Climate Change and America's Infrastructure: Engineering, Social and Policy Challenges – Tempe, AZ January 28-30

Global Climate Change & Local Public Health

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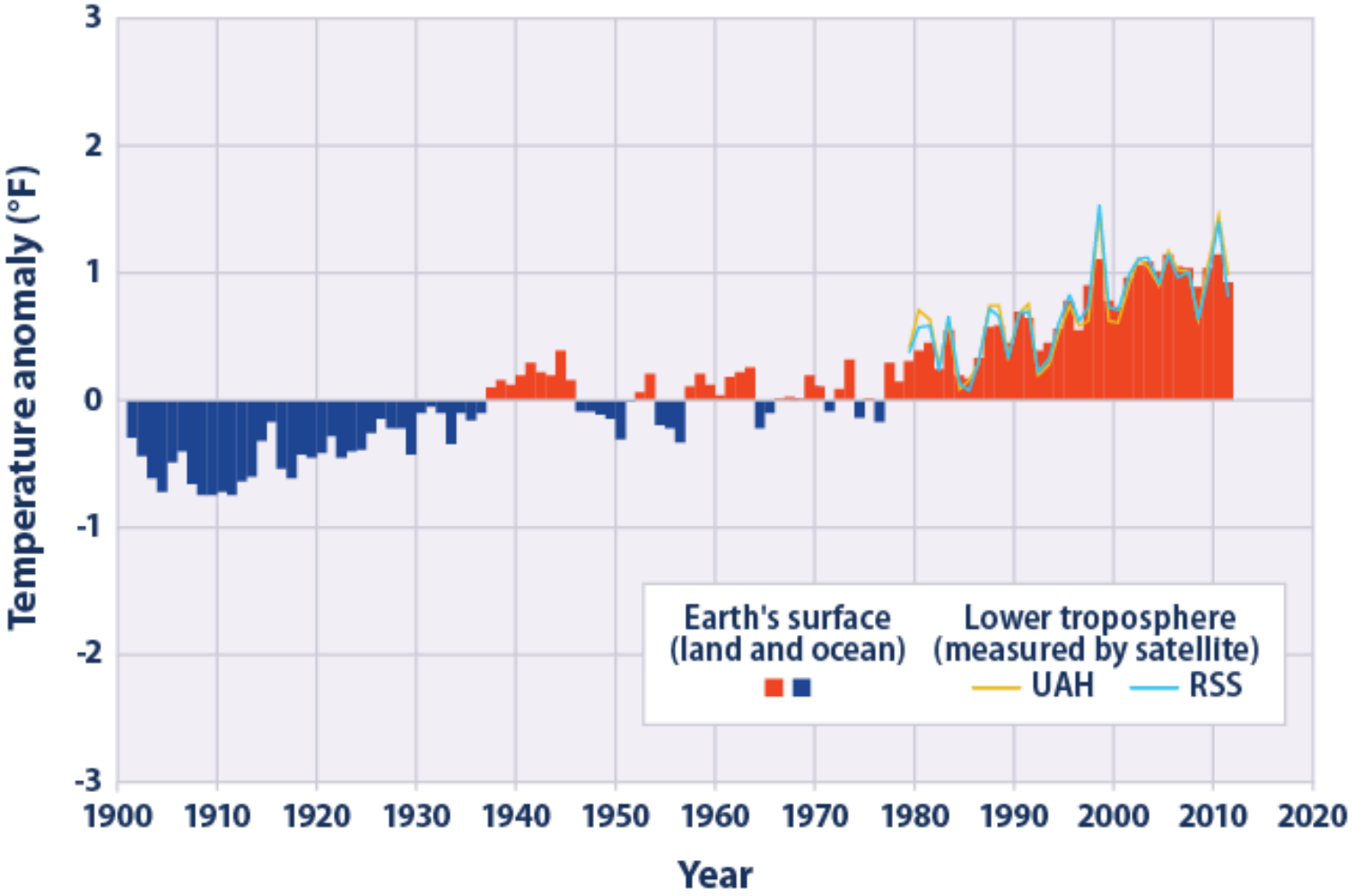
The Public Health Approach

- Philosophy of prevention
  - More leverage up the chain of causation
  - Vaccines, safety, IPM, Precautionary Principle
- PH driven by environment
- “Environment” in PH = water and air quality, sanitation, vector control, disease control, NRBC risk
- Risk multiplier, X-factor in the model

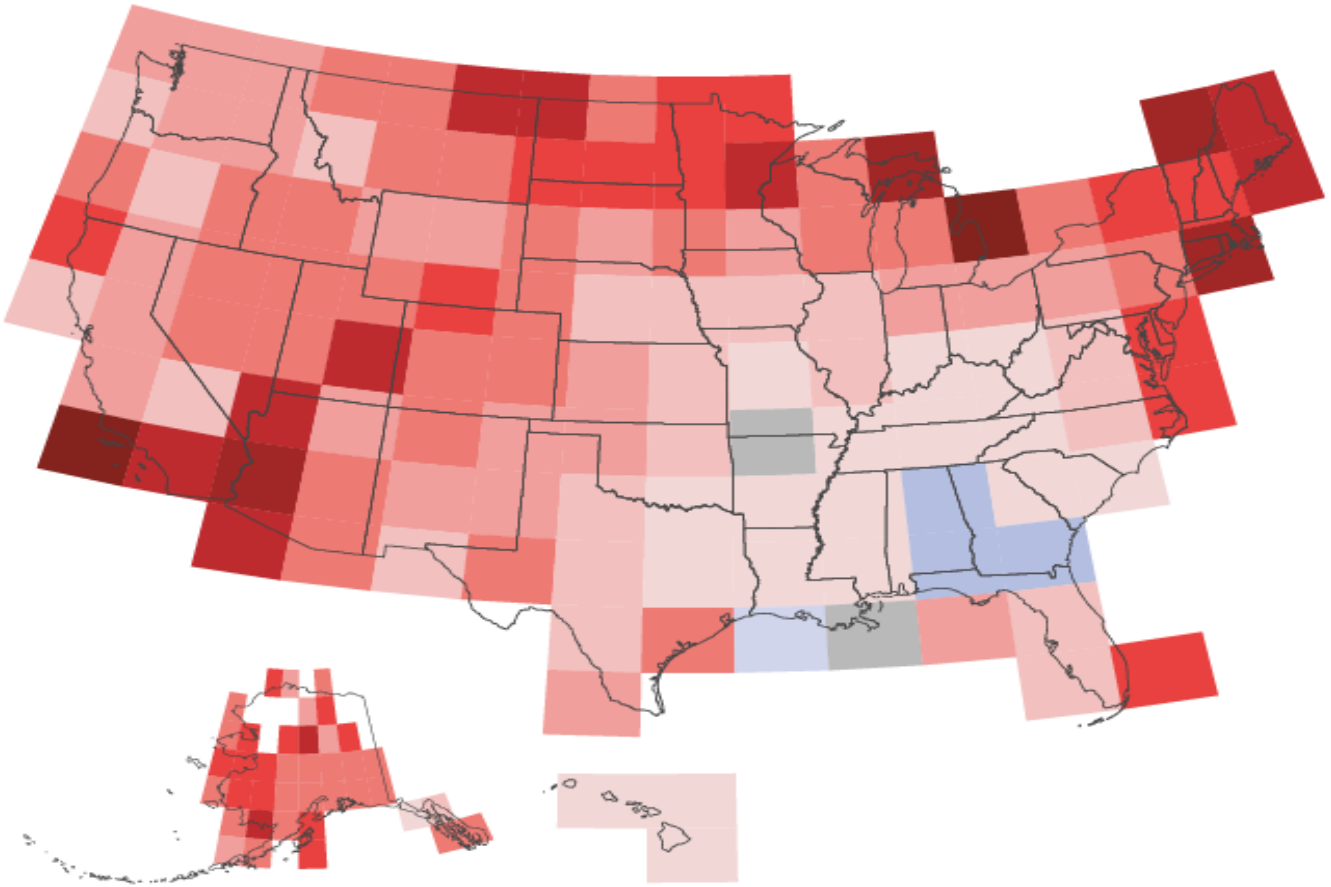
Temperatures Worldwide, 1901–2011



Data source: NOAA (National Oceanic and Atmospheric Administration). 2012. National Climatic Data Center. Accessed April 2012. www.ncdc.noaa.gov/oa/ncdc.html.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climatechange/indicators.

Rate of Temperature Change in the United States, 1901–2011



Rate of temperature change (°F per century):

-4 -3 -2 -1 0 1 2 3 4

Gray interval: -0.1 to 0.1°F

Data source: NOAA (National Oceanic and Atmospheric Administration). 2012. National Climatic Data Center. Accessed April 2012. www.ncdc.noaa.gov/oa/ncdc.html.

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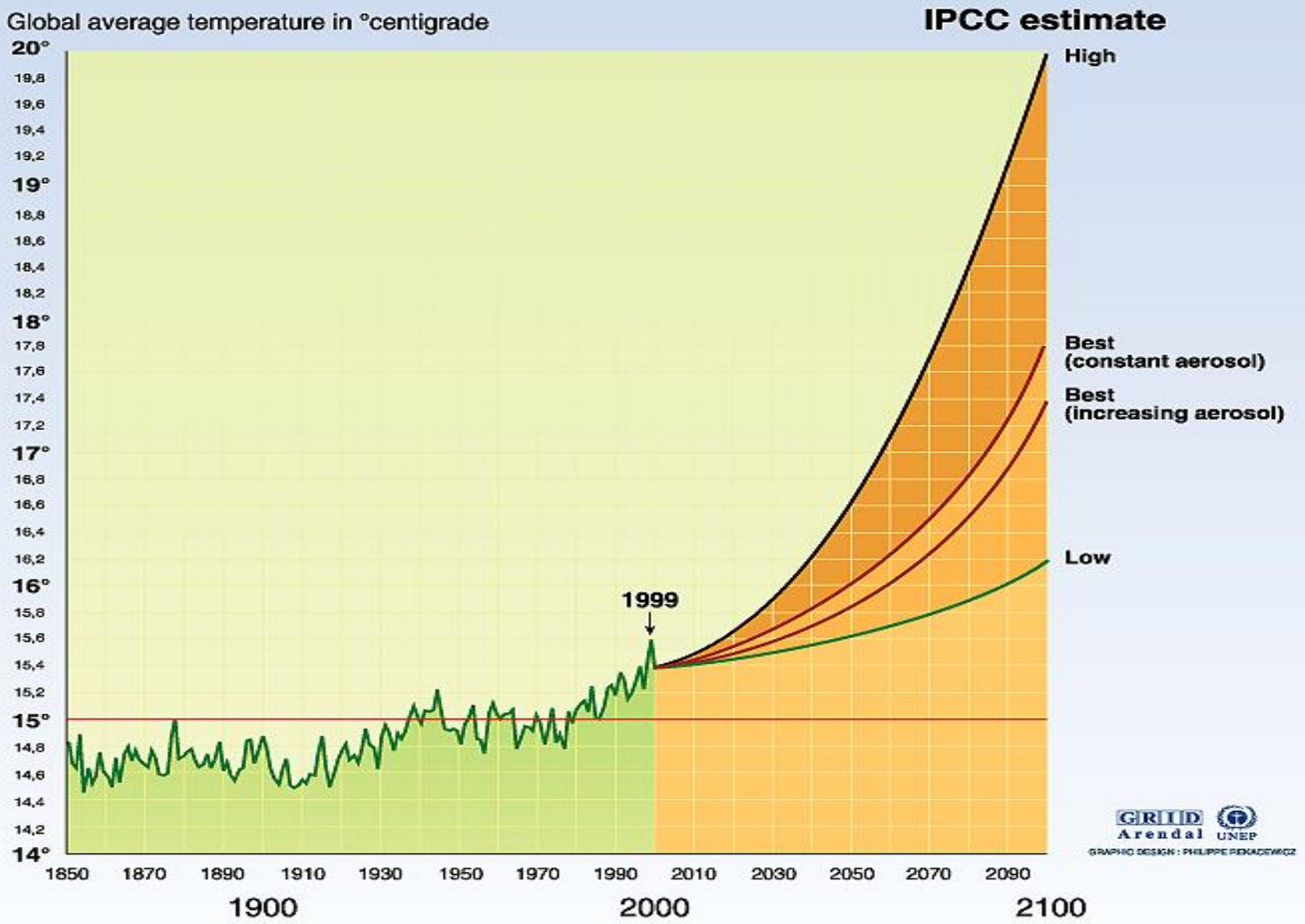
Projected changes in global temperature:

global average 1856-1999 and projection estimates to 2100



Source : Temperatures 1856 - 1999: Climatic Research Unit, University at East Anglia, Norwich UK. Projections: IPCC report 95.

Projecting Climate Change - Global

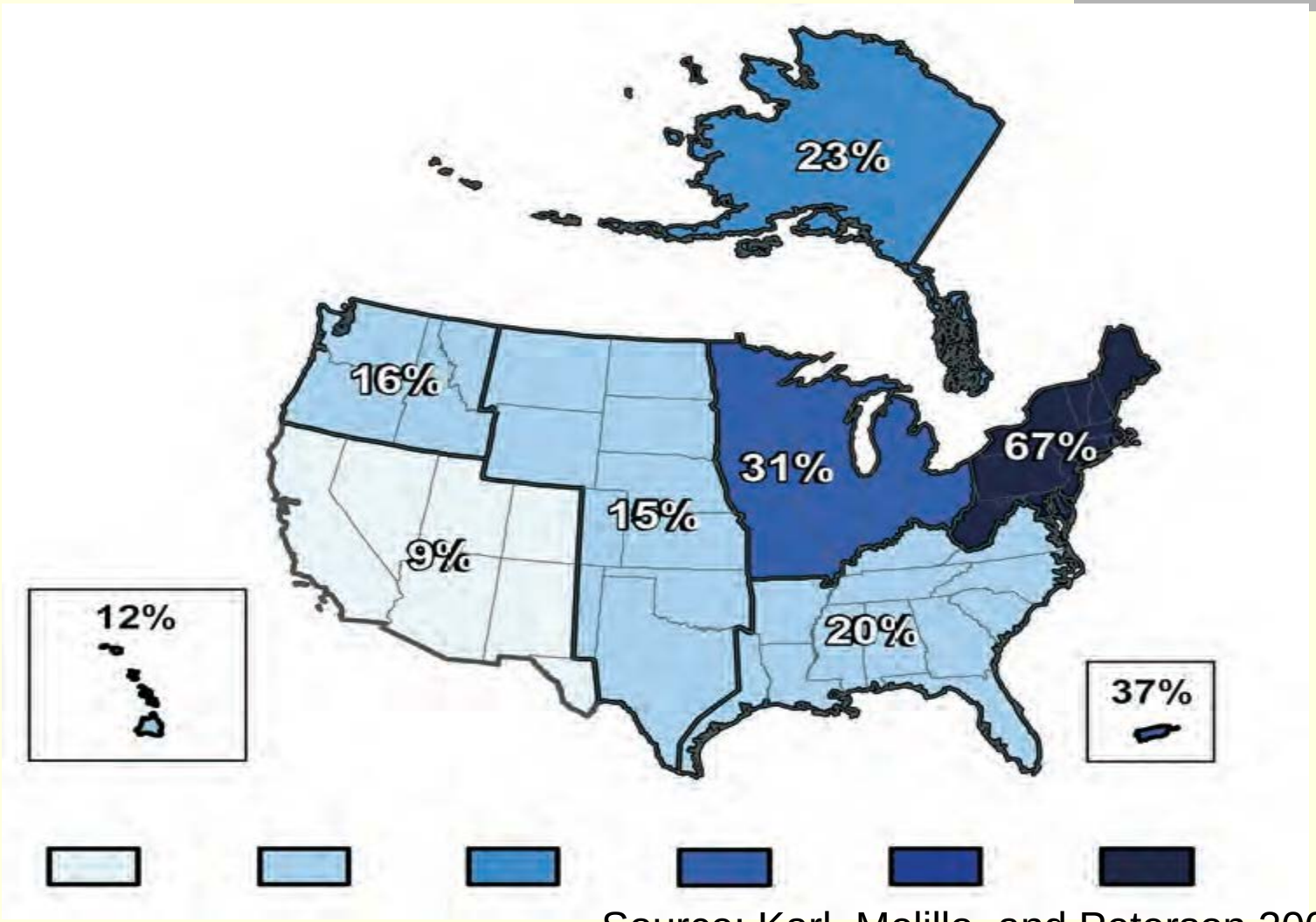
Models predicting global temp rise by 2100

- Best case: +4.0 °F
- Worst case: +11.5 °F
- Since 1980: +0.6 °F average
  - Greater rise in winter temps
  - Greater rise in arctic region temps

Projecting Climate Change - Regional

- Regional variation
  - **Northern states** wetter, more heavy rain events, extreme flooding
  - **Winters** in the Northeast could warm +8-12 °F
  - **Summers** +6-14°F
- Sea level + temp = coastal floods, storms
- Ocean temp, acidity (corral reefs, fishing)

Increases in heaviest precipitation events by US Region (1958-2007)



Source: Karl, Melillo, and Peterson 2009

Public Health Impacts from CC

- Air temperature rise & reduced air quality
  - Heat emergencies
  - Vulnerable people
    - elders, obese, people with respiratory and CVD illness
  - Heat waves may last for weeks
  - Air quality (ozone, smog) will worsen
  - Aeroallergens (↑ CO_2, ↑ pollen)

Public Health Impacts from CC

- Gastrointestinal & respiratory illnesses
  - Enteric pathogens, mold, bacteria, COPD, asthma
- New or expanded vectorborne risks:
  - WNV, Lyme Disease / EEE, Dengue
- Emotional and psychological effects
  - Stress, depression, loss of community, grief

Healthcare Impacts from CC Events

- Major flooding: loss of water, power, access
  - Hospitals and clinics may be off-line for weeks
  - Evacuation decisions often no-win
  - Communication may be interrupted
- Heat Emergencies: power loss, patient surge

Healthcare Impacts from CC Events

- Home-bound residents at heightened risk
  - Isolated, unidentified
  - Reduced access to providers, medications
  - Loss of A/C may worsen many conditions
  - Loss of power for medical equipment
  - Access to safe food, refrigeration

Residential Impacts from CC

- Post-flooding consequences (weeks, years)
  - Sewage-tainted water reaching basements, first floors
  - Mold and bacteria can grow and circulate
  - Risk to safety of water supply, recreational waters
  - Clean-up on private property requires resources
  - Financial, emotional stress may last for years
- Major Heat Emergencies (days, weeks)
  - Power loss: med equipment, food safety, A/C

Projected 100-yr Flood Zone (2100)

(Northeast Climate Impacts, Union of Concerned Scientists, 2007)

Challenges to Adaptation for PH

- Preparing for **rare but high-impact** events
- **Infrastructure** planning should cover 50+ yrs
- Built environment is a **fixed risk**: zoning, building code
- Agencies/Utilities must work **across** sectors/disciplines
  - stormwater/sewer system, streets, dams, flood control
  - power grid, public transit, communications
  - critical built structures: healthcare, food, schools, shelter
  - open space/parkland/waterways/watershed mgt
  - landscaping/building design/zoning

Planning for change underway

- Vulnerability Assessment over next 18 mos: at-risk populations, at-risk areas, essential services, public infrastructure, transit, power
- Capacity to respond: what can we handle for how long?
- Joint PH and public safety preparedness
- Anticipate health burdens now and in 50 years

A few observations so far

- Ability to model health impacts limited
- Assessment must rely on scenario/response
  - Major flooding
  - Power loss
  - Shelter-in-place vs. Evacuation
- Climate only one agent of change
- Vulnerability to heath risk is:
  - at-risk populations, demographics
  - treatment resistance, global pandemics

Hurricane Sandy November 2012

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