Climate Change: Challenges and Opportunities for Global Health

Graduate Institute
Geneva, Oct. 27, 2014

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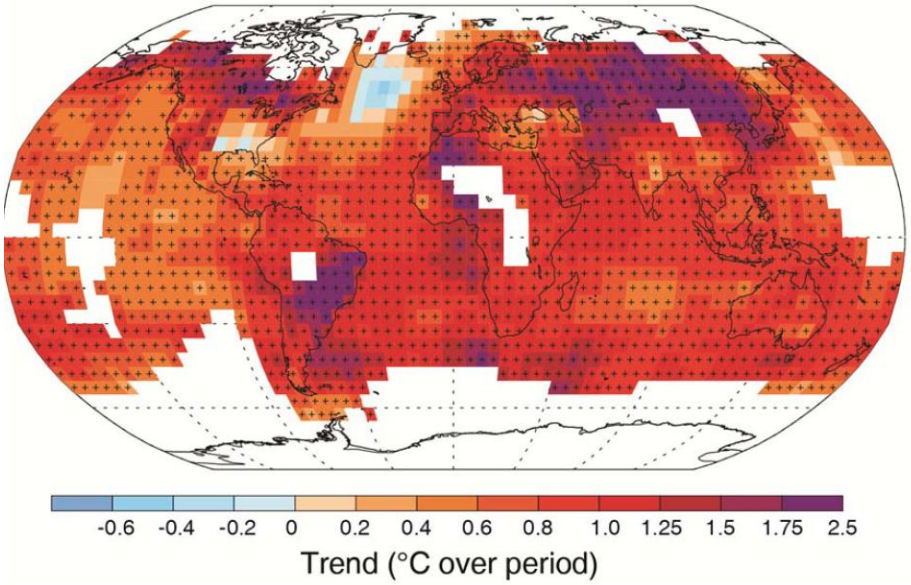
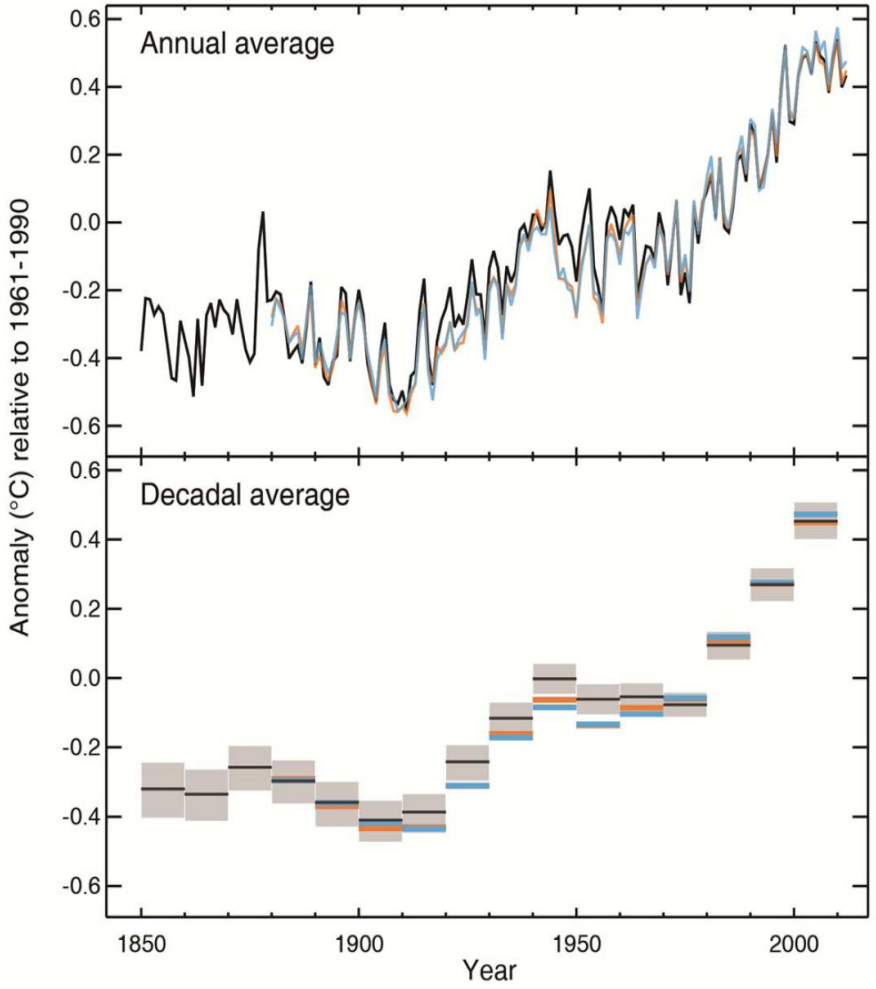
Temperature data

"The globally averaged combined land and ocean surface temperature data .. show a warming of 0.85 [0.65 to 1.06]° C, over the period 1880–2012" IPCC AR5 WG1 2013

Observed change in average surface temperature 1901–2012

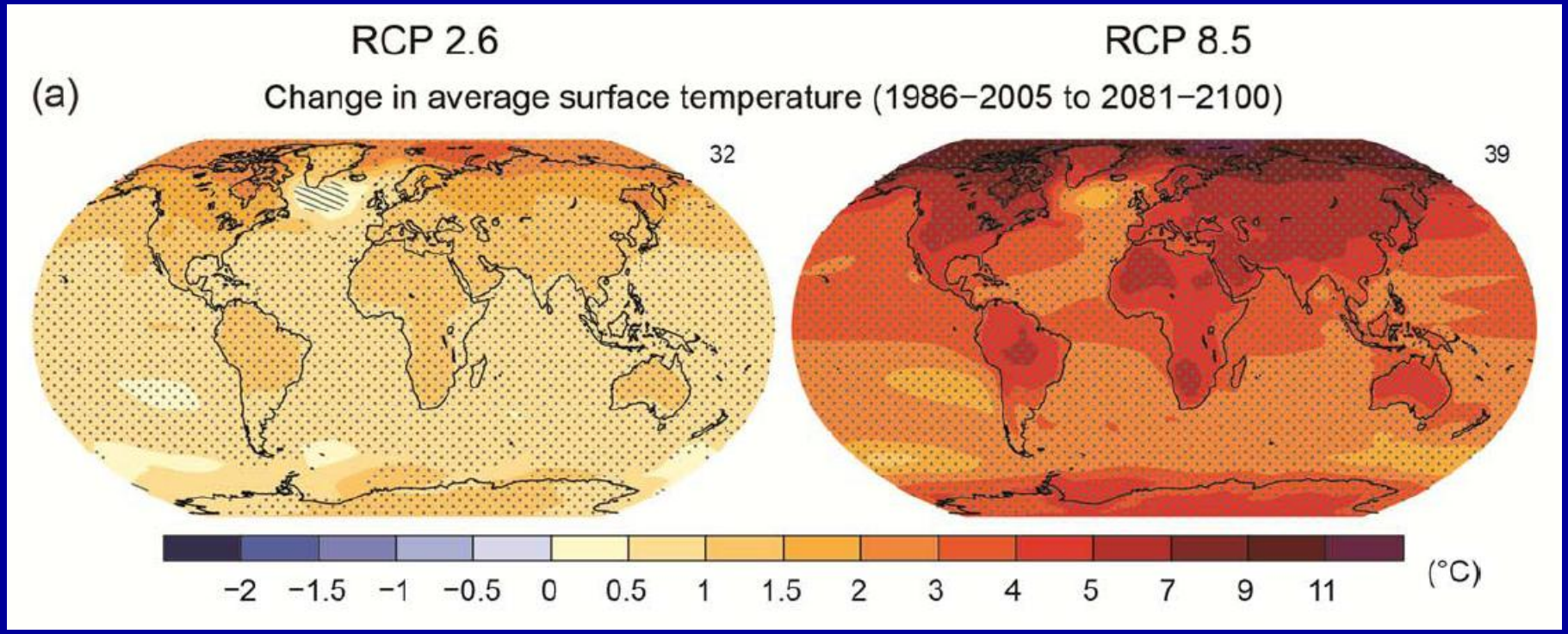


Global Temperature Anomaly 1850-2012



IPCC AR5 WG1 Figure SPM.1

Future Projections



Range: from 1 – 7° C average global warming by 2100

IPCC, AR5, 2013

HEALTH EFFECTS OF CLIMATE CHANGE

CLIMATE CHANGE

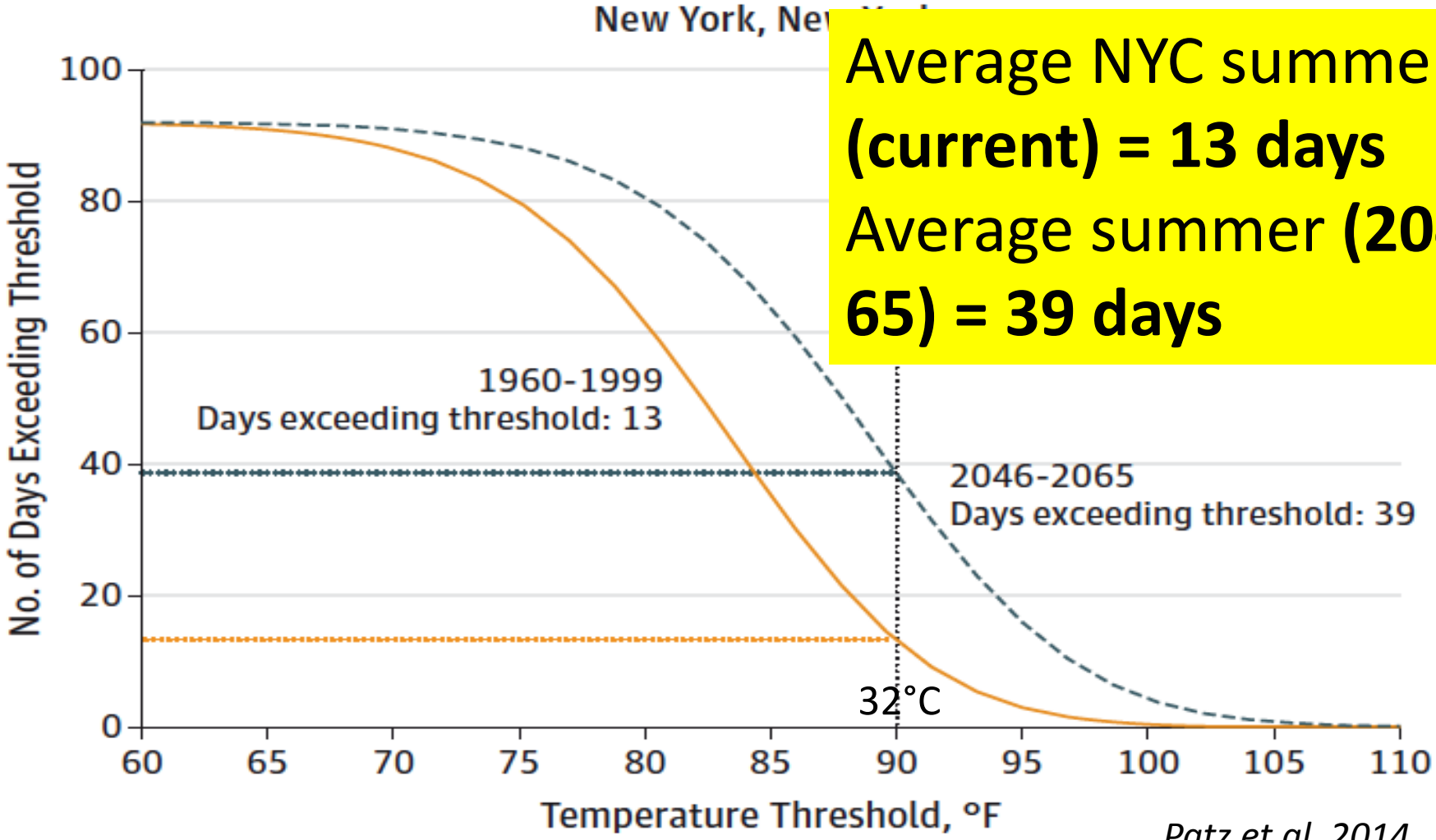
Temperature Rise [1]
Sea level Rise [2]
Hydrologic Extremes

[1] **3° C** by yr. 2100
[2] **40 cm** " "
IPCC estimates

Urban Heat Island Effect	→ Heat Stress Cardiorespiratory failure
Air Pollution & Aeroallergens	→ Respiratory diseases, e.g., COPD & Asthma
Vector-borne Diseases	Malaria Dengue Encephalitis Hantavirus Rift Valley Fever
Water-borne Diseases	Cholera Cyclospora Cryptosporidiosis Campylobacter Leptospirosis
Water resources & food supply	→ Malnutrition Diarrhea Toxic Red Tides
Mental Health & Environmental Refugees	→ Forced Migration Overcrowding Infectious diseases Human Conflicts

Patz, 1998

Projected # of days over 32°C



Average NYC summer **(current) = 13 days**

Average summer **(2046-65) = 39 days**

Patz et al. 2014

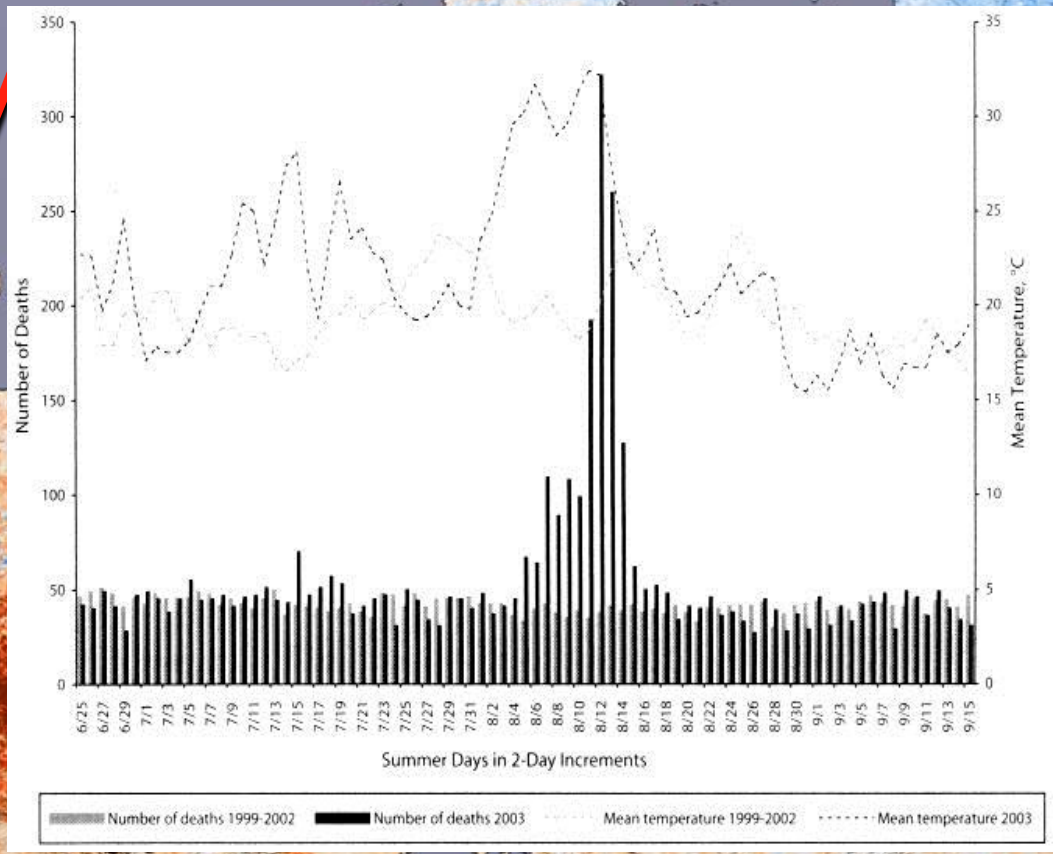

New York, Sept. 21, 2014
FRONTLINES OF CRISIS
FOREFRONT OF CHANGE
PEOPLES CLIMATE MARCH
FIRE
WATER
PROTECT GRANDMOTHER EARTH
KEEP THE OIL IN THE GROUND
BIKE LANE
John Minchillo,
AP Images

HEAT WAV

- **70,000 deaths**

in 11 days

TIME LINE (FRANCE)



Vandentorren et al. Mortality in 13 French cities during the August 2003 heat wave. *Am J Public Health 2004; 94(9):1518-20.*

Probability of 'mega-heatwaves' will increase by a factor of 5 to 10 within the next 40 years.

Future summers warmer than warmest on record

Today's 900 million at risk for hunger could double by mid-century.

Battisi and Naylor, *Science* 2009

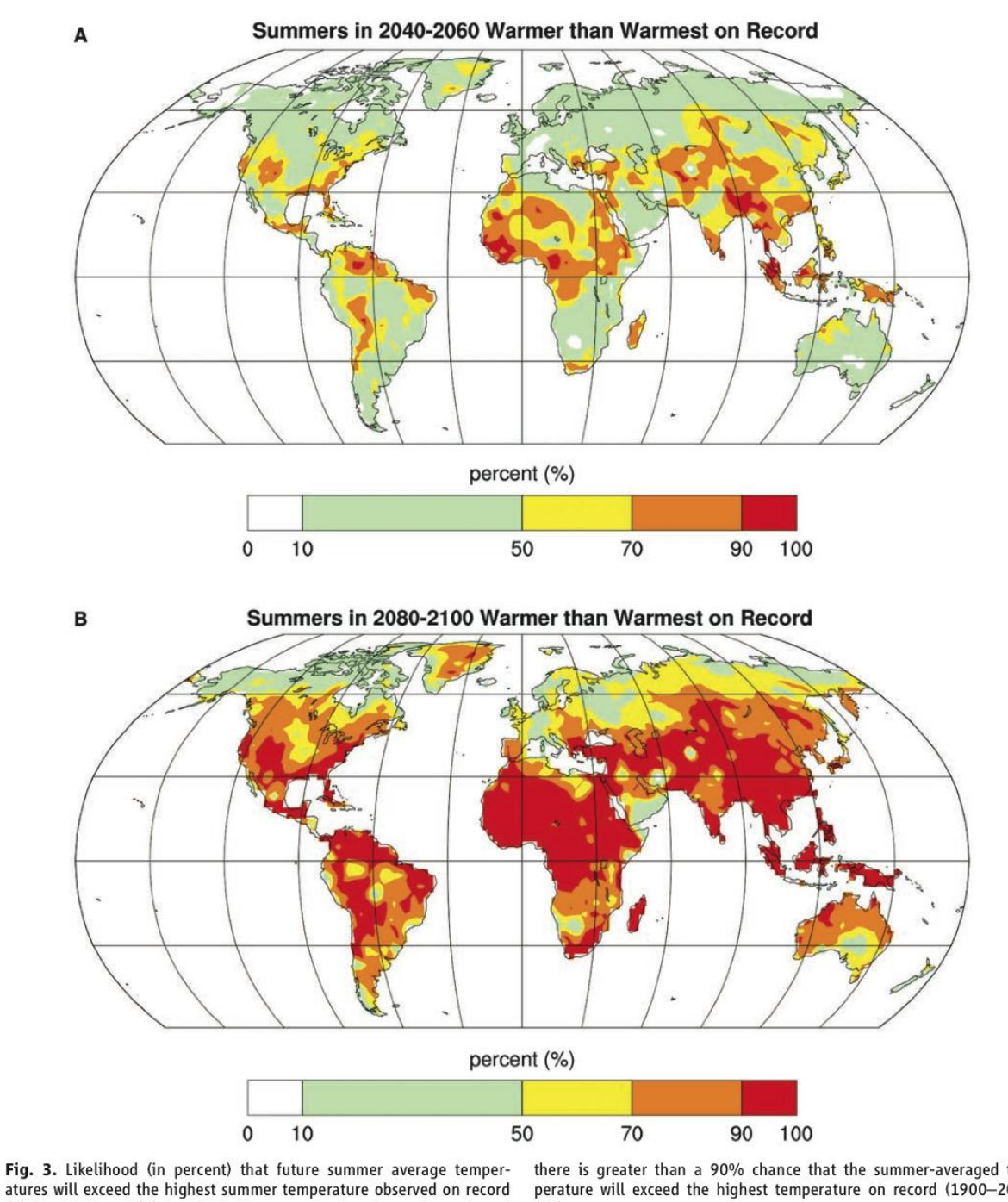
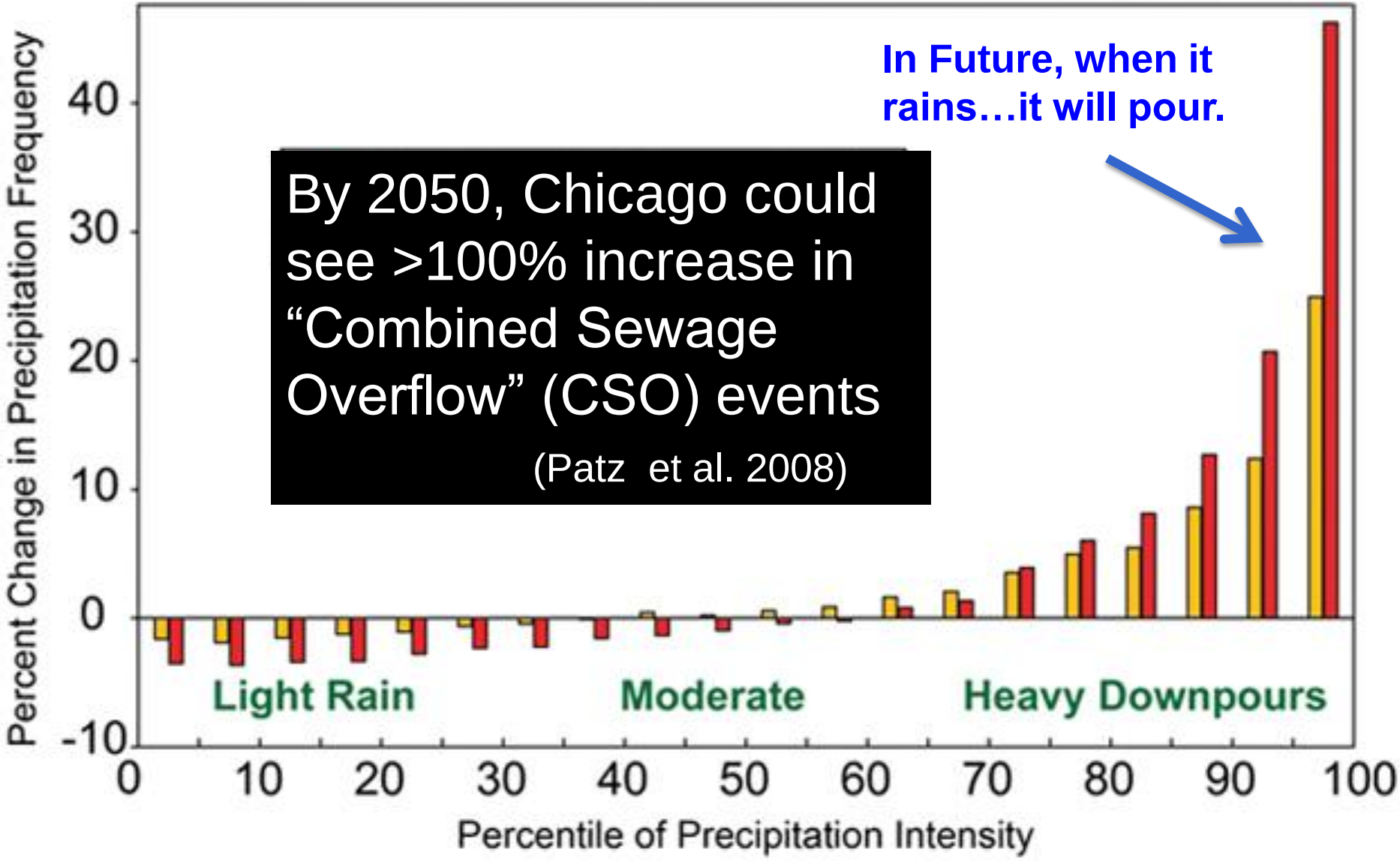


Fig. 3. Likelihood (in percent) that future summer average temperatures will exceed the highest summer temperature observed on record (**A**) for 2050 and (**B**) for 2090. For example, for places shown in red there is greater than a 90% chance that the summer-averaged t perature will exceed the highest temperature on record (1900–2 (*22*).



Globally Averaged

U.S. CCSP, 2008

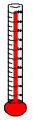
So climate change

is not just about warming.

…and of course it's not **just** about **human health**

Potential Climate Change Impacts

Climate Changes



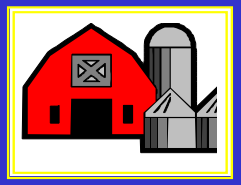
Temperature

Precipitation

Sea Level Rise

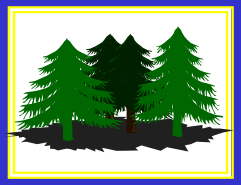
Health Impacts

Weather-related Mortality
Infectious Diseases
Air Quality-Respiratory Illnesses



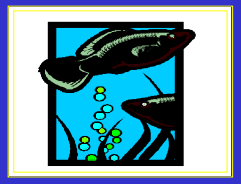
Agriculture Impacts

Crop yields
Irrigation demands



Forest Impacts

Change in forest composition
Shift geographic range of forests
Forest Health and Productivity



Water Resource Impacts

Changes in water supply
Water quality
Increased competition for water

Impacts on Coastal Areas

Erosion of beaches
Inundate coastal lands
Costs to defend coastal communities

Species and Natural Areas

Shift in ecological zones
Loss of habitat and species

EPA

Source: EPA, Global Change Research Program

Why focus on the health sector?

1. Adaptation plans for climate change often neglect the health sector

   (next presentation)

2. GHG mitigation cost/benefit analyses often lack health "**co-benefits**" in calculations…another rationale to act.

Could Combating Climate Change be cost-free?

…or even a net gain?

The opportunity for improving health determinants

We can reduce:

The **3 million annual deaths** from urban air pollution

The loss of **3.2 million deaths**, **from physical inactivity**

Global Burden of Disease Report, 2013

Examples from Transport Sector

Study of the Day: Biking to Work Could Save 1,100 Midwesterners

Grabow et al. 2011

NOV 2 2011, 8:00 AM ET

+1 0 Recommend

New research from U. Wisconsin projects the benefits of active transport in terms of improvements in air quality and physical fitness

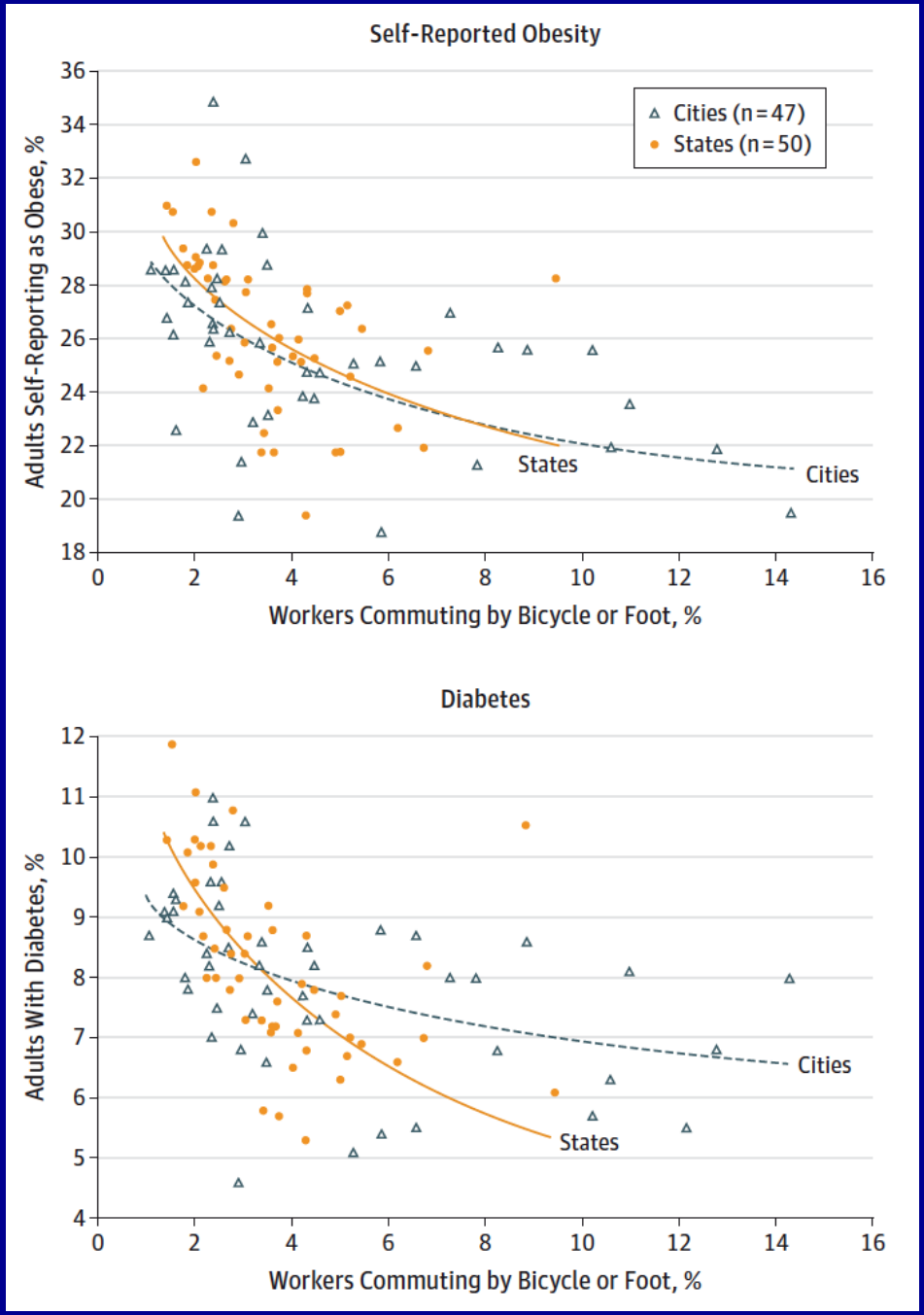
Shanghai : 44-48% reduction in colon cancer

Hou et al. 2004

London, 12-13% reduction in breast cancer and 10-19% less heart disease

Woodcock et al. 2007

Commuting to work by bike or on foot, yields health benefits in the US



Data from Pucher et al. 2010

Co-benefits: Food and Agriculture

People's Climate March, Sept. 21, 2014, NYC
Photo: J Patz

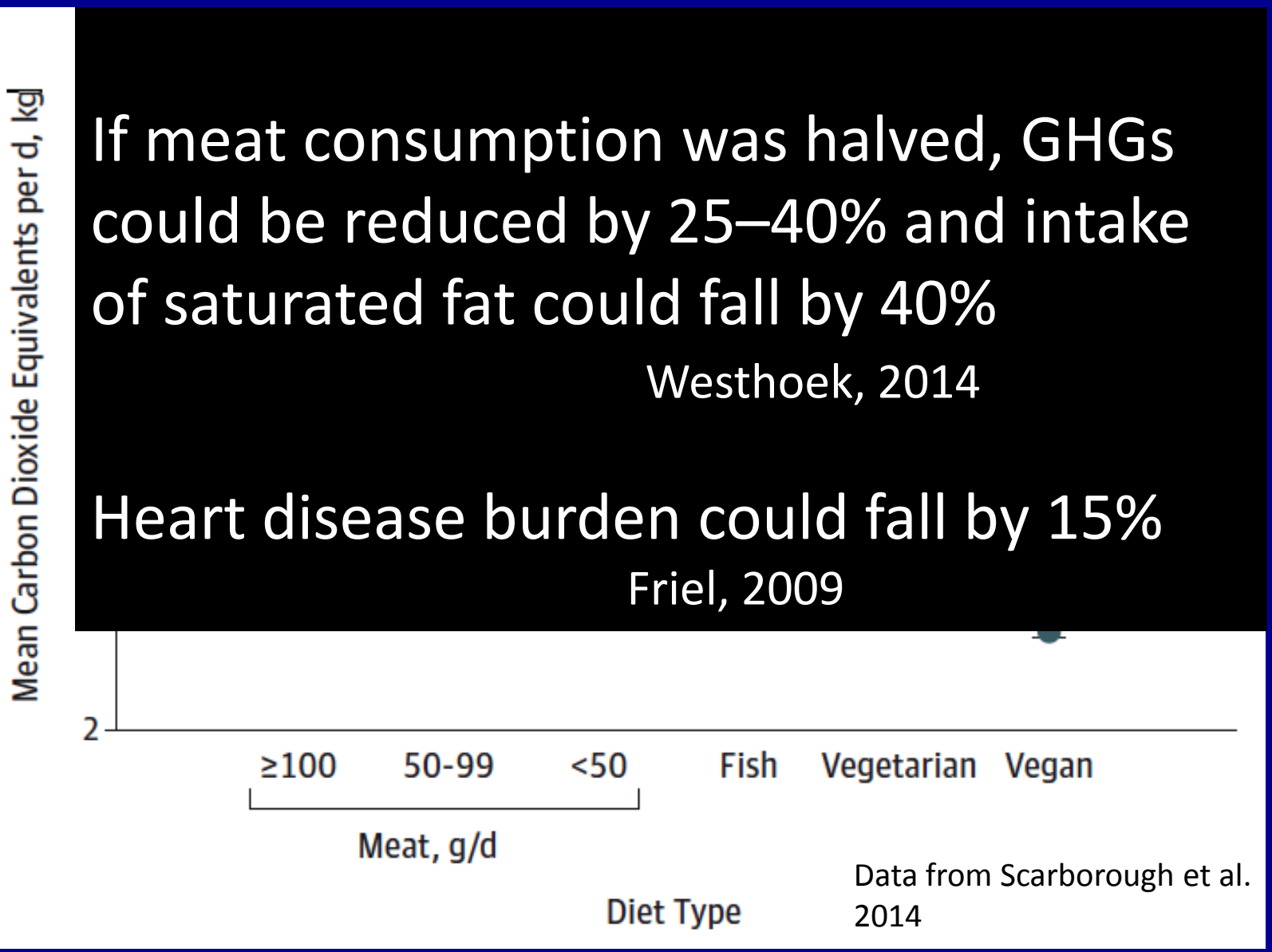
Diet and GHG Emissions

If meat consumption was halved, GHGs could be reduced by 25–40% and intake of saturated fat could fall by 40%

Westhoek, 2014

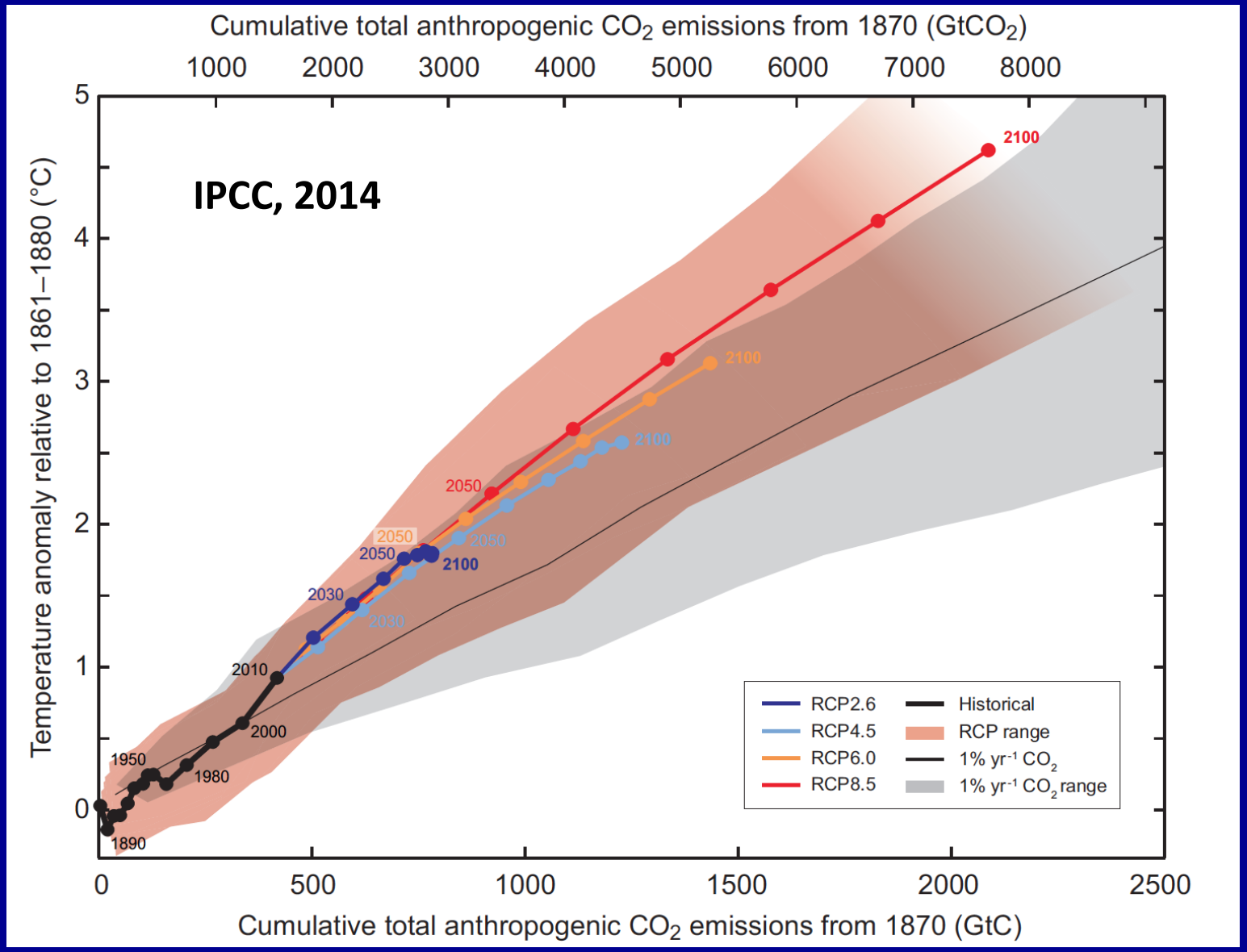
Heart disease burden could fall by 15%

Friel, 2009



Data from Scarborough et al. 2014

Historical & projected GHG emissions



Good news in Governance, Friday

EU adopts 2030 climate targets

European Council adopts binding 40% emissions reduction target by 2030 and compromises on non-binding renewable energy and efficiency goals.

by **Dave Keating** on 24.10.2014 / 03:36 CET

European Union leaders have adopted a package of four climate targets after many hours of intense negotiations at the European Council meeting in Brussels.

nature climate change

ARTICLES

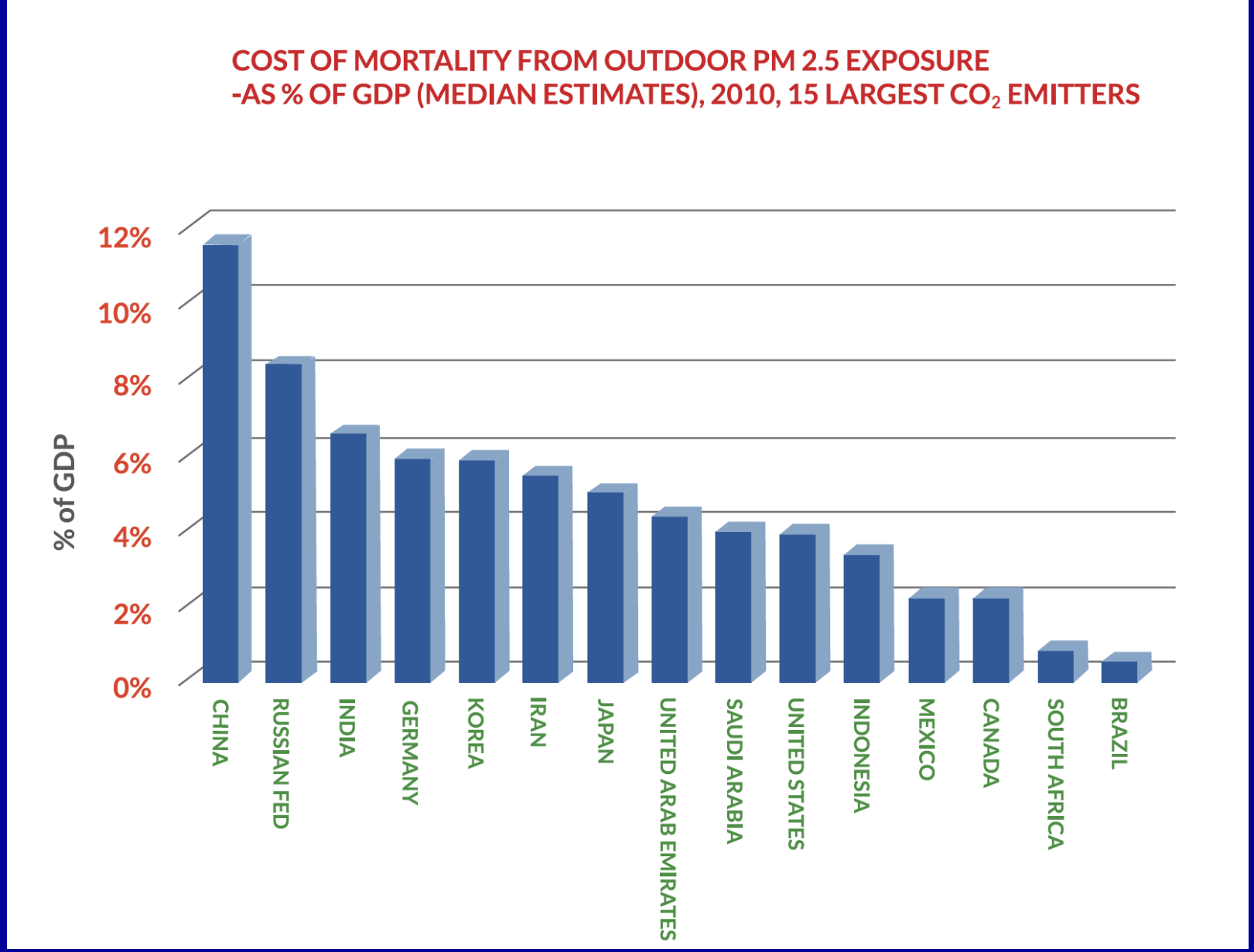
PUBLISHED ONLINE: 24 AUGUST 2014 | DOI: 10.1038/NCLIMATE2342

A systems approach to evaluating the air quality co-benefits of US carbon policies

Tammy M. Thompson[1*†], Sebastian Rausch[1†], Rebecca K. Saari[2] and Noelle E. Selin[2,3]

Because human activities emit greenhouse gases (GHGs) and conventional air pollutants from common sources, policy designed to reduce GHGs can have co-benefits for air quality that may offset some or all of the near-term costs of GHG mitigation. We present a systems approach to quantify air quality co-benefits of US policies to reduce GHG (carbon) emissions. We assess health-related benefits from reduced ozone and particulate matter ($PM_{2.5}$) by linking three advanced models, representing the full pathway from policy to pollutant damages. We also examine the sensitivity of co-benefits to key policy-relevant sources of uncertainty and variability. We find that monetized human health benefits associated with air quality improvements can offset 26–1,050% of the cost of US carbon policies. More flexible policies that minimize costs, such as

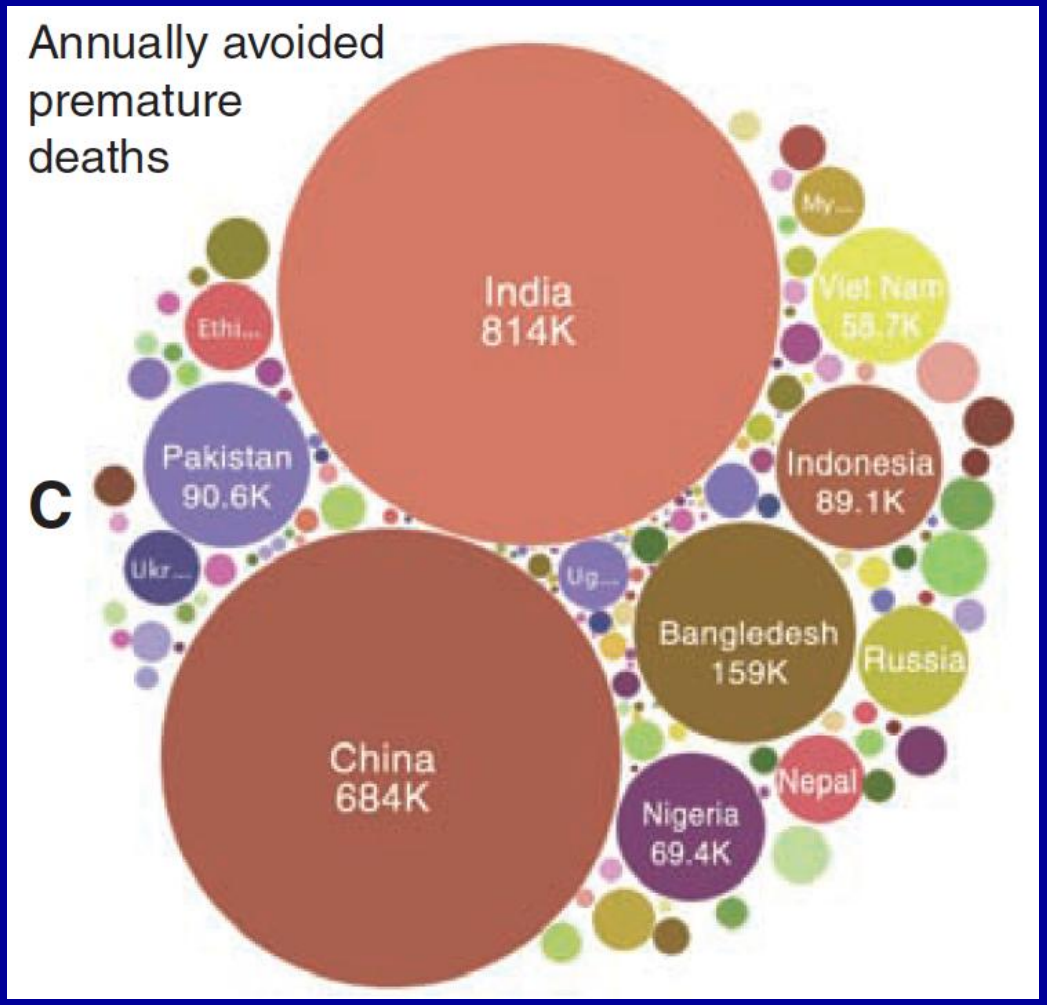
"…health benefits…can offset 26-1050% of the cost of US carbon polices"



From Hamilton, 2014. In: "The New Climate Economy Report," 2014.

Co-benefit of 0.7 to 4.7 million deaths/yr. Reductions in PM pollution in 2030

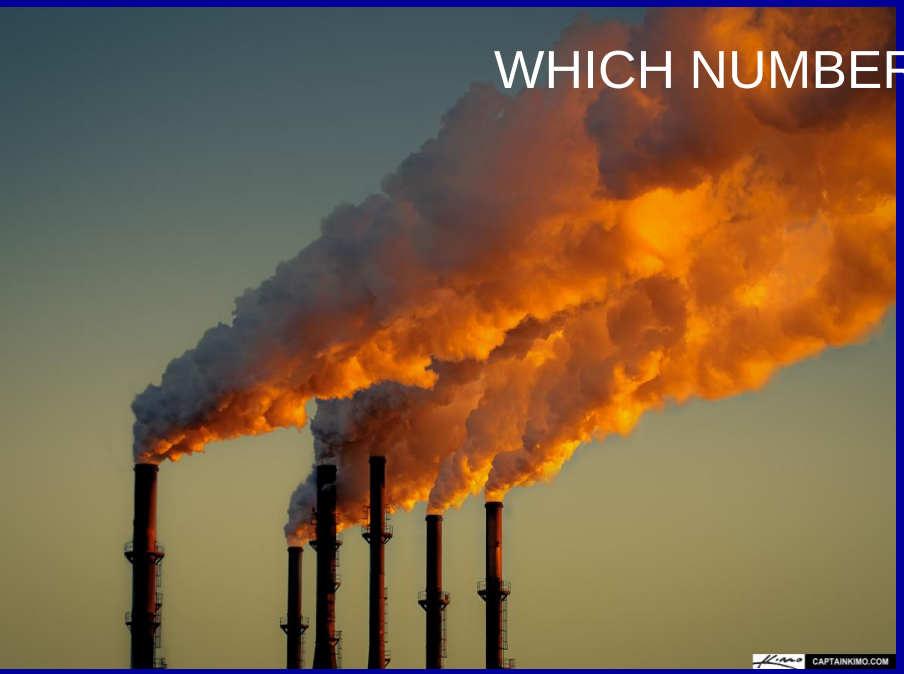
Shindell….J Schwartz… et.al. *Science,* 2012



- ***Cost of cleaner energy:***

  < $30/ tCO_2

- ***Benefits of cleaner energy:$200*/ tCO_2***



WHICH NUMBER IS BIGGER???

(* Range: $50 to $380)

For E. Asia, co-benefits are **10 to 70 times** greater

West et. al. 2013

Question of Governance

Knowing the interdependence between health and **climate change policy across sectors**,

…how might current governance approaches be improved, toward improving global health?

Merci beaucoup!

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