Disaster experiences' impact on public opinion on climate change in European countries

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Introduction

The Problem: Public opinion and climate (environmental) policies

- **Climate policies:** require a level of public acceptance
- **Public opinion:** volatile aspects
  - Competition of various agendas in the public sphere
  - Occasional events occur as external stimuli
- **Public opinion:** stable characteristics
  - Younger, political left, urban, better educated - support climate change policies (pro-environmental attitude)
- **Question:** Do interests or ideology drive opinions on climate change?

Ideology or interests – drivers of public opinion

Ideology

- Beliefs/ideas/concepts regarding „good” and „bad” society/world
- Claims regarding truth/justice
- Persuasive techniques
- Cognition and evaluation

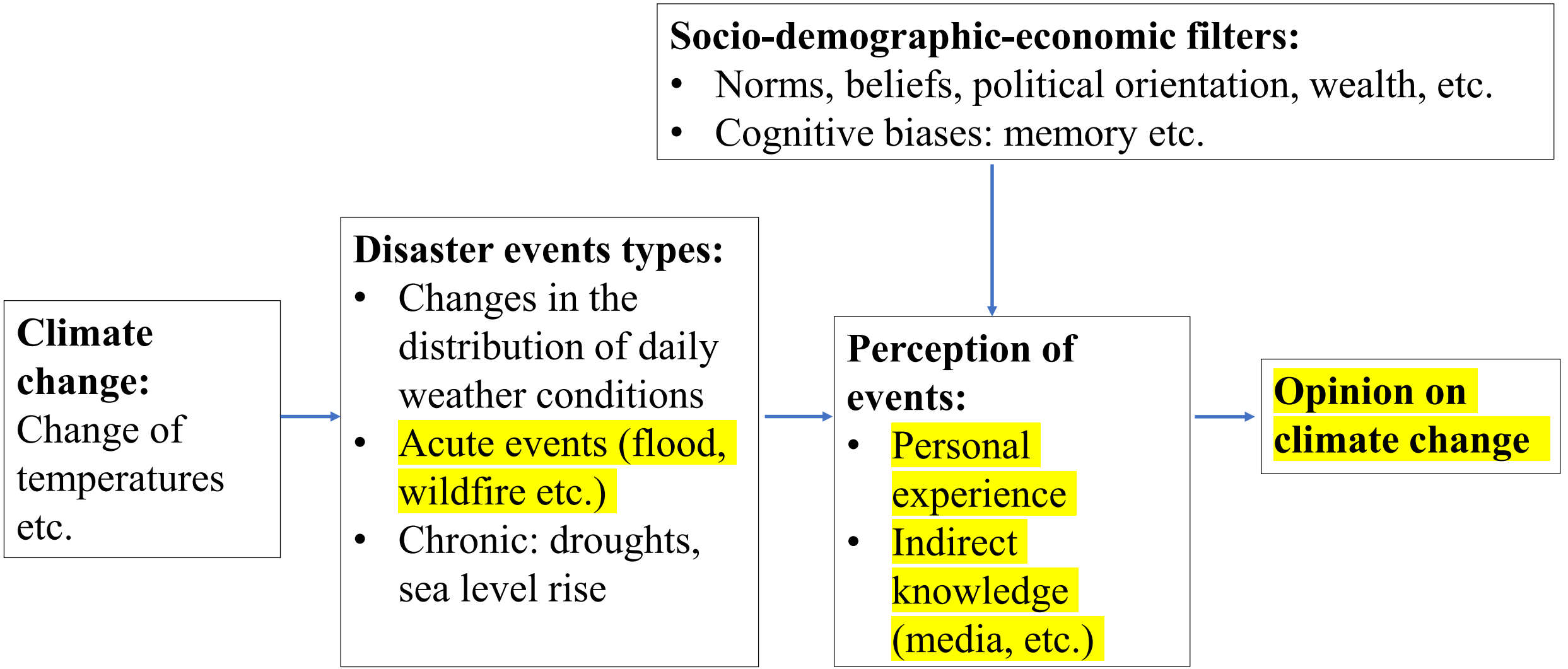
Interests (structural factors)

- Personal economic situation
- Group economic situation
- Political and social representation

The role of personal experience

- **J.Kingdon's thesis**
  - Willingness to accept a policy increases during a window of opportunity, a time after a focusing event
- A disaster results in a shift in public opinion
- Experience ~ interest

The conceptual model



Based on Howe (2021)

Literature review

Existing studies: Beliefs' impact on CC-related experience

- The relations between experience of weather events and beliefs regarding climate change are likely **filtered by prior beliefs** (Palm et al. 2017) (US citizens on CC)
- Individuals overweight evidence tilted towards their prior beliefs, providing evidence of **confirmation bias** (Zappala 2023) (droughts in Bangladesh)
- Perceptions of temperature related to social characteristics and situational variables (Ruddell et al. (2012) (self-reported perceptions of **regional and neighbourhood** temperatures in Arizona)

Existing studies: Impact of experience on beliefs (1)

Direct experience of flooding leads to an overall **increased salience of climate change** (Demski et al. 2017) (UK floods)

Personally experiencing unusual or extreme local weather did not shape people's awareness of climate change (Gaertner and Schoen 2021) (Panel survey data from German voters with weather data from 514 weather stations)

Those who report experience of flooding express **more concern over climate change** (Spence et al. 2011) (national survey data, the UK in 2010)

Existing studies: Impact of experience on beliefs (2)

- **Following an extreme weather event, life satisfaction is reduced**, the effect of storm & hail events is immediate, the floods effect persists longer (Möllendorff, Hirschfeld 2016) (representative panel data to study the effect of storm & hail events and floods on subjective well-being in the affected NUTS 3 regions)
- **Experienced seasonal temperature change influences personal climate change concerns** as well as the willingness to mitigate climate change, although with a weaker effect (Pfeifer, Otto 2023) (four yearly waves of a spatially explicit representative population survey in Germany and weather records)

Conlusions of literature review

- No agreement in the literature on experiencing extreme climatic/weather conditions impacts on peoples' opinion
- Studies vary conceptually and geographically

Data

Disaster events: EMDAT

EM-DAT: Global Database For Comprehensive Disaster Data

EM-DAT
The International Disaster Database
Centre for Research on the Epidemiology of Disasters

- EM-DAT is maintained by the Centre for Research on the Epidemiology of Disasters (CRED), part of the University of Louvain (UC Louvain), with the support of the United States Agency for International Development (USAID).
- EM-DAT compiles information on more than 26,000 global mass disasters from 1900.
- This database is sourced from various outlets, including UN agencies, non-governmental organisations, reinsurance companies, research institutes, and press agencies.
- The Centre for Research on the Epidemiology of Disasters (CRED) makes this data available for non-commercial purposes.
- Webpage: https://www.emdat.be/

EM-DAT: Data description

Definition of disaster:

A situation or event which overwhelms local capacity, necessitating a request to the national or international level for external assistance; an unforeseen and often sudden event that causes significant damage, destruction, and human suffering.

Inclusion criteria of disaster:

- At least ten deaths (including dead and missing);
- At least 100 affected (people affected, injured, or homeless);
- A call for international assistance or an emergency declaration;

Data limitations:

- **Time bias** resulting from unequal reporting quality and coverage over time by different institutions;
- **Hazard-related bias** resulting from unequal reporting quality and coverage for different hazard types;
- **Threshold bias** resulting from unequal reporting quality and coverage for disasters of various magnitudes;
- **Accounting bias** resulting from unequal reporting quality and coverage for other impact variables (i.e., total deaths, people affected, total damages / economic costs);
- **Geographic bias** resulting from unequal reporting quality and coverage worldwide;

EM-DAT: Disaster Classification System

EM-DAT: Content of the data

EM-DAT data model records disasters and maps their impacts at the country level:

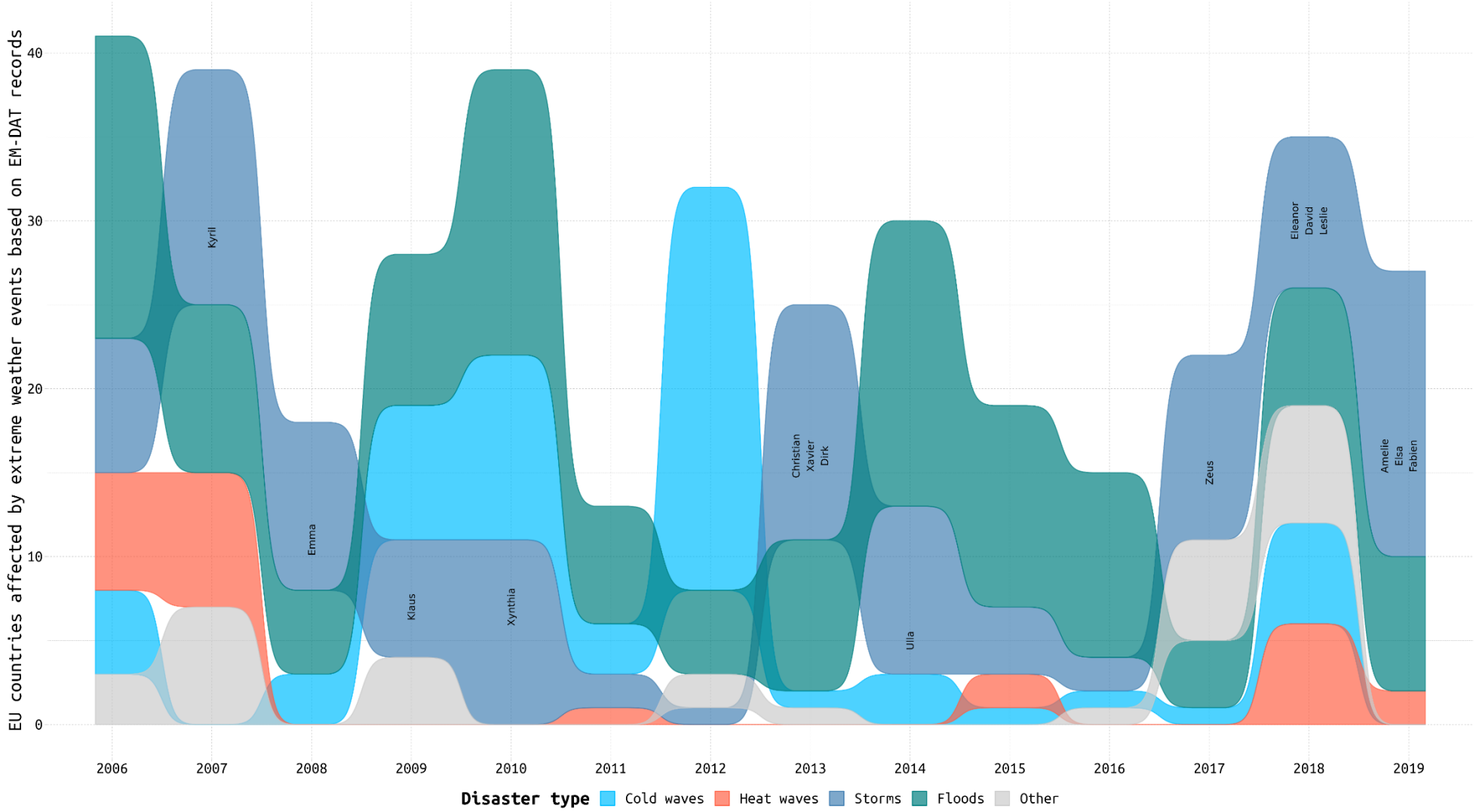
- Disaster ID
- Disaster Group and Subgroup
- Disaster type & associated disasters
- Event name
- Start\End: Year, Month, Day

- Spatial Information and Geocoding (ISO country; country name, subregion, region, location)

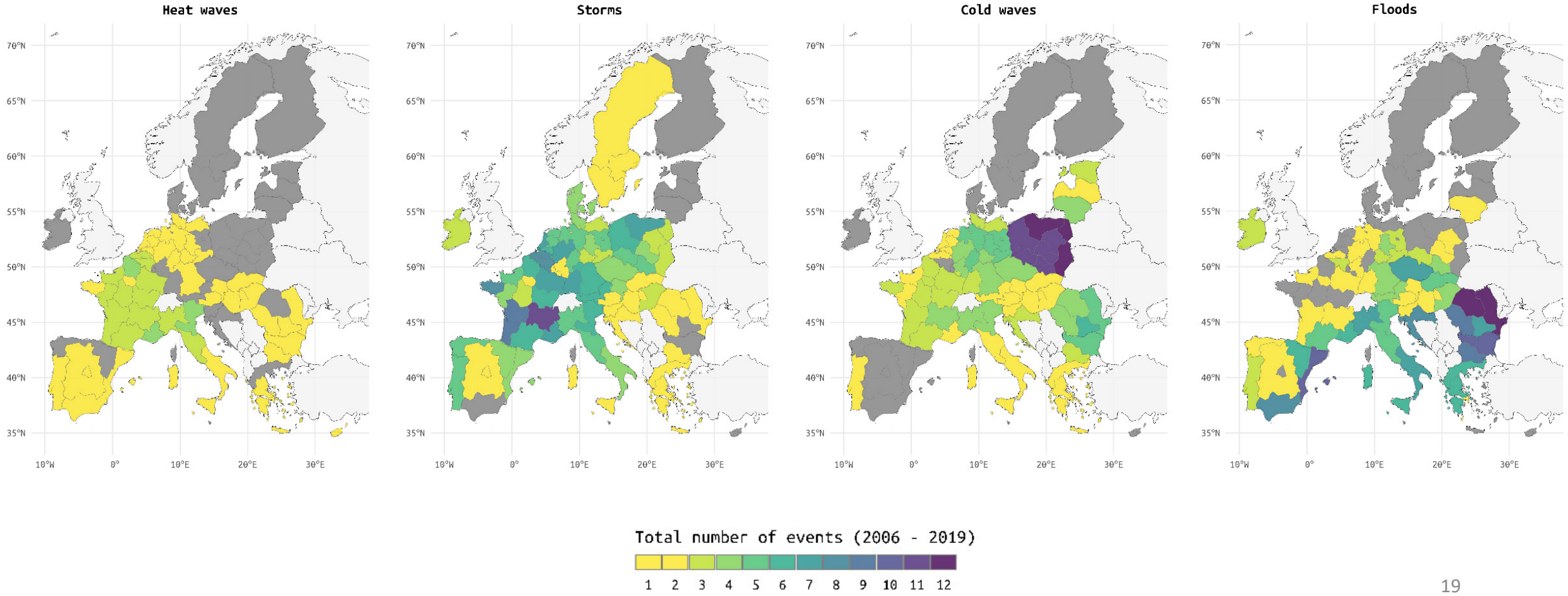
- Human impact variables (people affected and death toll)
- Economic impact variables (total economic damage, reconstruction costs, and insured damage)

- Sources of Information

EM-DAT: Hydrological, Meteorological and Climatological disasters in EU countries over time (2006 – 2019)

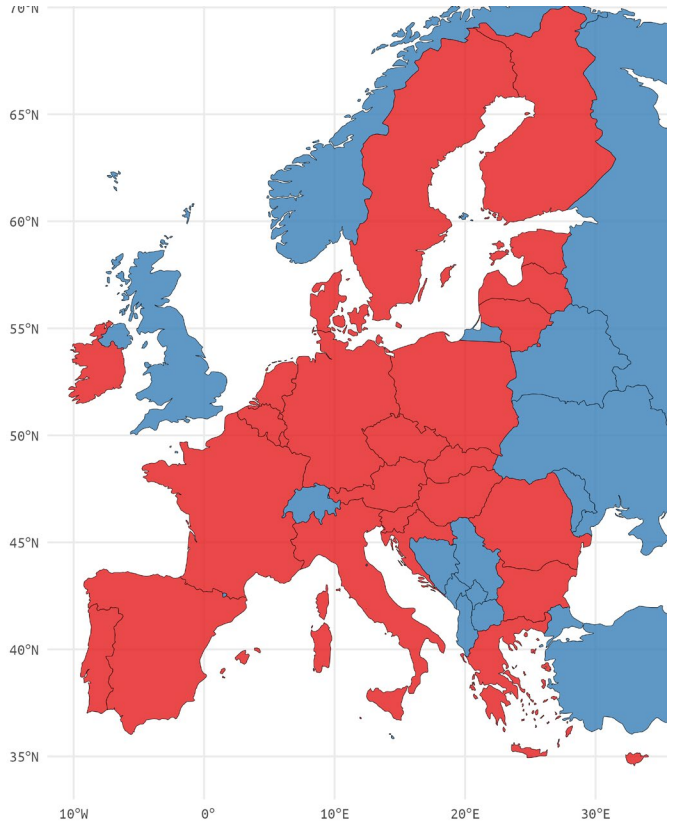


EM-DAT: Cumulative number of hydrological, meteorological and climatological disasters in EU NTS1 regions (2006 – 2019)



Public opinion data: EUROBAROMETER surveys

EUROBAROMETER



Eurobarometer surveys

Standard EB:

- Biannual cross-national surveys (spring/fall)
- Conducted on behalf of the EC since 1974
- Covers all EU member states and CCs
- Excludes the UK due to partial data unavailability

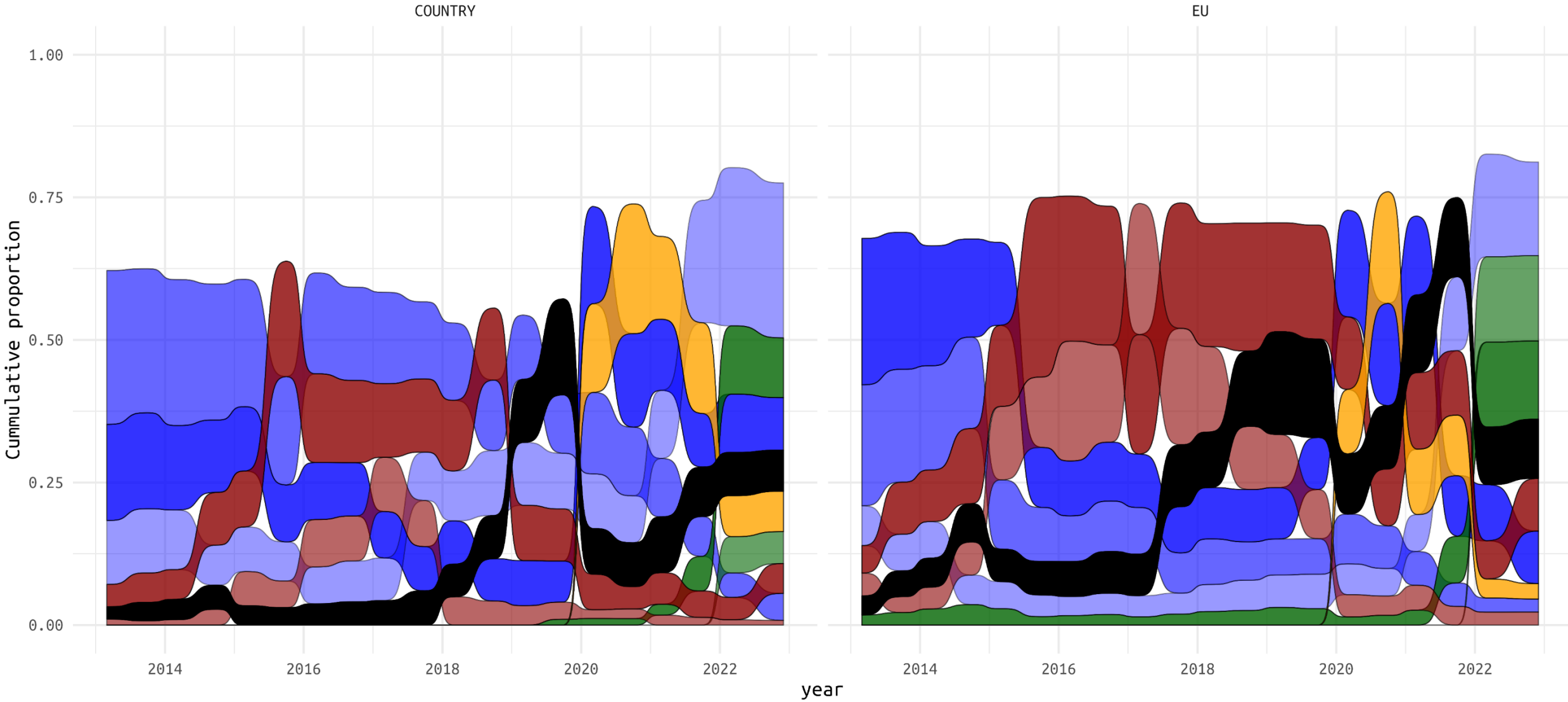
EB: most important issues

QA3a	What do you think are the two most important issues facing (OUR COUNTRY) at the moment?

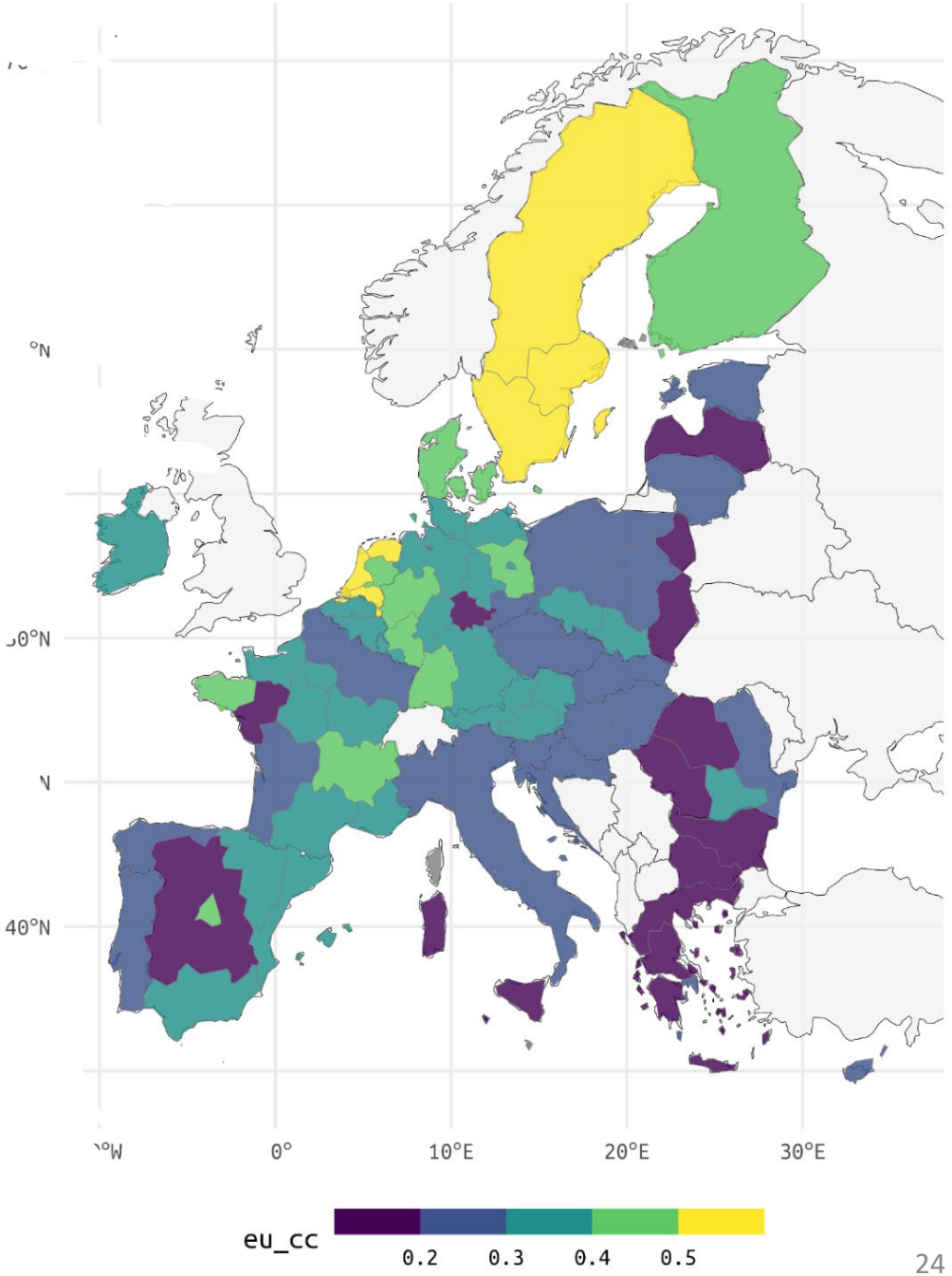
*?PipinInstruction19

Crime	1,
Economic situation	2,
Rising prices/ inflation/ cost of living	3,
Taxation	4,
Unemployment	5,
Terrorism	6,
Cyprus issue	15,
Housing	7,
Government debt	8,
Immigration	9,
Health	10,
The education system	11,
Pensions	12,
The environment and climate change	13,
Energy supply	14,
Other	996,
None	998,
Don't know	999,

- Standard EB question wording:
  - What do you think are the two most important issues facing (OUR COUNTRY) at the moment?
  - What do you think are the two most important issues facing the EU at the moment?
- Max 2 choices from open-ended lists
- Options: Evolve over time, differ between Country/EU,
- Consistently incorporated in Standard EBs since 2013
- A slightly different format employed in Special EBs


COUNTRY
EU
1.00
0.75
0.50
0.25
0.00
Cummulative proportion
2014
2016
2018
2020
2022
year
Issue
ECONOMIC SITUATION
UNEMPLOYMENT
INFLATION
ENERGY SUPPLY
INTERNATIONAL SITUATION
IMMIGRATION
TERRORISM
HEALTH
ENVIRONMENT OR CLIMATE CHANGE

Environment or climate change as an issue for the EU



Study:
Linking EMDAT with EUROBAROMETER

Assessing the potential impact of disaster exposure on climate-change perceptions

Multilevel hierarchical regression analysis (random intercept model & random slope model):

EB respondents (level 1) - nested within NTS1 regions (level 2) – nested within EU countries (level 3)

Dependent variable at level 1:

Respondent's perception of climate change (CC) as an important issue in the EU (EB data)

Explanatory variables at level 1:

Political orientation (left-right scale) (EB)
Gender, age, educational level, domicile (EB)

Explanatory variables at level 2:

Exposure to disaster weather conditions (STORMS or HEAT WAVES) in NTS1 regions (EM-DAT)
Log10 of GDP per capita in NTS1 regions (EUROSTAT)

Aim of analysis:

Test whether aggregated exposure to a) storms and b) heat waves in NTS1 regions explain between-regions diversity of average perception of CC as an important issue in the EU

Results (1) - impact of STORMS exposure on CC perceptions

	Null model		**Model 1**		**Model 2**		**Model 3**	
Predictors	*std. Beta*	*standardized std. Error*	*std. Beta*	*standardized std. Error*	*std. Beta*	*standardized std. Error*	*std. Beta*	*standardized std. Error*
(Intercept)	0.427 ***	0.049	0.429 ***	0.048	0.429 ***	0.041	0.428 ***	0.041
Storms			1.081 *	0.039	1.081 *	0.037	1.081 *	0.037
gdp log10					1.172 ***	0.052	1.165 ***	0.051
zleft right							0.908 ***	0.015
ICC	0.079		0.076		0.055		0.056	
N	77 NTS1		77 NTS1		77 NTS1		77 NTS1	
	21 isocntry		21 isocntry		21 isocntry		21 isocntry	
Observations	20308		20308		20308		20308	
Marginal R^2 / Conditional R^2	0.000 / 0.079		0.002 / 0.077		0.010 / 0.065		0.012 / 0.068	
AIC	24203.227		24200.694		24191.041		24156.920	
log-Likelihood	-12098.613		-12096.347		-12090.520		-12072.460	

** p<0.05 ** p<0.01 *** p<0.001*

Results (2) - impact of HEAT WAVES exposure on CC perceptions

	Null model		**Model 1**		**Model 2**		**Model 3**	
Predictors	*std. Beta*	*standardized std. Error*	*std. Beta*	*standardized std. Error*	*std. Beta*	*standardized std. Error*	*std. Beta*	*standardized std. Error*
(Intercept)	0.427 ***	0.049	0.389 ***	0.049	0.395 ***	0.041	0.394 ***	0.041
Heat waves			0.983	0.062	0.963	0.059	0.967	0.059
gdp log10					1.157 **	0.057	1.150 **	0.055
zleft right							0.907 ***	0.021
ICC	0.079		0.064		0.044		0.044	
N	77 NTS1		50 NTS1		50 NTS1		50 NTS1	
	21 isocntry		13 isocntry		13 isocntry		13 isocntry	
Observations	20308		11103		11103		11103	
Marginal R^2 / Conditional R^2	0.000 / 0.079		0.000 / 0.064		0.005 / 0.049		0.008 / 0.051	
AIC	24203.227		13074.294		13068.586		13051.266	
log-Likelihood	-12098.613		-6533.147		-6529.293		-6519.633	

** p<0.05 ** p<0.01 *** p<0.001*

Results

- We found weak significant impact of exposure to STORMS on the perception of CC as an important issue in the EU

- However, for the models assessing the impact of HEAT WAVES no significant relationship exist

- We confirmed results of previous studies demonstrating the significant role of economic conditions in shaping people's attitudes toward CC

- Our results indicates that political orientation plays a role affecting individual's perception of CC issues

Discussion

- Can policy makers rely on the „support” from extremes?
- Is public opinion deterministic?
- Does interdiscplinary approach (merging social science and natural science data) produce value added results?