The State of Climate Change Science

Dr. Erich Osterberg, Dartmouth College and UVAW Vice Chair

Climate Partners Summit
February 25, 2021
Climate Change Science
Five Key Facts:

It’s real.
It’s us.
Scientists agree.
It’s bad.
We can fix it!
The Earth has Warmed over 2°F...and Rising Fast

2020: Tied with 2016 as #1 Warmest

NH/VT Similar to Global Average
The Earth has Warmed over 2°F...and Rising Fast

This is ALL from humans

This is from humans plus *natural* warming

Global Temperature Anomaly (°F)
We *Should* Be Slightly Cooling Since ~1960
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- Highest CO$_2$ for 3-15 million years
- Modern CO$_2$ rise from humans is 150 times FASTER than natural
'Endless' wildfire season sets record as more winds threaten power outages in Southern California

Doyle Rice USA TODAY
Published 12:35 p.m. ET Dec. 23, 2020 | Updated 1:54 p.m. ET Dec. 23, 2020

LA County records highest-ever temperature

By Paul Vercammen, Hollie Silverman, Ross Levitt and Susannah Cullinane, CNN
Updated 9:31 PM ET, Sun September 6, 2020
Increased Lyme Disease in NE with Warmer Winters

Reported Cases of Lyme Disease in VT

Reported Cases of Lyme Disease

2001

2013
2020 Record Hurricane Season

Warmer oceans make hurricanes more powerful and rainier

Wikipedia Commons
NH & VT: Extreme Storms are MORE Extreme

Since 1996:
~50% Jump in Extreme Rainfall that Causes Flooding
(Huang et al., 2017; 2018)
Yes, More Summer-Fall Drought Too…. 

As New Hampshire Enters Extreme Drought, Officials Urge Water Conservation

October 6, 2020 Drought Map

Drought Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Author:
David Simera! Western Regional Climate Center

droughtmonitor.unl.edu
Our Choice: Temperatures 4 or 8+ °F Warmer by 2100

Today:
1 week per year >90°

3.5 weeks >90°

USNCA, 2014

Temp. Increase °F
NH Coast Looked Like This ~20,000 years ago
The last time the Earth was ~8-9°F colder
Athabasca Glacier, Jasper Natl. Park, Canada
The lower glacier will be gone in 2060

2017
Athabasca Glacier, Jasper Natl. Park, Canada

The lower glacier will be gone in 2060
NH Seacoast Lost $15 million from Sea Level Rise: Sea Level is already ~8 inches Higher, and Rising...

Credit: Joann Theriault
Our Choice: 1.5-4+ Feet of SL Rise by 2100

- We must reduce CO\(_2\) as quickly as possible

- Some disruptive sea level rise is unavoidable (and already here)

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**Year**

- 1800
- 1850
- 1900
- 1950
- 2000
- 2050
- 2100

**Sea Level Rise (Feet)**

- 0
- 2
- 4
- 6
- 8

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- More CO\(_2\) and fast melting
- More CO\(_2\) and slow melting
- Less CO\(_2\) and slow melting

**Best 2100 NH Estimate:** 2.9 feet
We Must Reduce CO$_2$ Quickly

MITIGATION!!

Climate Impacts are Already HERE

Adaptation!!

Reported Cases of Lyme Disease in VT

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<thead>
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<th>Year</th>
<th>Cases</th>
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We can fix it through Mitigation and Adaptation.