

2nd Workshop on Drivers of Climate Risks: Towards Operational Impact Attribution

Workshop introduction

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Funded by the
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The COMPASS project has received funding from the European Union's HORIZON Research and Innovation Actions Programme under Grant Agreement No. 101135481

Welcome to the Science Park on Telegrafenberg Potsdam!

GFZ
Helmholtz Centre for Geosciences

AWI
Alfred Wegener Institute,
Helmholtz Centre for Polar
and Marine Research

DWD
German Weather Service

PIK
Potsdam Institute for
Climate Impact Research

AIP
Leibniz Institute for
Astrophysics Potsdam



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The previous workshop (22/09/2023)

Drivers of climate risks in Europe: harmonizing research on impact attribution of past events

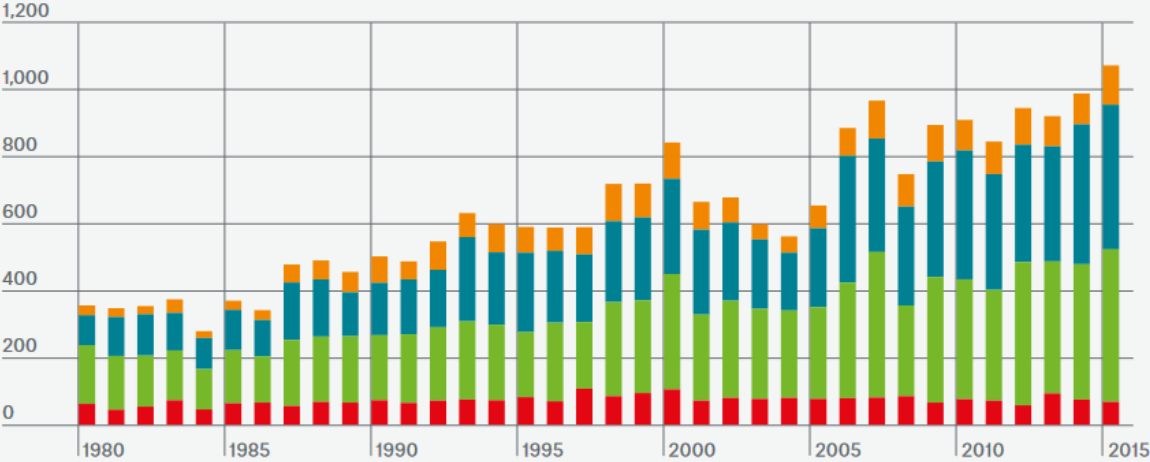


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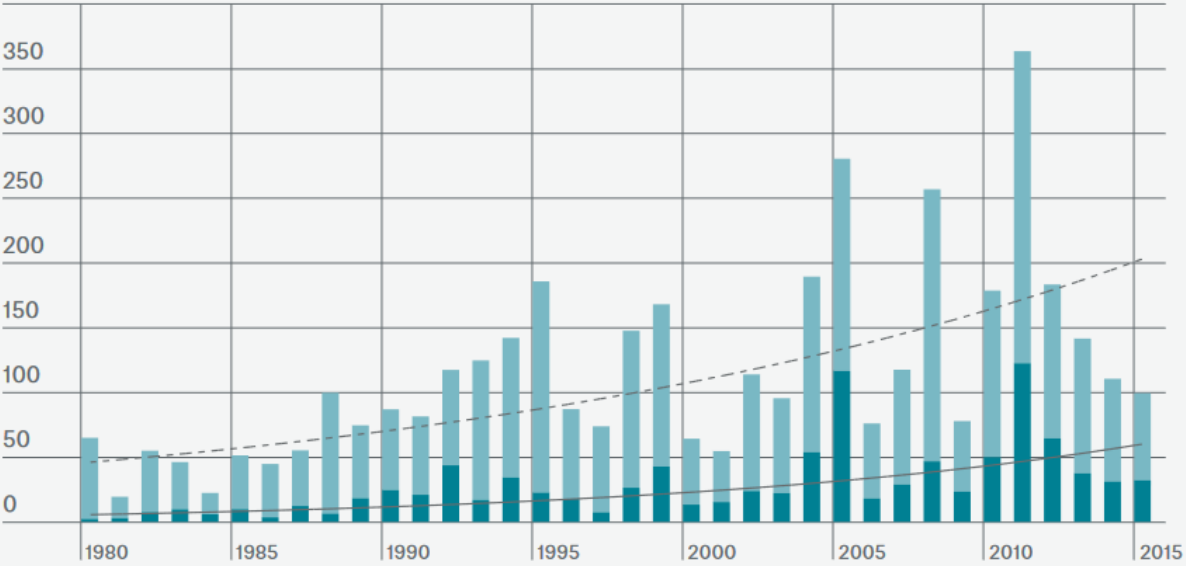
Losses are increasing...

Number of loss events 1980-2015



- **Geophysical events:**
Earthquakes, tsunamis, volcanic activity
- **Meteorological events:**
Tropical storm, extratropical storm, convective storm, local storm
- **Hydrological events:**
Flood, mass movement
- **Climatological events:**
Extreme temperatures, drought, wildfire

Overall and insured losses 1980 to 2015 (in US\$ bn)

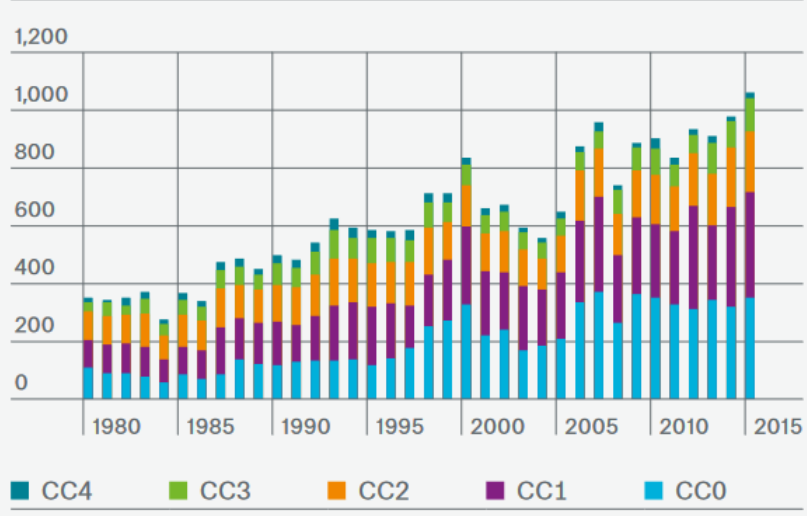


- **Overall losses***
(2015 values)
- **Of which insured losses***
(2015 values)
- Trend overall losses
- Trend insured losses

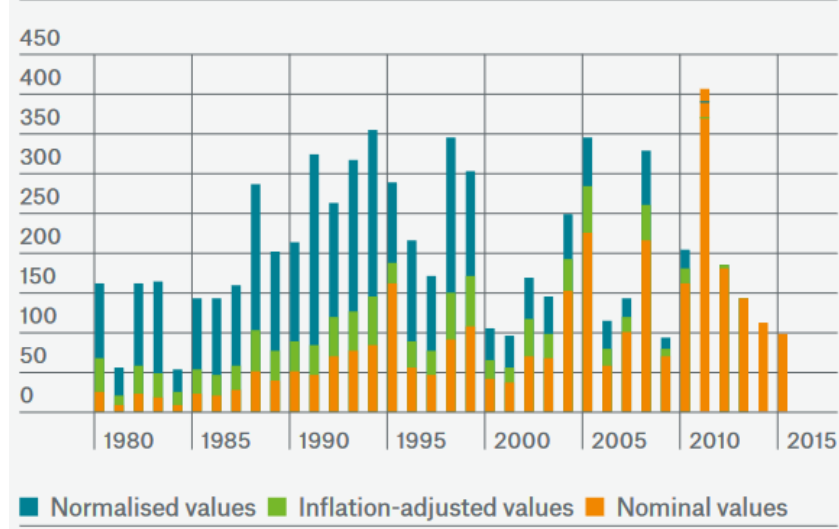
*Values adjusted for inflation using the Consumer Price Index (CPI) of each country and taking into account fluctuations in exchange rates

...or are they?

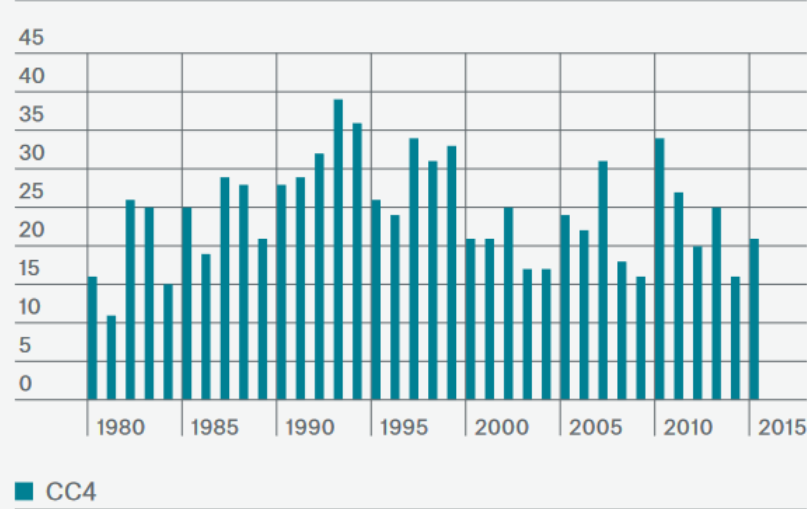
Number of loss events by cat classes CC0-CC4



Annual global overall losses in US\$ bn (CC0-CC4)

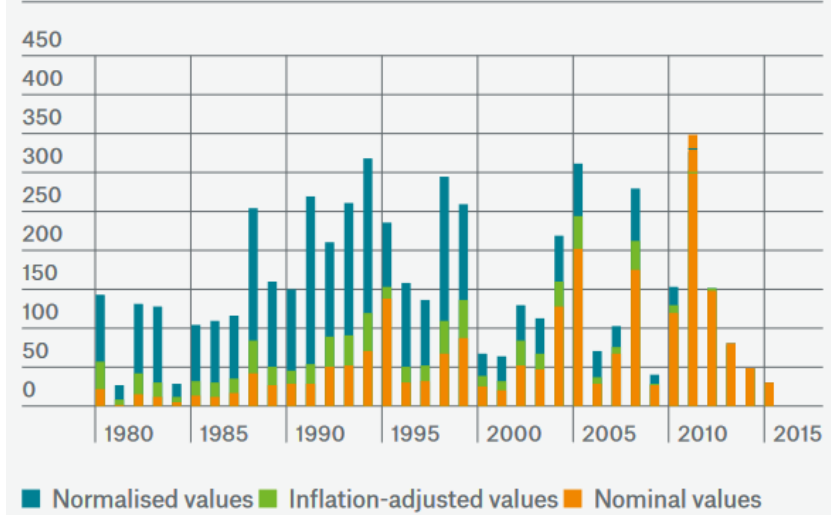


Number of loss events by cat class CC4



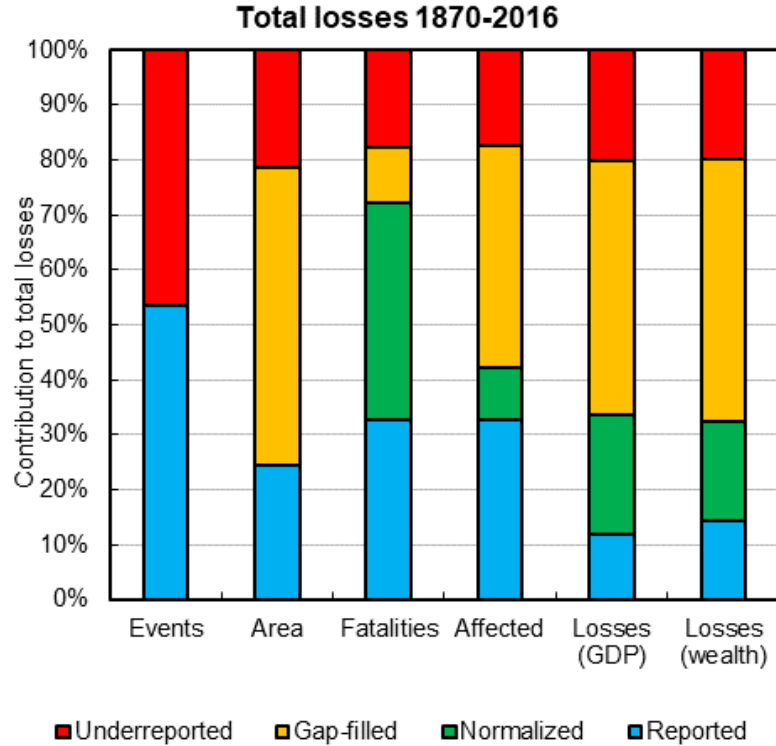
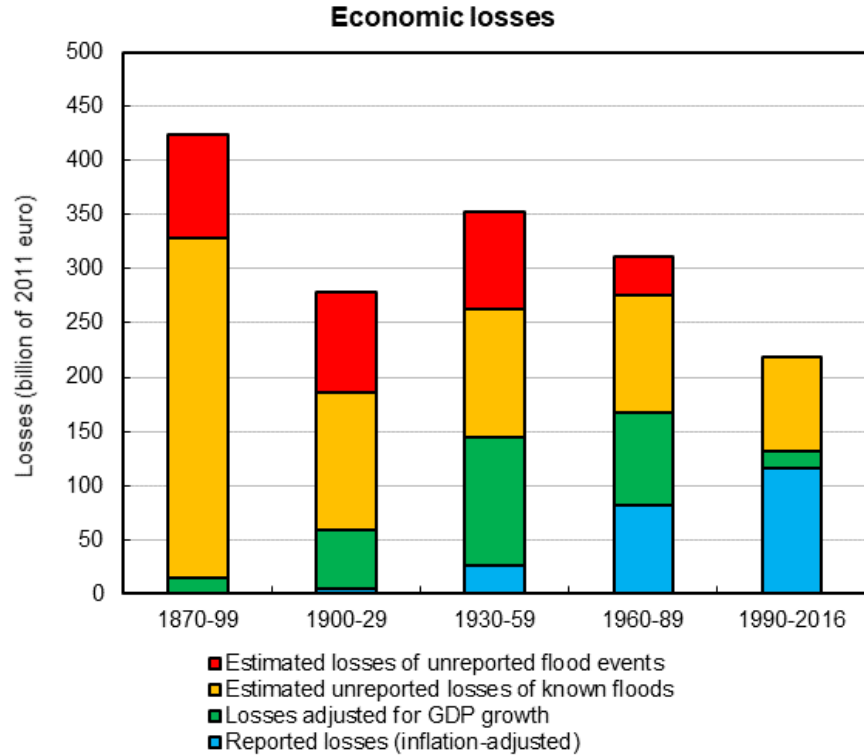
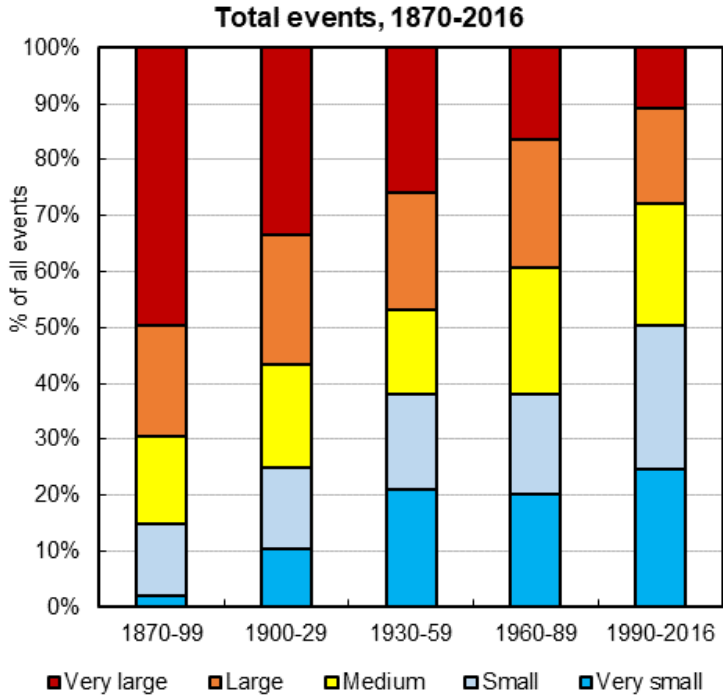
Observational bias
Short timeframe

Annual global overall losses in US\$ bn (CC4)



Using losses as reported

Normalized flood impacts in Europe, 1870-2016



Source: based on Paprotny et al., 2018, *NatComms*

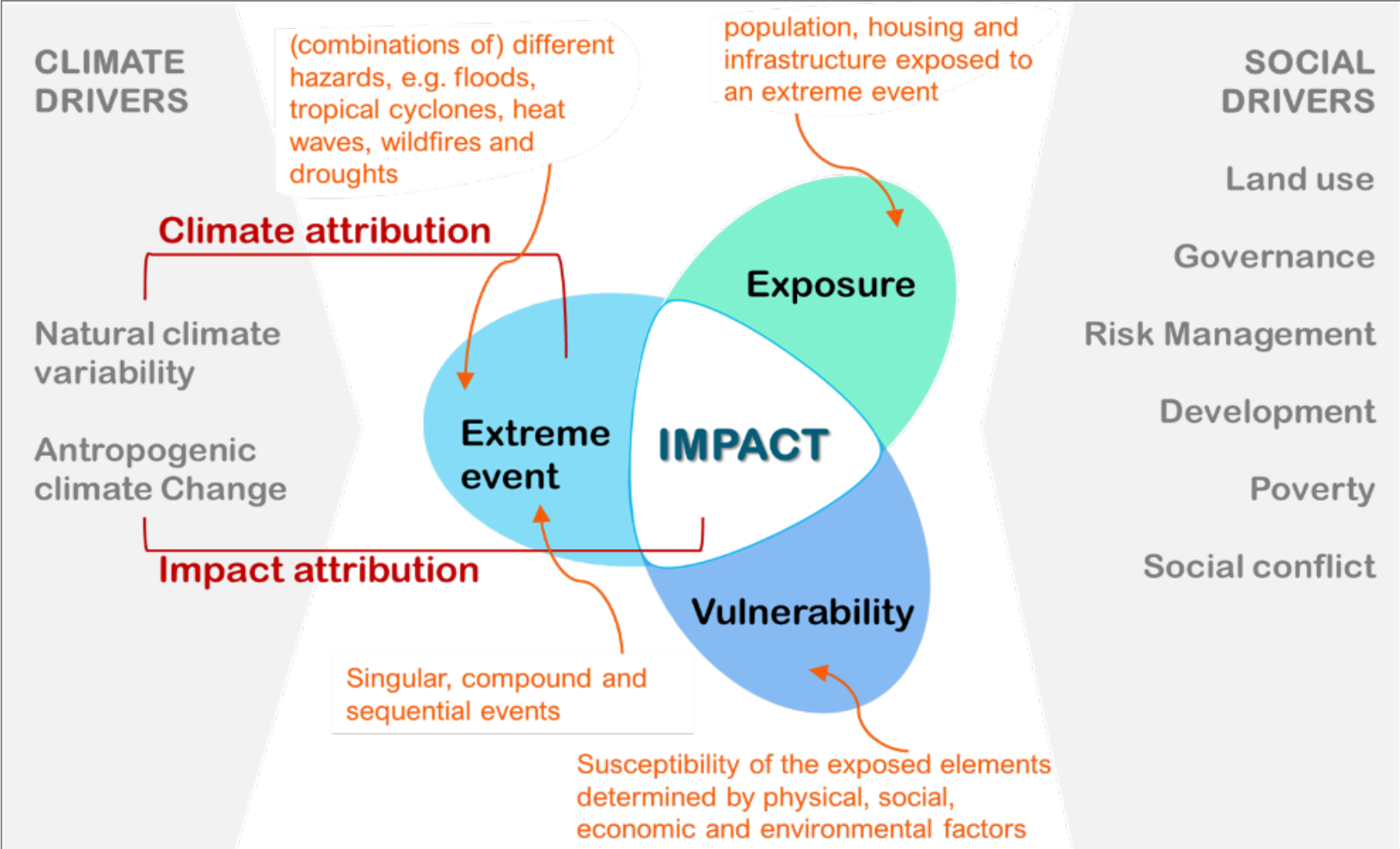


Exposure-adjusted („normalized”) losses

TABLE I. Normalization studies of disaster loss records.

Hazard	Location	Period	Normalization	Normalized loss	Reference
Bushfire	Australia	1925–2009	Dwellings	No trend	Crompton et al. (2010)
Earthquake	United States	1900–2005	Wealth, population	No trend	Vranes and Pielke (2009)
Flood	United States	1926–2000	Wealth, population	No trend	Downton et al. (2005)
Flood	China	1950–2001	GDP	Increase since 1987	Fengqing et al. (2005)
Flood	Europe	1970–2006	Wealth, population	No trend	Barredo (2009)
Flood	Korea	1971–2005	Population	Increase since 1971	Chang et al. (2009)
Flood and landslide	Switzerland	1972–2007	None	No trend	Hilker et al. (2009)
Hail	United States	1951–2006	Property, insurance market values	Increase since 1992	Changnon (2009a)
Windstorm	United States	1952–2006	Property, insurance market values	Increase since 1952	Changnon (2009b)
Windstorm	Europe	1970–2008	Wealth, population	No trend	Barredo (2010)
Thunderstorm	United States	1949–98	Insurance coverage, population	Increase since 1974	Changnon (2001)
Tornado	United States	1890–1999	Wealth	No trend	Brooks and Doswell (2001)
Tornado	United States	1900–2000	None	No trend	Boruff et al. (2003)
Tropical storm	Latin America	1944–99	Wealth, population	No trend	Pielke et al. (2003)
Tropical storm	India	1977–98	Income, population	No trend	Raghavan and Rajesh (2003)
Tropical storm	United States	1900–2005	Wealth, population	No trend	Pielke et al. (2008)
Tropical storm	United States	1950–2005	Asset values	Increase since 1970; no trend since 1950	Schmidt et al. (2009)
Tropical storm	China	1983–2006	GDP	No trend	Zhang et al. (2009)
Tropical storm	United States	1900–2008	GDP	Increase since 1900	Nordhaus (2010)
Weather (flood, thunderstorms, hail, bushfires)	Australia	1967–2006	Dwellings, dwelling values	No trend	Crompton and McAneney (2008)
Weather (hurricanes, floods)	United States	1951–97	Wealth, population	No trend	Choi and Fisher (2003)
Weather (hail, storm, flood, wildfire)	World	1950–2005	GDP, population	Increase since 1970; no trend since 1950	Miller et al. (2008)

Risk = Hazard * Exposure * Vulnerability



Source: COMPASS project proposal

Attribution studies



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Climate change increased the likelihood of wildfire disaster in highly exposed Los Angeles area



ClimaMeter

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February 2025 floods in Queensland mostly exacerbated by human-driven climate change

Press Summary

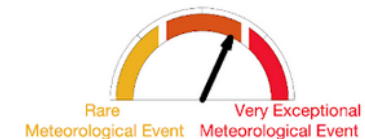
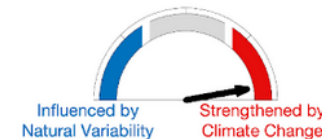
- Meteorological conditions similar to that causing floods in Queensland are up to 17 mm/day (up to 20%) wetter over the coast of Queensland. Additionally, conditions are up to 5 km/h (up to 20%) windier offshore Queensland and up to 1.5 °C warmer in the present compared to the past.
- This event was associated with exceptional meteorological conditions.
- We ascribe the heavier precipitation associated with Queensland floods to human driven climate change and natural climate variability likely played a minor role.

04-Feb-2025CNRS-IPSL (ERA5+GFS Data)

ClimaMeter for Queensland Floods 01-Feb-2025 to 02-Feb-2025



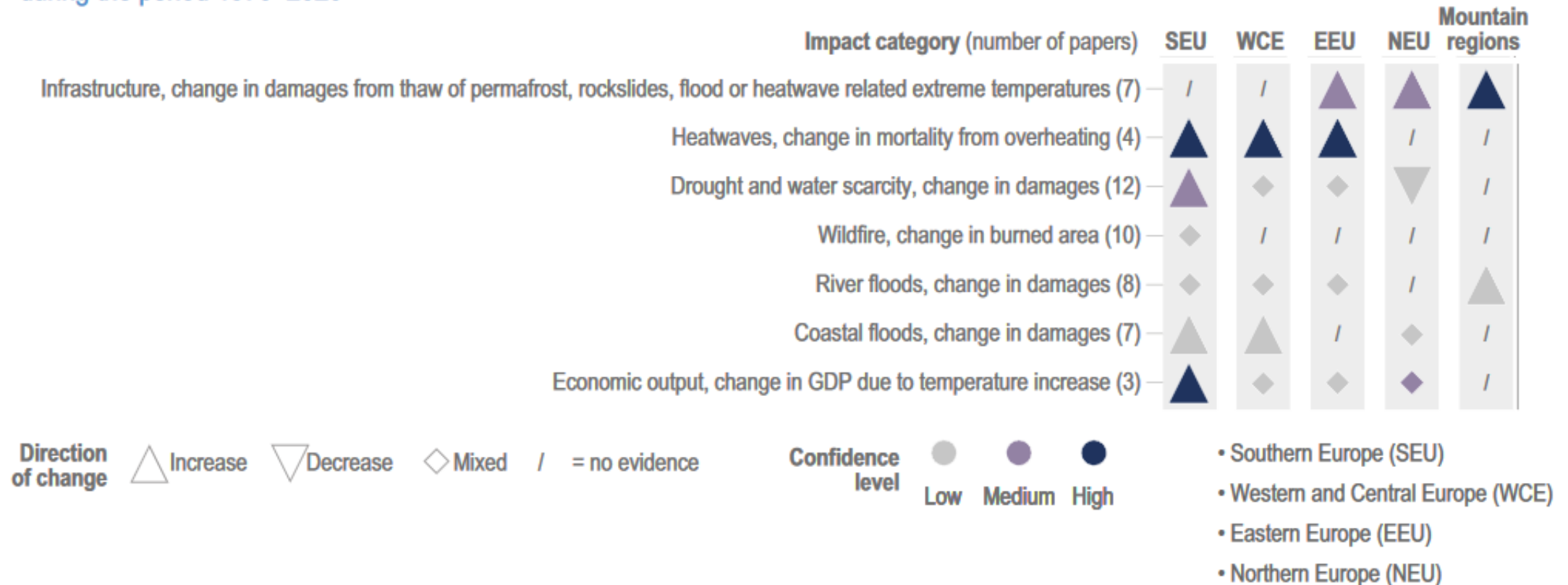
LSCE-IPSL
www.ipsl.fr



www.climameter.org
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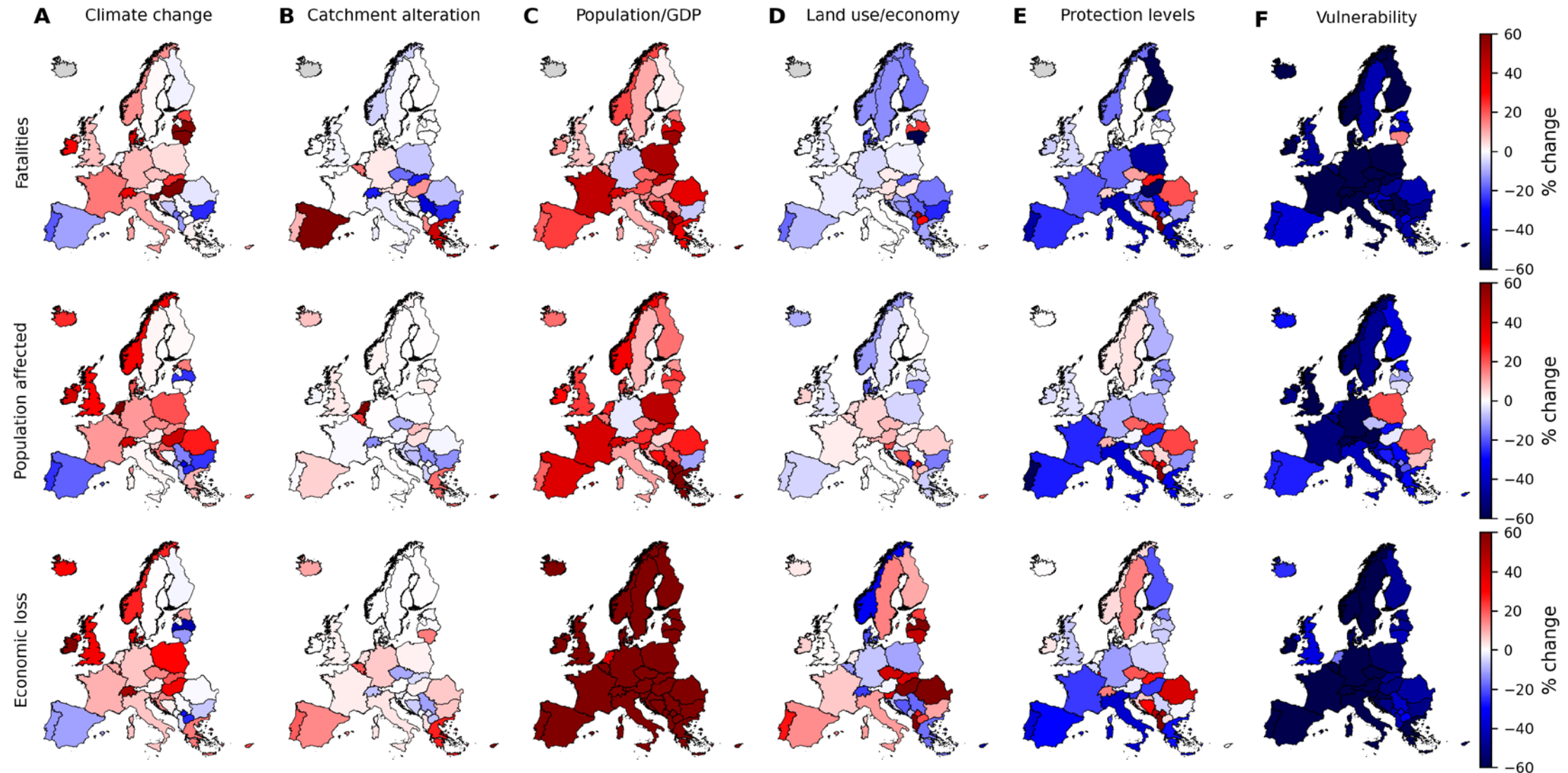
Attribution studies

Detection and attribution of climate-related impacts in Europe during the period 1970–2020



Source: adapted from IPCC, AR6, II, Fig. 13.27

Attribution studies



Source: Paprotny et al., in review

Operational attribution



COMPASS aims to develop a harmonised, yet flexible, methodological framework for climate and impact attribution of various complex extremes that includes compound, sequences and cascading hazard events



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C3S2_451

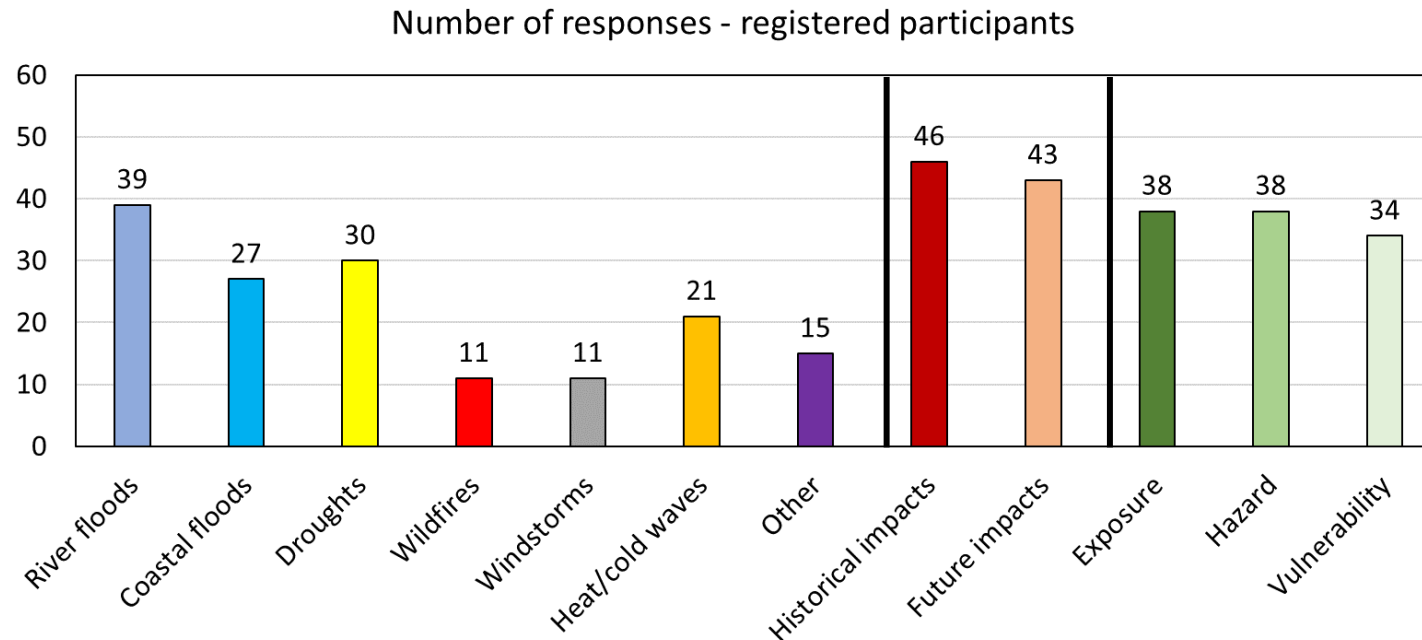
C3S2_451 Operational extreme event monitoring and attribution service

CONTRACT NOTICE: 407876-2024, PUBLISHED DATE: 9th July 2024, DEADLINE: 19th September 2024, [MORE INFORMATION](#)



Workshop goals

- Bring together researchers working on different aspects of attribution
- Expand COMPASS project' network
- Discuss most important questions on attribution



Day plan

Hybrid participation

11:00	Presentations (3 x 20 min with questions) <ul style="list-style-type: none">• <i>Introduction to the workshop and impact attribution (Dominik Paprotny)</i>• <i>Project COMPASS and work towards operational impact attribution (Sanne Muis)</i>• <i>Pan-European impact attribution activities (Aloïs Tilloy)</i>
12:00	Poster pitches (2 min per participant)
12:30	Combined lunch and poster session
14:00	Discussion on operational impact attribution in the 'World Café' formula
15:00	Coffee break
15:20	Summary of the discussion (4 x 5 min)
15:40	Presentation: <i>Copernicus Climate Change Service operational attribution - status and plans (Freja Vamborg)</i>
16:00	Panel discussion on effective communication of attribution results
17:00	Wrap-up

**THANKS FOR JOINING AND
ENJOY THE WORKSHOP!**



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