



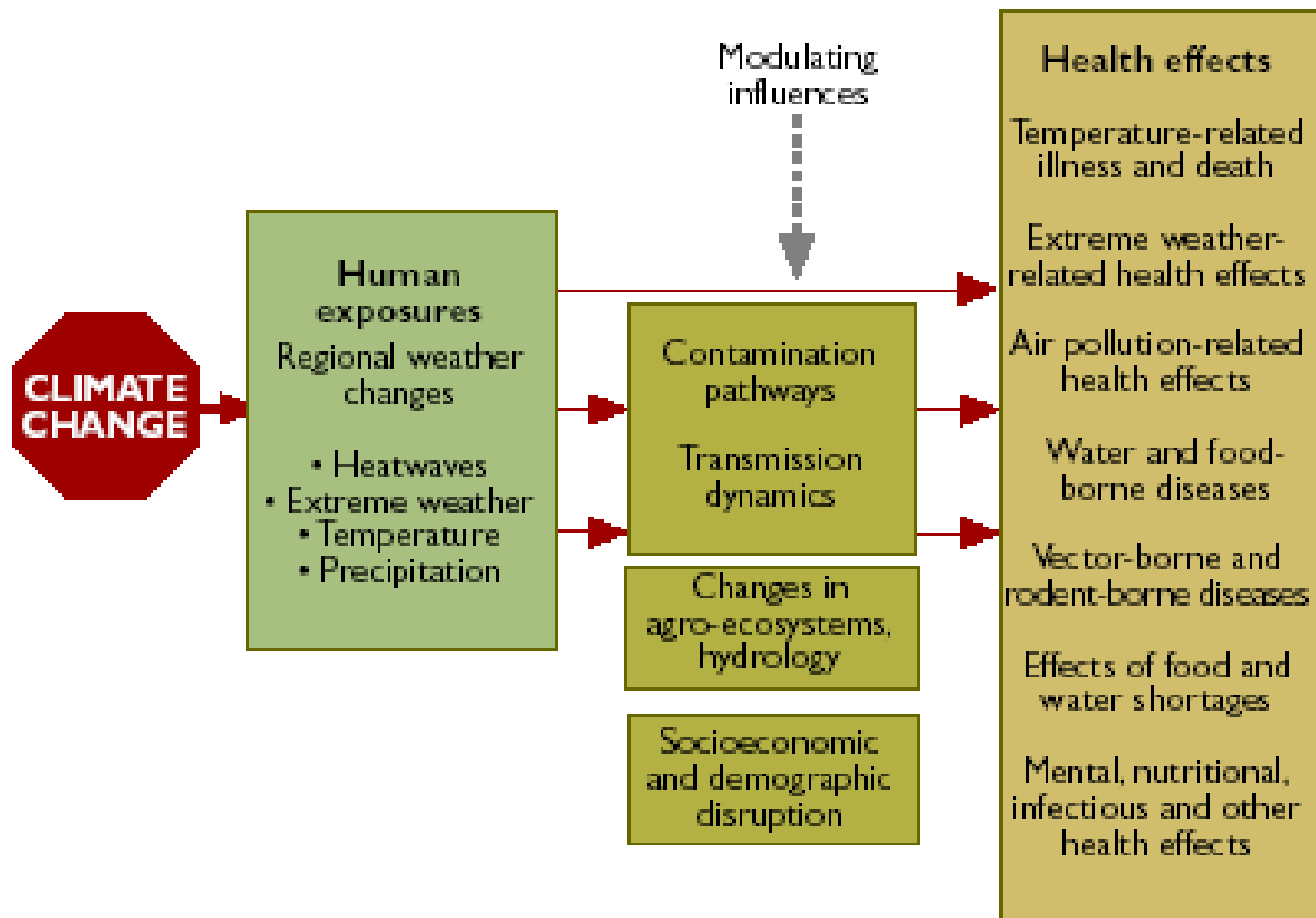
Climate change and health

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WHO

Regional Office for Europe

Figure 3.1. Pathways by which climate change affects human health (modified from reference 2)



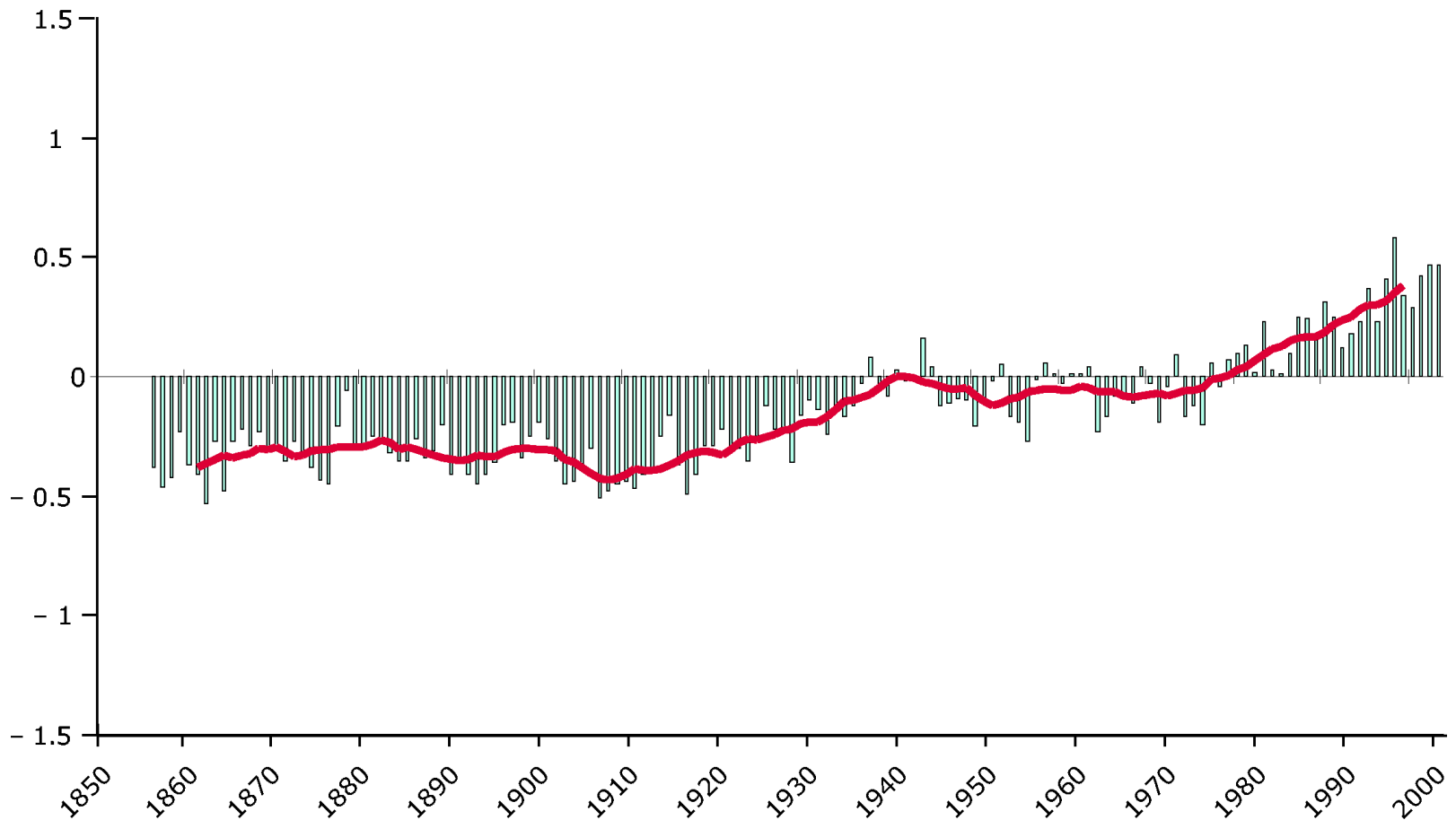
Source: WHO, WMO, UNEP: Climate Change and Human Health – Risks and Responses; Summary; 2003

Content

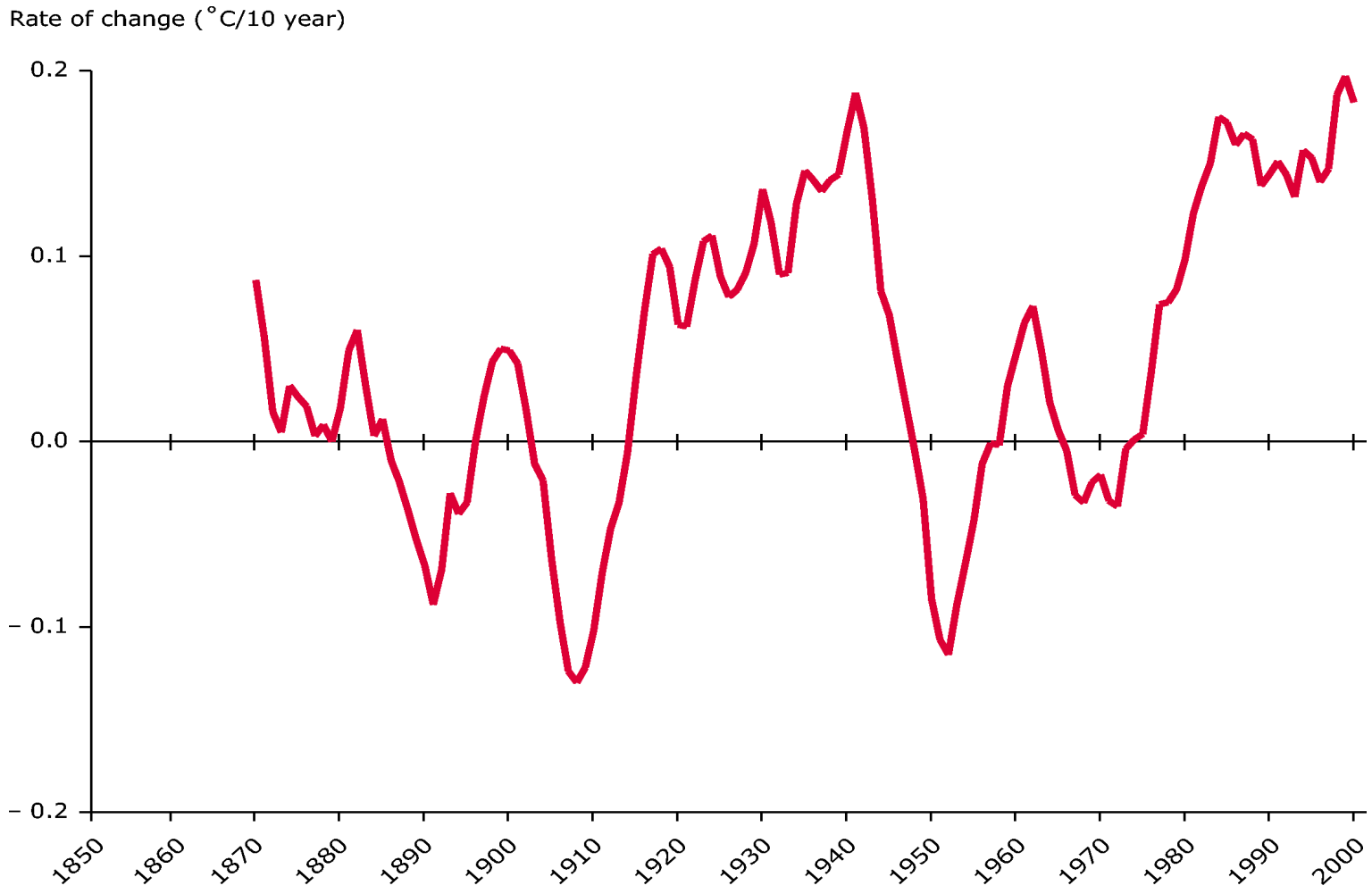
- What are the observed climatic changes?
- Has population health been affected?
- What are future potential changes,
- and How could health be affected?
- What actions are needed?

Temperature deviation, compared to 1961-1990 averages

Temperature deviation, compared to 1961-1990 average (°C)

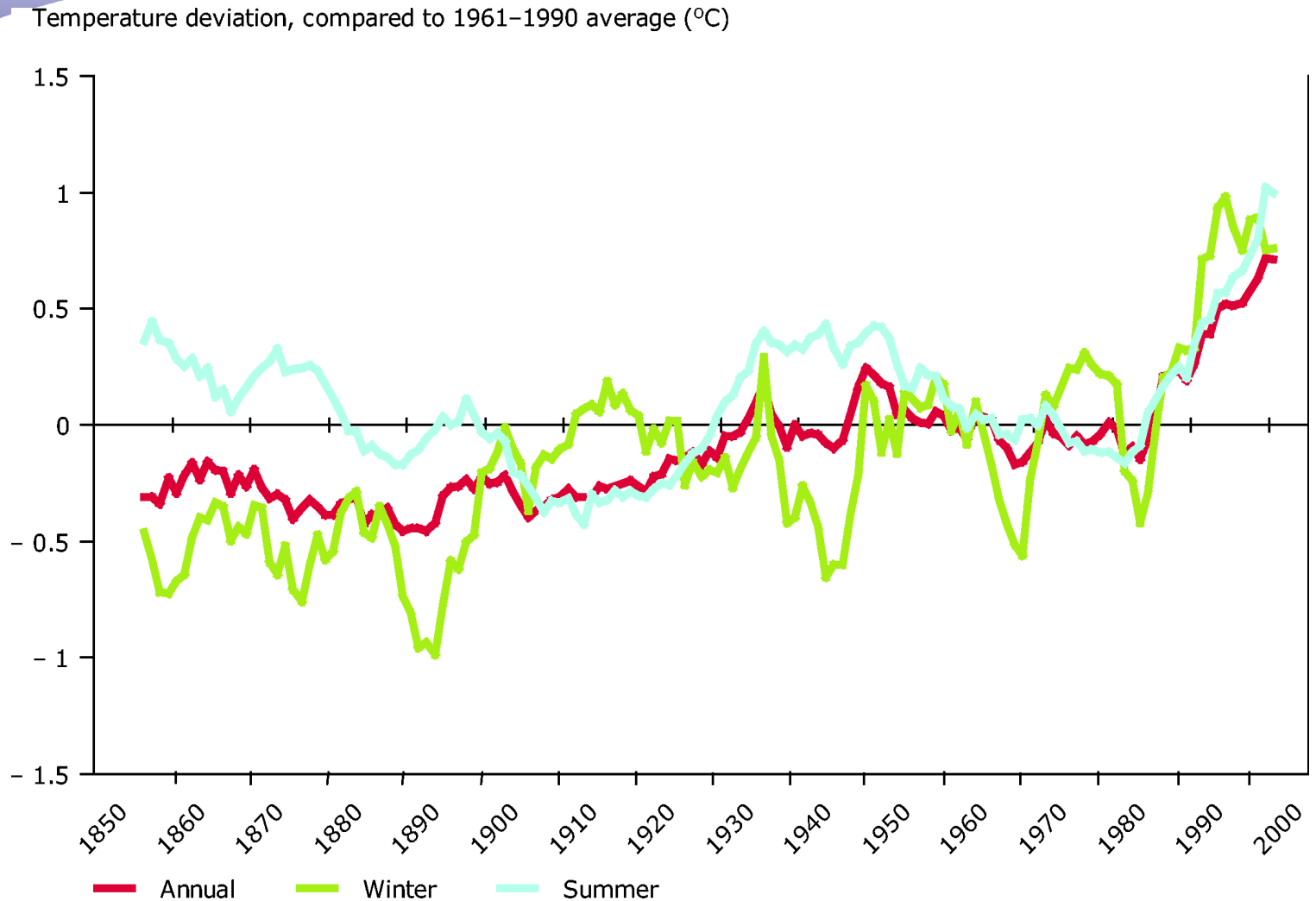


Rate of change since 1850

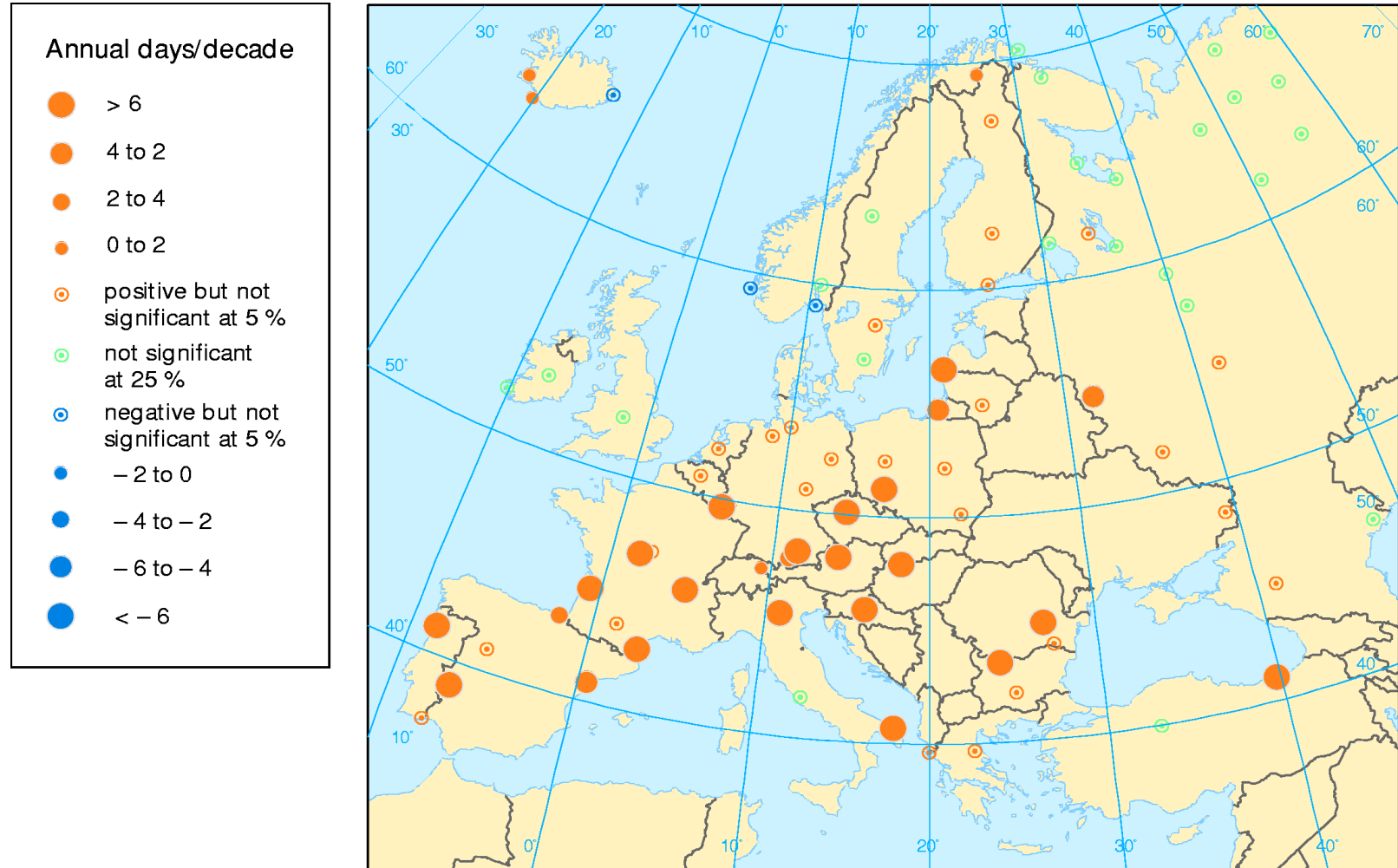


Source : KNMI 2005

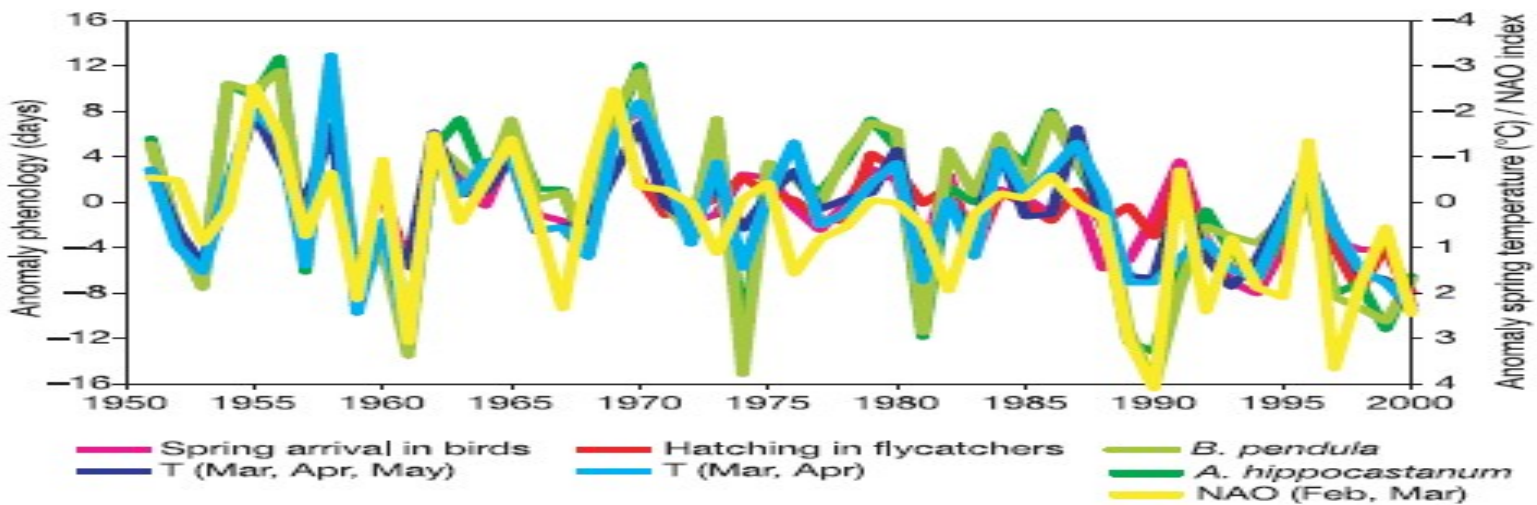
What is the trend and rate of change in the European annual and seasonal temperature?



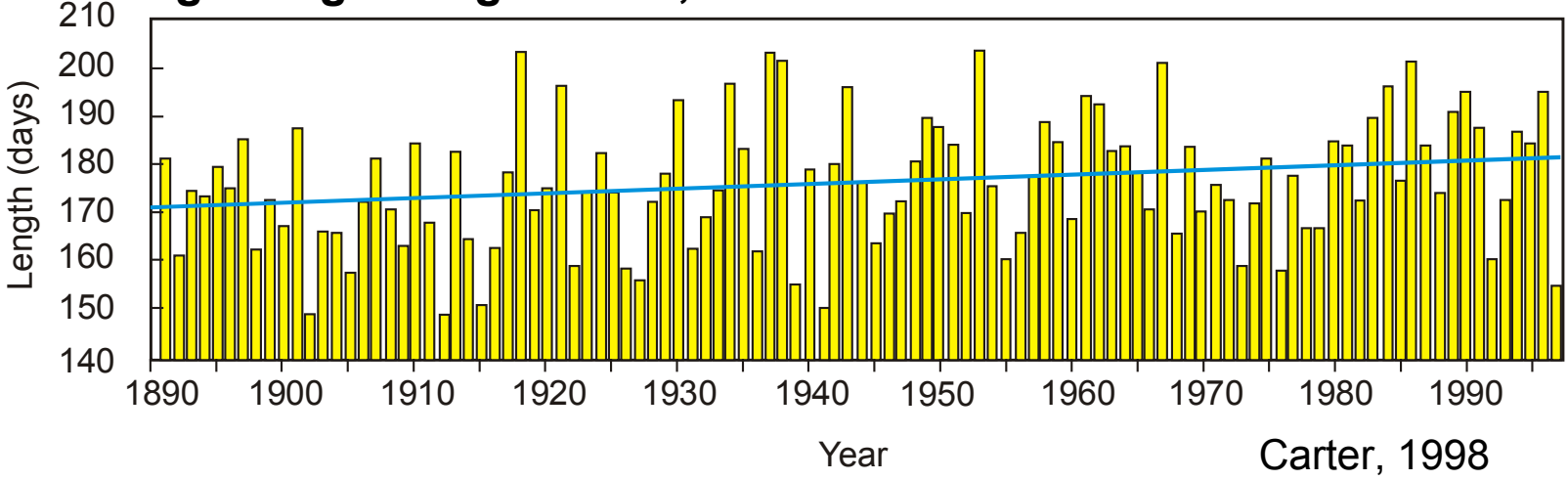
Change in frequency of days with temperatures above 25°C in Europe, in the period 1976-1999



Lengths and start of growing season



Length of growing season, Finland



Similar patterns in other biological systems

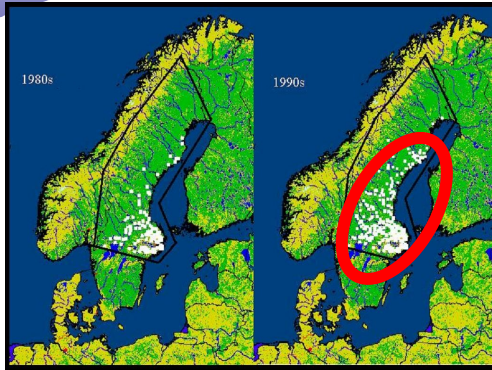
- Northward movement of range of plankton and fish in Northsea;
- Upward shift of the tree line in mountains,
- Invasion of *laurophyllous* evergreen species in forests and upward shift of pine mistletoe in Alps;
- Disappearance of palsa mires in Lapland ;
- Increased species richness and frequency at altitudinal margin of plant life in Fennoscandia;
- Change in high mountain vegetation types and new occurrence of alpine vegetation on high summits in high mountain;
- Increased in growing season wine-grape and changes in wine quality in France;
- Advance in the beginning of growing season for fruit trees in Germany;
- Decrease in thickness and areal extent of permafrost in Northern Russia.

Evidence is growing that climate change is already affecting health



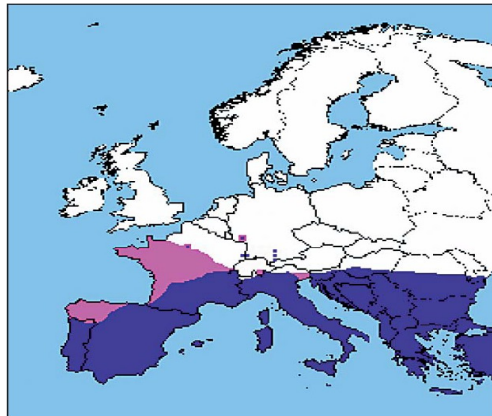
Photo is part of the cover of the book "Climate Change and Adaptation Strategies for Human Health"

Species in higher latitudes or altitudes



Spread of *Ixodes ricinus* was observed in higher

- latitudes (Sweden: milder winters, early arrival of springs)(Lindgren et al)
- altitudes (the Czech Republic: shift from 700 to 1,100 m) (Daniel et al, 2003)



Leishmania

- New endemic areas have been detected in northern Italy, North Croatia, Switzerland and Germany.(Lindgren and Naucke, 2005)

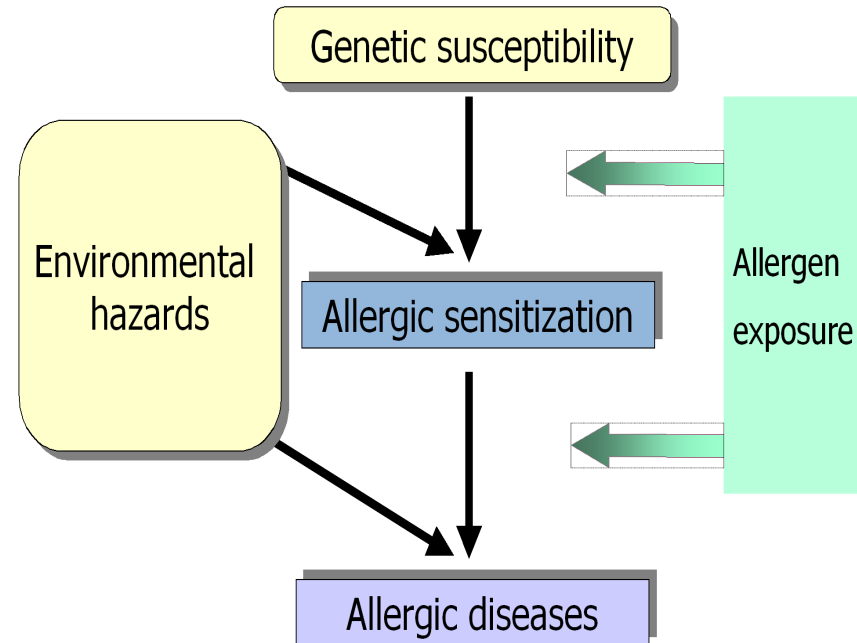
Earlier start of pollen season

In Europe the pollen season is expanding: on average it has increased by 10–11 days over the last 30 years (Menzel, 2001).

An earlier onset followed by a prolonged exposure implies a longer and possibly heavier period of symptom occurrence;

The introduction of new aeroallergens into an area, increases sensitization;

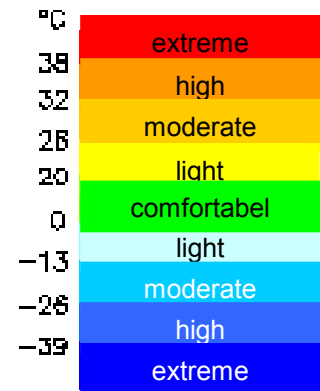
The introduction of **new invasive plant species** with high allergenic pollen, in particular ragweed (*Ambrosia artemisiifolia*), present important risks to human health.



The risk of dying in heat is increasing

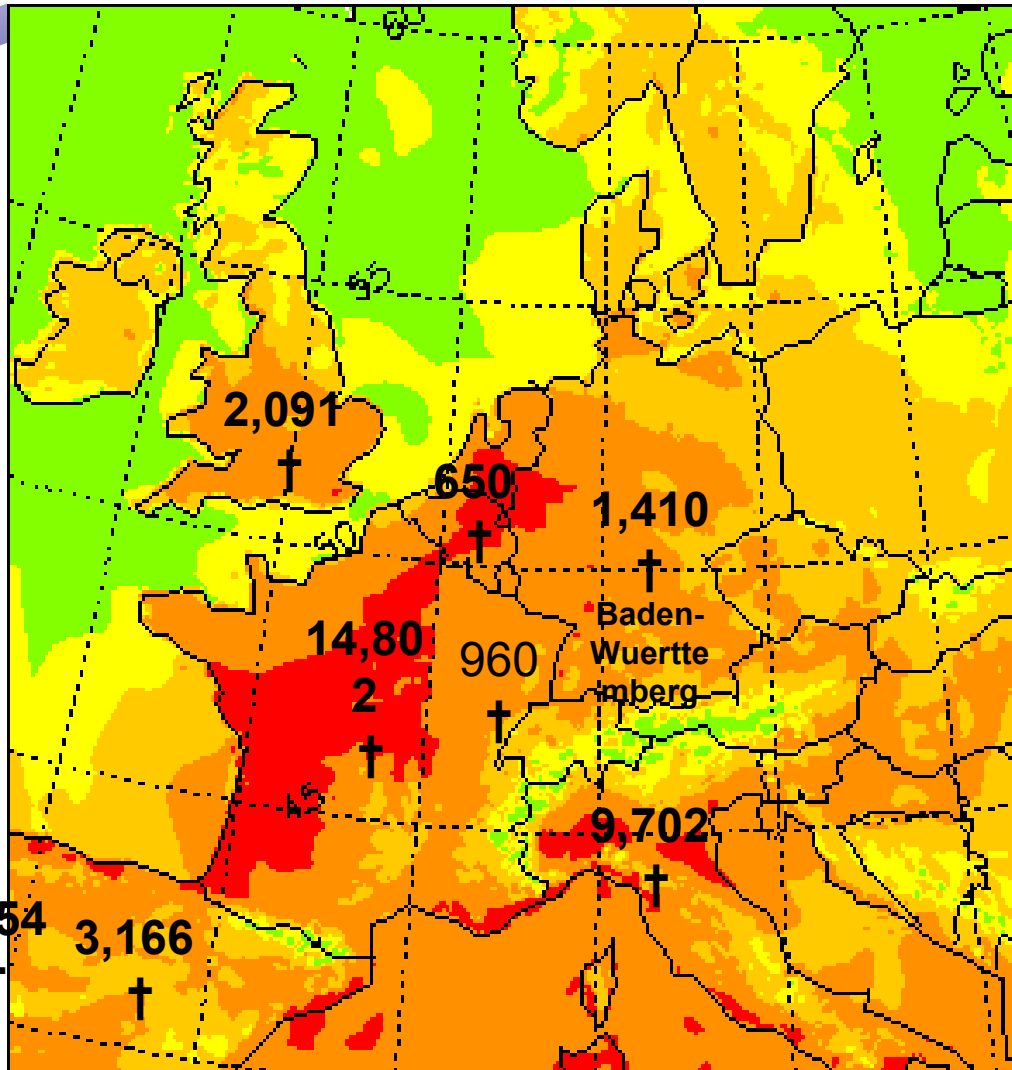


Heat Stress



Cold Stress

UTC
13:00



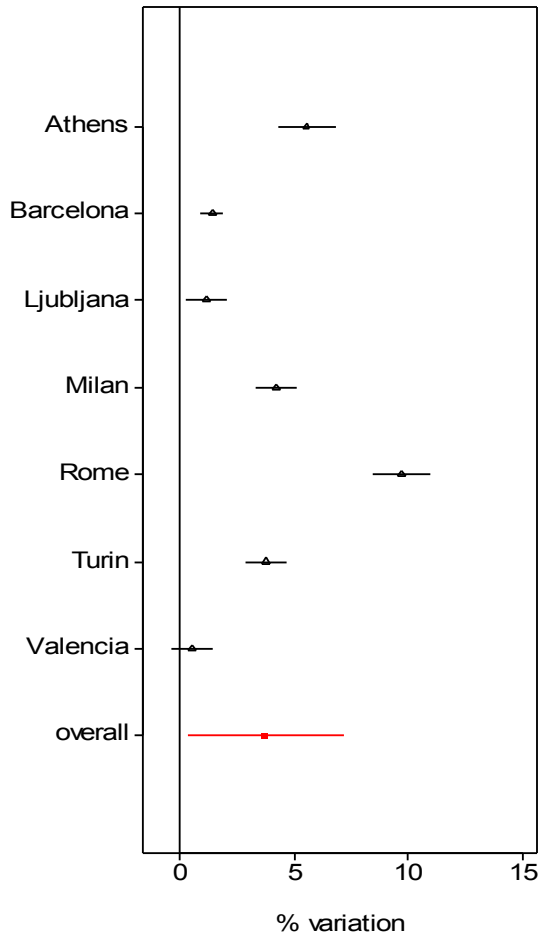
EUROPE

Perceived temperature on 8 August 2003 and August heat mortality

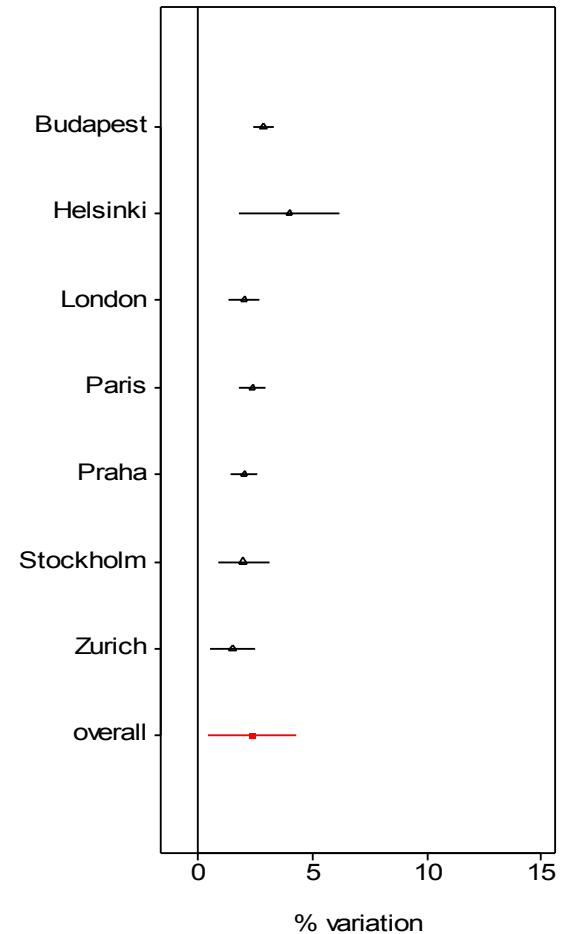
Mortality changed with degree increase of temperature

City-specific and pooled estimates of the effect of high apparent temperatures on mortality for all causes

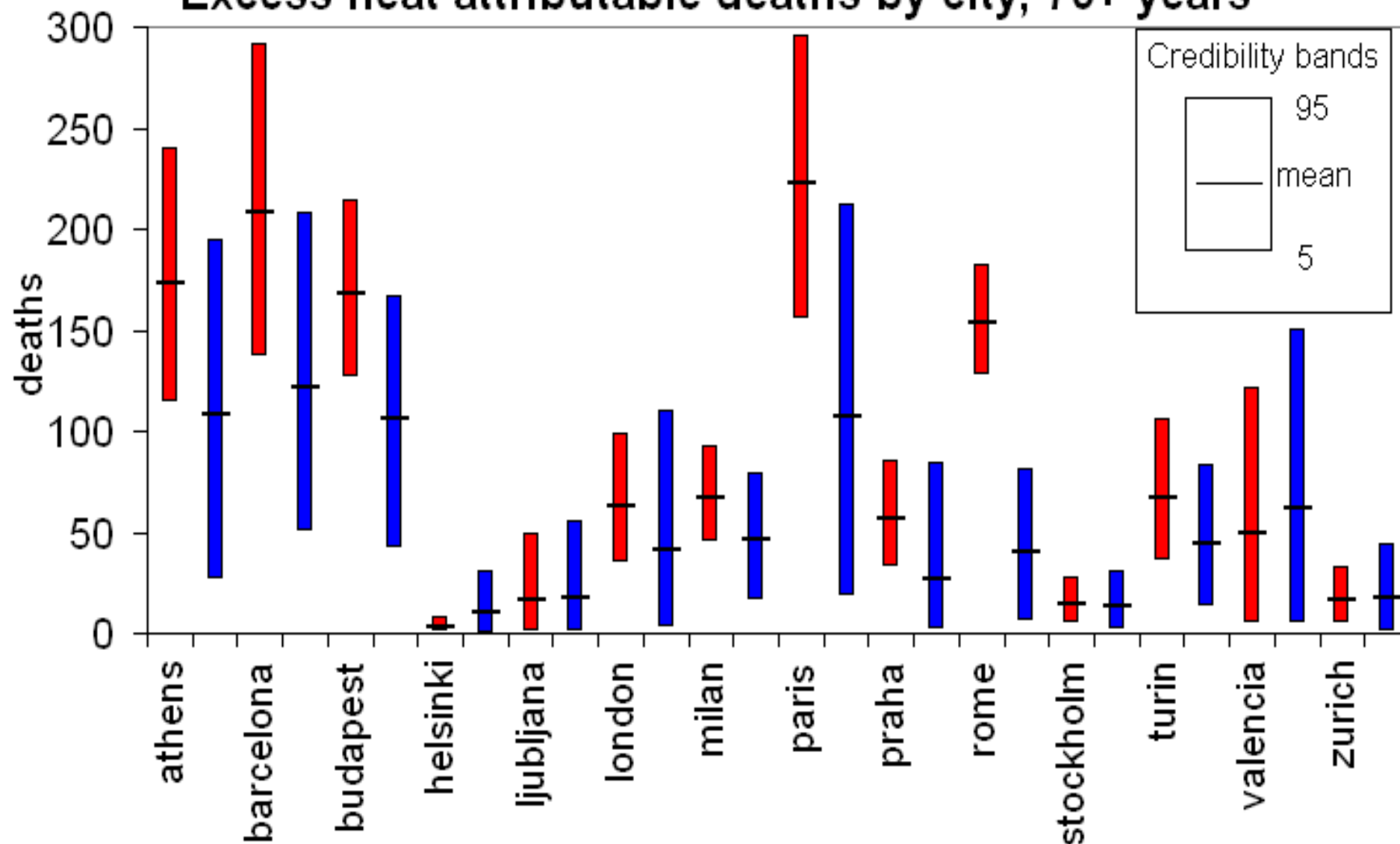
Mediterranean cities



North-Continental cities



Excess heat attributable deaths by city, 75+ years



Deaths due to linear effect above the threshold of max apparent temperature

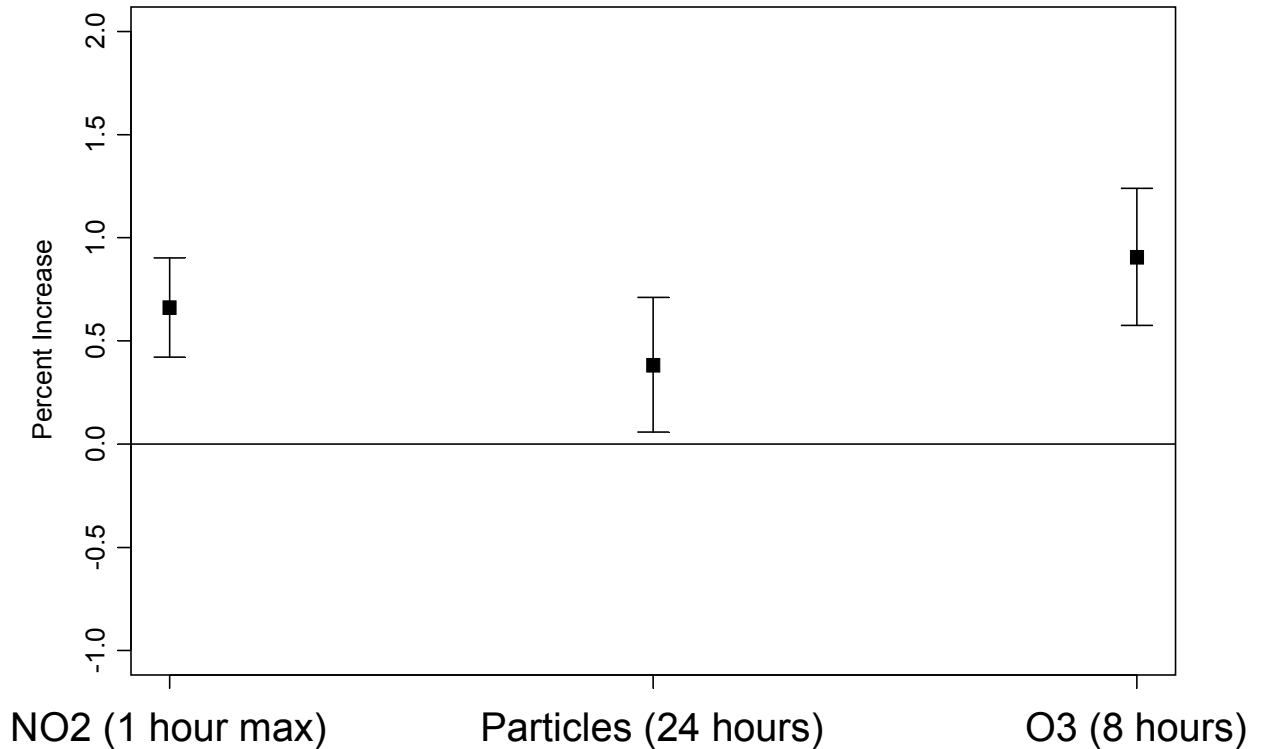
Deaths due to cumulative (up to lag 30 days) effect above the threshold of max apparent temperature

Confounding with air pollutants in summer

All air pollutants have statistically significant main effects on the daily total number of deaths.

An increase of $10\mu\text{g}/\text{m}^3$ in these pollutants is associated with a 0.5-1.0% increase in the daily number of deaths.

Percent increase in the total daily number of deaths for an increase of $10\mu\text{g}/\text{m}^3$ in various pollutants in the warm season (March-October)

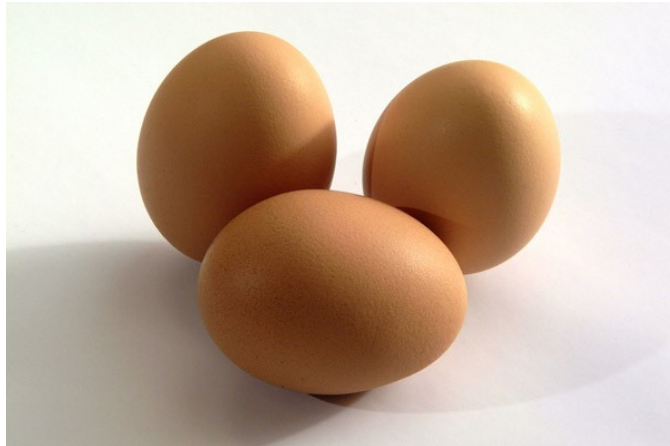


Phewe, forthcoming



EUROPE

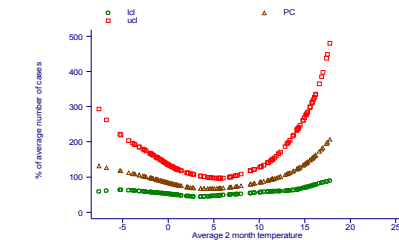
Salmonella cases raise for each 1-degree increase in weekly temperature



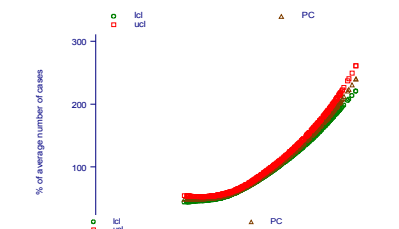
Temperature influences the transmission in 35% cases in England, Poland, the Netherlands, Czech Republic, Switzerland and Spain (Kovats et al).

In some countries salmonella cases are decreasing, which shows that measures and policies can be effective

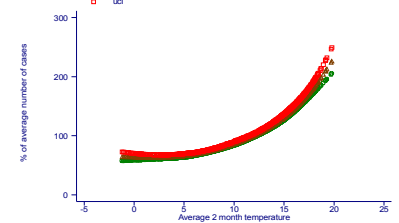
These diseases show seasonal variations.



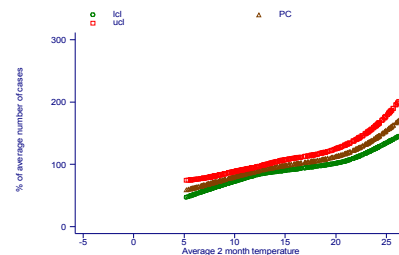
Czech R



UK



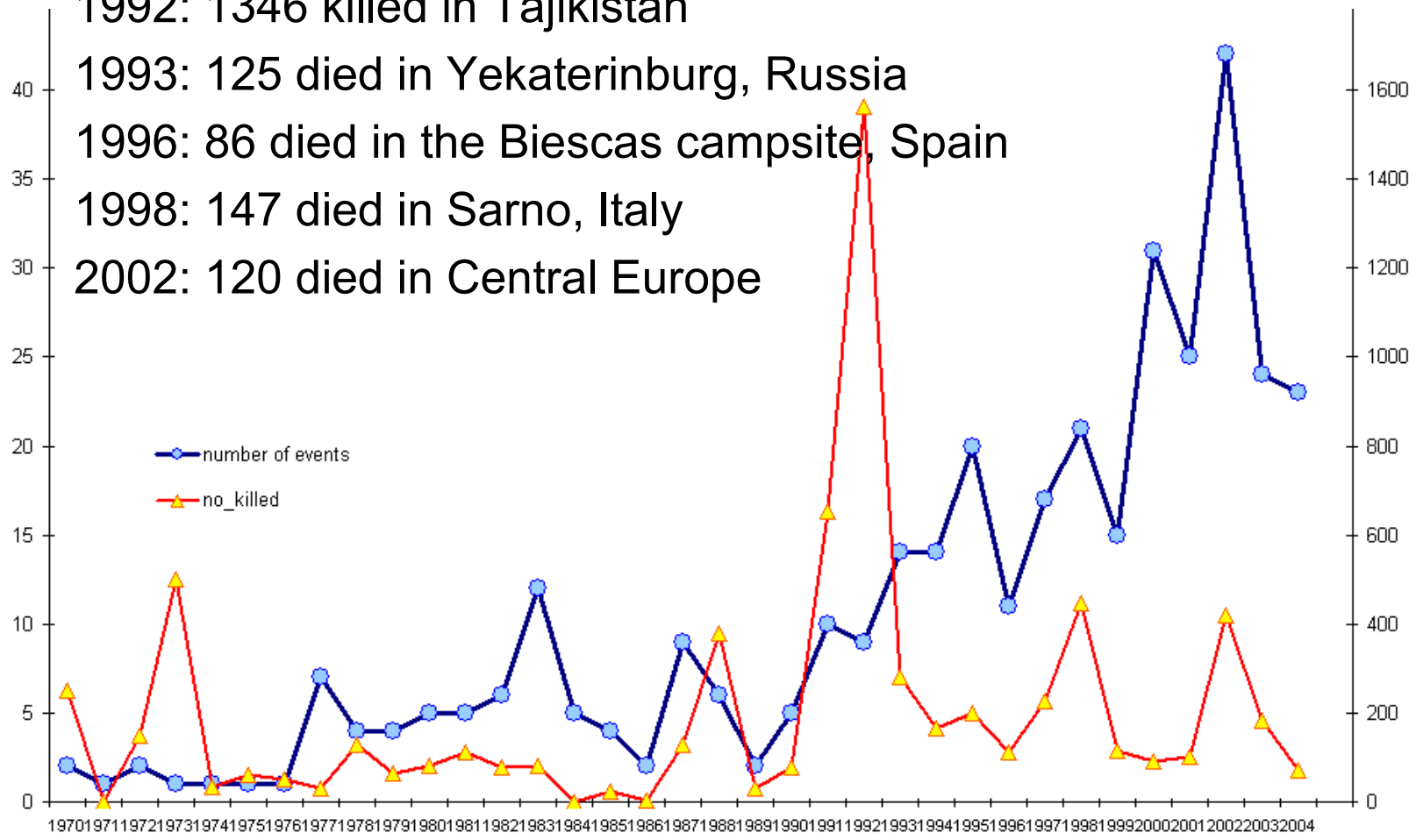
Switzerland



Spain

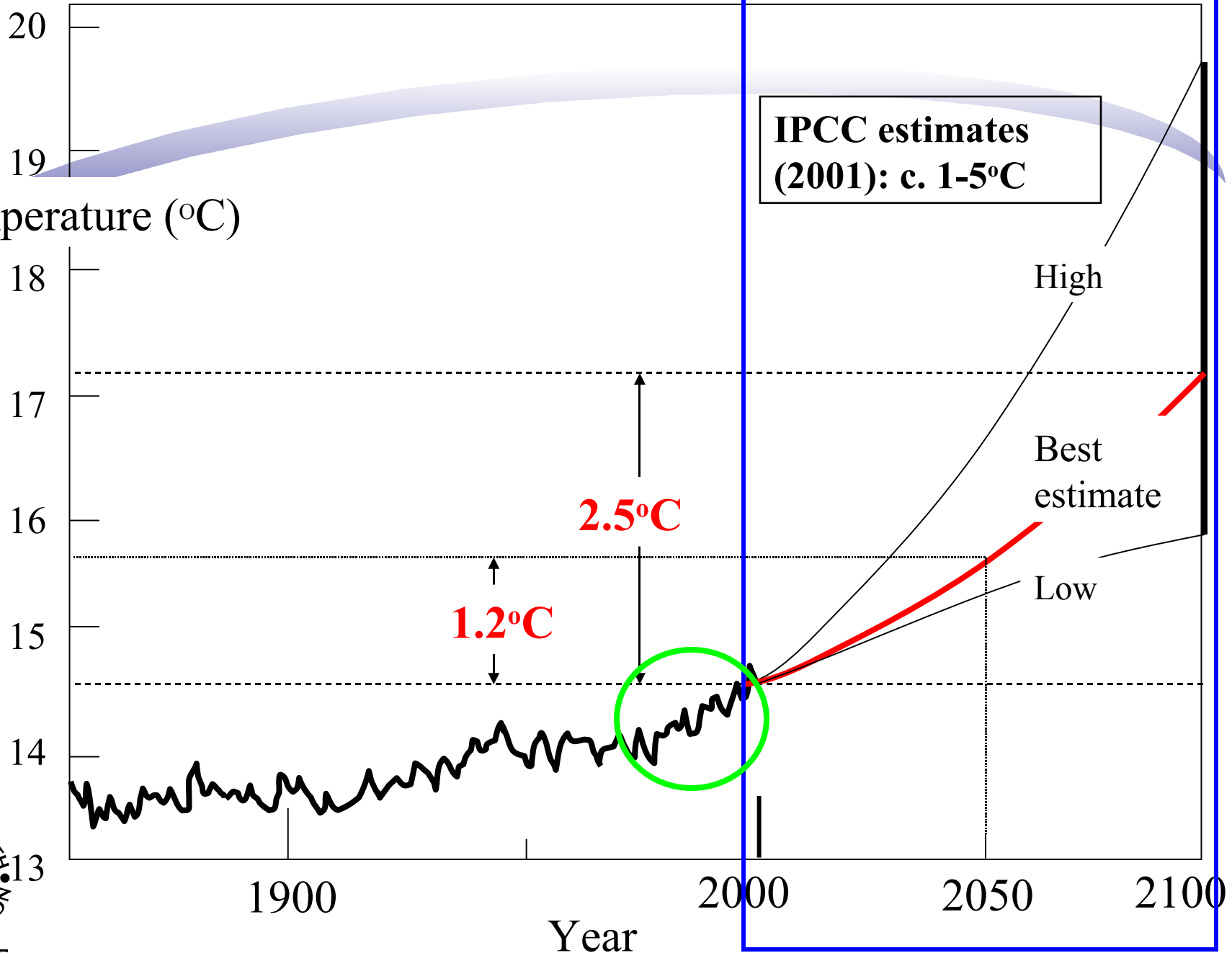
Floods affect health in Europe

1992: 1346 killed in Tajikistan
 1993: 125 died in Yekaterinburg, Russia
 1996: 86 died in the Biescas campsite, Spain
 1998: 147 died in Sarno, Italy
 2002: 120 died in Central Europe



Source: Source: "EM-DAT: The OFDA/CRED International Disaster Database, www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium" Created on: May-23-2005. - Data version: v05.05

Temperature (°C)



IPCC estimates
(2001): c. 1-5°C

High

Best estimate

Low

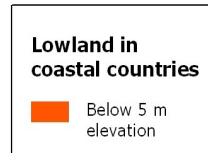
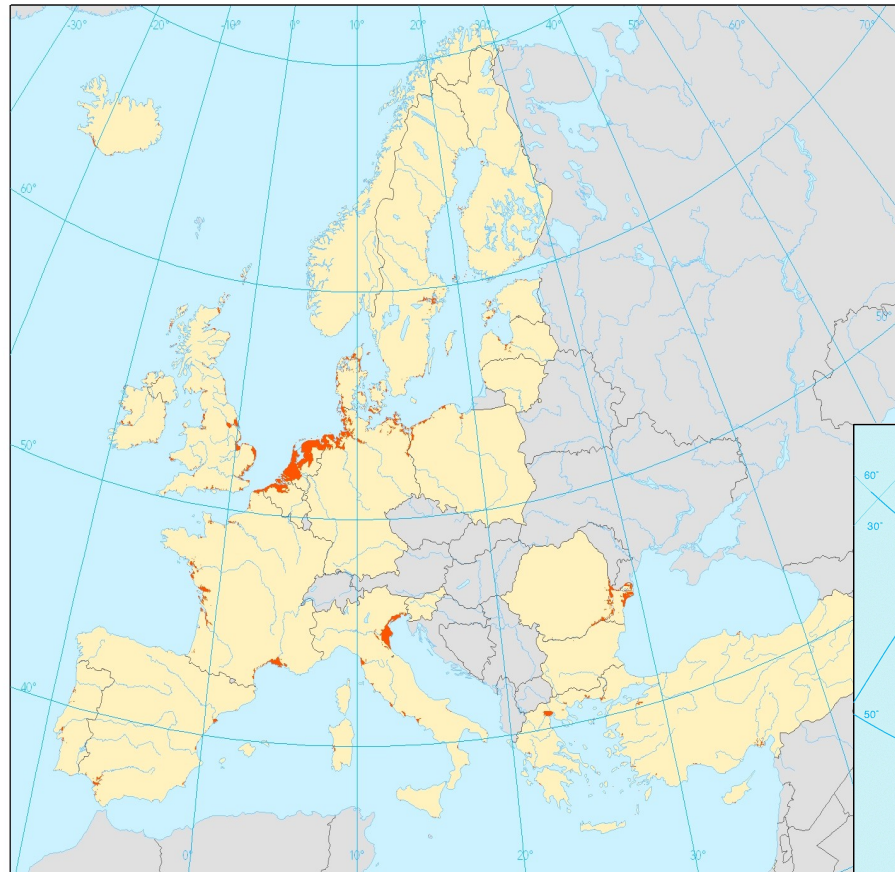
1.2°C

2.5°C

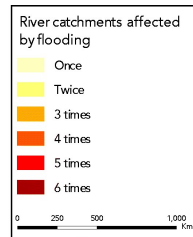
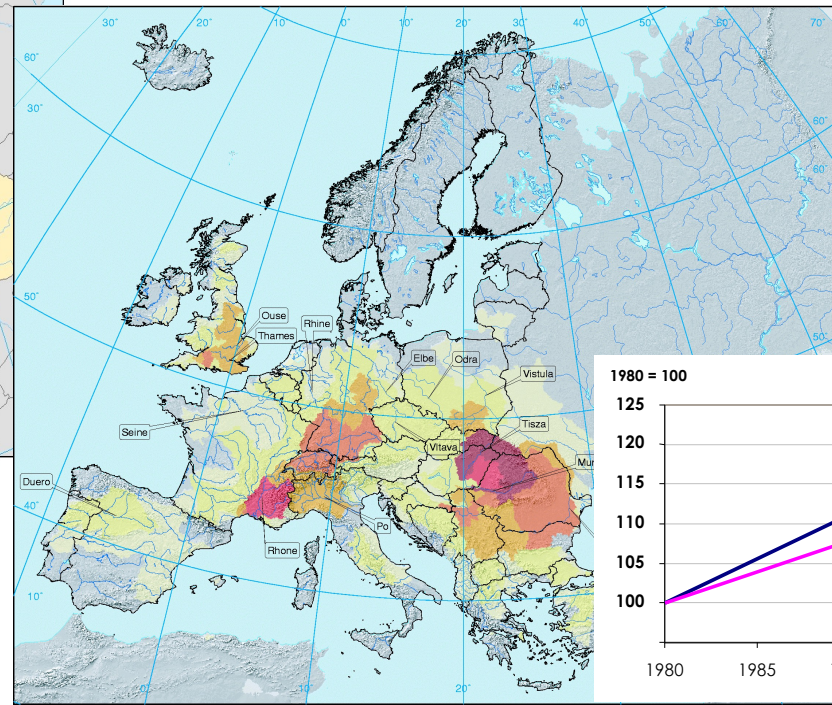


Increase in vulnerability?

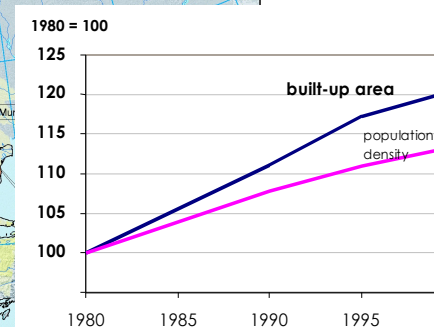
9% of all European coastal zones are below 5 m elevation



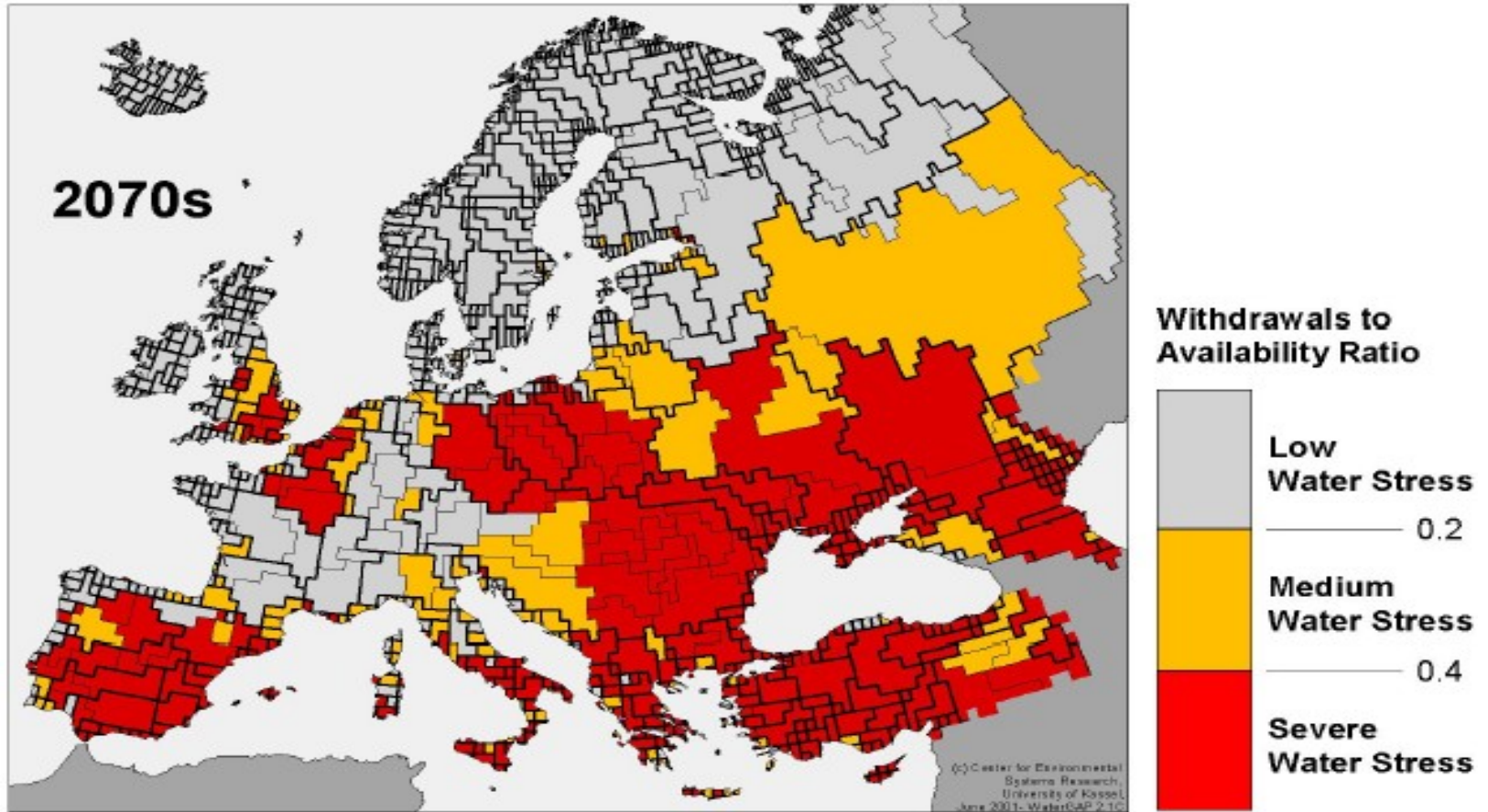
Average sea levels are rising about 1.7mm/yr globally



2.5 million people at risk annually
EEA, 2005

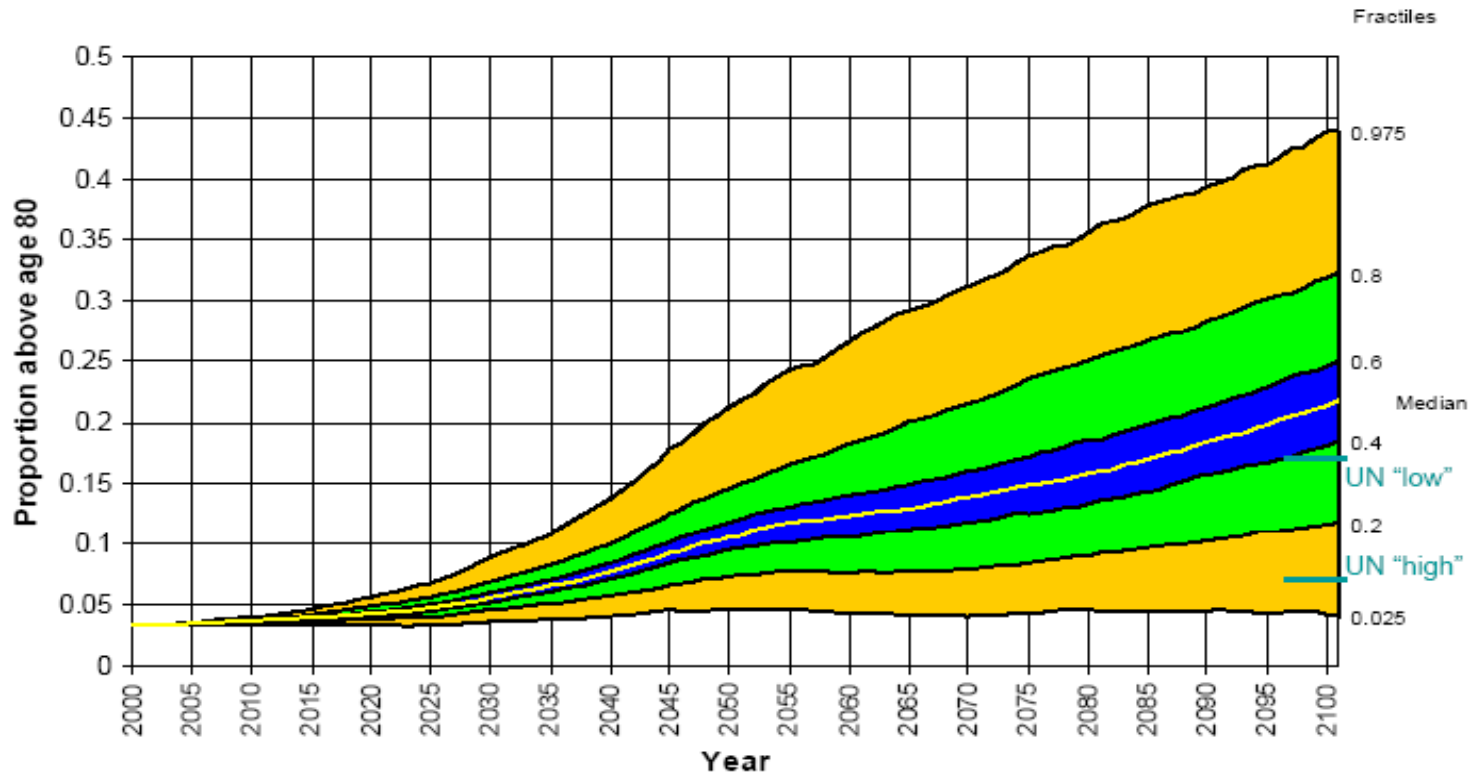


Some projections are strong



Data source: Henrichs and Alcamo, 2001. Hadley Centre HadCM3 model, baseline scenario

Europe is aging

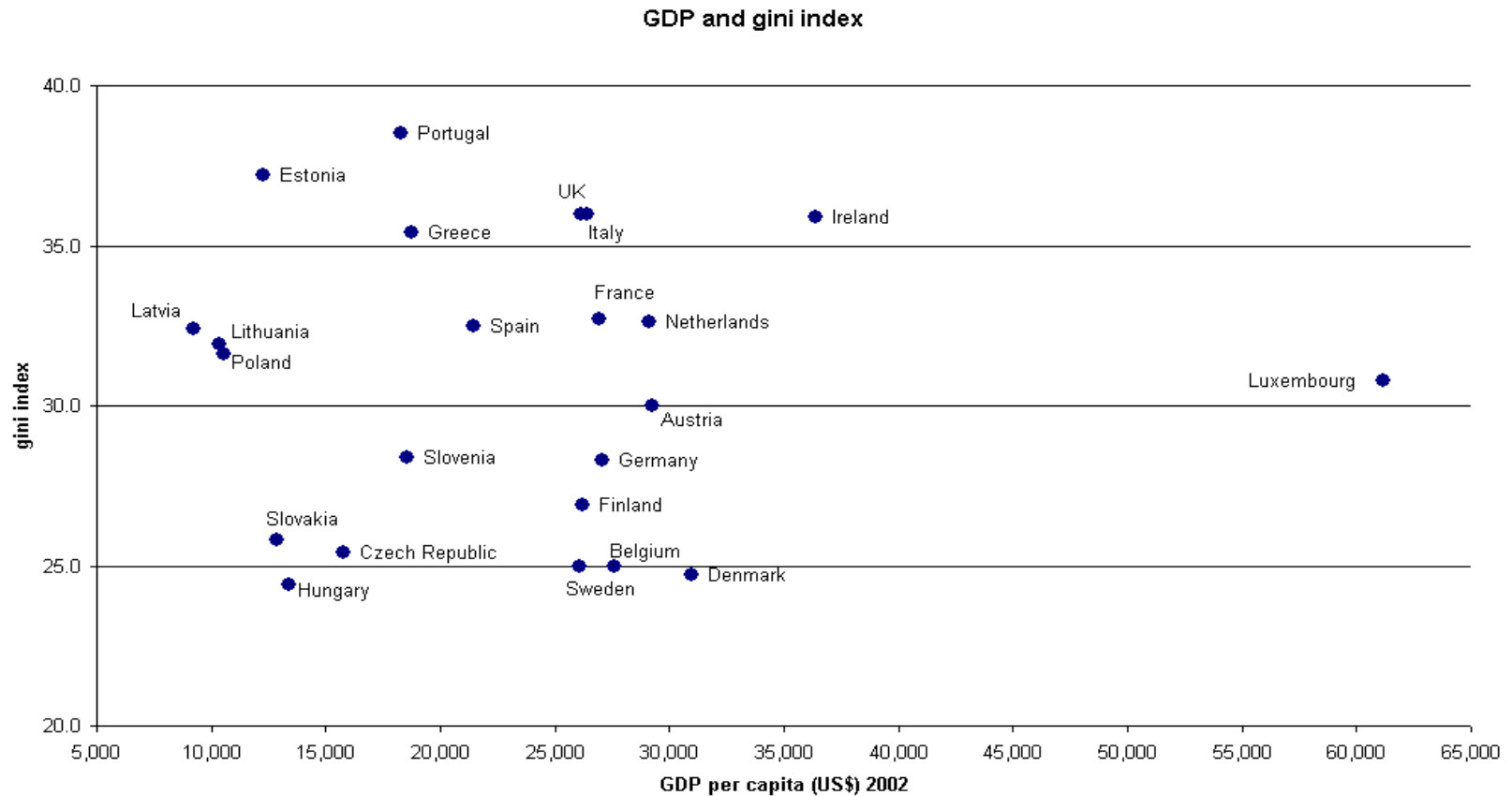


<http://www.who.int/mediacentre/factsheets/fs204/en/>

Figure 3. Proportion of population above age 80 in Western Europe (UN "low" scenario for 2100 = 0.17, UN "high" scenario = 0.07).



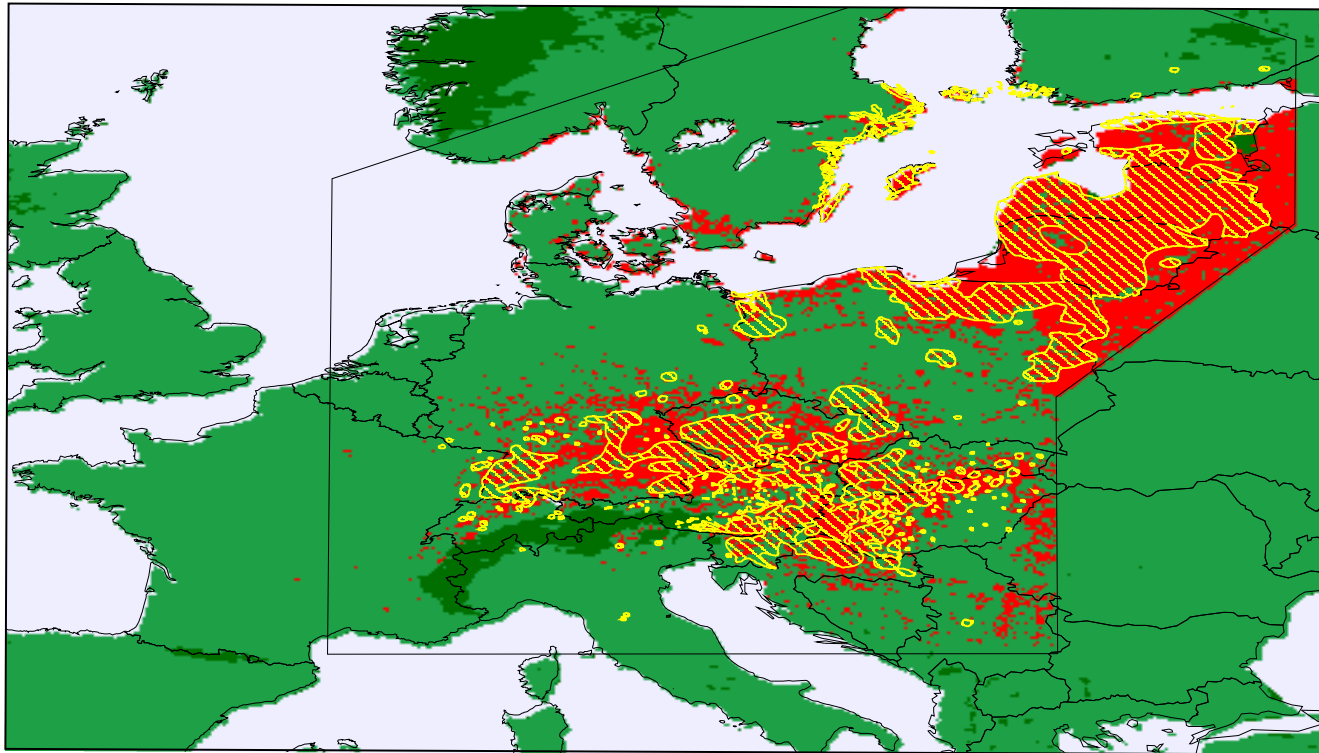
Will inequalities further increase?



Scenario studies on heat

- United Kingdom (Donaldson et al. 2001)
 - Medium-high climate change scenario results in an estimated annual 2800 heat deaths in the UK in the 2050s (250% increase). Greater reductions in cold-related mortality.
- Lisbon, Portugal (Dessai 2003)
 - Increases in heat related mortality by 2020s to range of 5.8-15.1 deaths per 100,000, from baseline of 5.4-6 deaths per 100,000

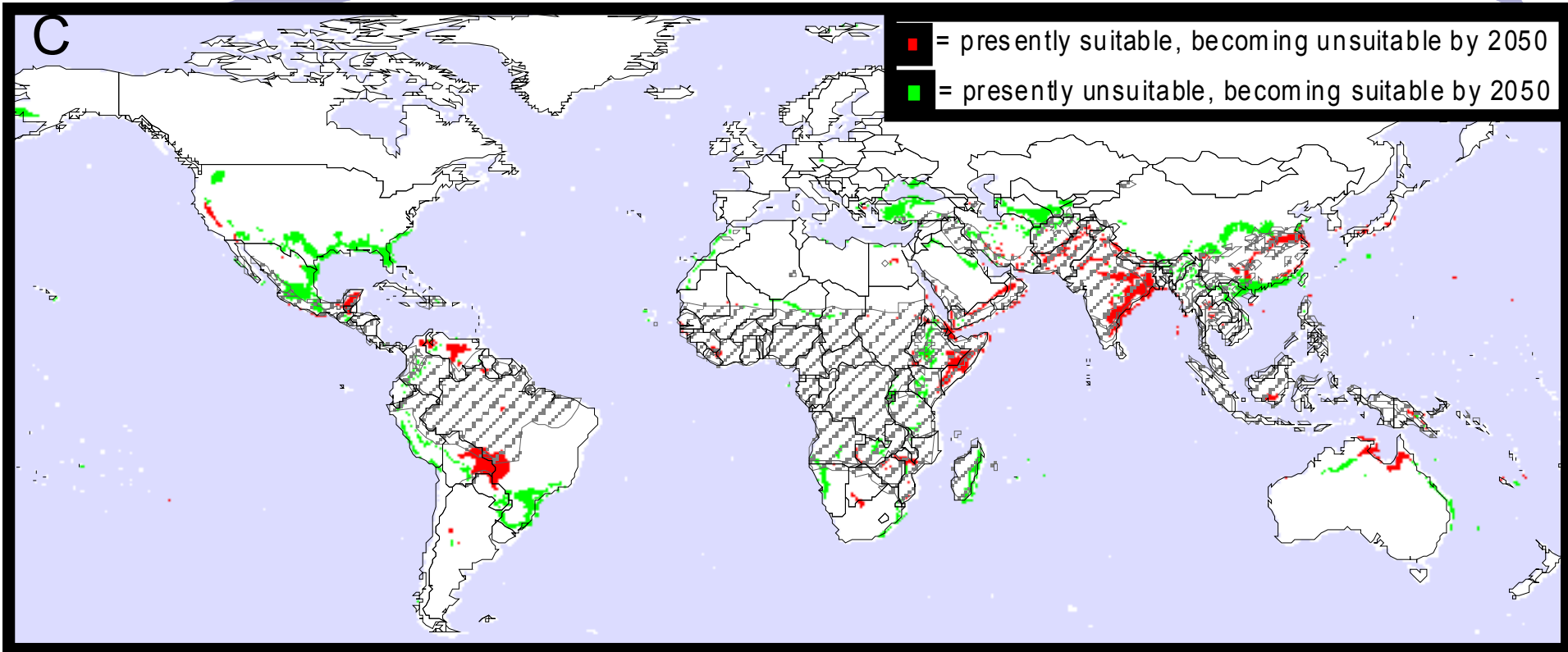
Contraction and expansion?



European Climate Change Programme - Working Group II - Impacts and Adaptation
3. Human Health
Brussels, 2.May.06

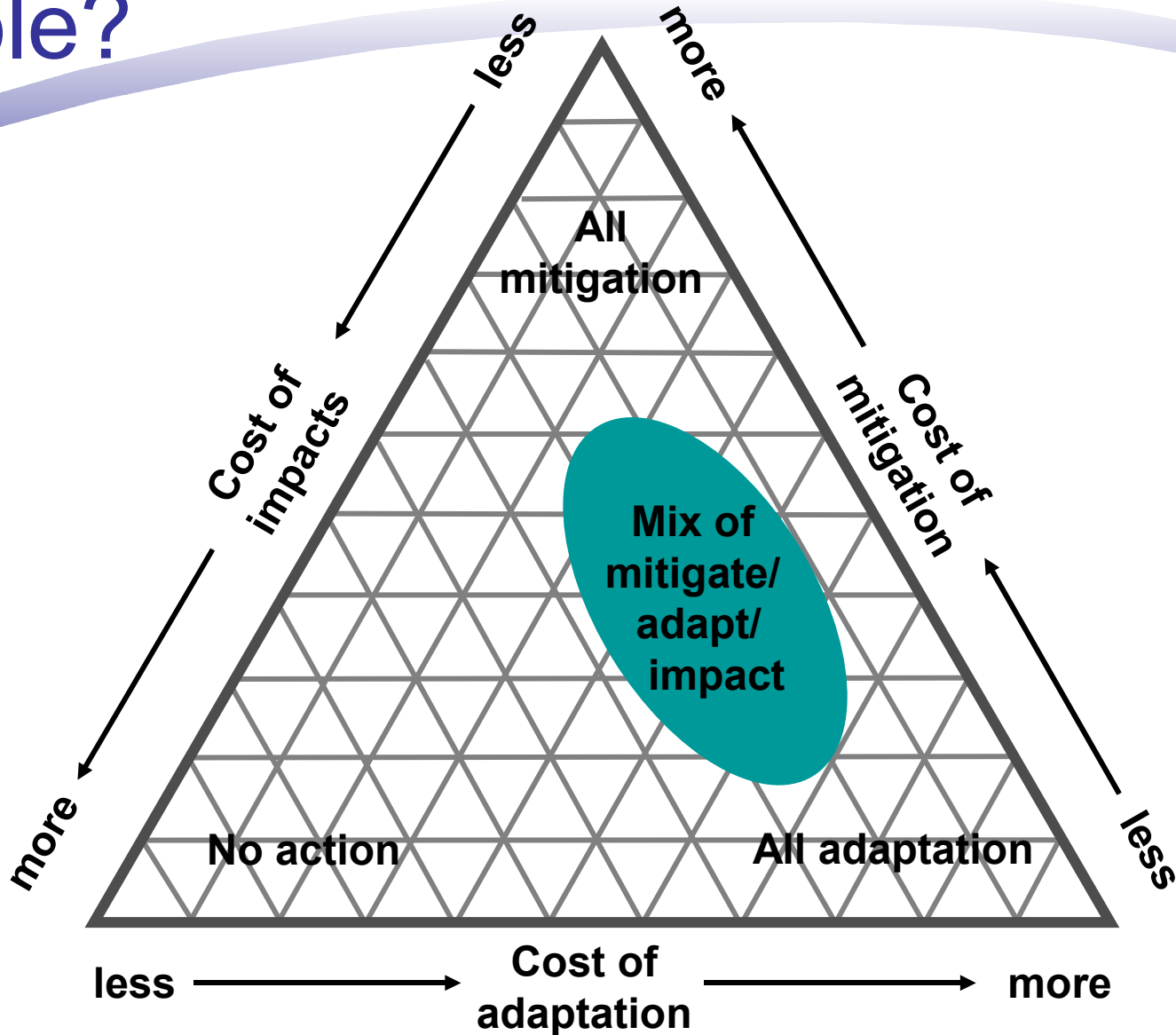


Predicted change by 2050



Change in population at risk = \pm 25 mill

What mix of mitigation/adaptation is possible?

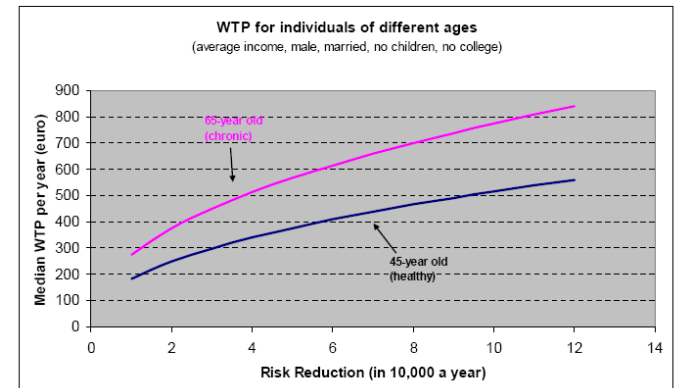
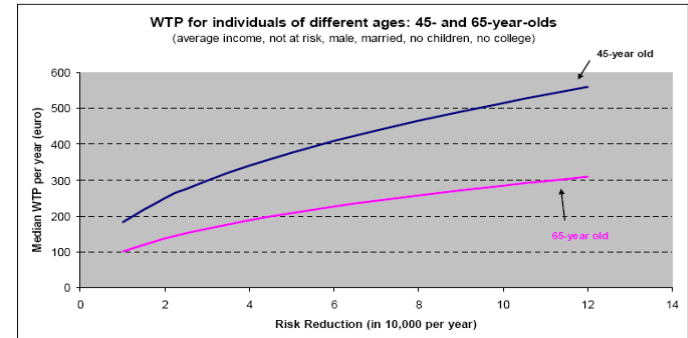


(Holdridge diagram)

The costs of inaction are high

For the city of Rome the monetized mortality damages in the absence of adaptation programs are estimated to be €281 million for the year 2020 (2004 Euro)

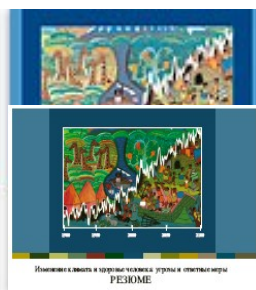
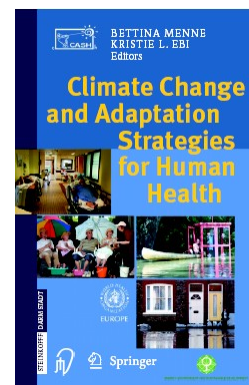
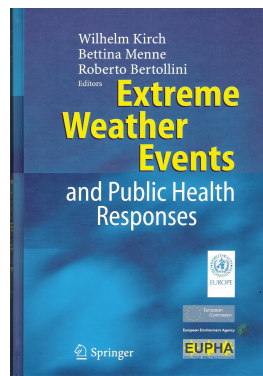
Figure 2.



In summary

- Climate change affects health and will affect health
- Anticipatory thinking is needed to link the multiple global change exposures to anticipate risks to human health
- Adaptation strategies are needed to anticipate, detect and prevent the health effects
- Without the reduction of greenhousegases in the long run adaptation will not be sufficient

The WHO EURO Global change and health programme



<http://www.euro.who.int/globalchange>



Climate change and adaptation strategies for human health

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