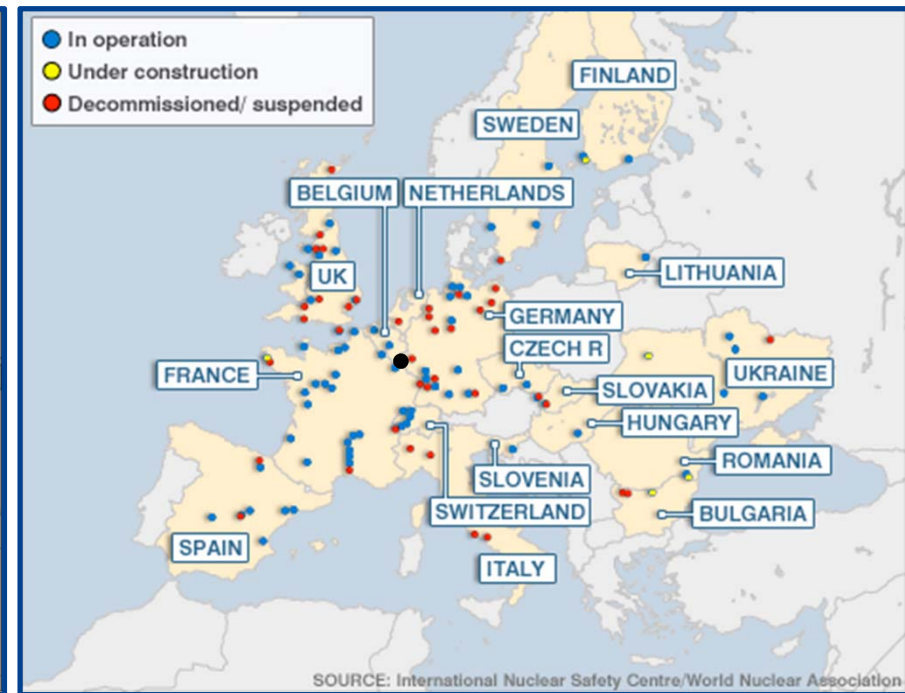
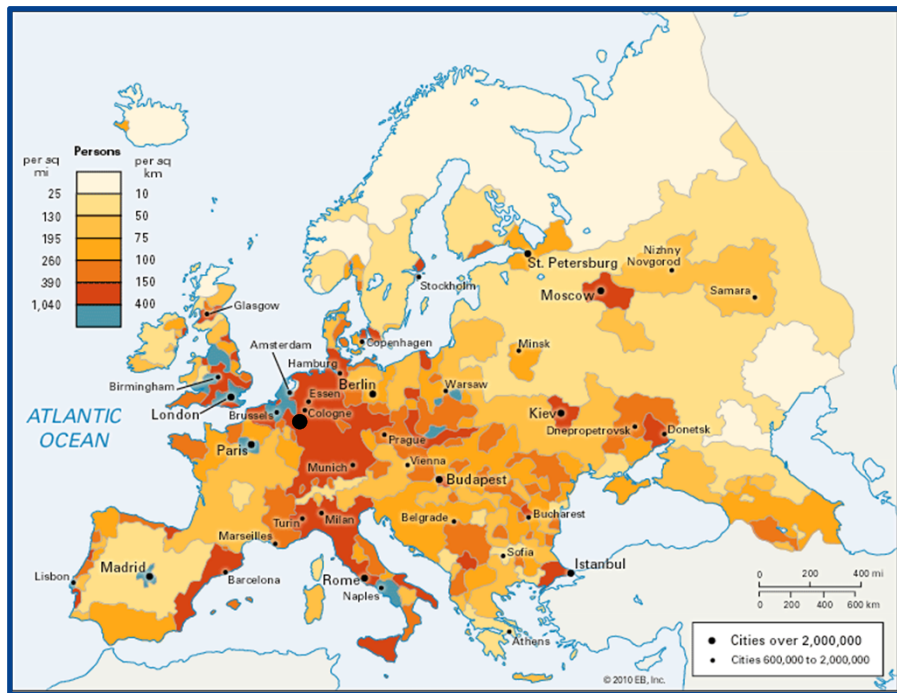
3600 BP THERA, AD 536 ILOPANGO, 2010 EYJAFJALLAJÖKULL ERUPTION, ...

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# CONCLUSION. POTENTIAL OF AN APPLIED SCIENCE OF PAST DISASTERS.



CONCLUSION.

POTENTIAL OF AN APPLIED SCIENCE OF PAST DISASTERS.

Impact/response type	$N_{\text{events}}$	$N_{\text{people}}$ affected
Killed	~250	~90,000
Injured	~150	~16,000
Homeless/infrastructure damage	~100	~300,000
Evacuated/migration	~250	~5,000,000

20<sup>th</sup>-century eruption, after Witham (2005).



## CONCLUSION.

### POTENTIAL OF AN APPLIED SCIENCE OF PAST DISASTERS.

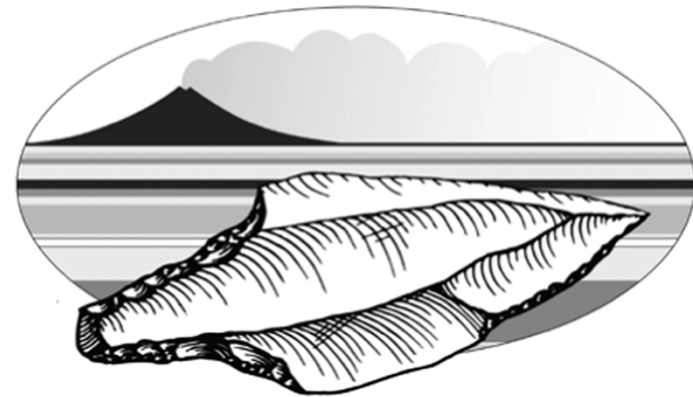
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- Using ‘possibilist thinking’ (Clarke 2007; 2008) as a tool for preparedness – also in relation to existentialist risks (Rees 2013).
- Past events as building blocks for future ‘warning scenarios’ – both geologically and socially (Mastrolorenzo et al. 2006; Riede in prep.).
- Effects on mobility – migration as adaptation with its political and economic implications (Black et al. 2011).
- Cultural heritage not only as passive victim of climate change (see Blue Shield, Noah’s Ark), but as resilience resource with European value added.
- Cultural heritage as local/regional participatory tool (= information/identify source) for change agents – a ‘usable past’ (Stump 2013).

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