Climate Change and its Health Impacts in New England

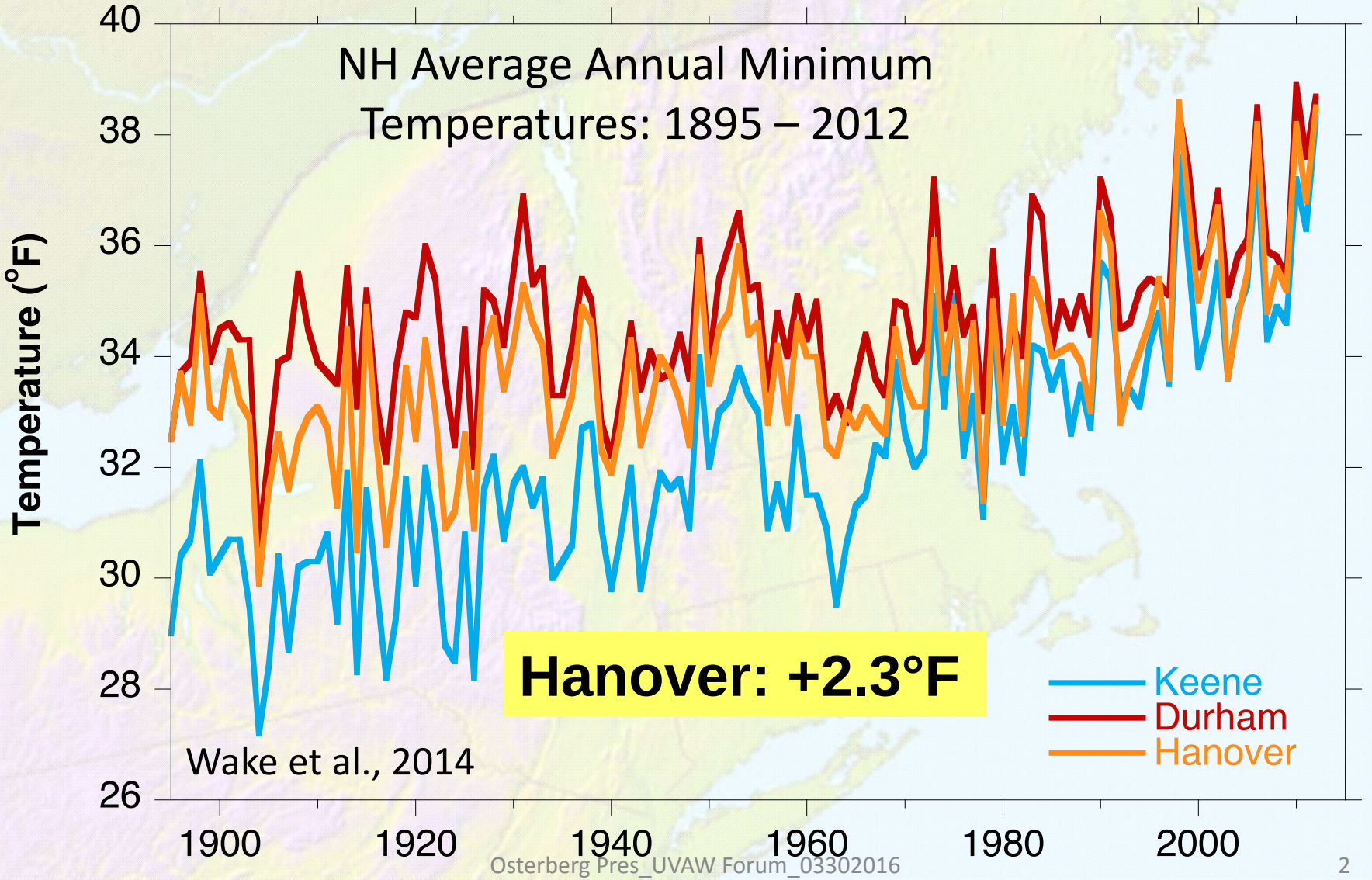






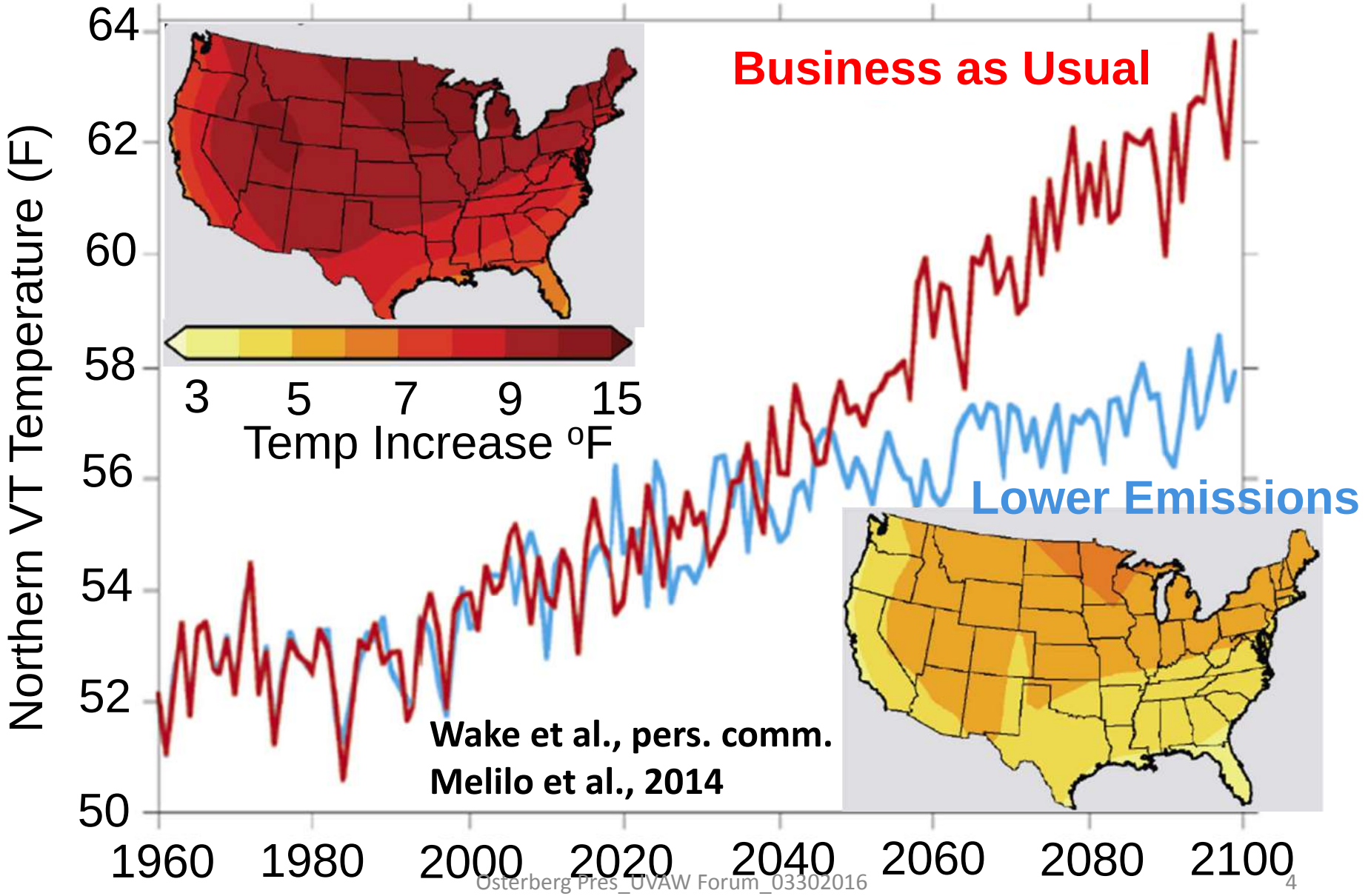
Dr. Erich Osterberg
Dartmouth College Earth Sciences

NH/VT are Already Warming: 2-4°F since 1895
Winter Warming Fastest

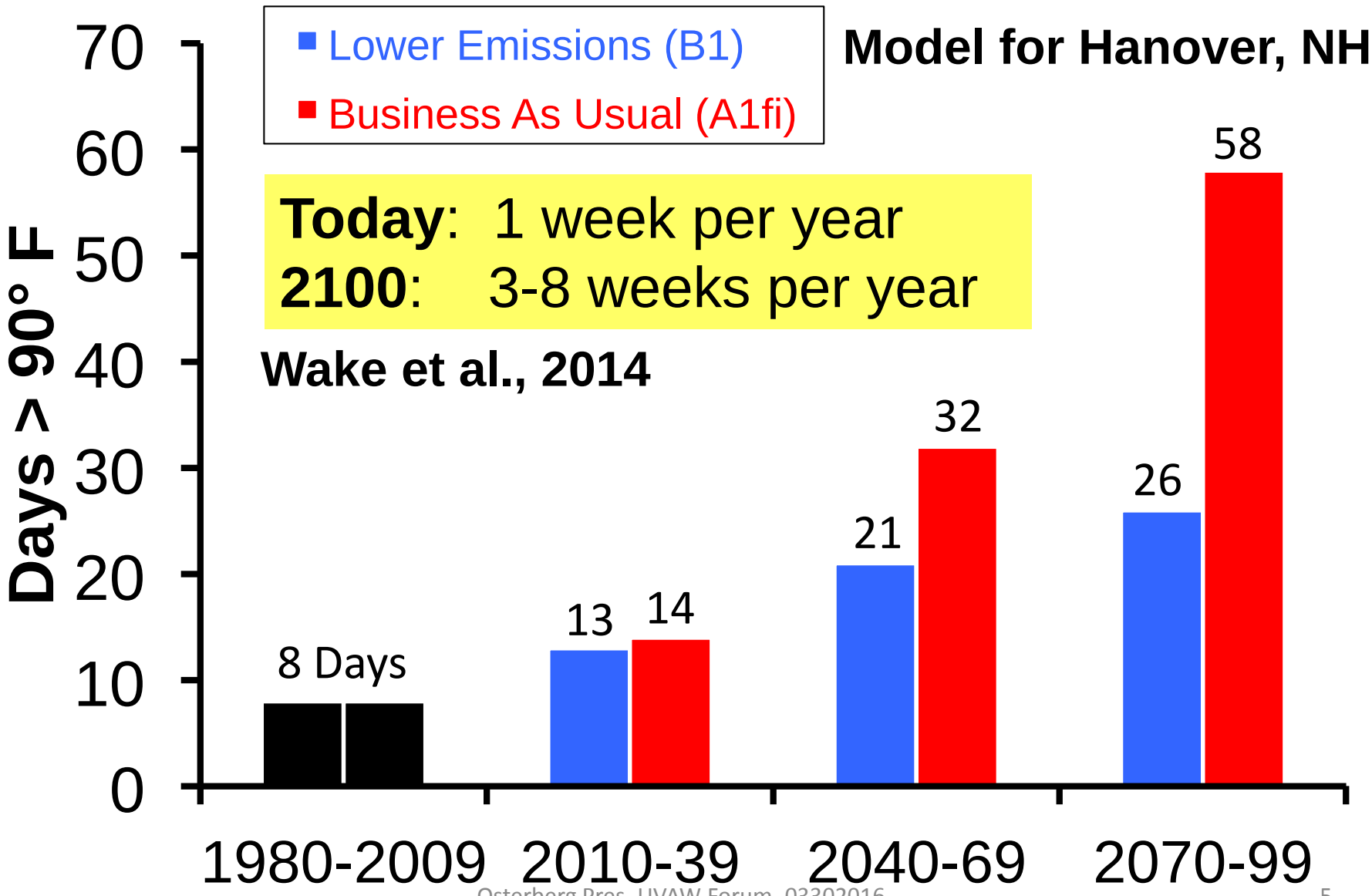



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2015 is warmest year on record, NOAA and NASA say
By Brandon Miller, CNN senior meteorologist
Updated 12:21 PM ET, Wed January 20, 2016
No surprise, NH just experienced its warmest winter ever recorded
By DAN SEUFERT
Union Leader Correspondent
NEW HAMPSHIRE
UNION LEADER
CNN
U.S. | World | Politics | Money | Opinion | Health | Entertainment | Style | Travel | Sports | Video
February shatters heat records, becomes hottest month for planet
By Brandon Miller, CNN Senior Meteorologist
Updated 10:31 AM ET, Thu March 17, 2016

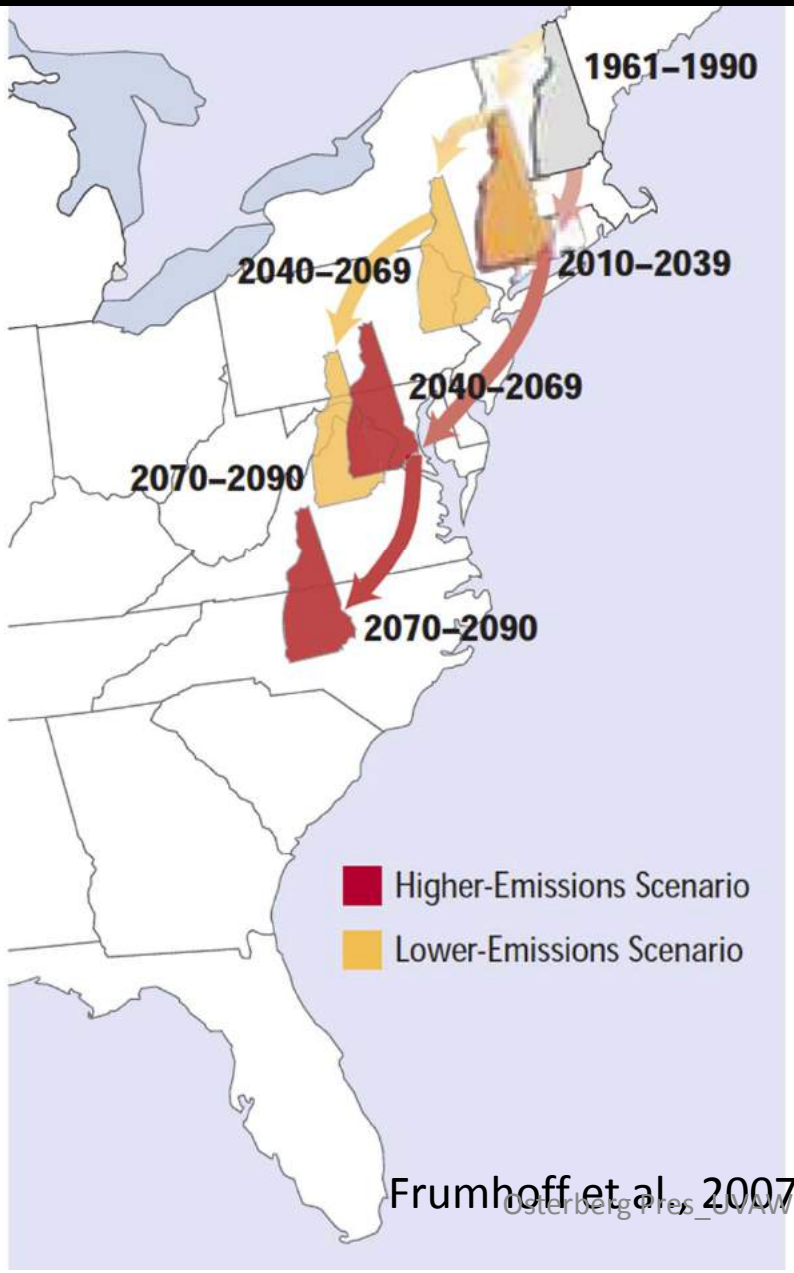
Our Choice: Temperatures 4-9 °F Warmer by 2100



The Future: Many More Very Hot Days



The Future: NH Summers Will Feel Like N. Carolina

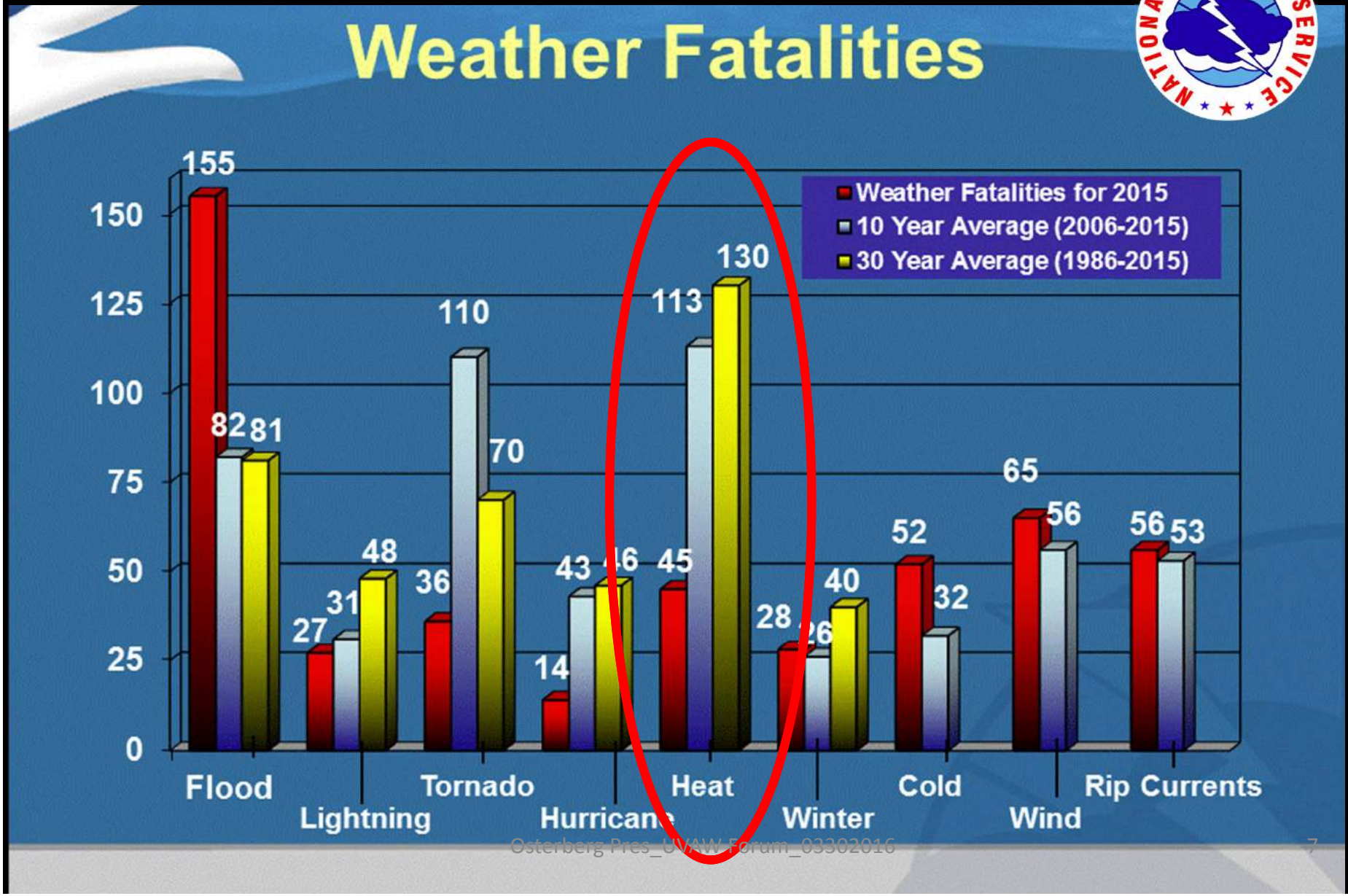


Frumhoff et al., 2007

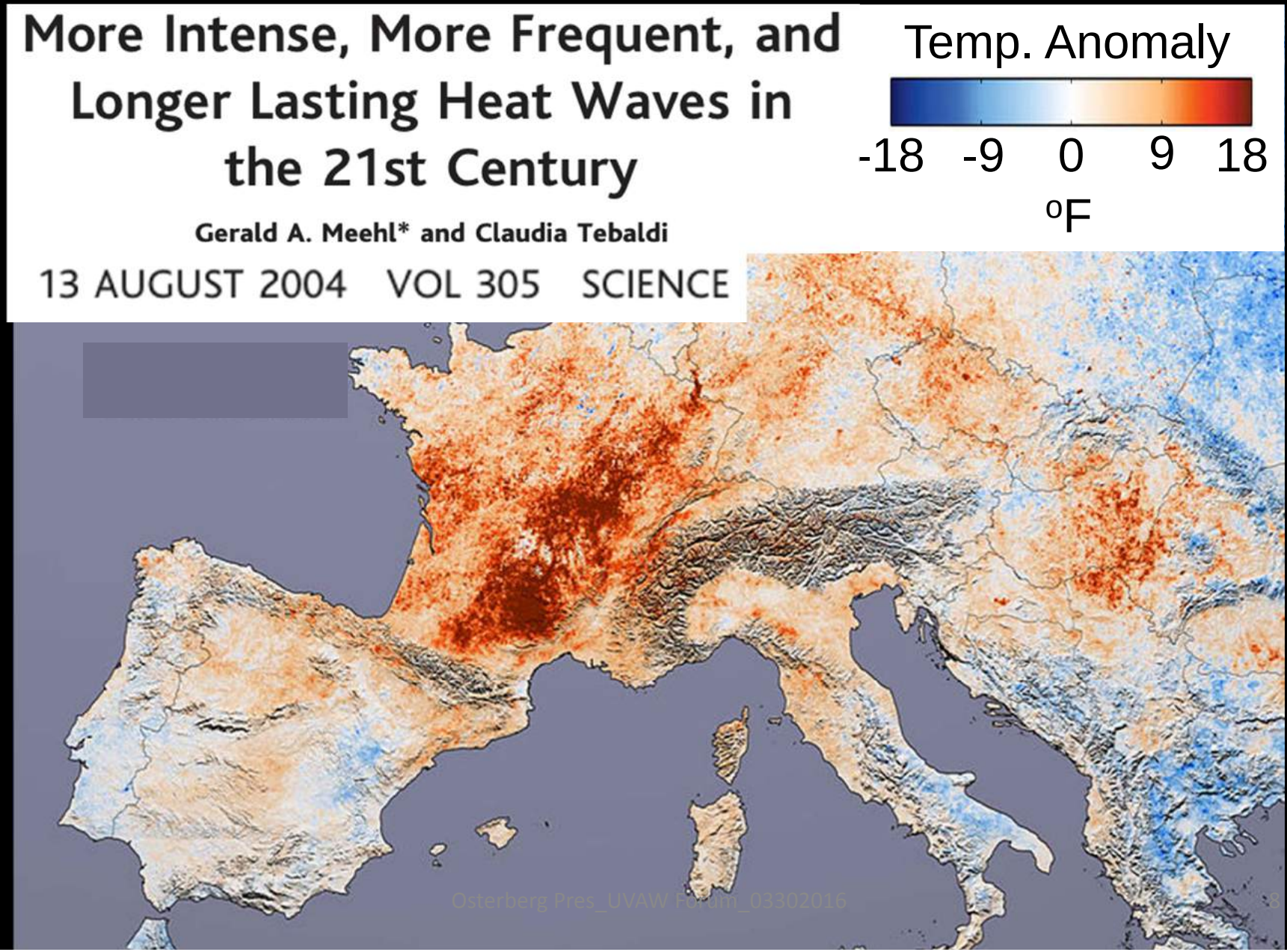
- **Under Business as Usual**: In 65 years, NH's summers will feel like North Carolina's summers do today

- Heat index related to temperature AND humidity = "feels like"

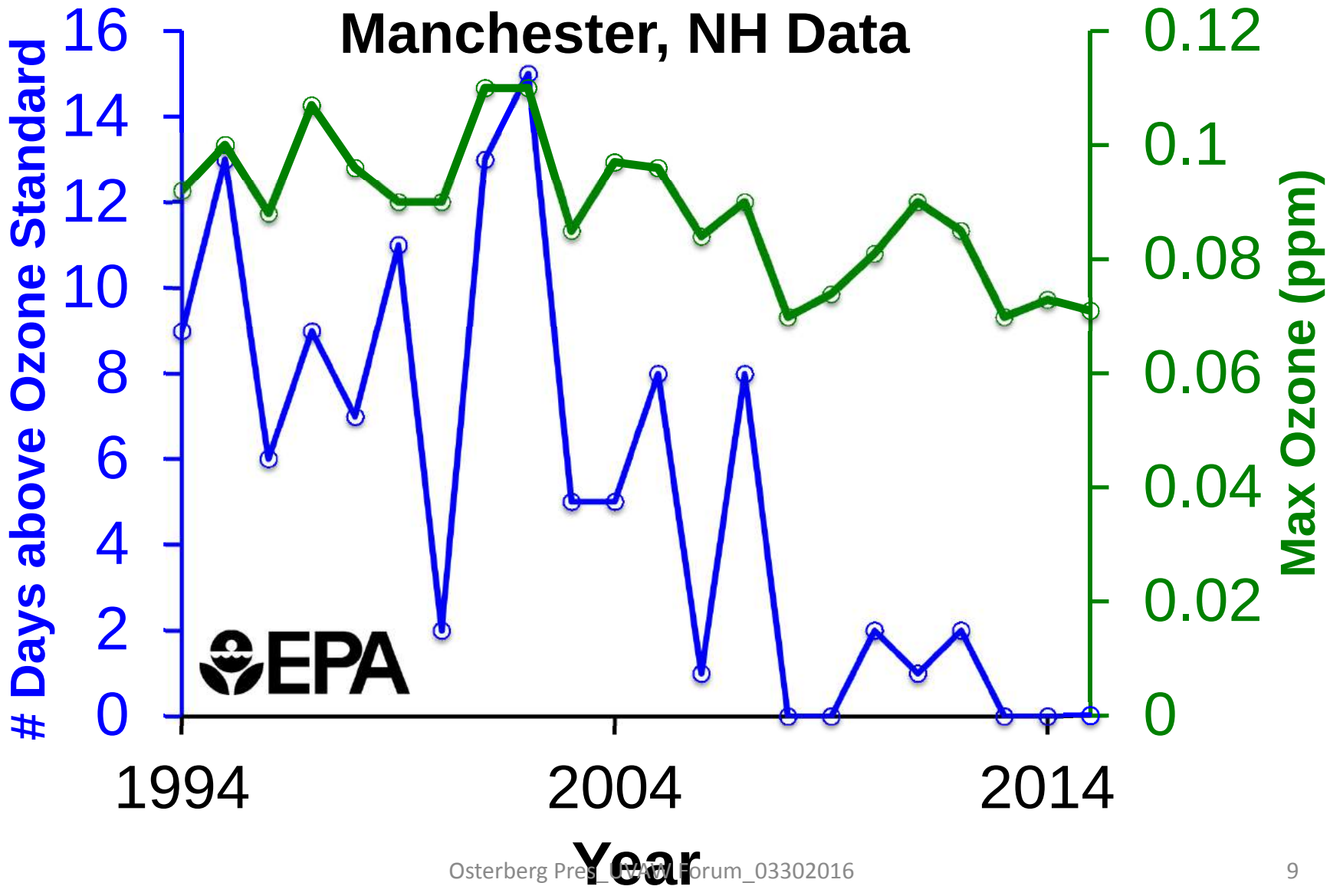
Temperature Effects: Heat Stress Increases Fatalities of At-Risk Populations



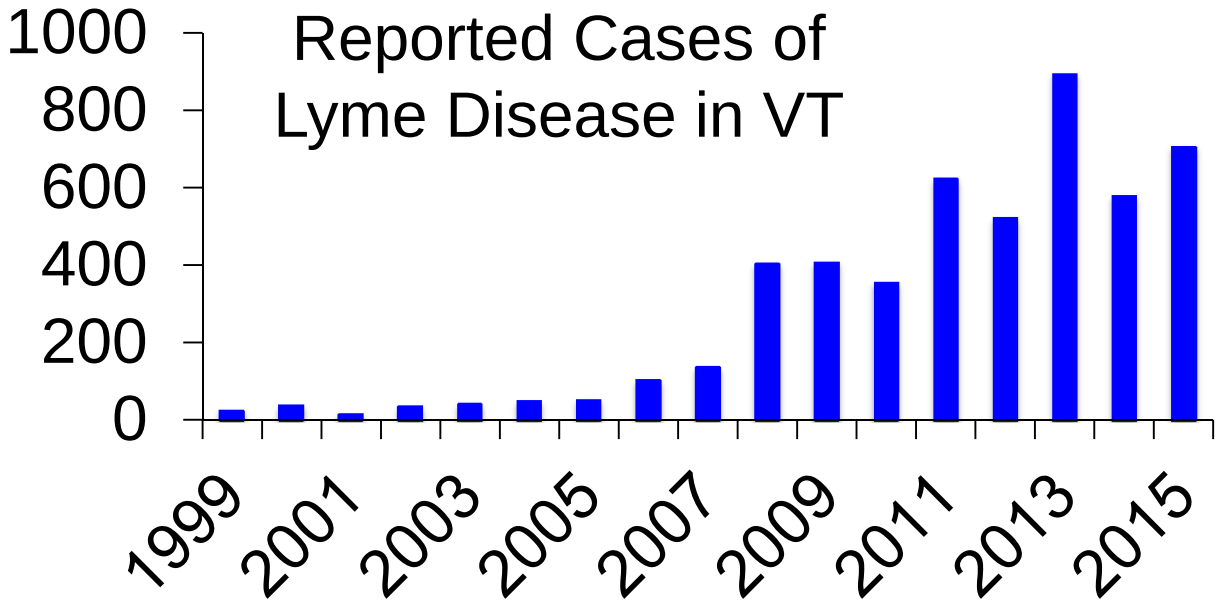
2003 European Heat Wave: 35,000+ Deaths



Warming Increases Smog, But Smog Levels Declining due to Mitigation

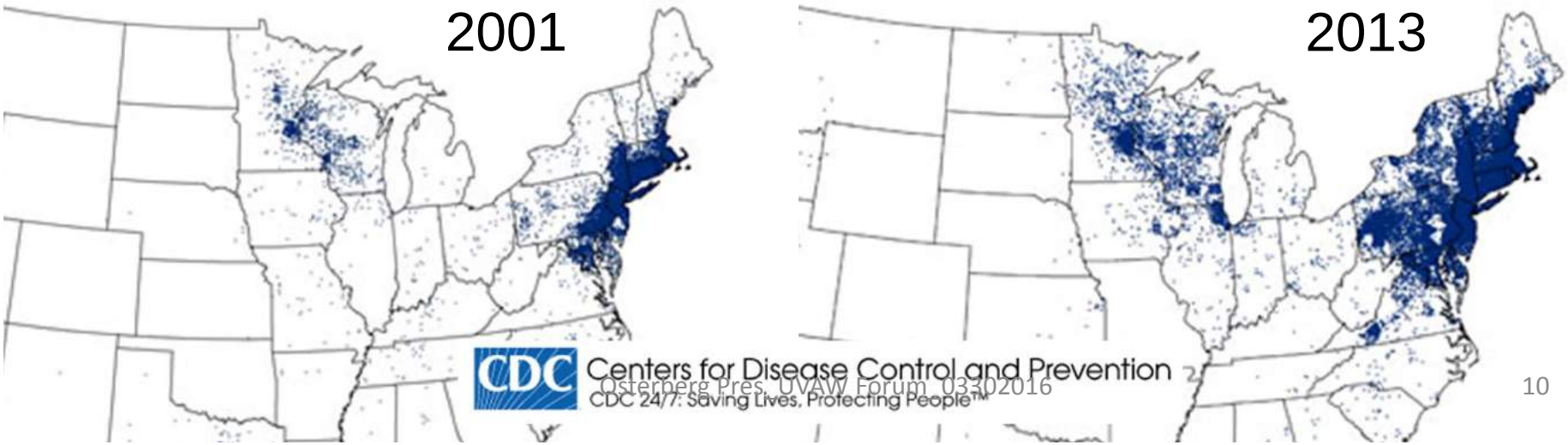


Increased Lyme Disease in NE: Climate Connection?



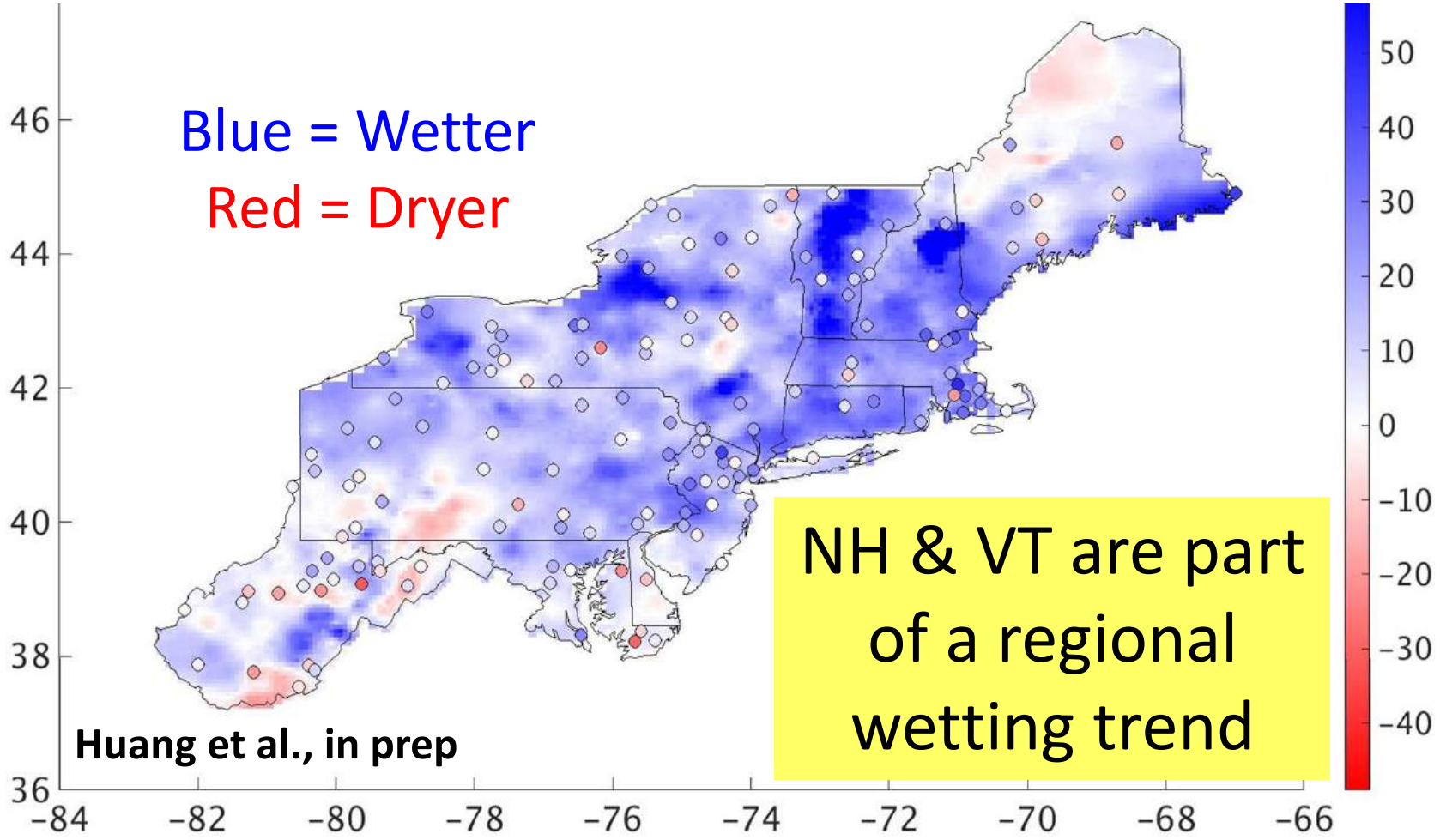


Reported Cases of Lyme Disease

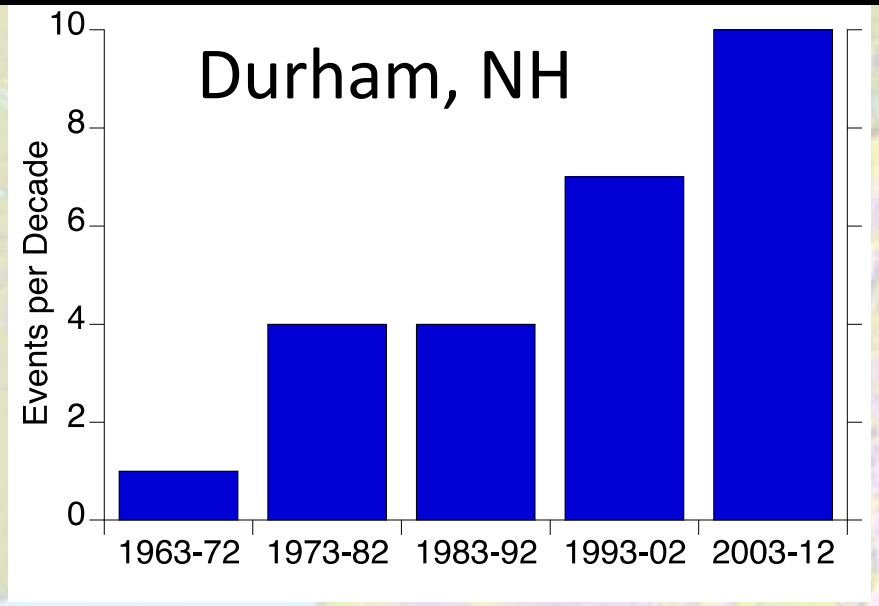


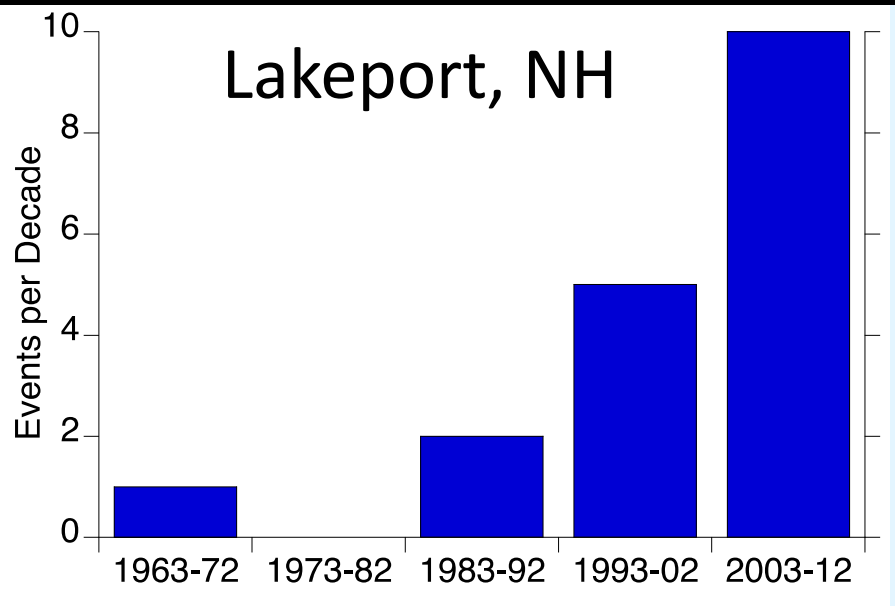
The Northeast is Already Getting Wetter (5-15%)

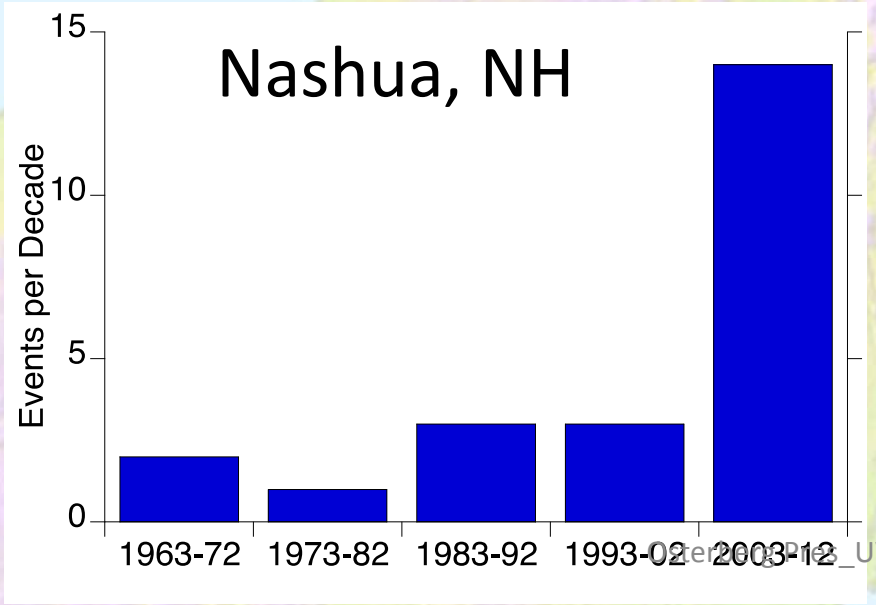
Trends in Total Annual Precipitation from 1901-2011

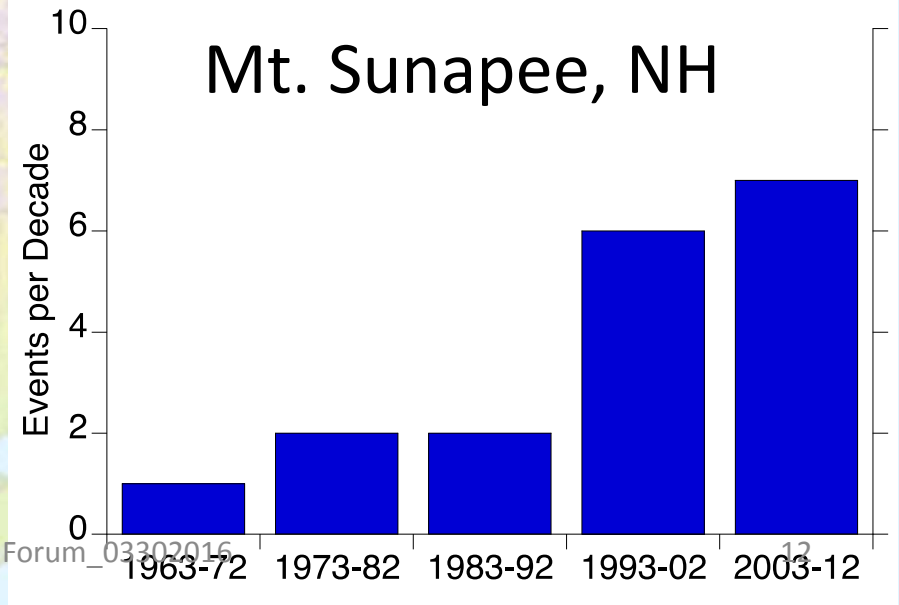


Extreme Rainfall Events are Becoming More Frequent (Extreme is >4" in 48 Hours) Wake et al., 2014

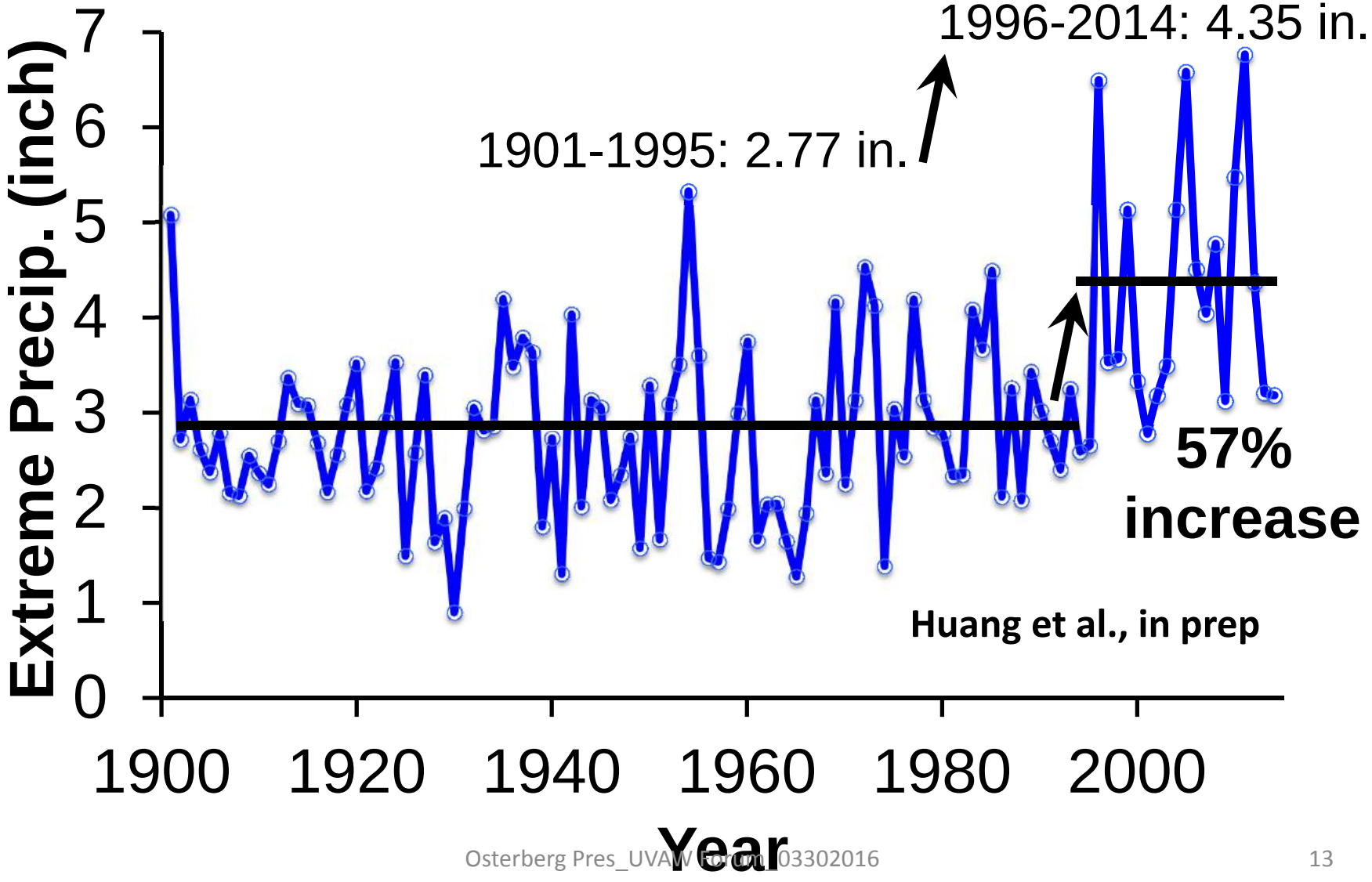




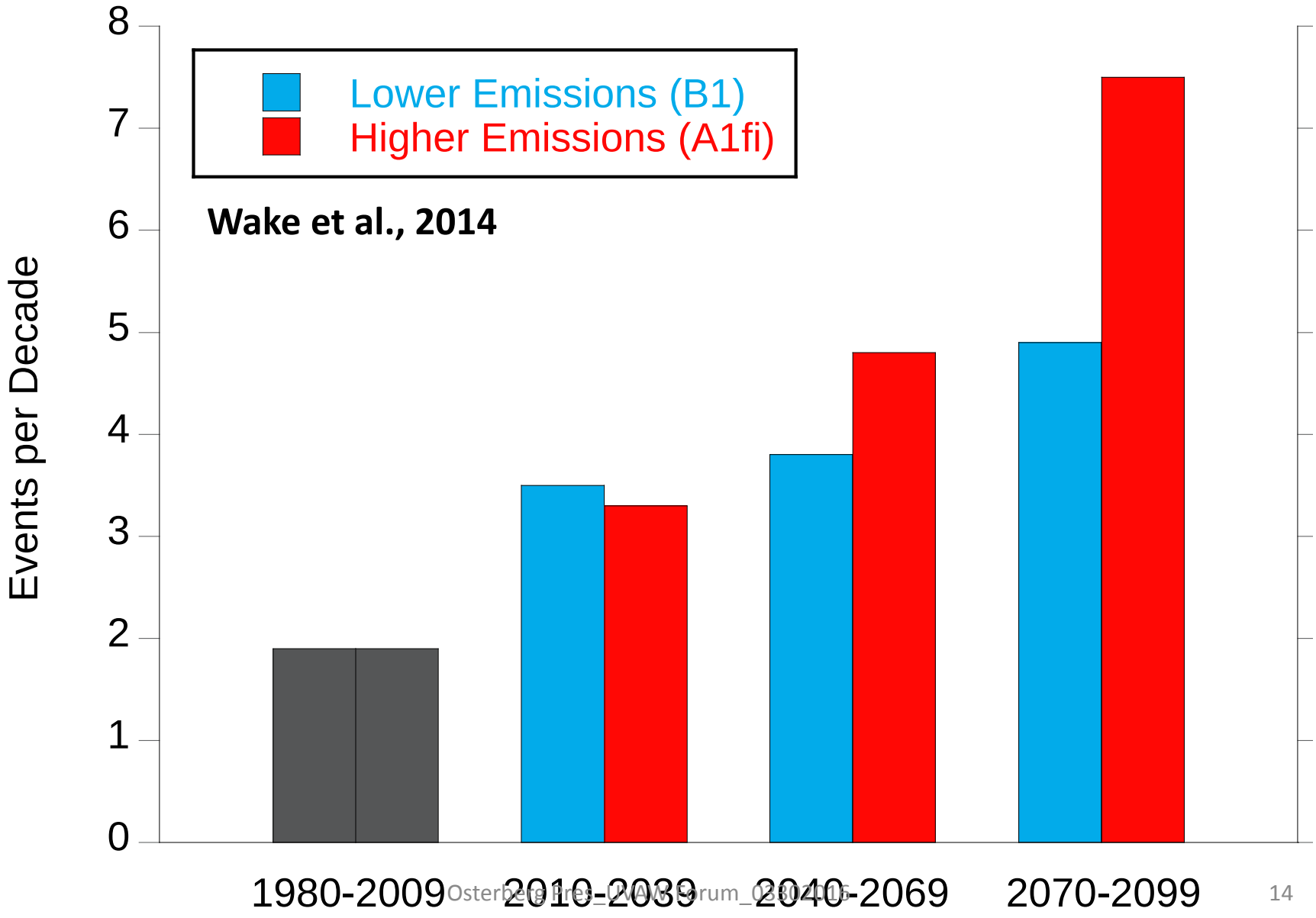




Extreme Rainfall from 1996-2014 was ~50% higher than from 1901-1995



The Future: More Extreme Storms (like recently)



Lebanon NH – July 2, 2013 Thunderstorms



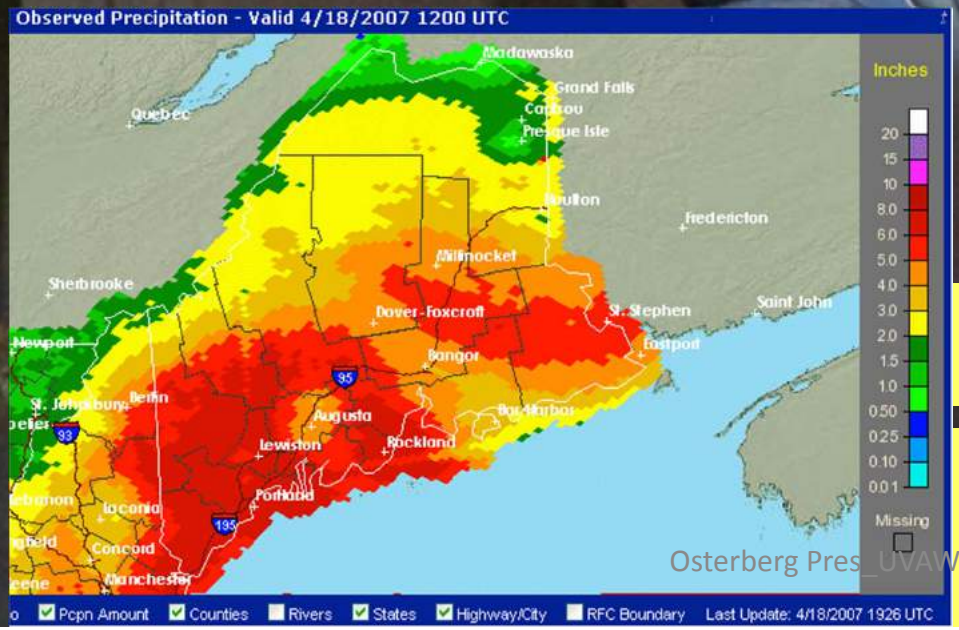
Lebanon NH – July 2, 2013 Thunderstorms



3.5” Rain at Lebanon Airport



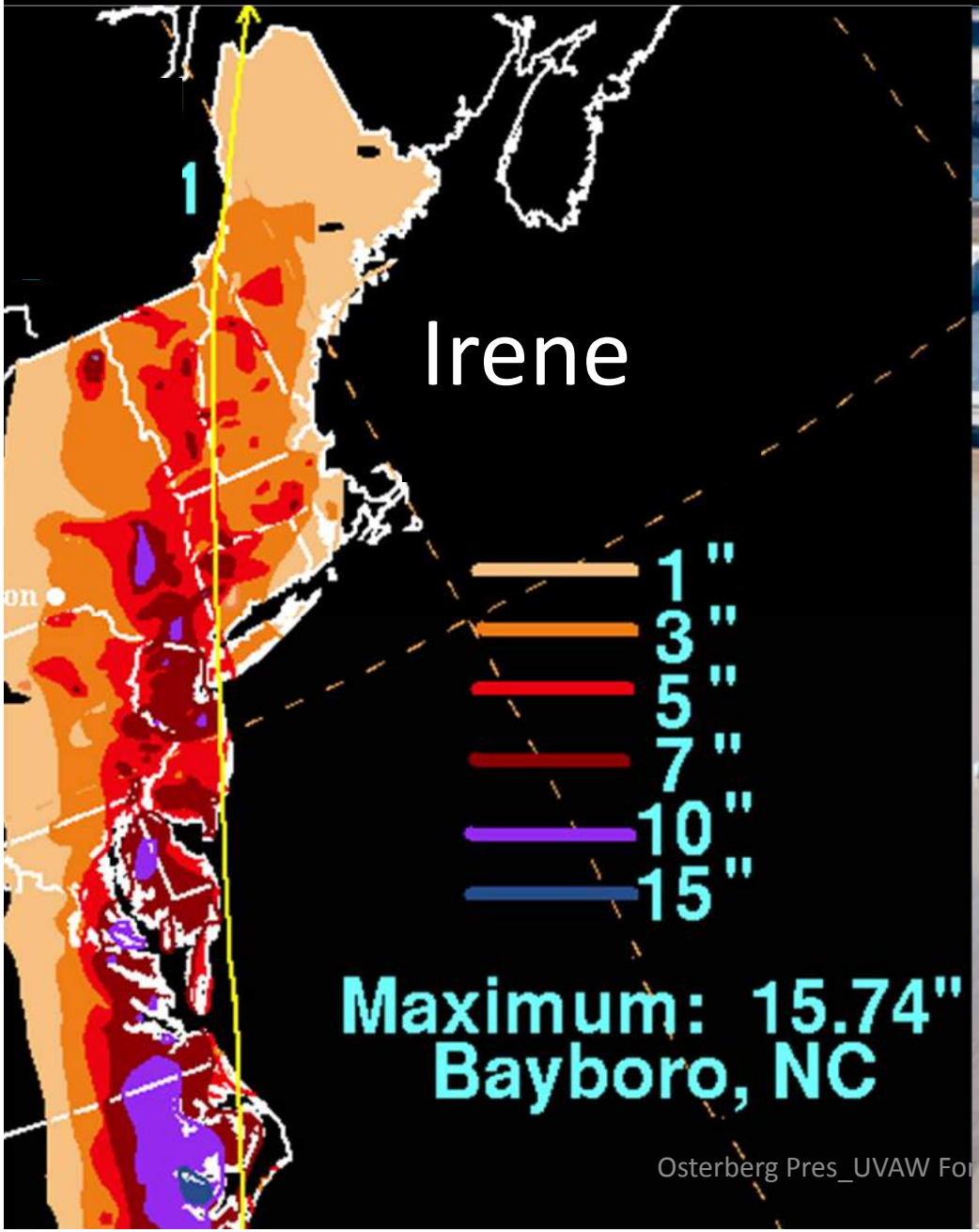
President's Day 2007 Nor'easter



Newmarket, NH: 6" rain

More rain from spring Nor'easters recently

Hurricane Irene: August, 2011





Hurricane Irene: August, 2011

$800 Million in NH & VT



Health Impacts:

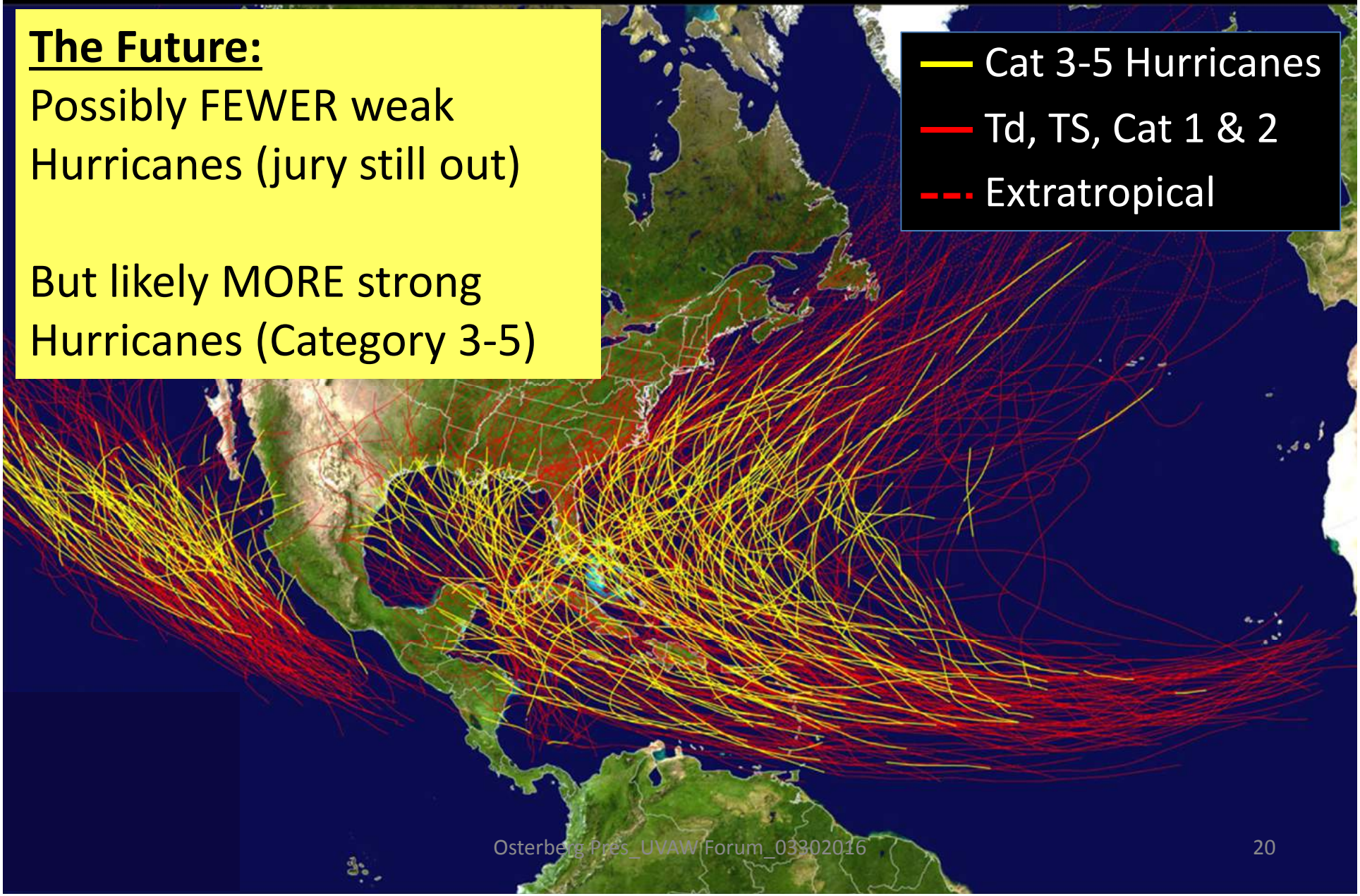
+ Mortality and injury
+ Mental health illness
+ Exposure to chemicals and pathogens

The Future: Fewer but MORE Powerful Hurricanes

The Future:

Possibly FEWER weak Hurricanes (jury still out)

But likely MORE strong Hurricanes (Category 3-5)



New England Climate Assessments

ClimateSolutionsNE.org



Climate Change in Southern New Hampshire

PAST, PRESENT, AND FUTURE

A PUBLICATION OF THE SUSTAINABILITY INSTITUTE AT THE UNIVERSITY OF NEW HAMPSHIRE

Climate Change and Human Health in New Hampshire

AN IMPACT ASSESSMENT

A PUBLICATION OF THE SUSTAINABILITY INSTITUTE AT THE UNIVERSITY OF NEW HAMPSHIRE



climate solutions new england

Climate Change in Northern New Hampshire

PAST, PRESENT, AND FUTURE

A PUBLICATION OF THE SUSTAINABILITY INSTITUTE AT THE UNIVERSITY OF NEW HAMPSHIRE





climate solutions new england

Dr. Cameron Wake
University of New Hampshire

Summary

- NH & VT have been warming (2-4^{o}F since 1895) and getting wetter (~8-15% since 1900), with more extreme storms (~50% higher recently)
- By 2100, projections show:
  - 5-9^{o}F warmer (largest in winter)
  - 2-7 weeks more extreme heat each summer
  - Extreme storms similar to 2000's (or more?)
- Largest local health impacts likely to be:
  - Heat injuries and mortality
  - Flooding injuries and mortality, mental health, and pathogens and chemicals
  - Vector-borne disease