



Developing a National Integrated Heat Health Early Warning System

Dr. Wayne Higgins

Director, Climate Program Office / NOAA / OAR

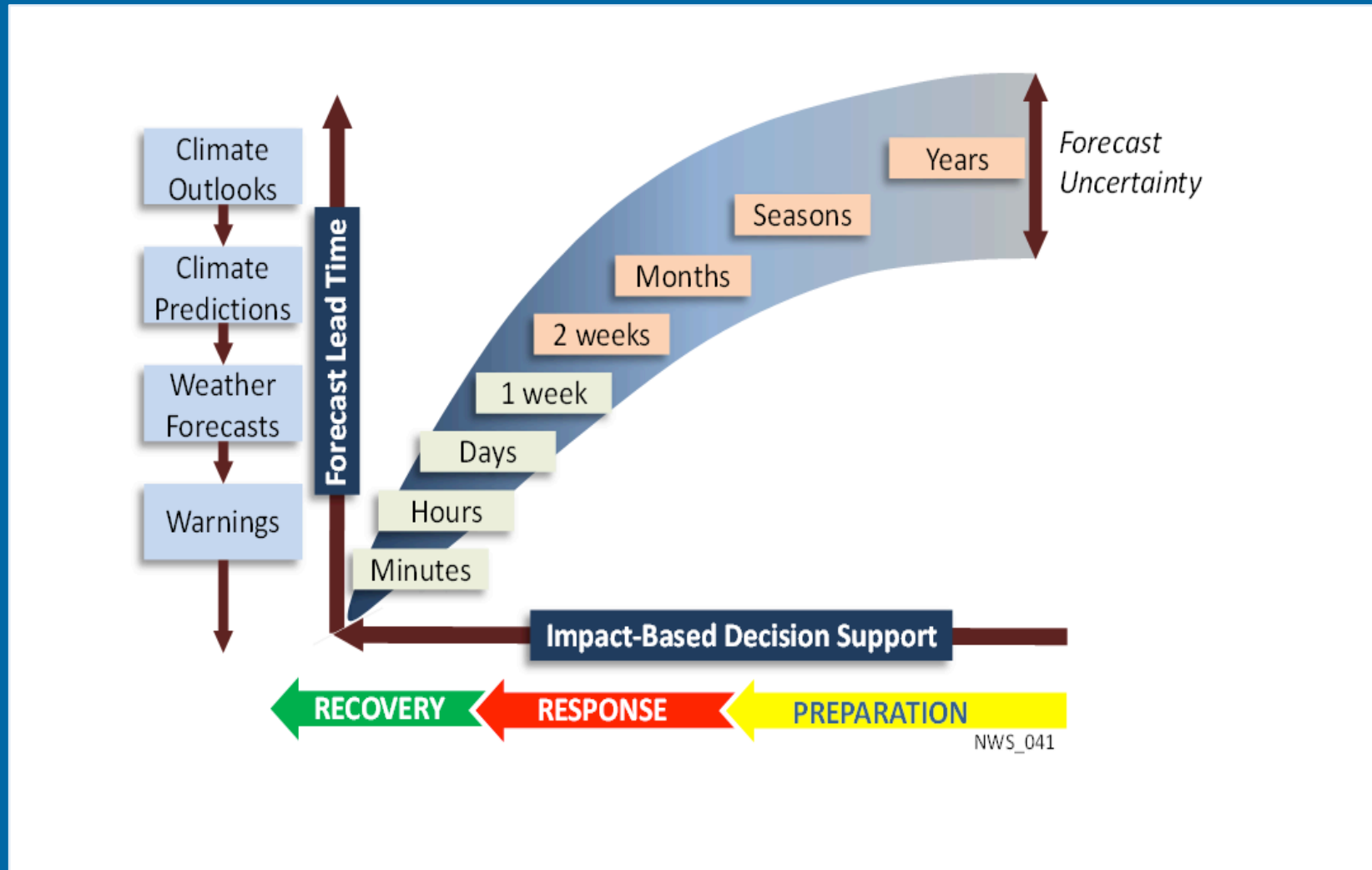
Heat Health Workshop

July 29, 2015

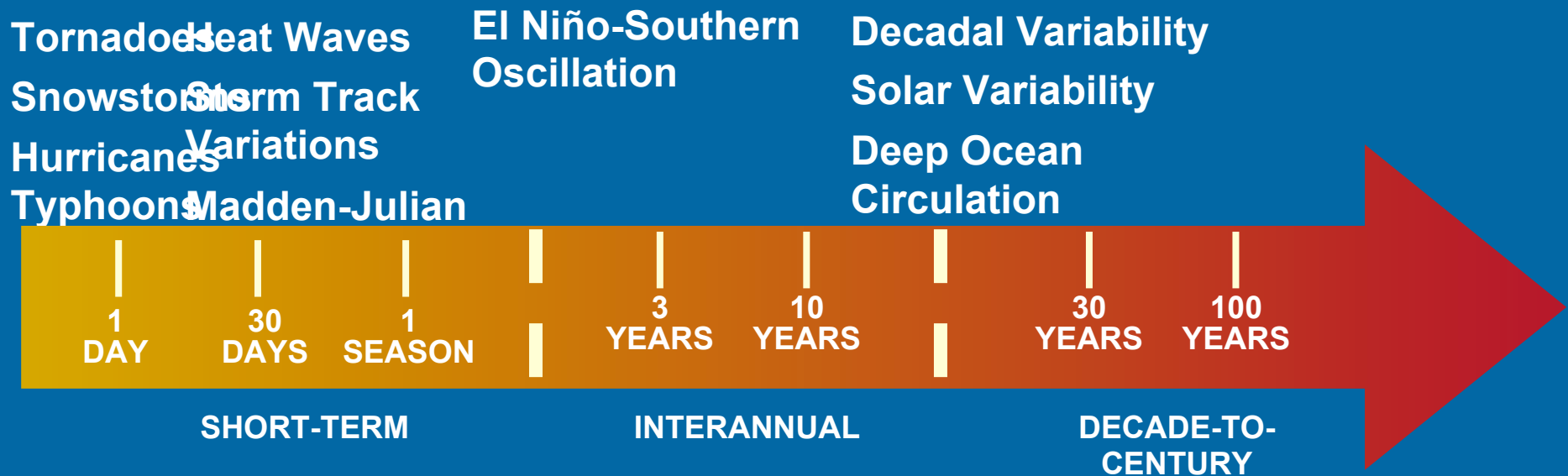
Acknowledgments: Hunter Jones, Juli Trtanj, Roger Pulwarty

What information is needed for decisions?

Timely, credible, useful - across all time scales



Weather to Climate is a Continuum.....



A changing climate influences the frequency and intensity of extremes, including heat waves.....

What is the Role of NOAA?

NOAA provides essential environmental information



Observations

Monitoring

Assessment

Modeling

Forecasts and
Products

TOP PRIORITIES FOR 2014–2016

1 Make communities more resilient

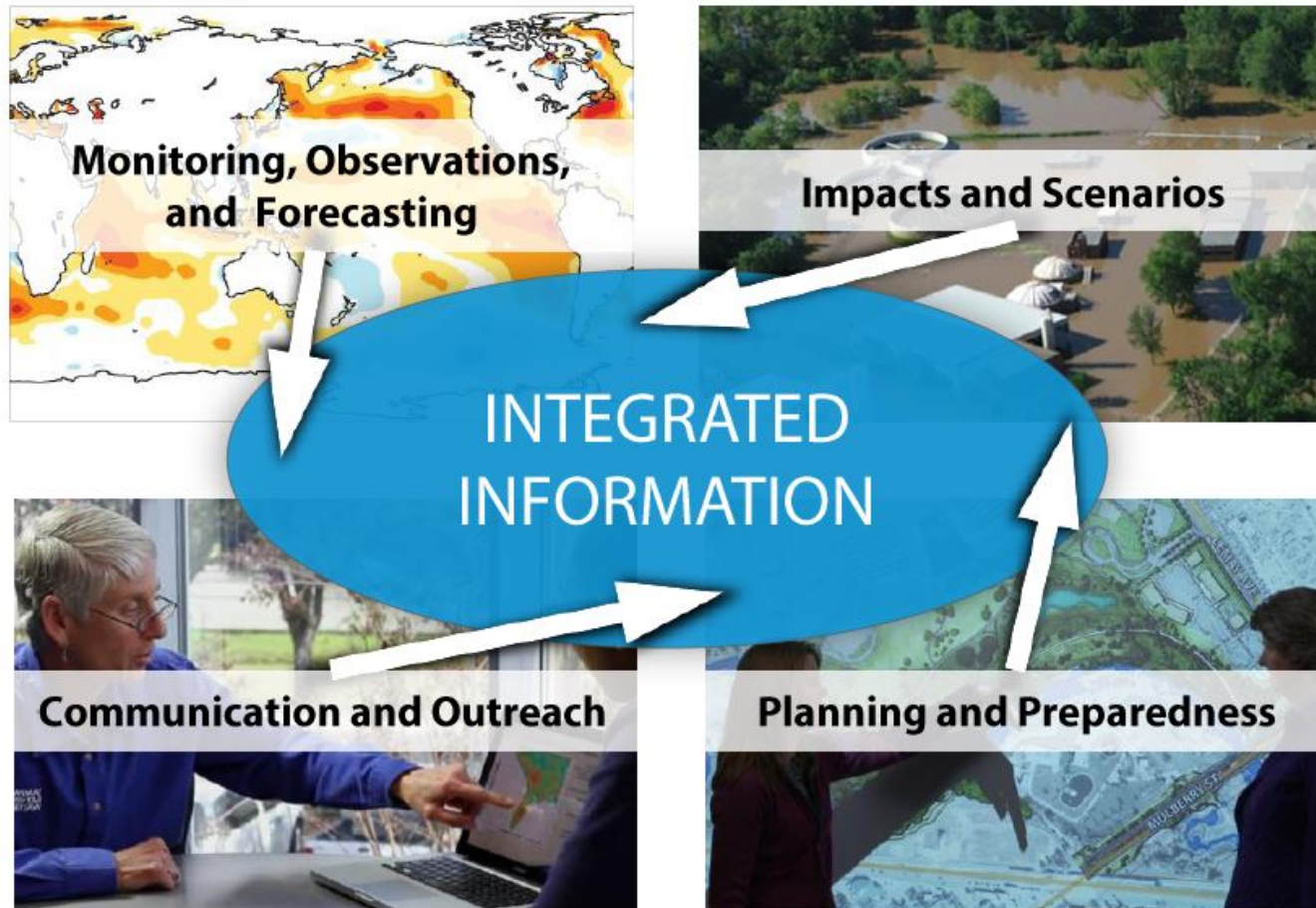
2 Evolve the Weather Service

3 Invest in observational infrastructure

4 Achieve Organizational Excellence

Putting environmental information into the hands of people who need it

What is an Integrated Information System?



It is the systematic collection and analysis of relevant information about areas of impending risk that informs early warning to early action.

Weather-Scale Heat Health Systems Around the World



United States^ψ

- Local action prompted by NWS WFO alerts
- NWS WFOs Issue watch/advisory/warning; local agencies respond; CDC has Natl Env. Public Health Tracking Network
- Alerts issued at forecaster discretion; NWS issues guidance
- 72-hour lead time for heat watch; 6-10 excessive heat outlook
- Trigger is Heat Index, max/min temp., or synoptic system



Canada[¥]

- City/Province level HARS (Heat Alert & Response Systems)
- Environment Canada issues Humidex fcast., high-low temps; Provincial Med. Officer of Health (MOH) administers
- Alert ultimately determined by MOH (Toronto)
- MOH issues extreme alert if 3 day duration exceeds thresholds
- Trigger is flexible: air temp, Humidex, air pollution, mortality



Japan^Δ

- City-level systems & national forecasts
- Local departments of Crisis Management, Health Promotion, or Sports Associations coordinate the systems
- Alert thresholds vary by city
- Advanced warning varies, one example is 21 hours
- WBGT is monitored at schools, as well as air temperature



Germany^{*}

- National system with county-level warnings
- Developed and operated by federal environment agency and weather service in conjunction with public health office
- Warnings are produced at the county level
- 6 day forecast of heat pre-info from federal level
- Trigger is heat load based on perceived temperature



Australia^Ω

- State-level systems (Natl. req. for Heatwave Sub Plans)
- Dept. of Health owns system in Victoria; Emergency Operations owns system in New South Wales
- Alert threshold varies by forecast district (Victoria)
- 3-4 day advanced warning; 7 day forecast
- Trigger is average temperature $\frac{1}{2}(\text{max} + \text{min})$



India[‡]

- City-level system; Ahmedabad Heat Action Plan in 2013
- Ahmedabad Municipal Corporation (AMC) Nodal Officer issues alerts, Indian Met Centre declares heat wave
- 40C max daily temp threshold in plains, 30C in hilly regions
- 7 day forecast
- Hybrid dynamical-statistical probabilistic temperature forecast



United Kingdom^{*}

- National system with regional thresholds
- Dept. of health owns and operates system while Met Office forecasts
- Alert threshold >30C day temp & 15C overnight
- 2-3 days lead time for lowest alert levels
- Trigger is min and max temperature



France^{*}

- National system (SACS) with regional plans
- Health department issues plan and manages system while Meteo-France monitors and issues warnings
- Alert threshold regionally dependent
- 5 day forecast and 1 day alert lead time
- Trigger is min and max temperature; heat stress index

Expected Outcome

(a) Input and best practices and (b) possible parameters to predict heat and its impacts towards a

National Integrated Heat Health Information System

- Extreme heat events will be more frequent and more intense in the future (NCAA, IPCC)
- Collaboration among climate and public health communities defines demand and enables use of Heat Health forecasts and other information
- NOAA research, observation, prediction, and communication capabilities underpin NIHHIS – from weather to climate time scales
- NOAA CPO, NWS, NCEI-Partnering with Centers for Disease Control (*NIH, USDA*)
- ***Goal: To provide a suite of decision support services that better serve public health needs to prepare and respond***



Starting to build the National Integrated Heat Health Information System—weaving together existing pieces, identifying gaps and filling them



Extras

Expected Outcome of this Session

(a) Input and best practices and (b) possible parameters to predict and warn for heat and its impacts towards a:

National Integrated Heat Health Information System

RECOGNIZING:

- Heat is the number one weather related killer
- Extreme heat events will be more frequent and more intense in the future (NCAA, IPCC)
- Collaboration among climate and public health communities defines demand and enables use of Heat Health forecasts and other information
- NOAA capabilities underpin NIHHIS – from weather to climate time scales
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GOAL: To provide a suite of decision support services that better serve public health needs to prepare and respond

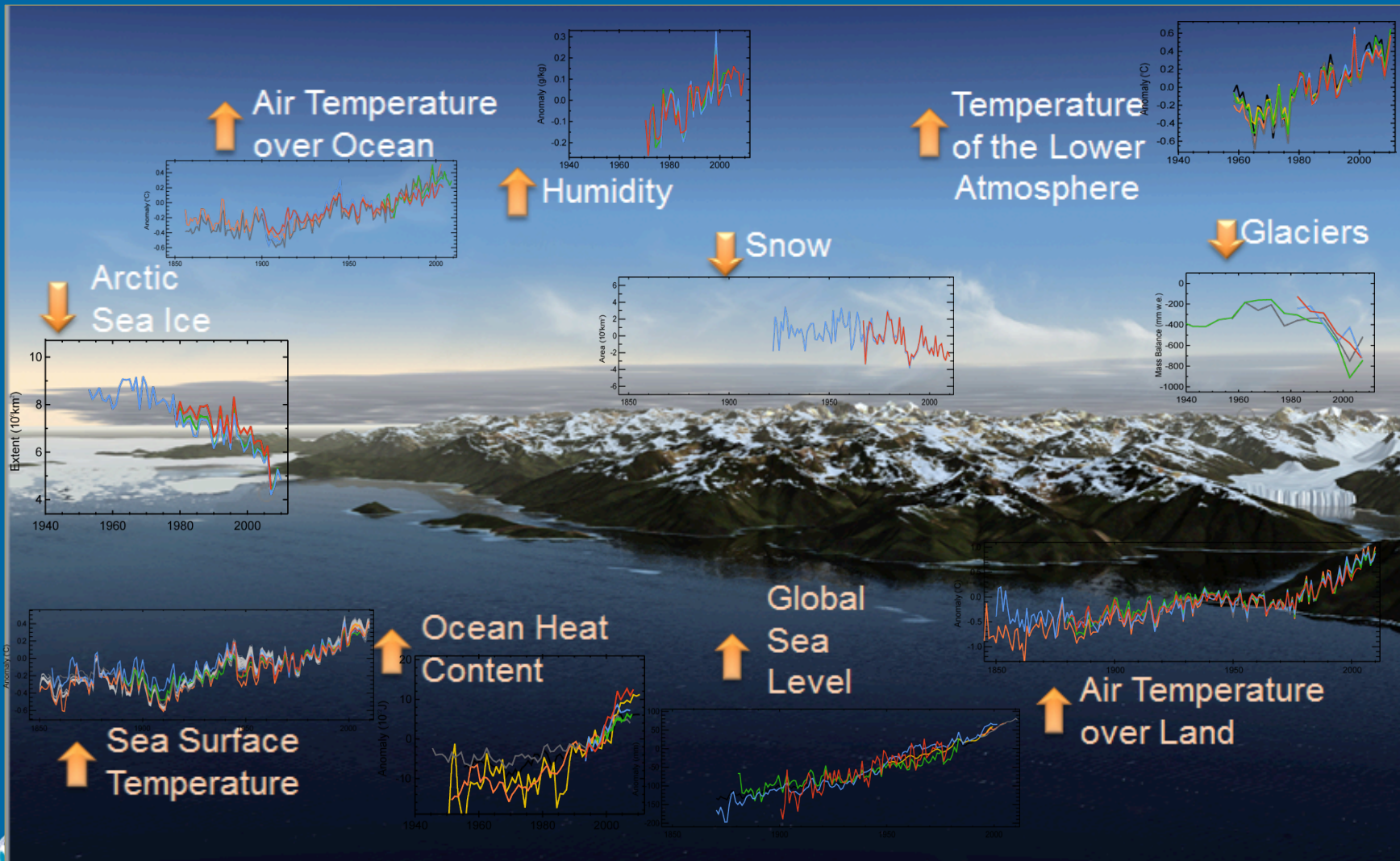
Outline

- A Changing Planet Means Changing Conditions
- NOAA's Role
- What is an Integrated Information System?
- Current Heat Health Early Warning Systems
- Expected Outcome of this Session



What do we know?

Ten Indicators of Changing Conditions:



Why do we care?

Lives, Livelihoods and Economies are at risk



Life and Property



Aviation



Maritime



Space Operations



Forests



Emergency Management



Commerce



Ports



Energy



Hydropower



Reservoir Control



Infrastructure



Construction



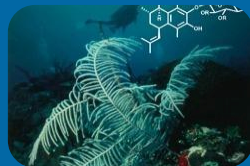
Agriculture



Recreation



Ecosystems



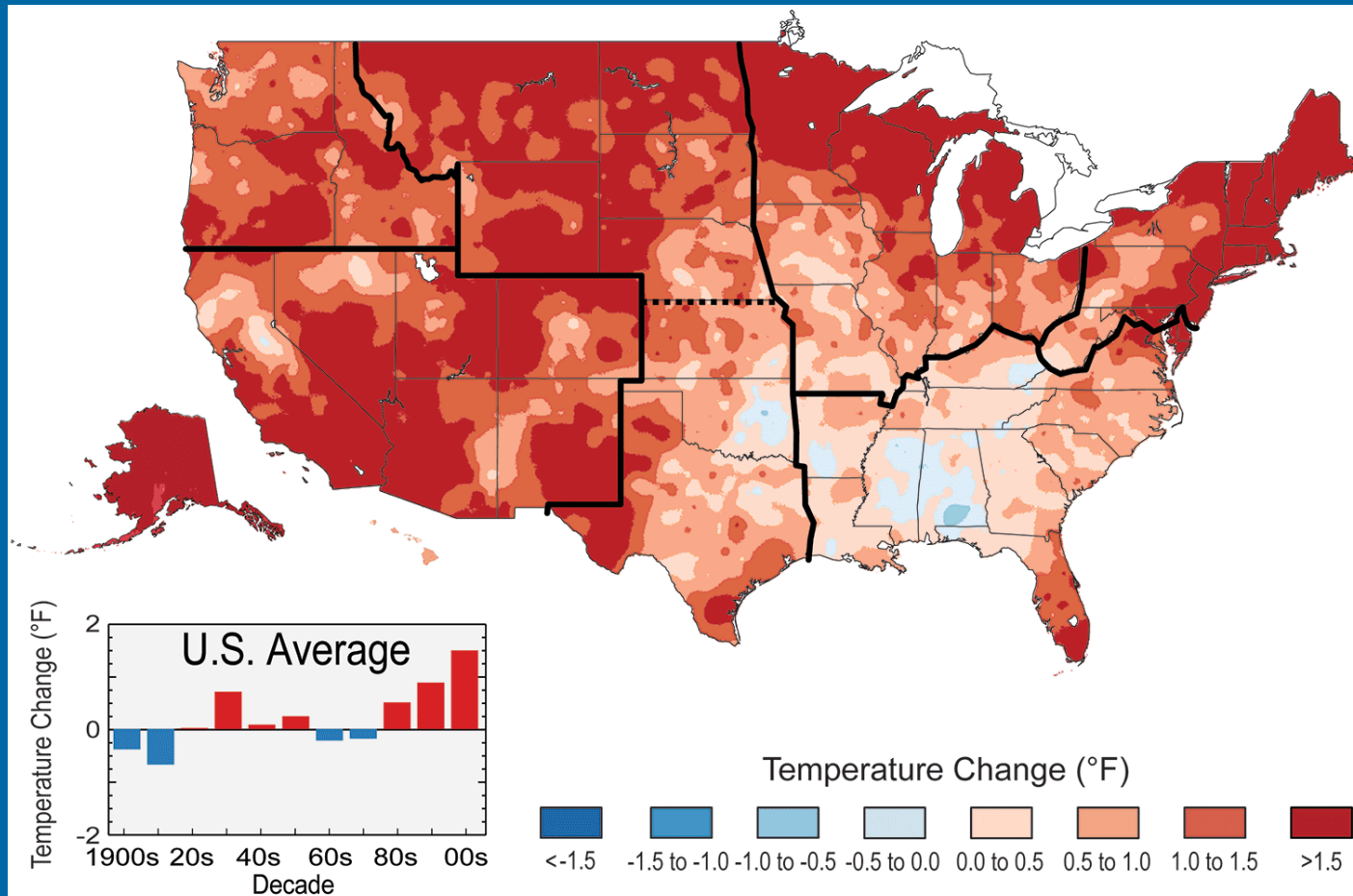
Health



Environment

Careful preparations are required to seize opportunities, and minimize risks and vulnerabilities

Observed U.S. Temperature Change

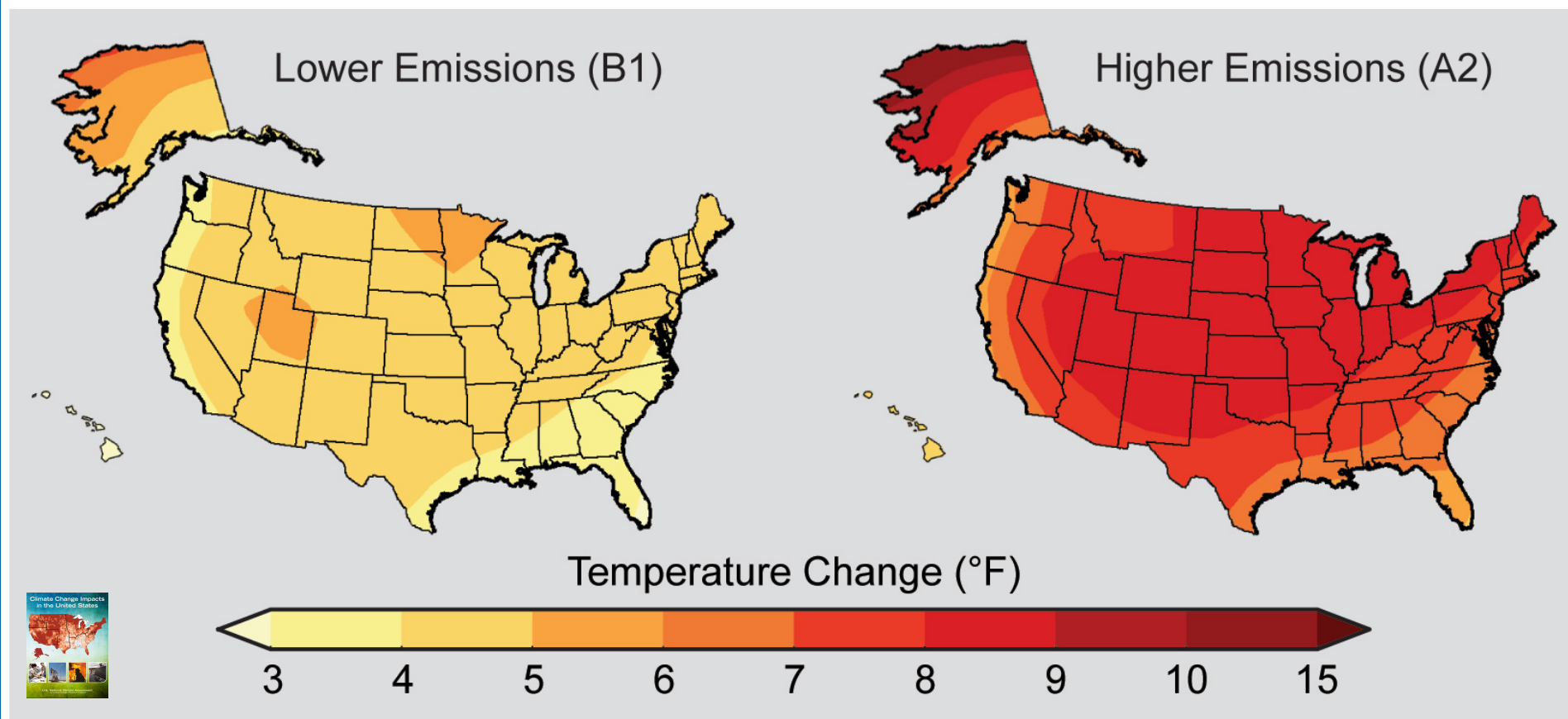


GlobalChange.gov
U.S. Global Change Research Program

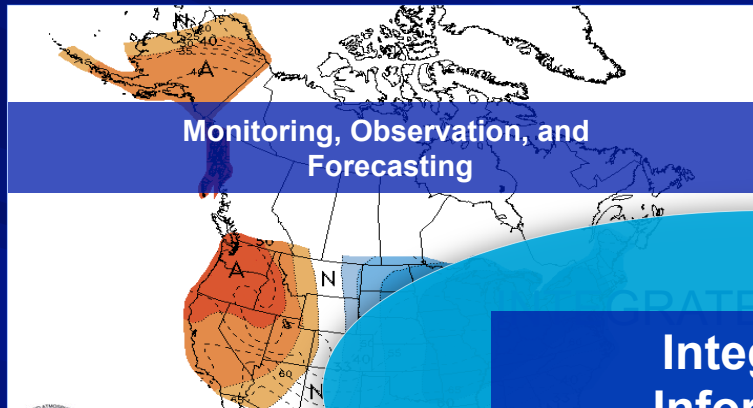
Map: changes over 22 years (1991-2012) compared to 1901-1960 average.

Bars: change by decade for 1901-2012 (relative to a 1901-1960 average).

Projected U.S. Temperature Change



Components of a National Integrated Heat Health Information System



A National Integrated Heat Health Information System

NOAA's research programs and expertise help the nation understand, anticipate and respond to increased heat waves and heat-related events

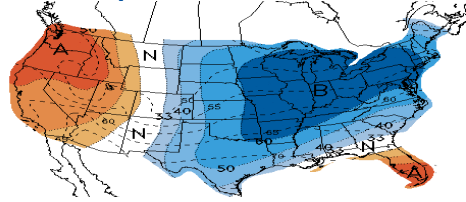
Define Demand



NOAA sustains engagement between climate and public health communities to **identify needs, develop solutions, and inform decisions.**

- RISA and Heat Health
In New York City: www.CCRUN.org
In North Carolina: www.CISA.SC.edu
In Arizona: www.CLIMAS.arizona.edu
- CDC Climate and Health Program: www.CDC.gov/climateandhealth

Improve Forecasts



NOAA works to **improve current heat forecasts** based on user need and to extend heat projections from weeks to months and beyond.

- Climate Variability & Predictability Program (CVP): bit.ly/AboutCVP
- Modeling, Analysis, Predictions, & Projections Program (MAPP): bit.ly/MAPPprojects
- Madden-Julian Oscillation: bit.ly/MJOandTemp
- Climate Prediction Center Temperature Outlooks: www.CPC.NCEP.NOAA.gov

Observe & Monitor



NOAA works to sustain observations that support **improved understanding of the role of climate on extreme heat** and enhance operational efforts.

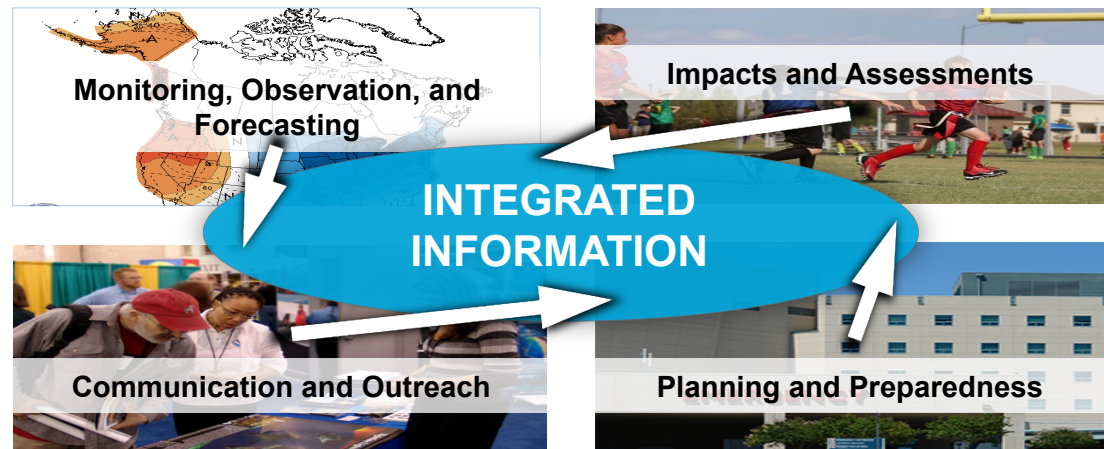
- Climate Observations and Monitoring (COM): bit.ly/ClimateObs
- CDC National Environmental Public Health Tracking Program: bit.ly/CDC-NEHTP

Understand & Communicate

NOAA research **enhances understanding** and impact of extreme heat events across time scales, **builds capacity** across climate and public health communities, and develops timely and accessible communication tools **to inform preparedness and adaptation.**

- U.S. Climate Resilience Toolkit and Human Health: toolkit.climate.gov/topics/human-health
- Regional Integrated Sciences and Assessment (RISA): bit.ly/CPORISA
- Coastal and Ocean Climate Applications Program (COCA): bit.ly/CPO-COCA

Crafting an integrated information system



To make the best decisions, stakeholders need access to more than just one piece of the puzzle. Integrated Information Systems are designed to evolve over time, offer opportunities for diverse participation, and integrate what we learn through practice.