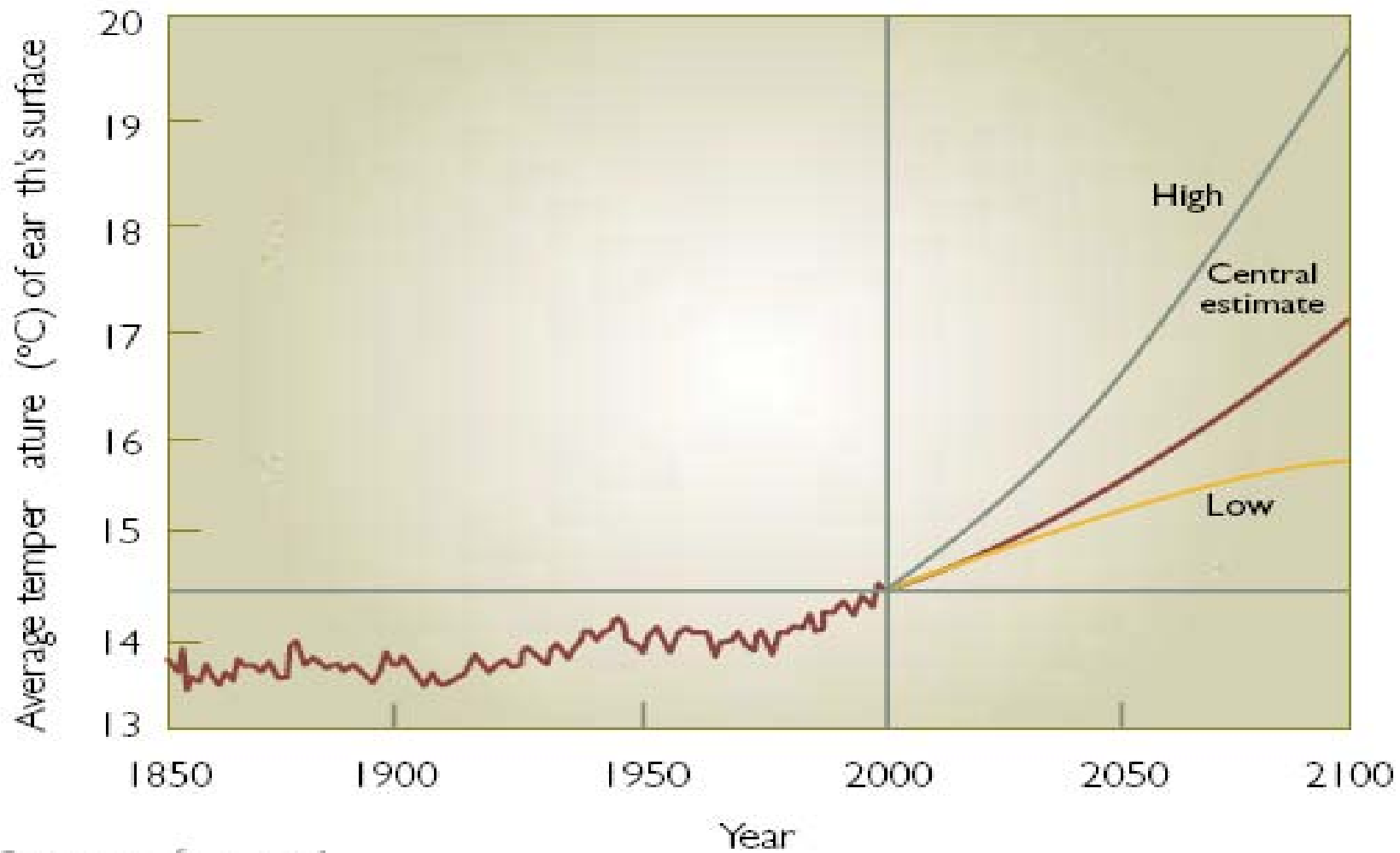


Warmer day mortality in Yellowknife and Whitehorse: are there already demonstrable climate change impacts?

Tom Kosatsky, md
Acting Director

Environmental Health Services, BCCDC
and National Collaborating Centre in Environmental Health

Figure 1.2 Global temperature record, since instrumental recording began in 1860, and projection to 2100, according to the IPCC

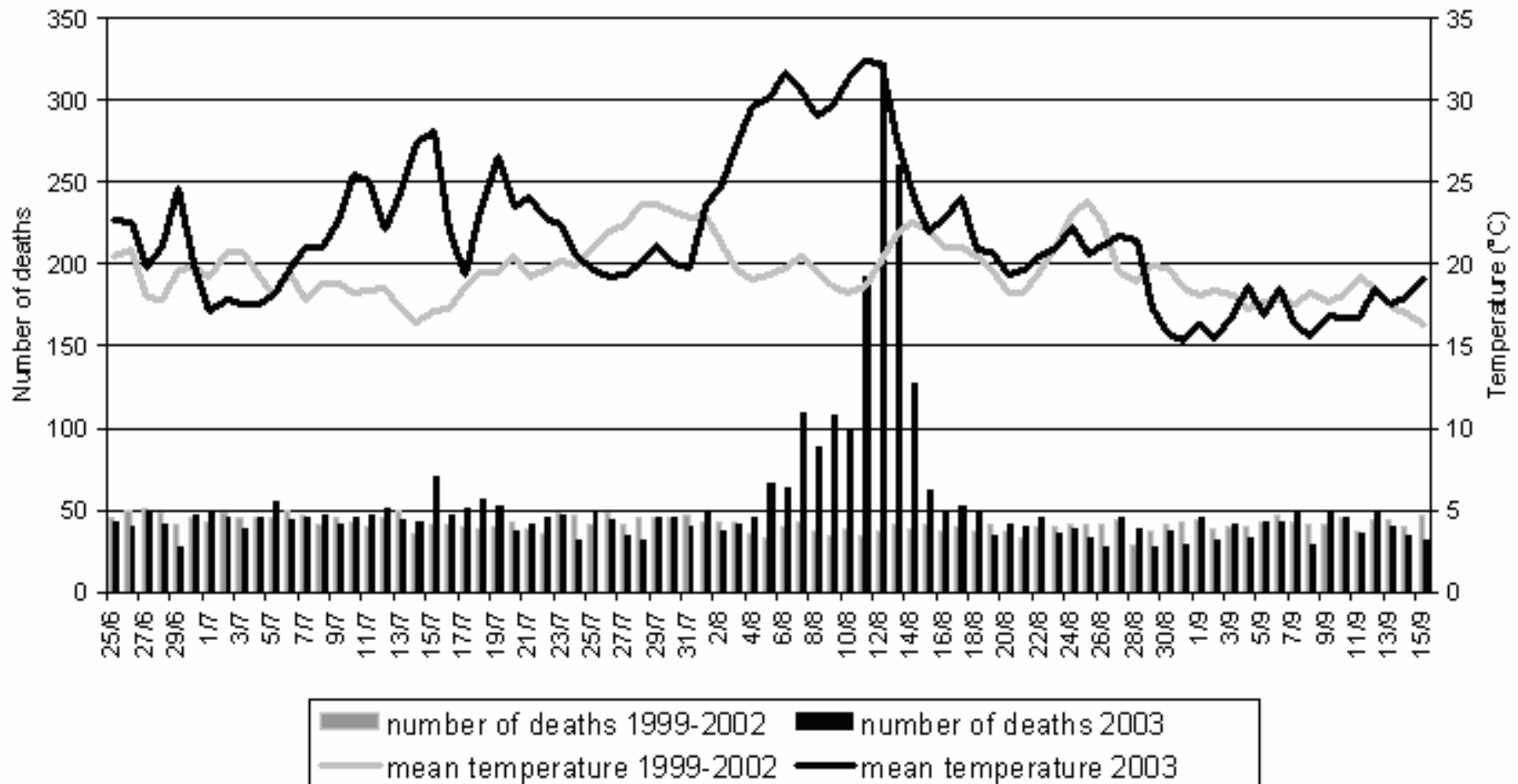


Source: reference 1

Paris heat-wave, summer 2003



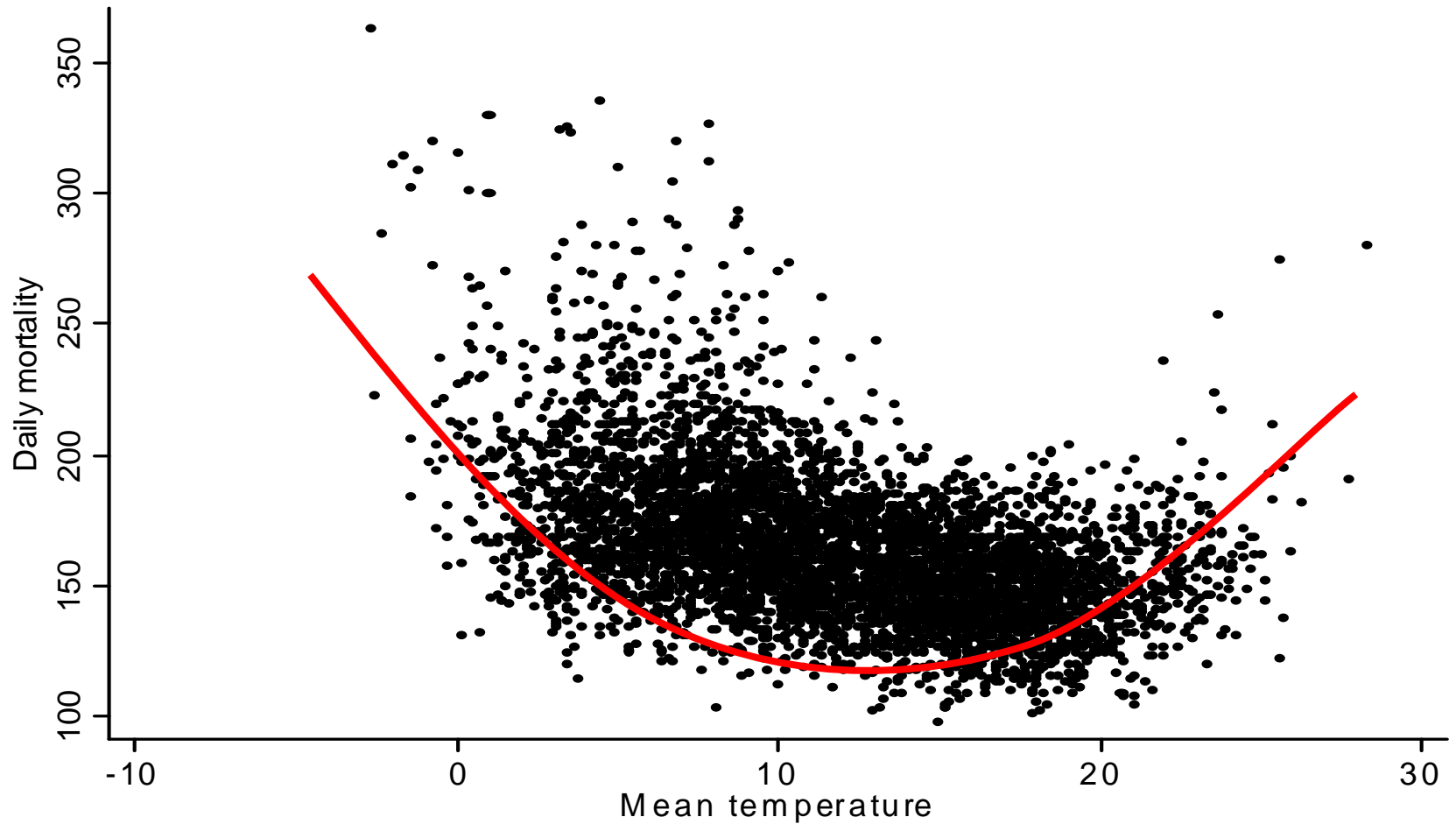
Daily mortality in Paris during summer 2003



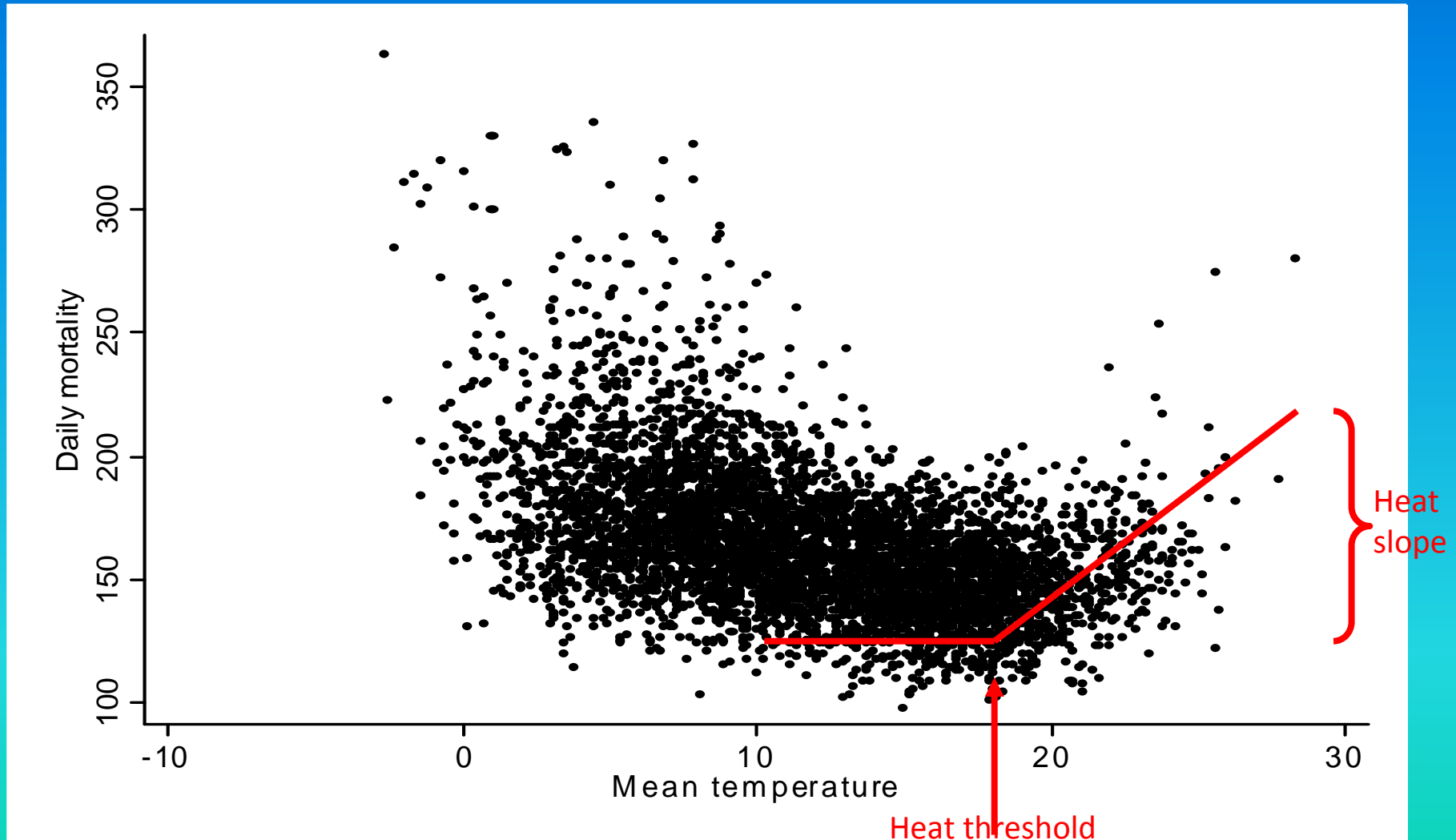
Source: Institut de Veille Sanitaire, France

Outside of “heat waves” there is also a relationship between warmer weather and overall same and next day mortality

Daily mortality in London: 1993-2006



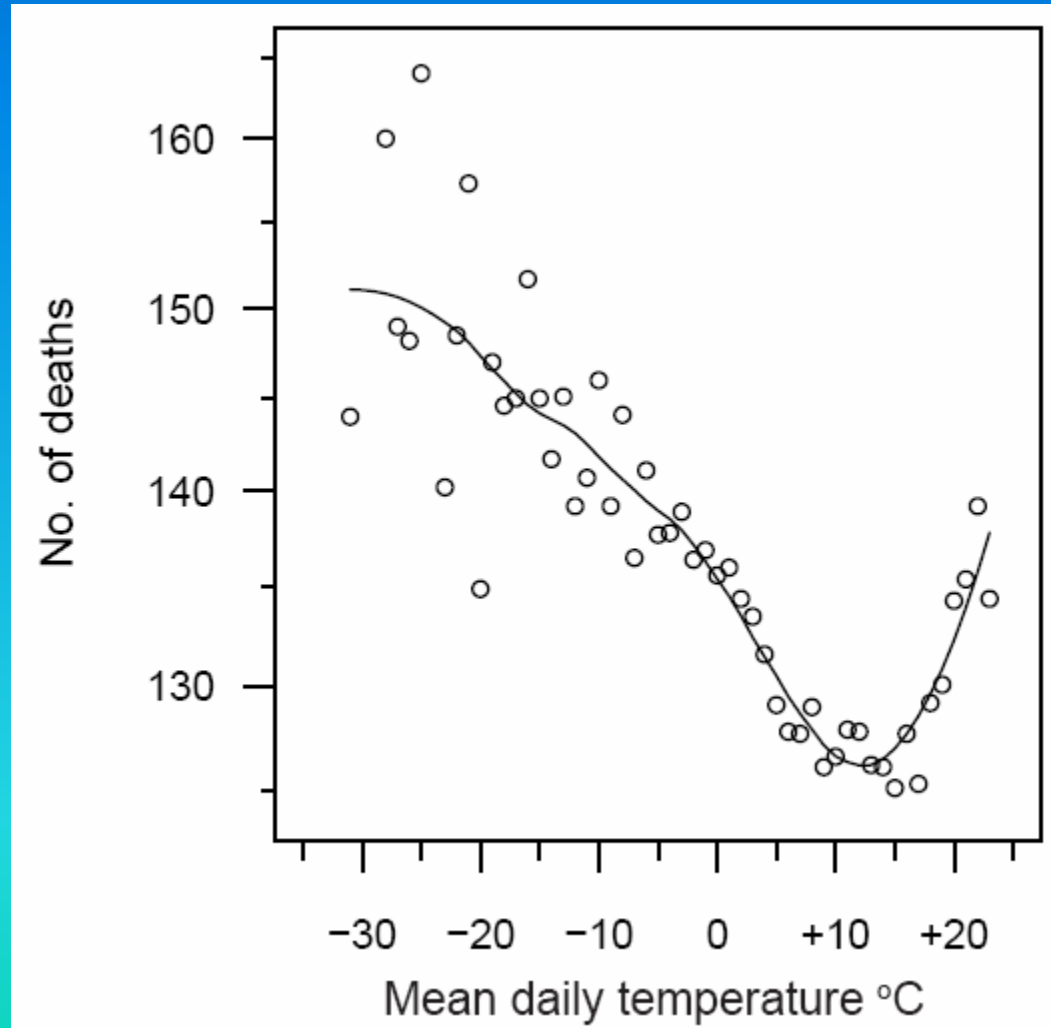
Daily mortality in London: 1993-2006—typical threshold and above threshold heat/mortality slope



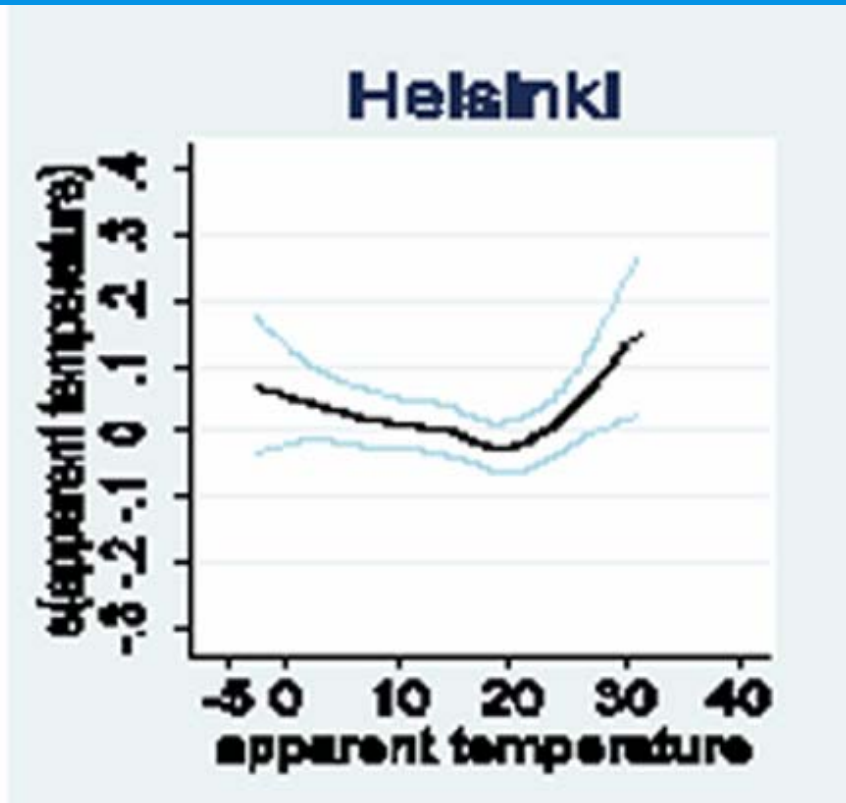
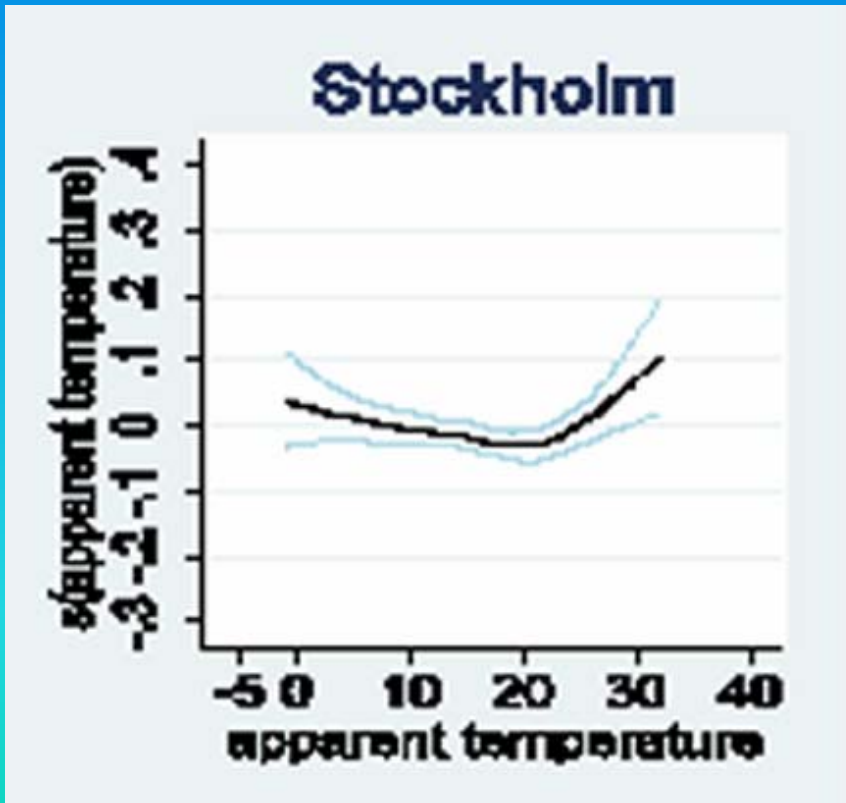
Outside of “heat waves” there is also a relationship between warmer weather and overall same and next day mortality: this phenomenon has been seen in Northern cities too



Daily deaths in Finland, 2000–2005, by mean daily temperature. Circles indicate mean counts of deaths in each 1°C interval; line shows regression-based smoothed values (Nayha, 2007)



Summer Deaths by 4-Day Apparent Tmax, Stockholm and Helsinki, 1990-2000 (Baccini, 2008)



North/South temperature/ mortality gradient (Keatinge, 2003)

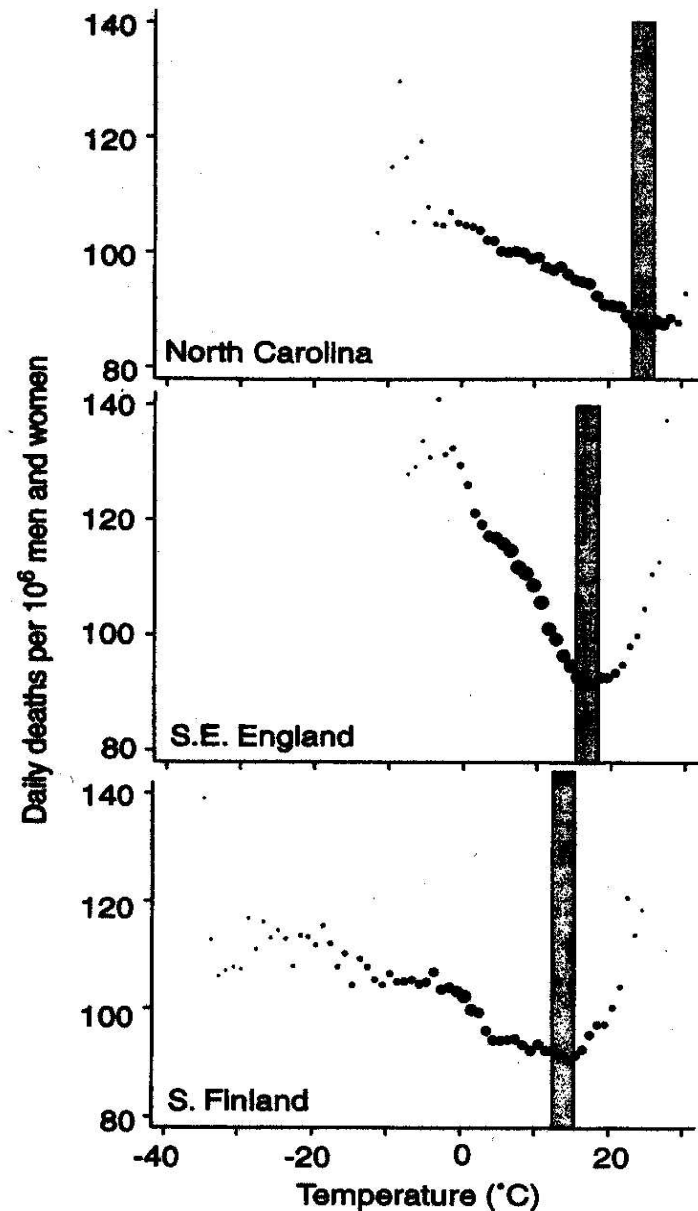


Fig. 1. Mortality at different mean daily temperatures. Pooled data for each region at age 55+, 1971–1997. The areas of circles are proportional to the number of days at each temperature.

Temperature and mortality: mechanisms

- Cardiovascular disease
 - reduced cardiovascular reserve
- Respiratory disease
- Infectious diseases
 - infectious intestinal disease
 - vector-borne diseases
- External causes
 - accidents / violence
- Heat stroke / hyperthermia

All causes can be
affected by
temperature

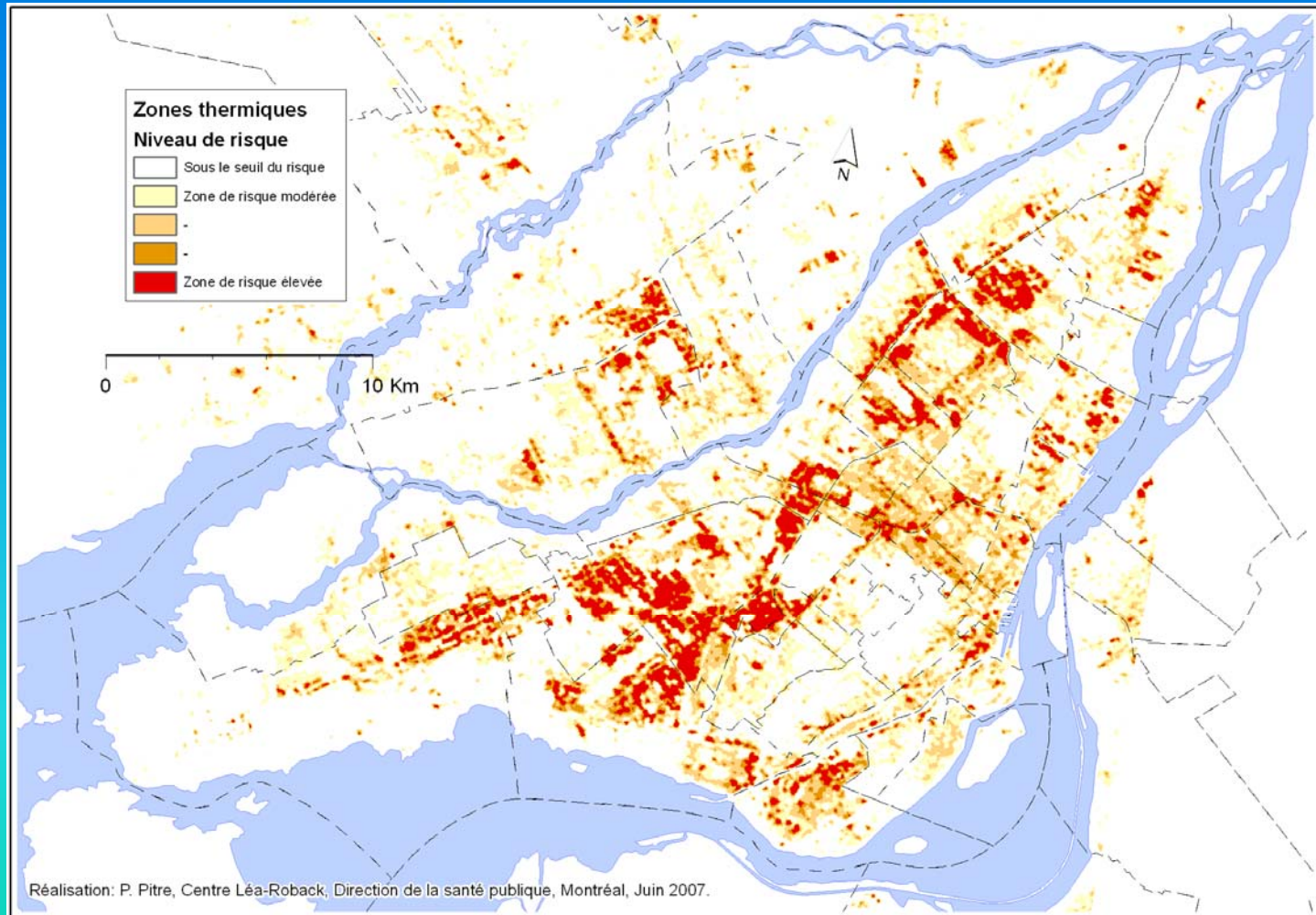


Risk factors for heat related death

- Elderly
- Pre-existing disease (cardiovascular, etc.)
- No air conditioner in home or residential institution
- Social isolation
 - living alone, not leaving house at least once per day
- Use of certain drugs, e.g. tranquillisers
- Housing
 - building type, living on top floor
- Urban heat-island

Satellite imagery-based heat capture index, Montreal

(the redder, the hotter)



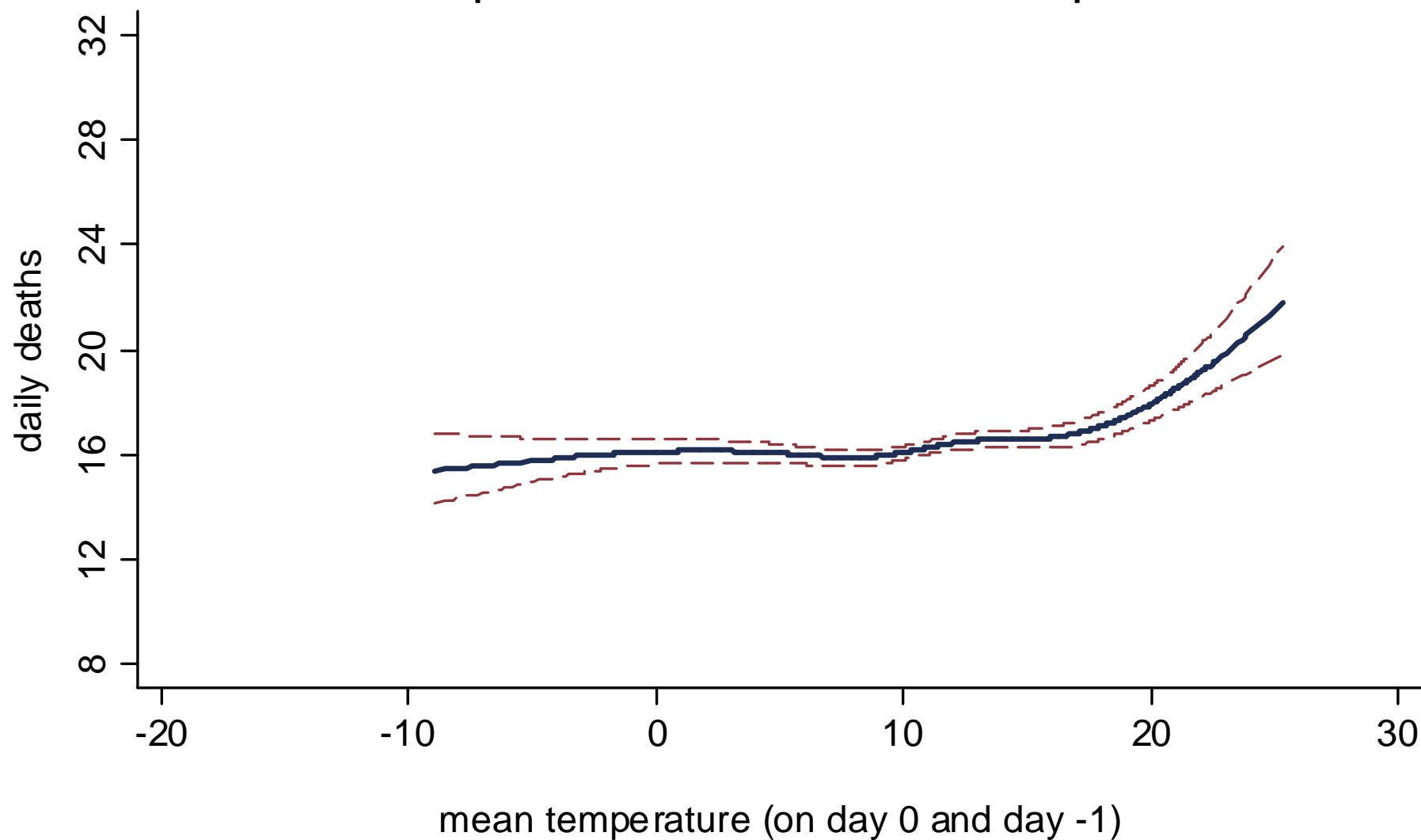
Temperature/mortality relationships for selected Canadian communities



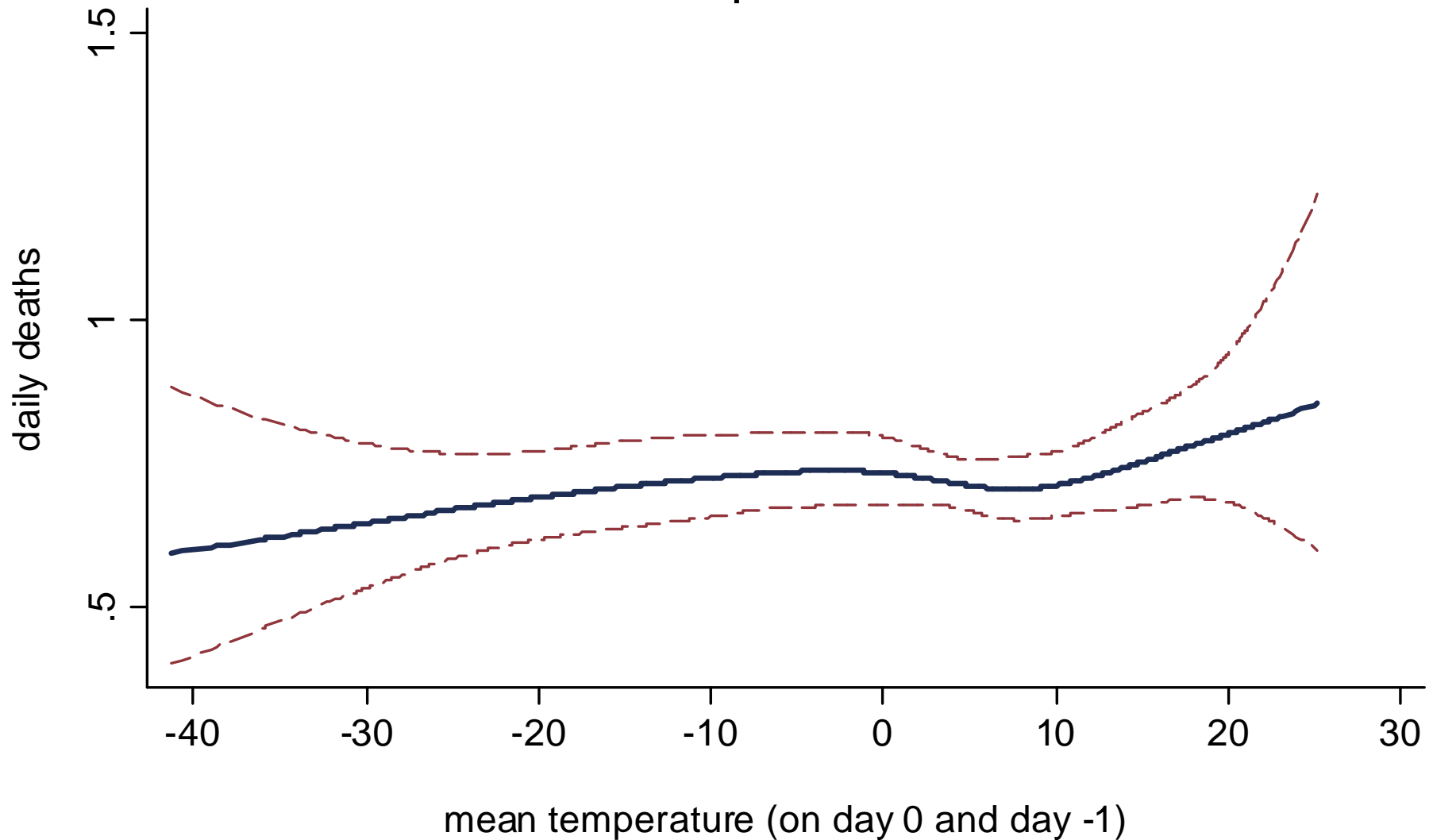
Daily Deaths (all ages, all cause)

Vancouver North Metropolitan Area (LHAs: 38, 44, 45, 161-166)

Associated with Temperature at Vancouver Airport, 1986-2008

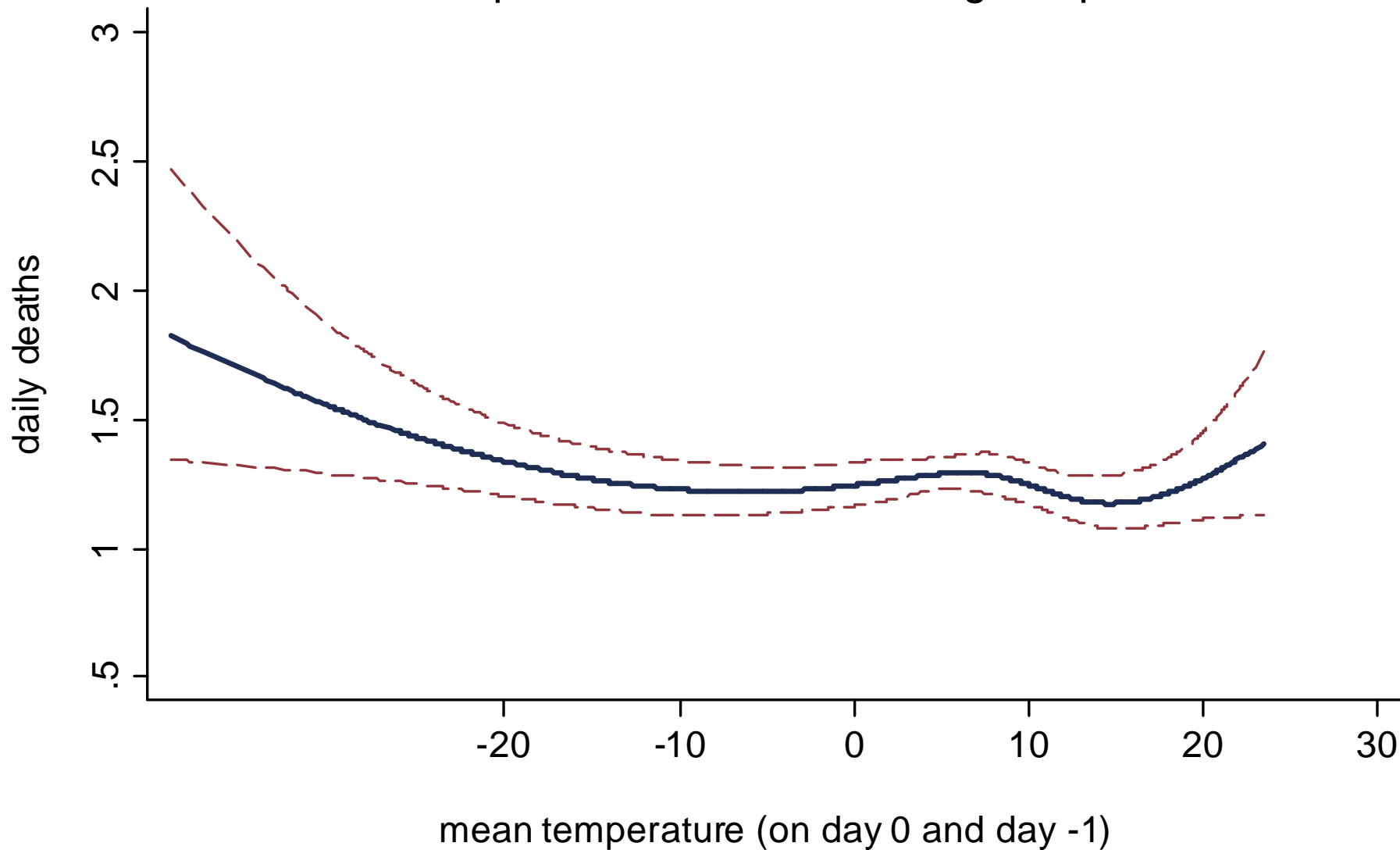


Daily Deaths (all ages, all cause) for Peace River (LHA: 59, 60) Associated with Temperature at Fort St. John Airport, 1986-2008

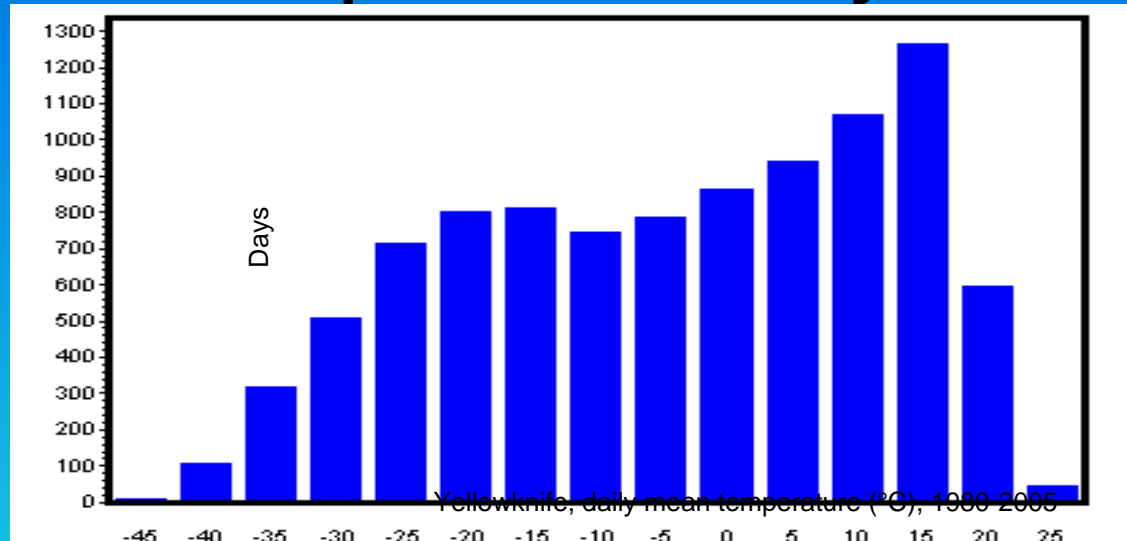


Daily Deaths (all ages, all cause) for Prince George (LHA: 57)

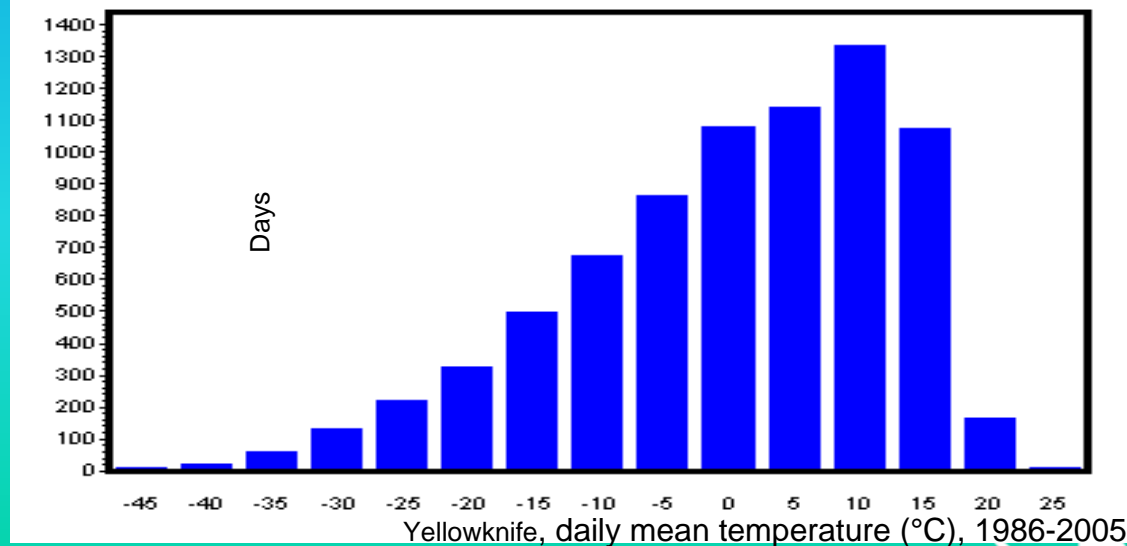
Associated with Temperature at Prince George Airport, 1986-2008



Distribution of mean daily temperatures, year-round



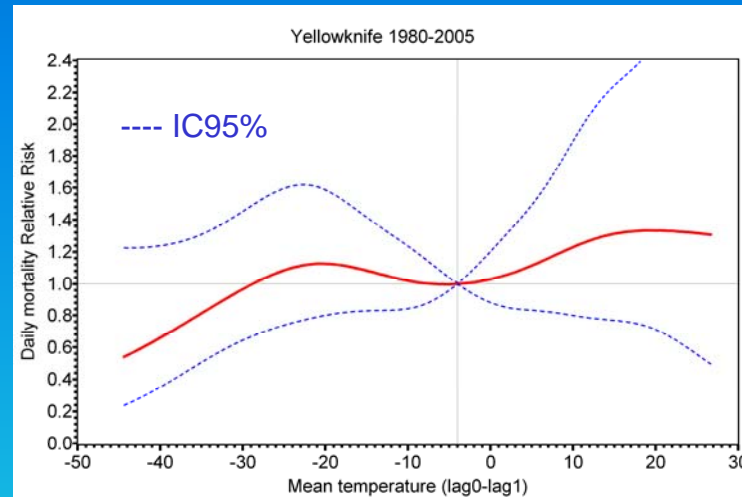
Yellowknife, 1980-2005



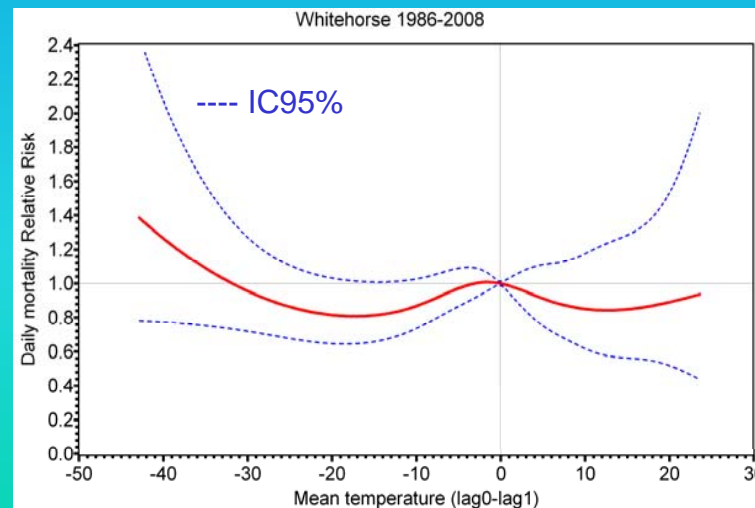
Whitehorse, 1986-2008

Relative number of daily deaths vs. daily temp compared to reference (deaths at mean temperature over study period): same, next day effect

**Yellowknife
1980-2005**



**Whitehorse
1986-2008**

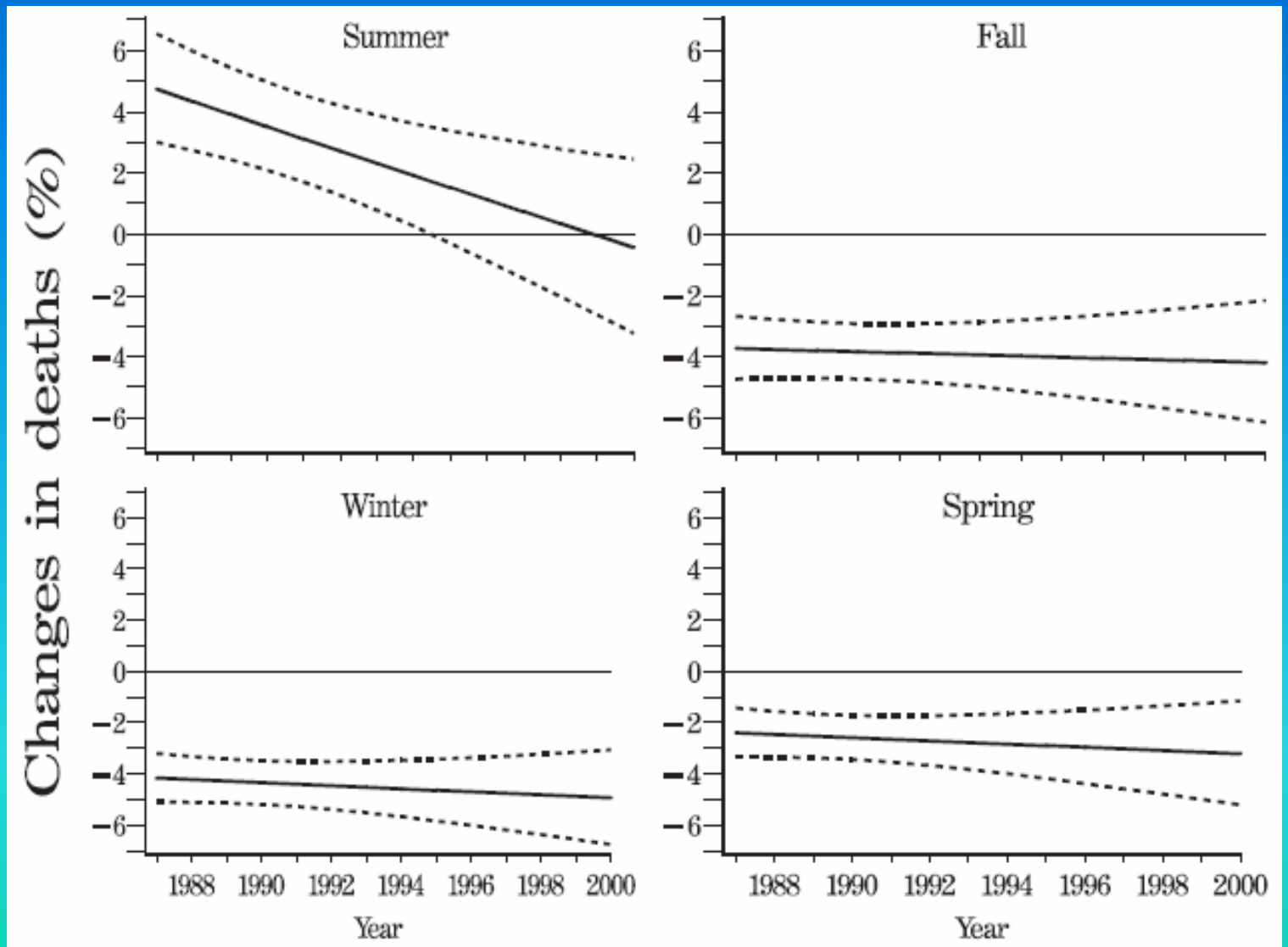


Warmer day mortality in Yellowknife and Whitehorse: are there demonstrable climate change impacts already?

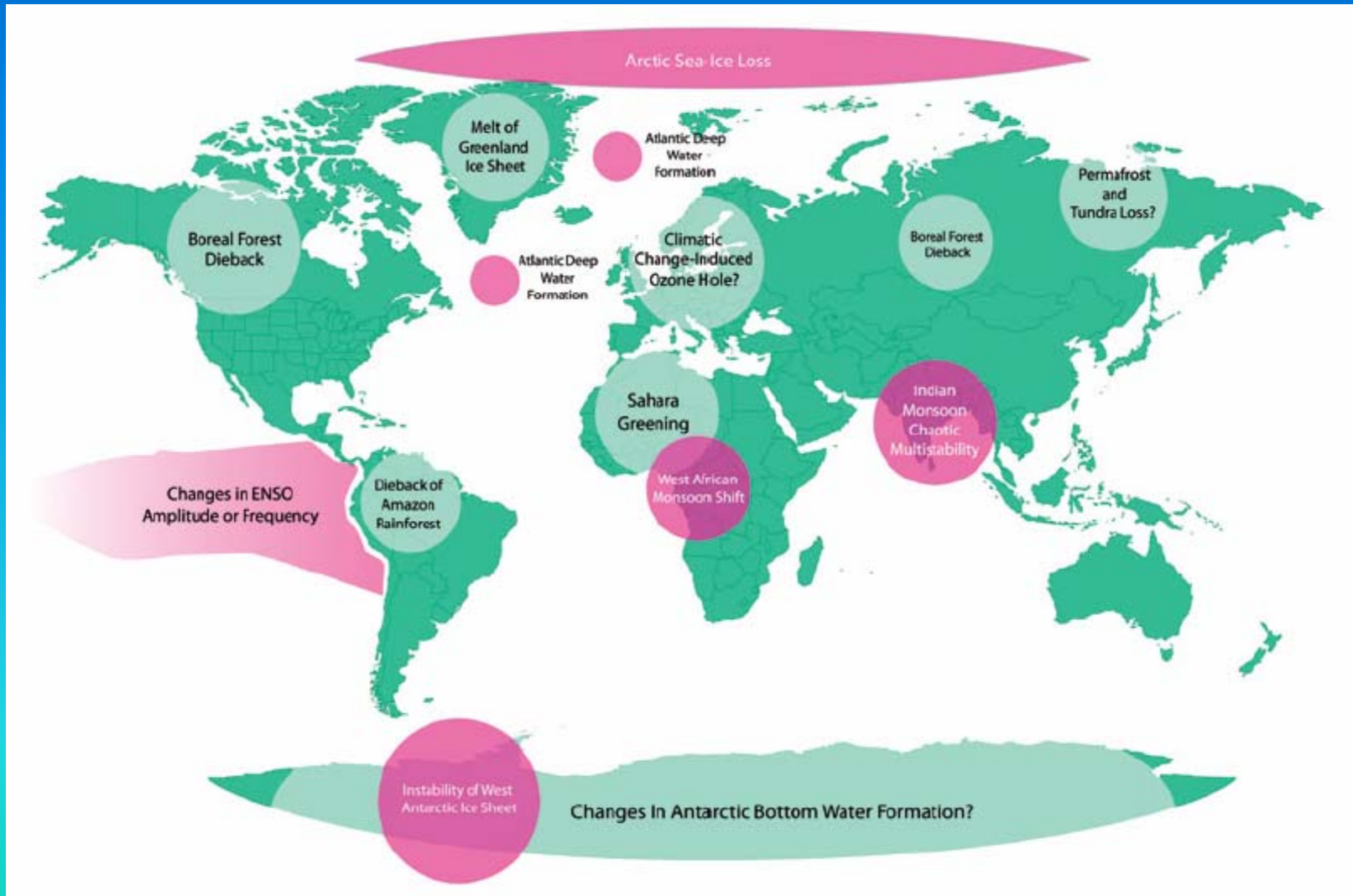
- ***Little evidence based on a 25 year temperature/ mortality record***
 - Small, young populations/low study power?
 - Lack of appreciable heat island effect?
 - Less indoor summer living?
 - Greater social support?
- ***What to expect in future?***



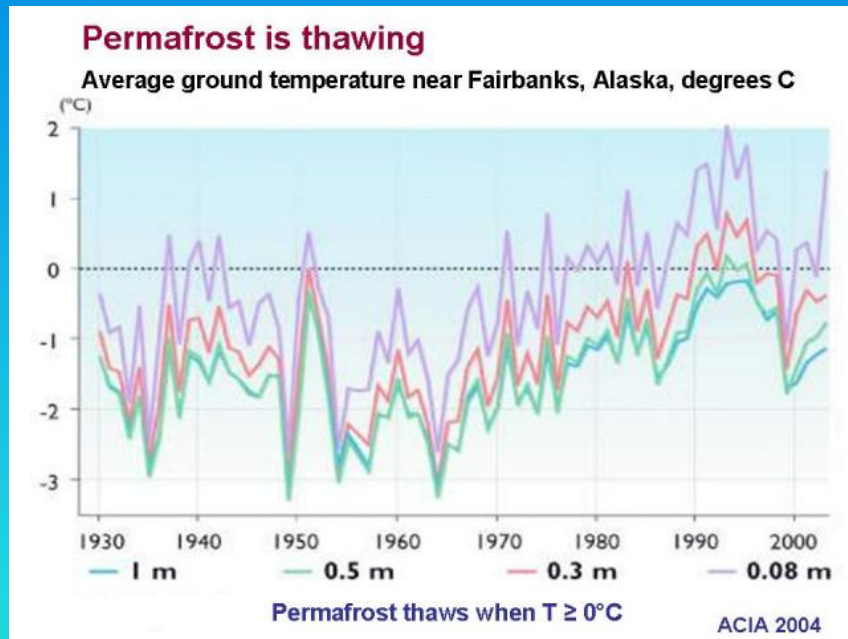
Mean changes in daily cardiovascular deaths (%) and 95% posterior intervals due to a 10°F increase in temperature by year and season, US cities Barnett,2007



Potential climate tipping points



The double impact of melting permafrost



Warmer day mortality in Yellowknife and Whitehorse: should climate change impacts be expected?

- Given adaptive capacity, and public health preparedness, gradual warming presents a minimal direct threat
- Indirect climate change impacts (habitat change, coastal erosion, economic migration) are likely of greater importance
- And, if the climate tips, all bets are off

Thank you

- Shakoor Hajat, Celine Plante, Karen Glassford, Vanita Sahni
- ICCH and Congress participants



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BC Centre for Disease Control
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