- Climate change -
What can Canada expect?

Alain Bourque
Paul Kovacs

Sommet de Québec sur les changements climatiques

April 14, 2015

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Western Institute for Catastrophic Loss Reduction (ICLR)

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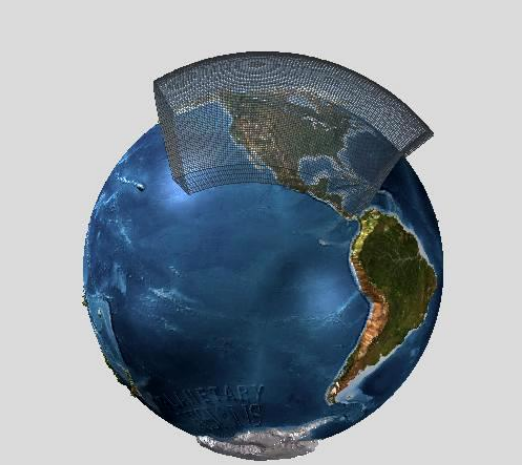
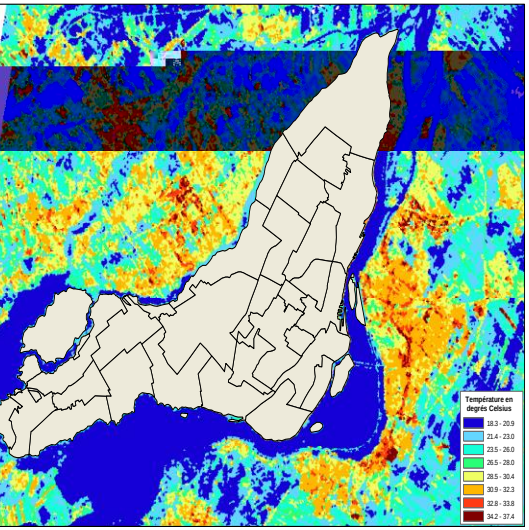




- Based in Montreal, created by members in 2002
- Critical mass of expertise to insure the development and coordination of interdisciplinary, applied and user driven R&D
- Innovation through collaborative research connected to decision making (policy, planning, operations)

1. A program in Climate science dedicated to climate scenarios and regional climate modeling (300km/45km/10km)

2. A multidisciplinary and multi-stakeholder program in Vulnerability, Impacts and Adaptation

- Water resources
- Built environment
- Maritime environment
- Northern Environment
- Ecosystems and biodiversity
- Forestry
- Agriculture
- Energy
- Health
- Tourism

Environnement Canada Environment Canada
Hydro Québec
Québec
ONTARIO POWER GENERATION
Université du Québec École de technologie supérieure
McGill
UQÀM Université du Québec à Montréal
INRS Université d'avant-garde
UNIVERSITÉ LAVAL
RioTintoAlcan
UQAR
Manitoba Hydro

Institute for Catastrophic Loss Reduction

Established in 1997 by Canada's insurers, based at Western University

Mission: Reduce the risk of loss of life and property damage due to severe weather and earthquakes

Champion for evidence-based adaptation and risk reduction based on multi-disciplinary research

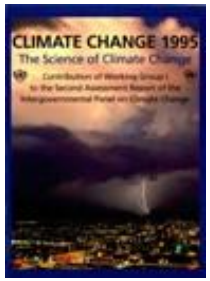
Programs focus on:

- Flood damage reduction tools for local gov'ts
- Building codes adapted for climate extremes
- Better protection for existing buildings

1988

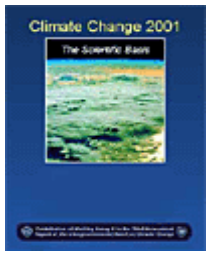
First assessment report (1990)

- The unequivocal detection of the enhanced greenhouse effect from observations **is not likely** for a decade or more.



Second assessment report (1995)

- Our ability to quantify the human influence on global climate is currently limited because the expected signal is still emerging from the noise of natural variability… Nevertheless, the ***balance of evidence*** suggests that there is a discernible human influence on global climate.

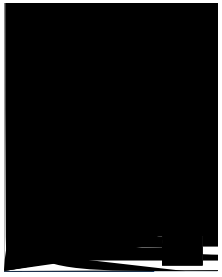


Third assessment report (2001)

- Most of the observed warming over the last 50 years is ***likely*** to have been due to the increase in greenhouse gas concentrations.

Fourth assessment report (2007)

- Most of the observed increase in global average temperatures since the mid-20th century is ***very likely*** due to the observed increase in anthropogenic greenhouse gas concentrations.



Fifth assessment report (2013)

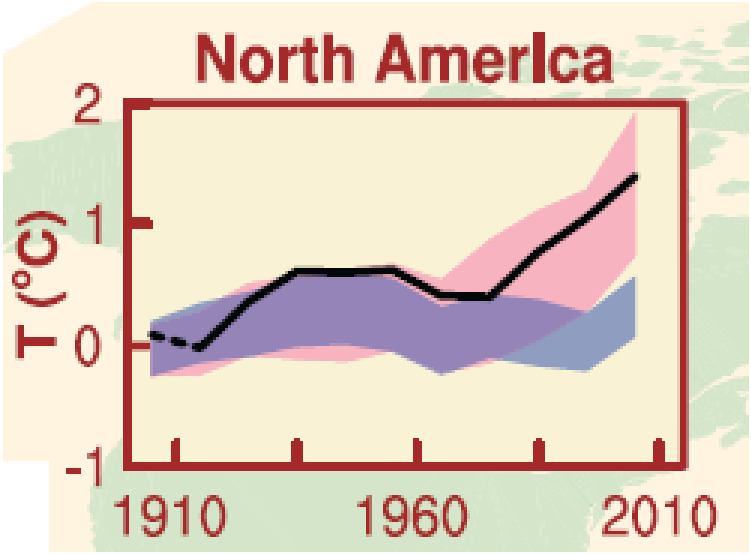
- It is ***extremely likely*** that human activities have caused more than half of the observed increase in global average surface temperature since 1950.

2020

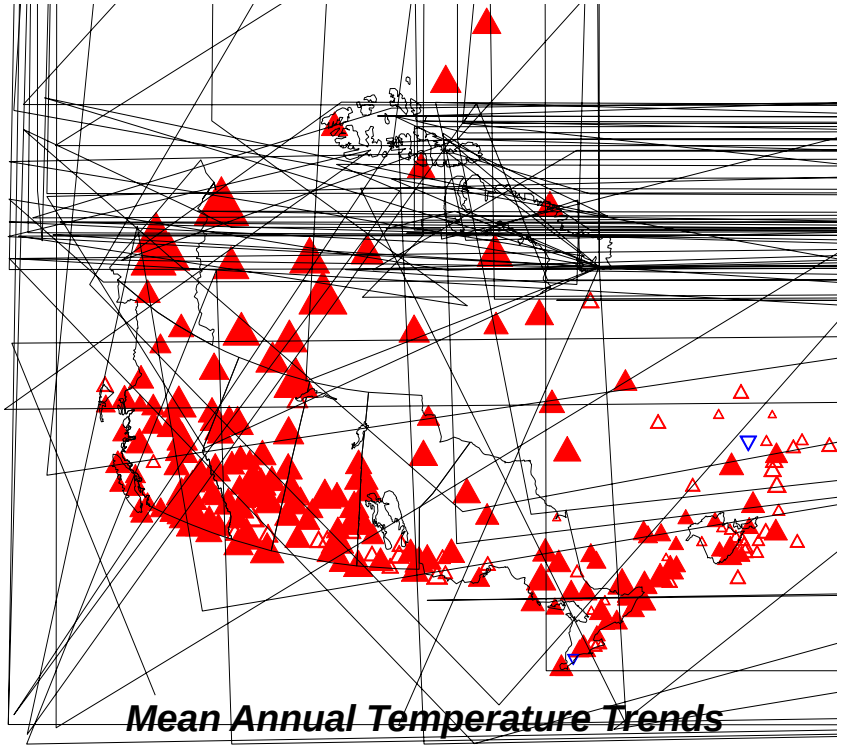
Canada's climate is changing

Canada has become warmer (1948-2013):

- Average temperature increased by 1.6˚ C (2X global)
- In Arctic, average temperature increased by 2.2˚ C (3X global)

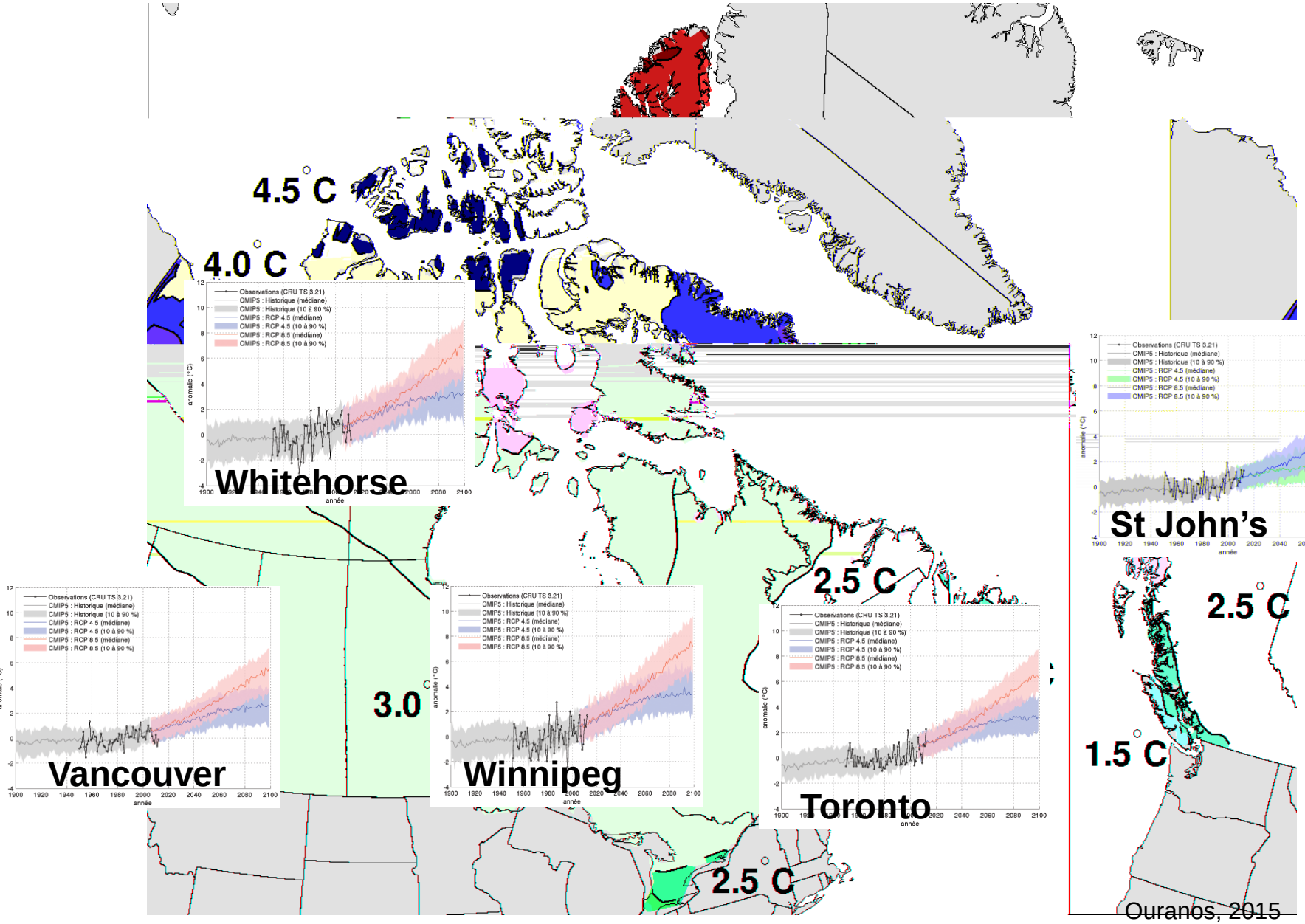


Temperature change with vs without GHG increases
Source: IPCC



Source: Environment Canada

Regional climate scenarios for 2050's



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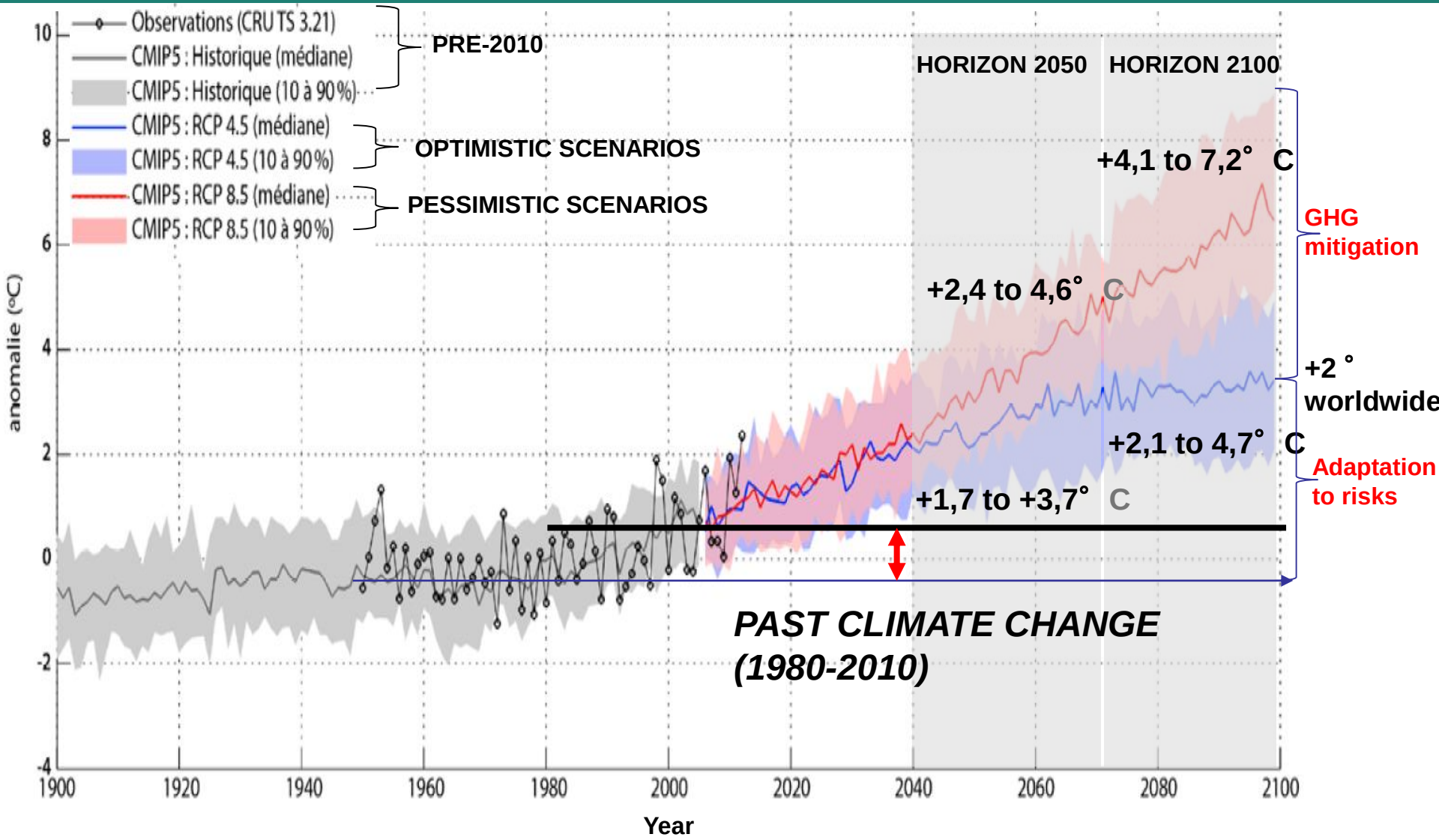
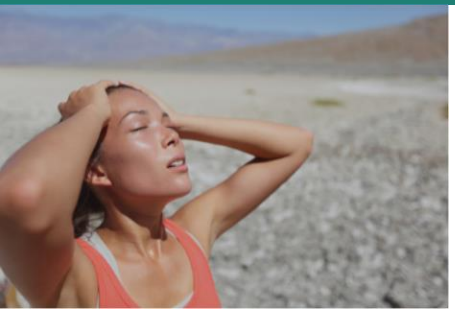
Trend for temperatures in Southern Quebec



Observed annual temperature anomaly trends for Southern Quebec (1950-2012) and simulated (1900- 2100) compared to 1971-2000 mean, for the past (gray) and the optimistic scenarios RCP4.5 (blue) and pessimistic RCP8.5 (red).

Ouranos, 2014

Impact of climate change on Canada



Canada will be warmer

- Increased risk of heat-health fatalities

Canada will be wetter (except when/where needed)

- Increased risk of flood damage

Canada will be stormier

- Increased risk of disruptions from disaster

Nature of impacts will vary by regions

- Increased risks will depend on preventive actions

1. Canada will be warmer

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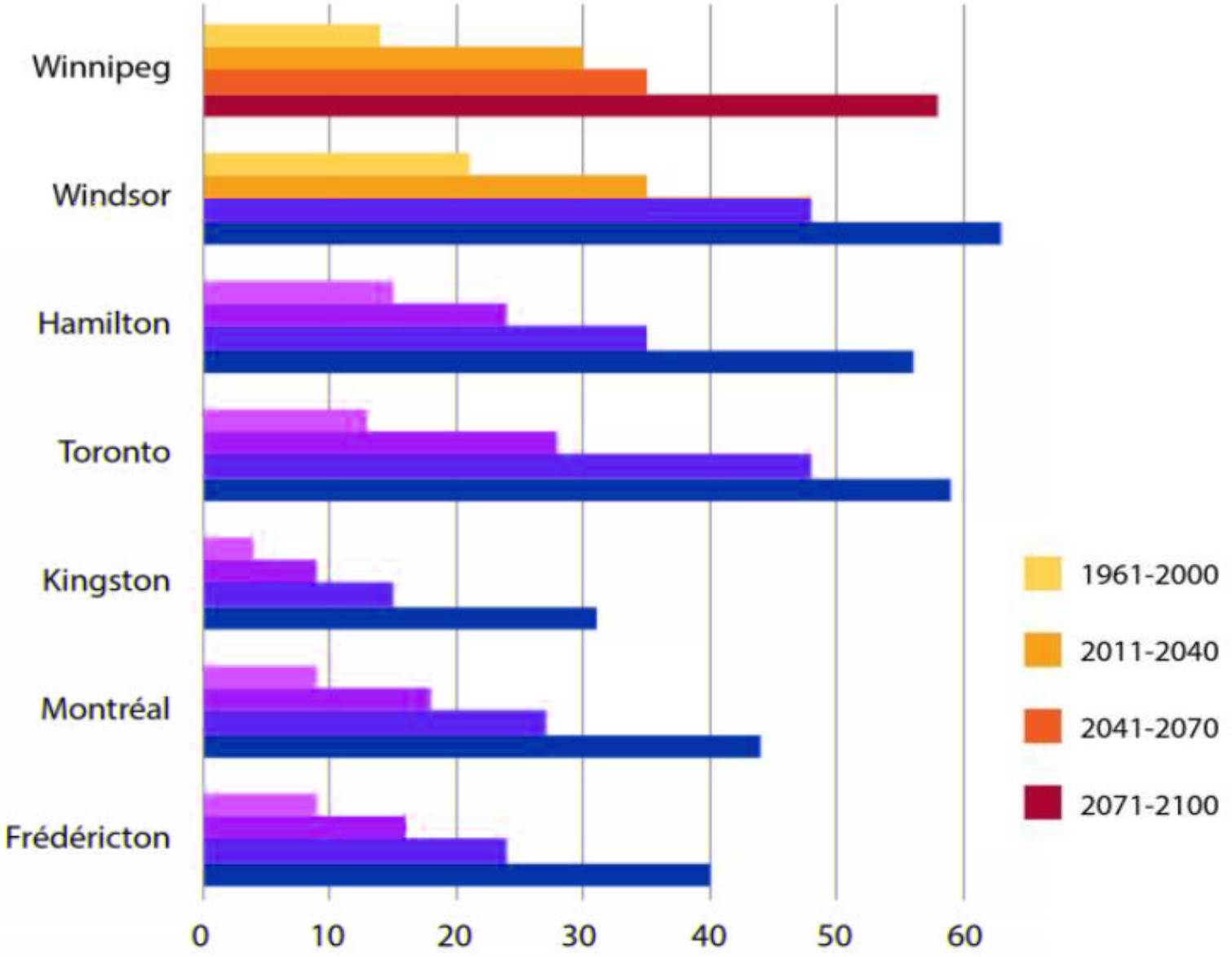
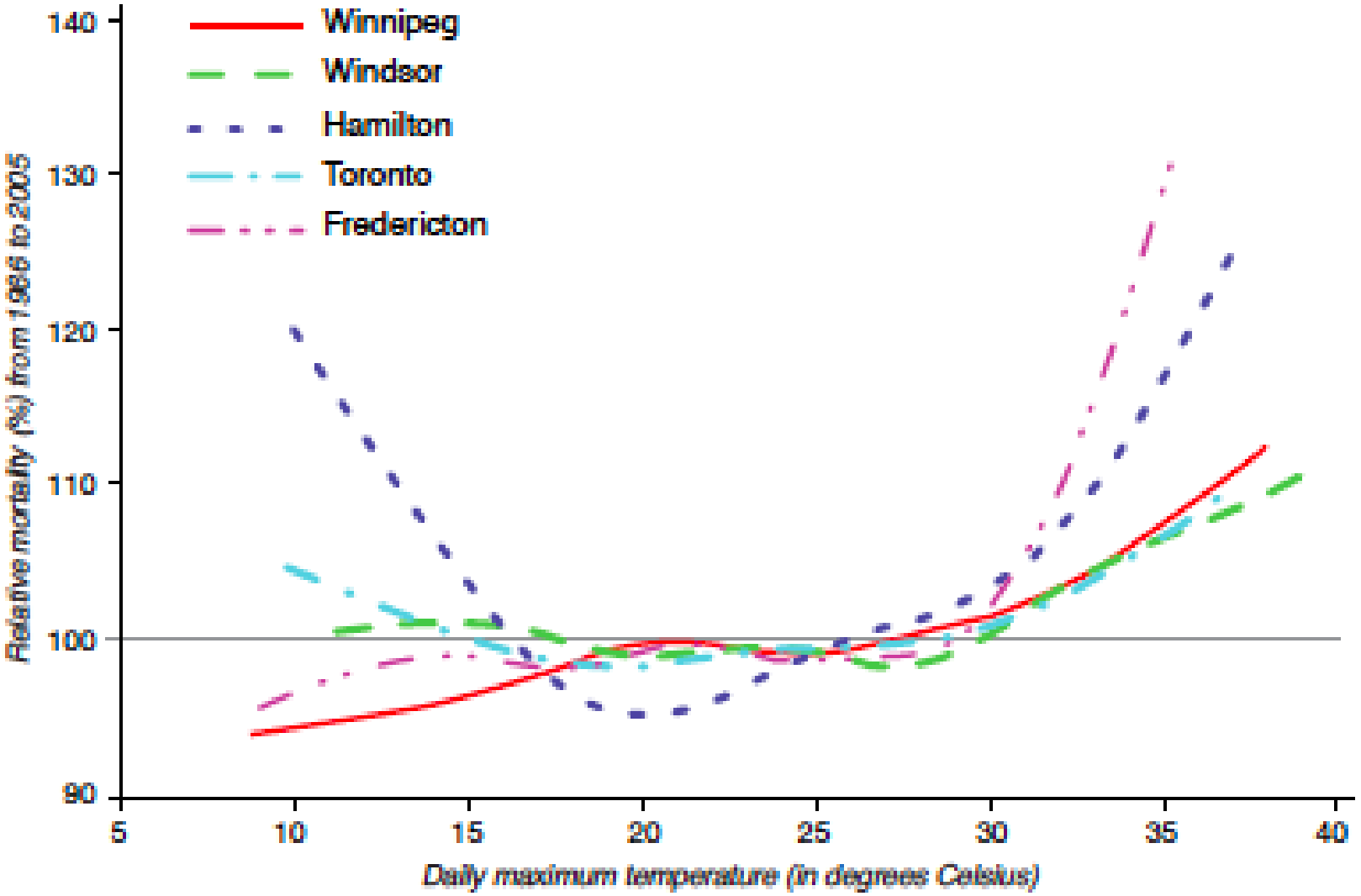
1. Number of hot days (>30°C)



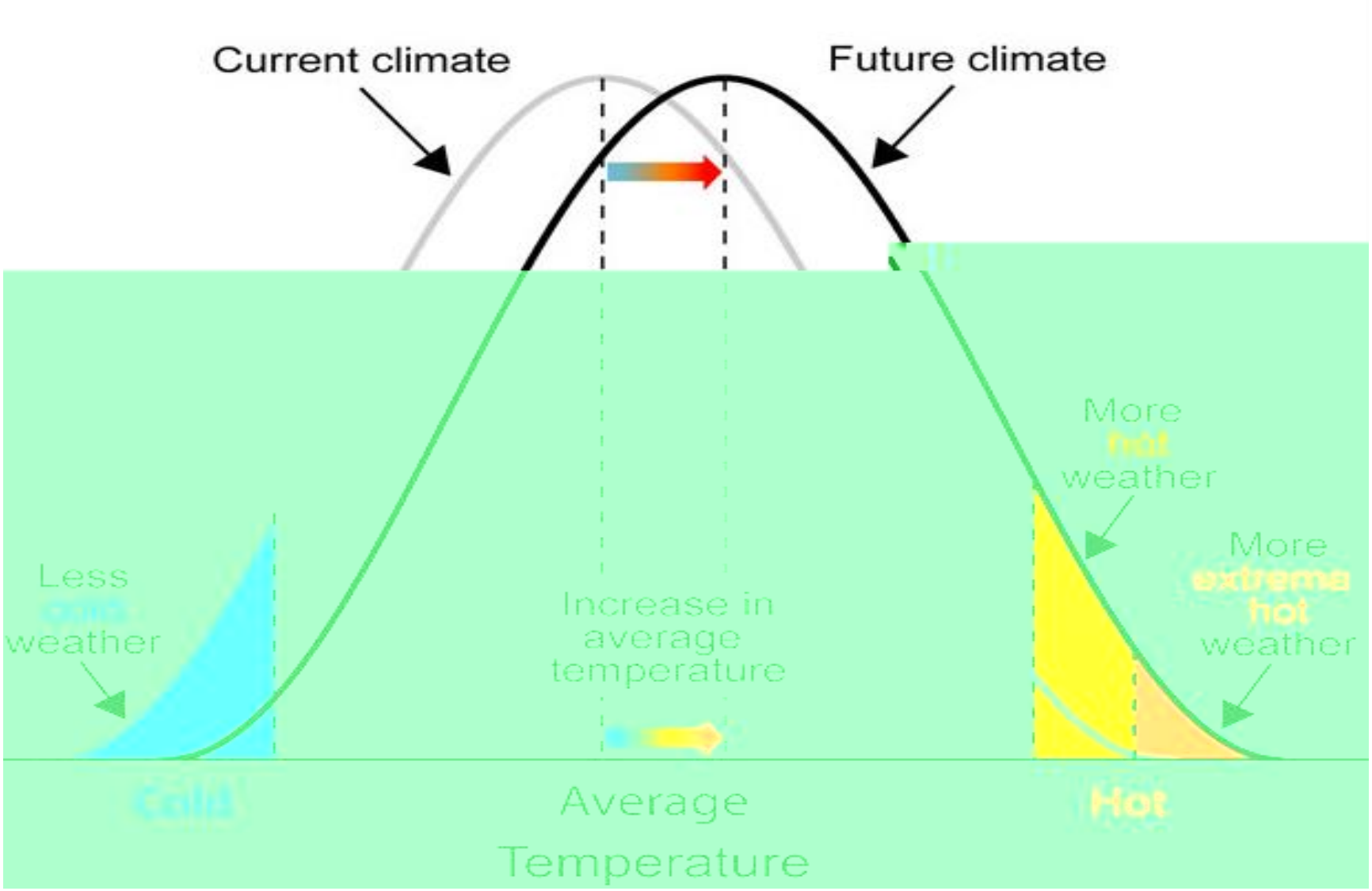
Casati and Yagouti (2013)

1. Greater risk of death in extreme heat



Casati and Yagouti (2013)

1. Greater risk of extreme heat incidents



2. Canada will be wetter *(except when/where most needed)*

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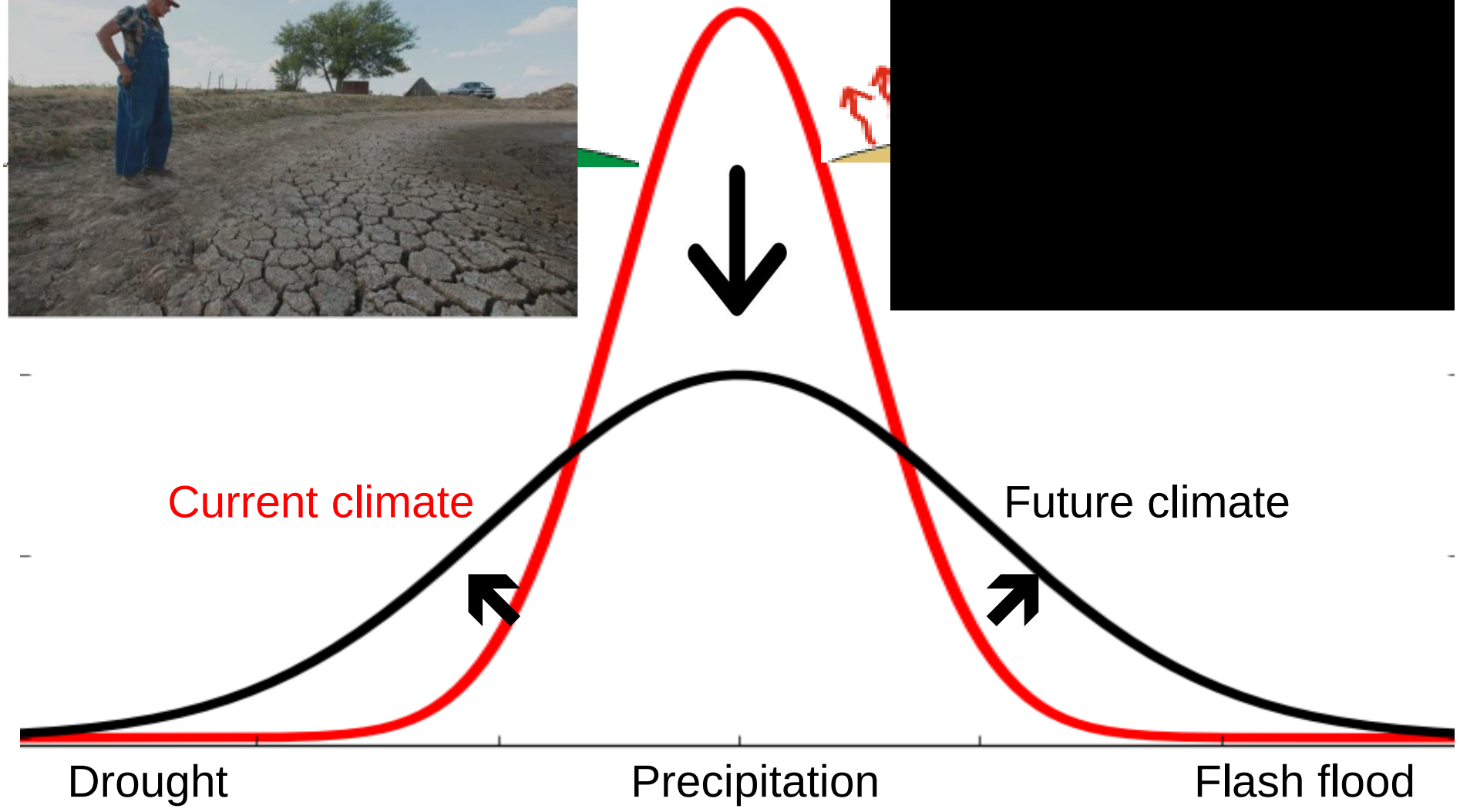
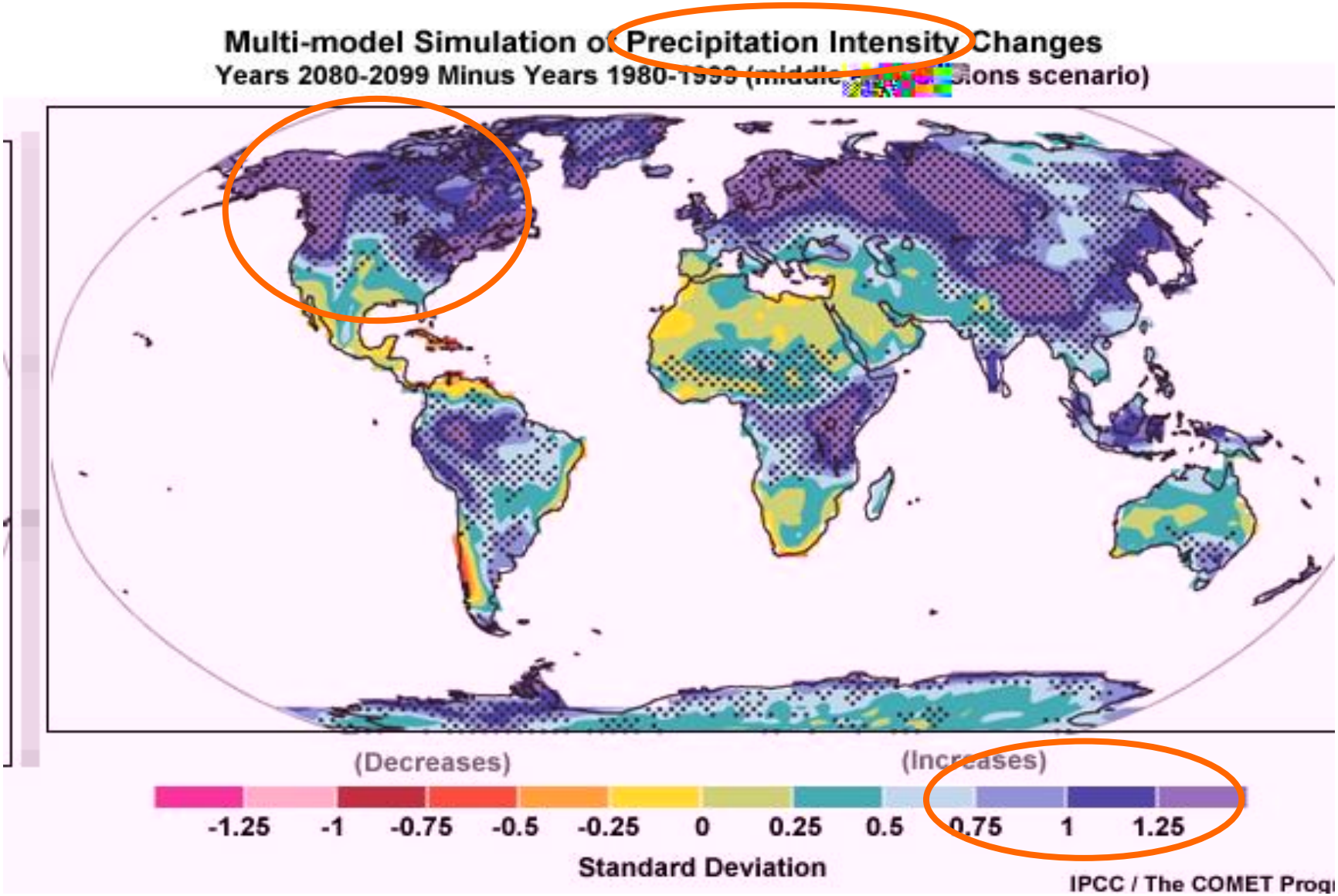
2. Greater risk of extreme rainfall and drought

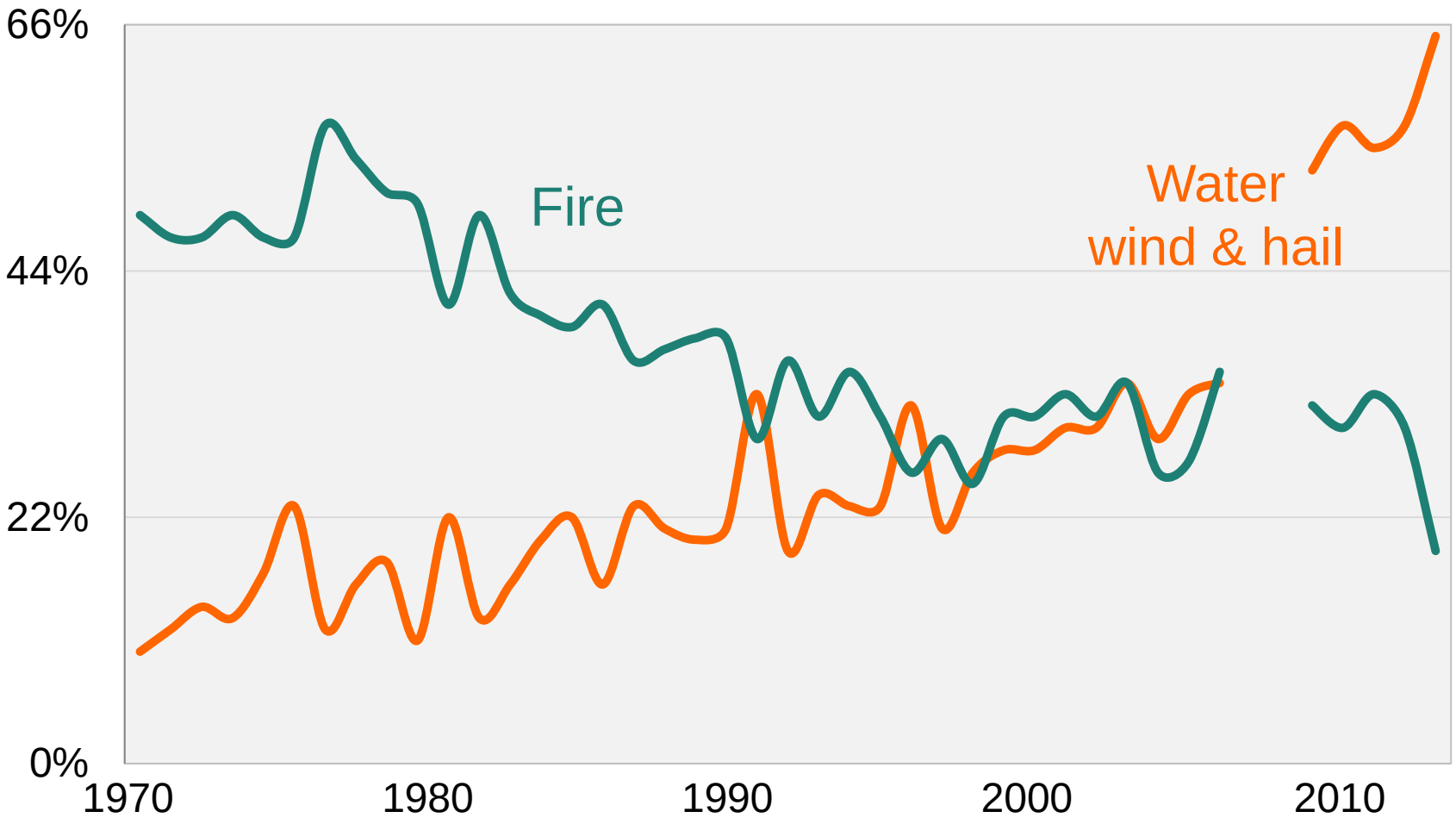


2. More extreme rainfall



2. Water damage to homes is increasing

Share of insurance property claims incurred, Canada



Institute for Catastrophic Loss Reduction

3. Canada will be stormier

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3. More large storms

Winter storms

- Ice storms shift North

Hurricanes

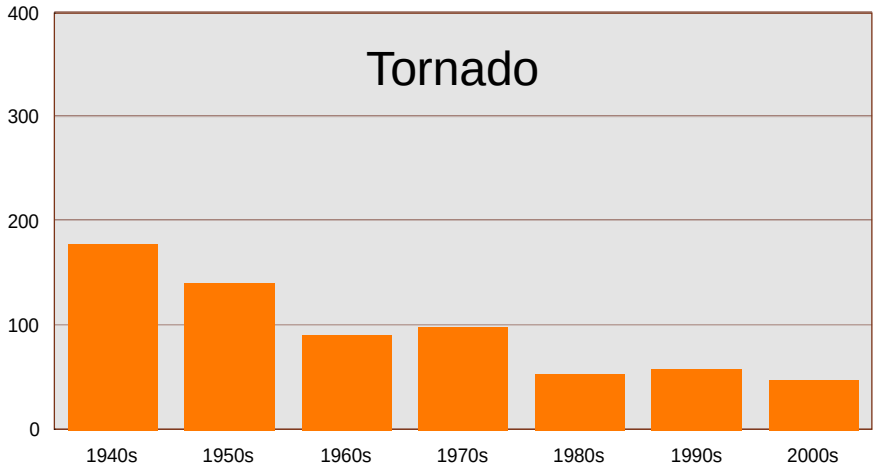
- More large hurricanes

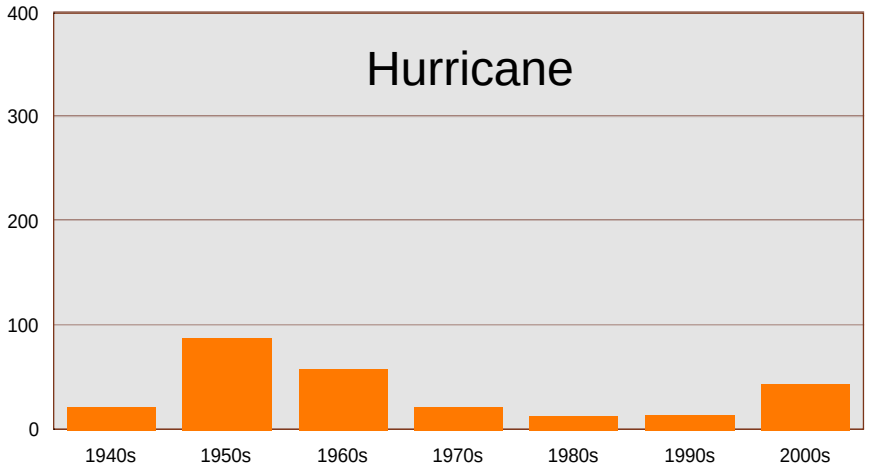
Tornadoes and hail

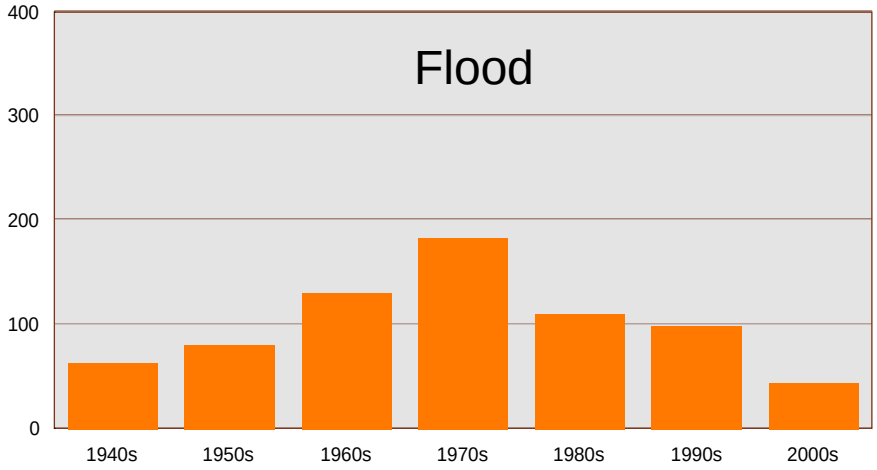
- Likely increase

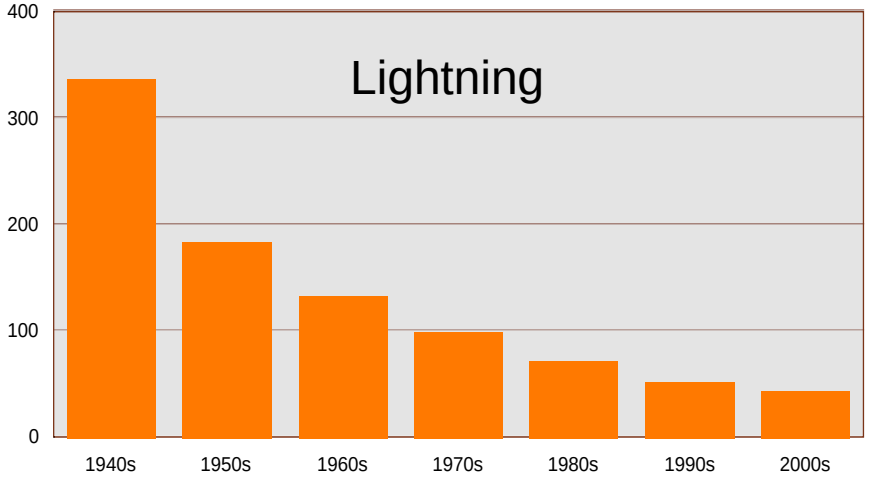
3. Storm fatalities have been falling

Annual average number of accidental deaths, United States









NOAA Natural Hazard Statistics

3. More disruptions from disasters

4. Nature of impacts will vary by region

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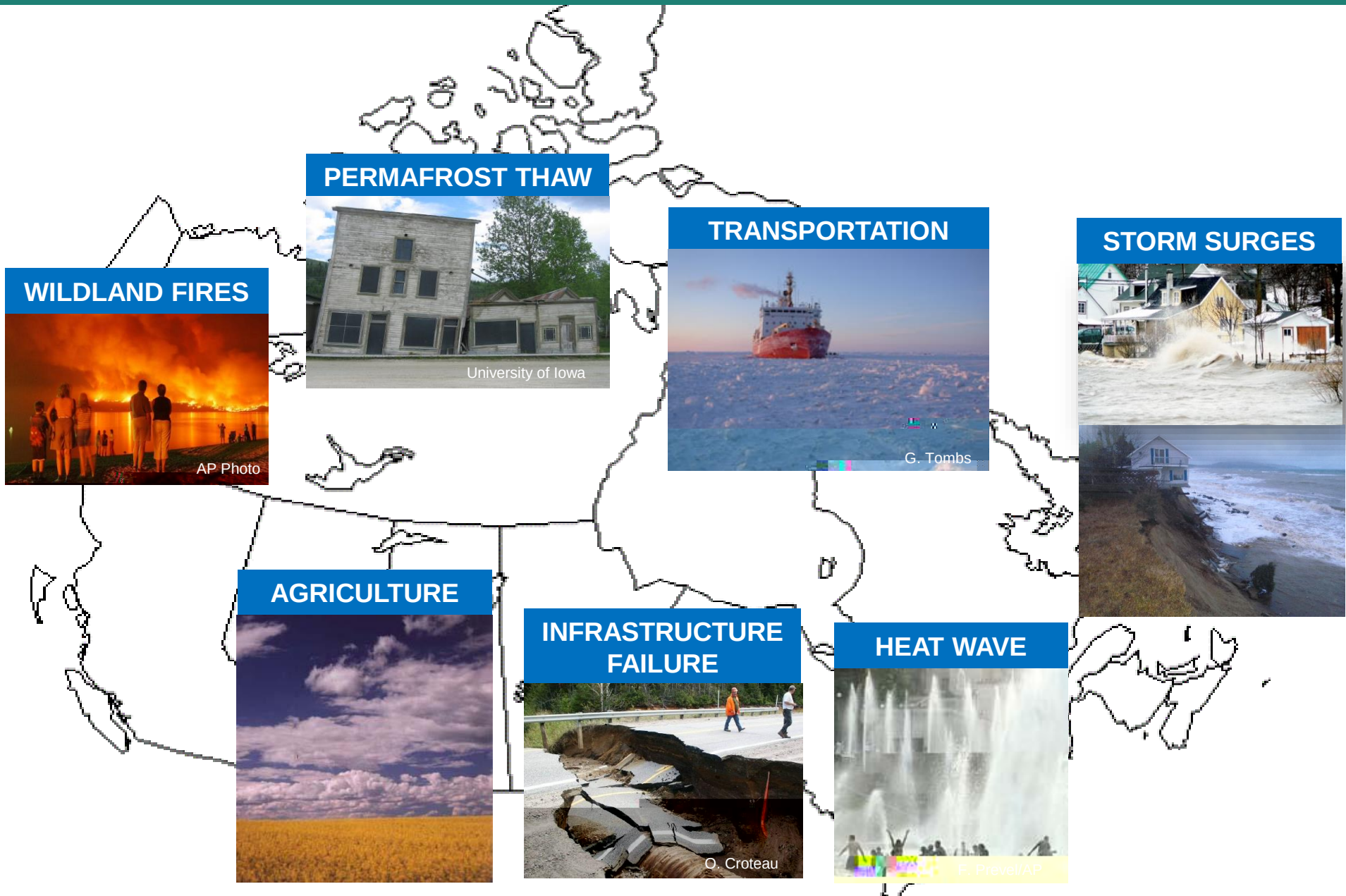
4. Regional impact of climate change



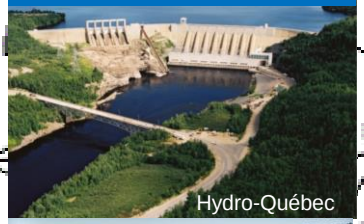
4. Regional impact of climate change

ECOSYSTEMS

FOREST

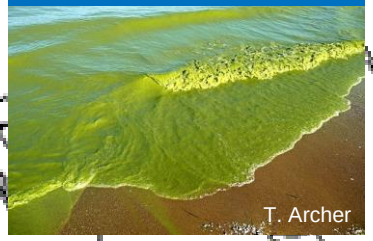
AQUATIC RESOURCES

WATER AVAILABILITY

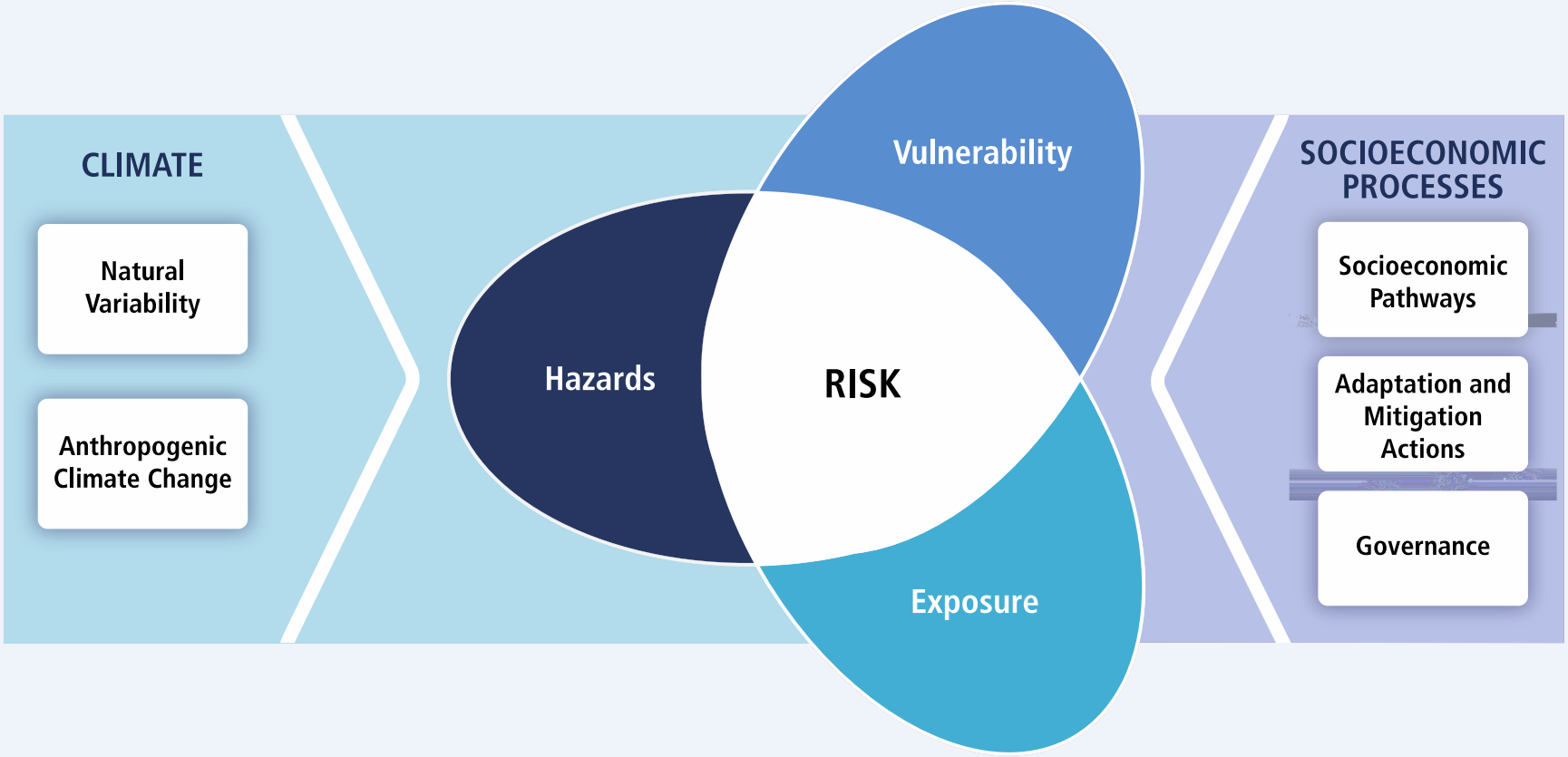


WATER AVAILABILITY

WATER QUALITY



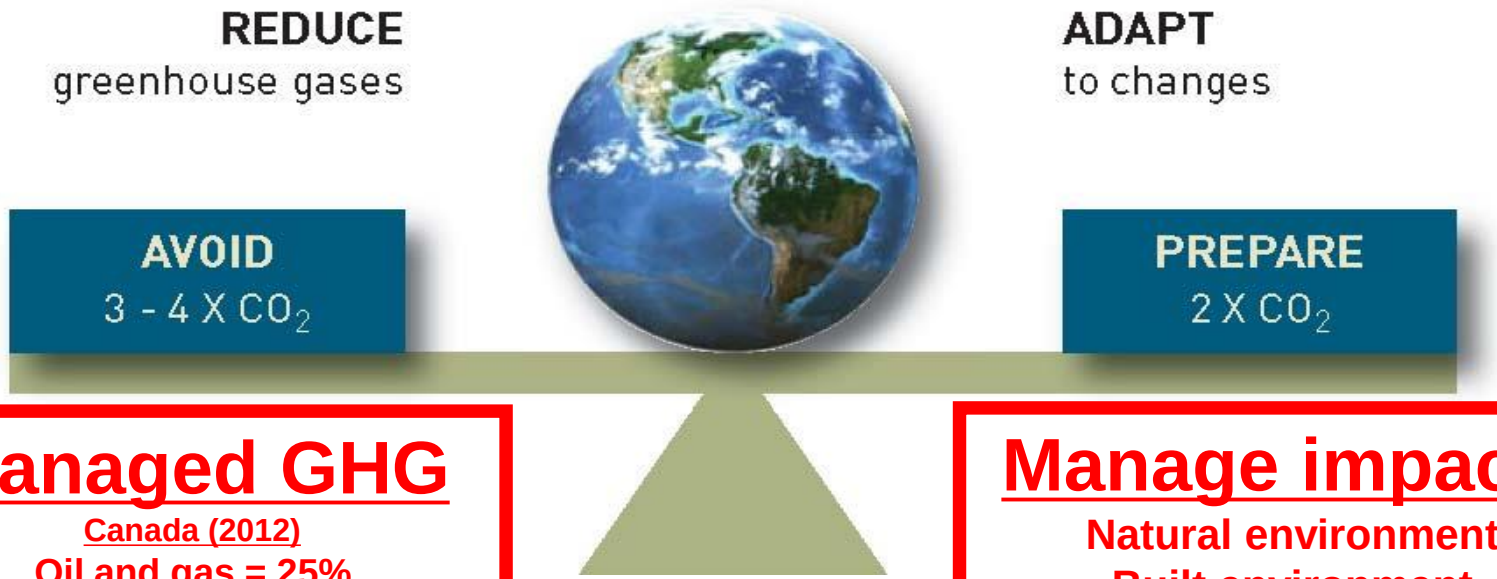
Risk management can reduce the impact



IPCC Advice for Governments

A COMPLEMENTARY APPROACH

INTERNATIONAL COMMITMENTS | **NATIONAL NEEDS**



Managed GHG

Canada (2012)

Oil and gas = 25%
Transportation = 24%
Electricity = 12%
Buildings = 11%
Agriculture = 10%

Manage impacts

Natural environment
Built environment
Public health and safety
Socio-economic activities

We must adapt to…

STAY COOL
WINDSOR-ESSEX

DRAFT
HEAT ALERT AND RESPONSE PLAN

… protect health

- Establish local response plans
- Invest in risk reduction
- Plant trees, swimming pools, drinking fountains

… build resilience

- Rebuild our storm and sanitary sewers
- Green and safe standards for new developments
- Managing risks with better costs/benefits

Manitoba wildlands

… reduce disruption

- Plan for more disaster response
- Build back better
- Invest in resilience

- Climate change -
What can Canada expect?

Canada will be warmer, wetter and stormier

We have means to avoid most irreversible impacts

Some impacts can be offset or managed by adaptation

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