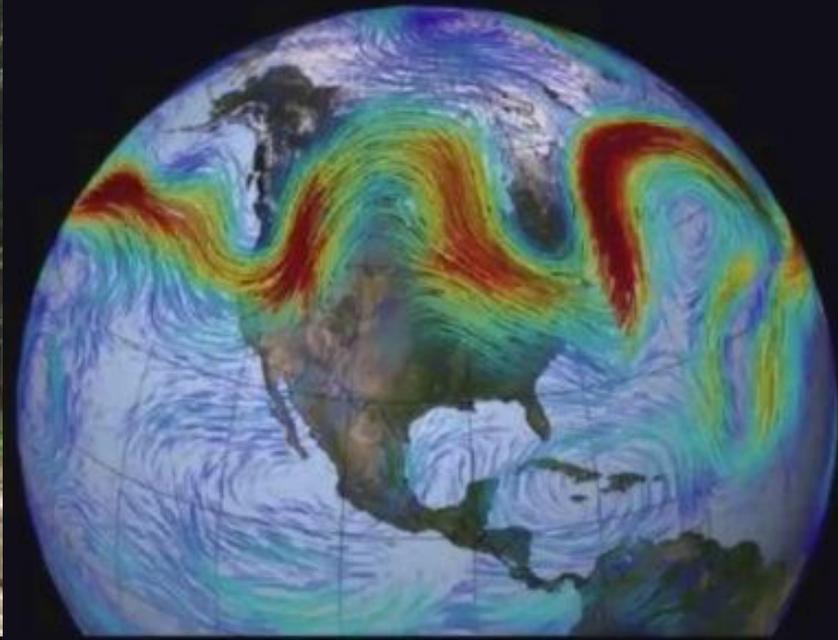
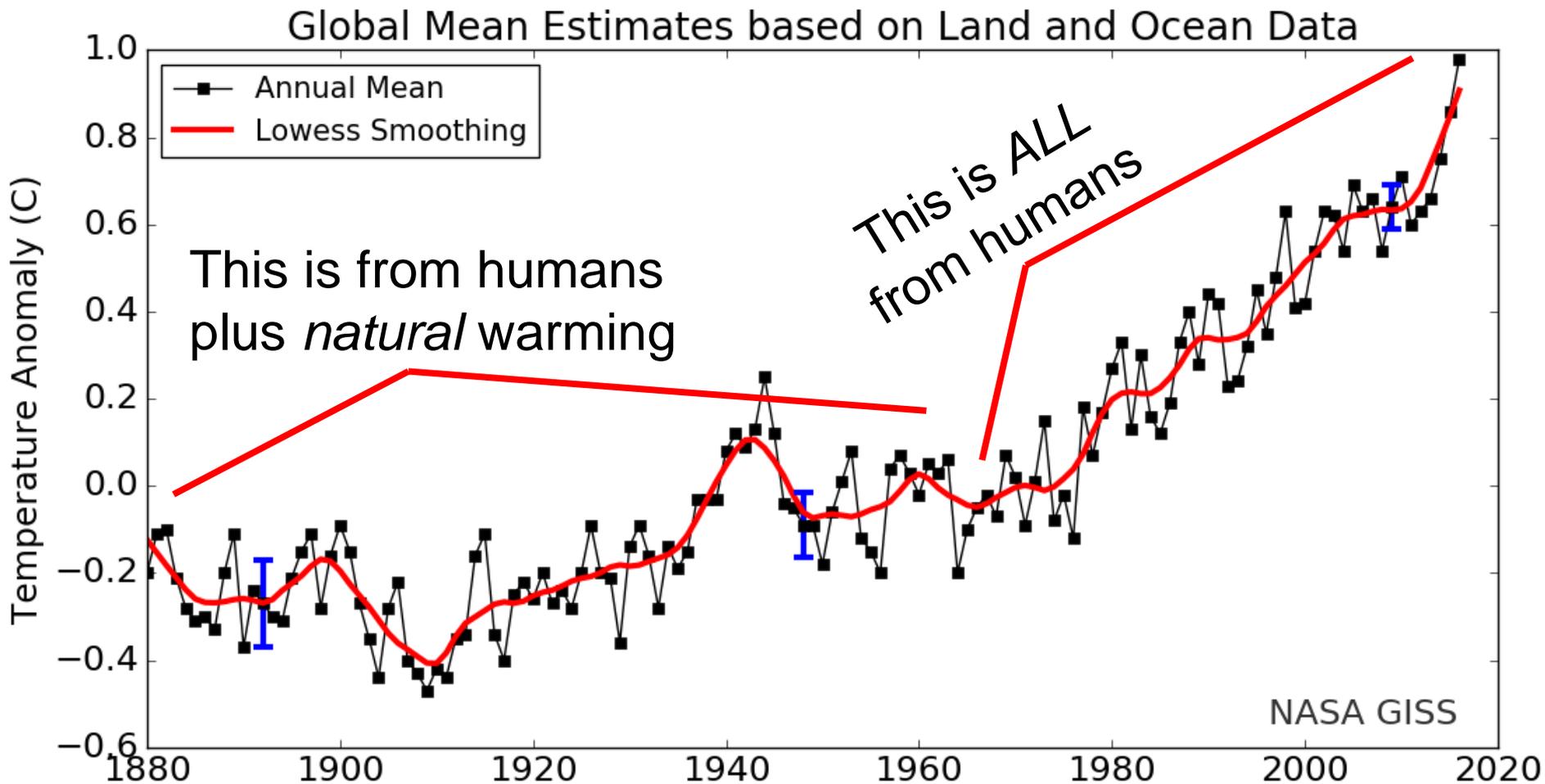


Latest Research on Climate Change in the Upper Valley



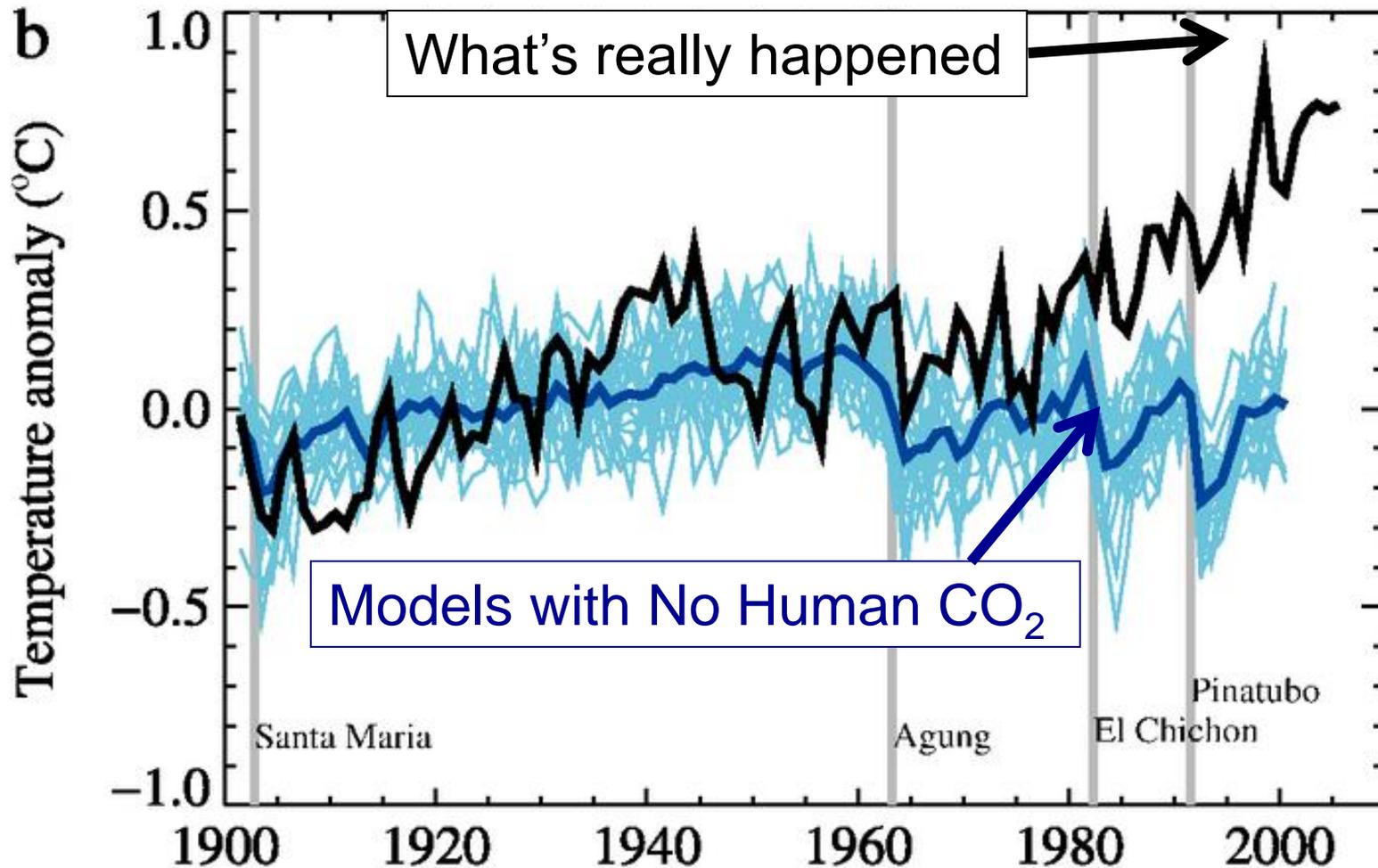
Dr. Erich Osterberg
Department of Earth Sciences
Dartmouth College
Hanover, NH

Global Temperatures have Increased $\sim 2^{\circ}\text{F}$



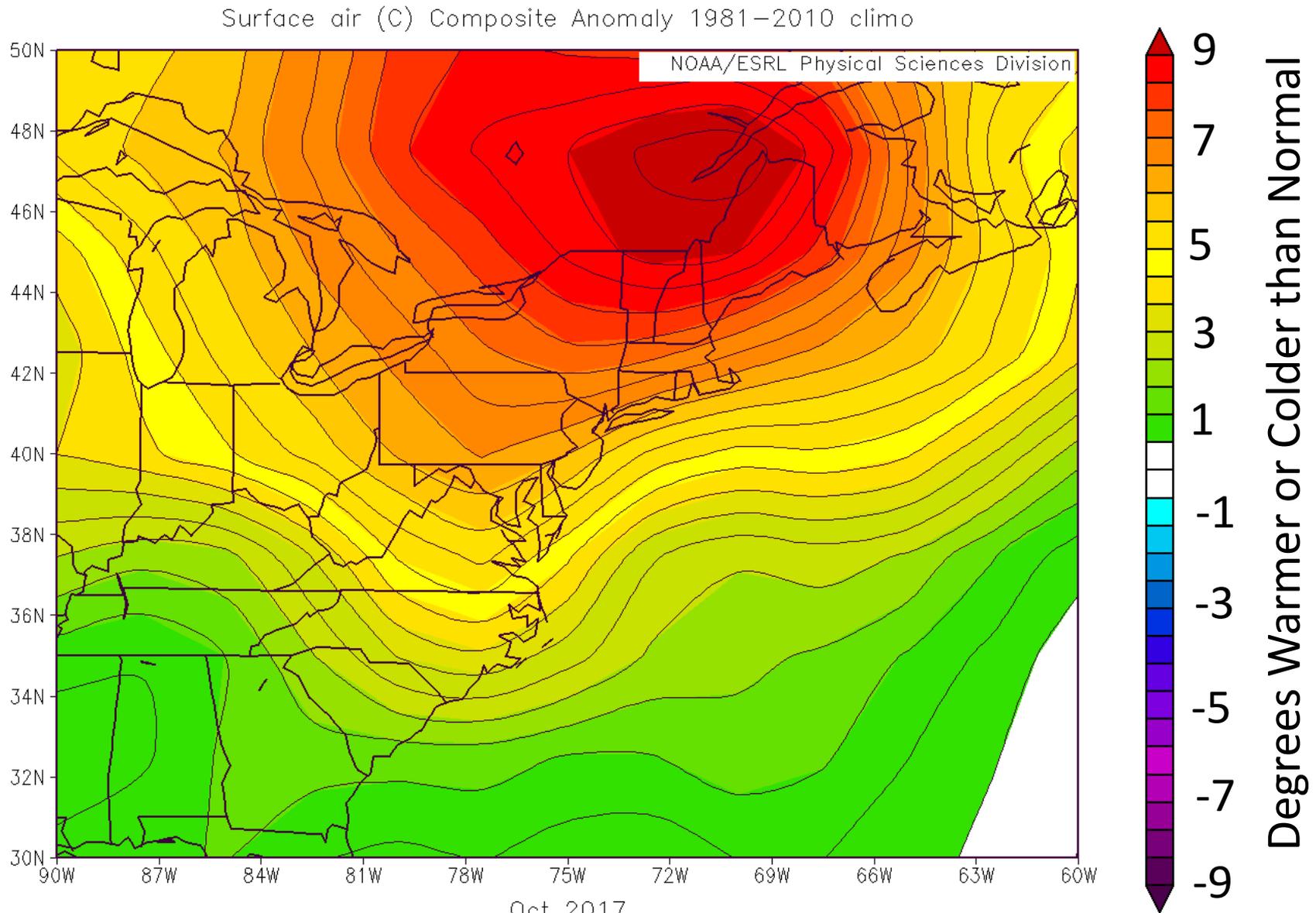
Bottom Line for NH & VT: Warmer, Wetter and more extreme storms

Modeling Temperature with ONLY Natural Forcing



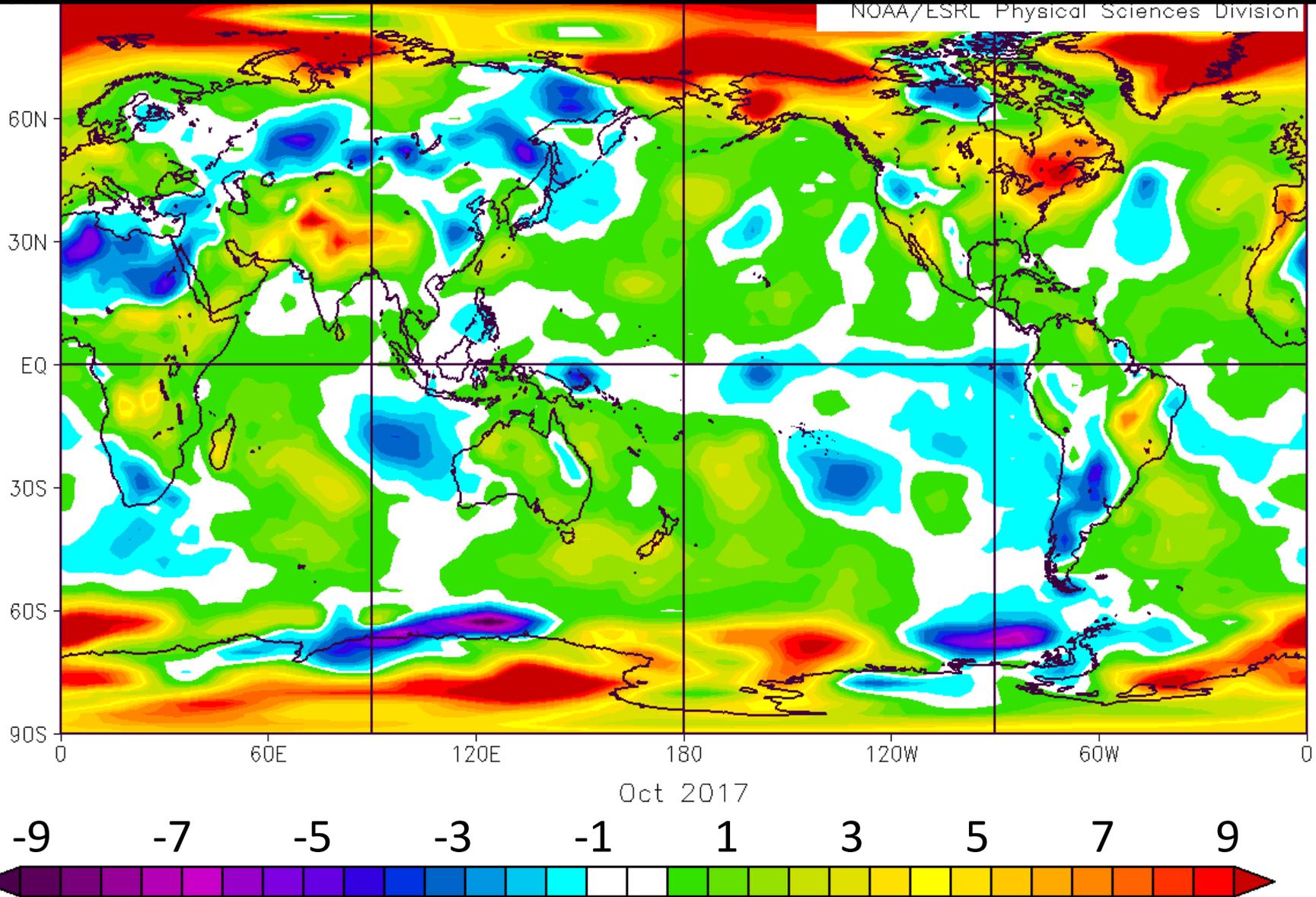
Bottom Line: In order to explain temperature rise since ~ 1960 , one MUST include human CO_2 .

Warmest October on Record in New England: Hanover ~8 F above average = 4 weeks behind



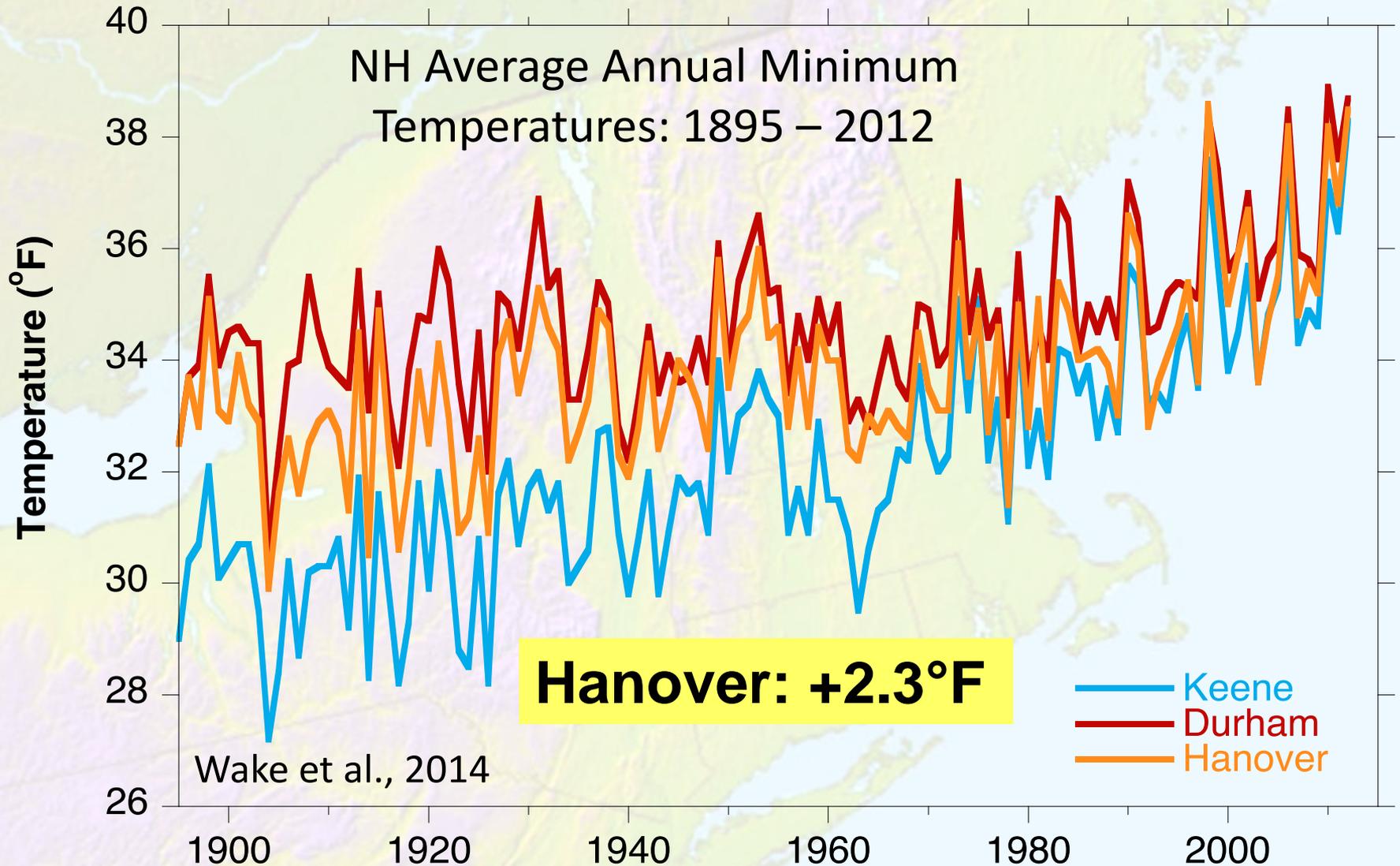
Globally, 2017 is 2nd Warmest So Far

Be Careful of Single Warm or Cold Seasons in One Place



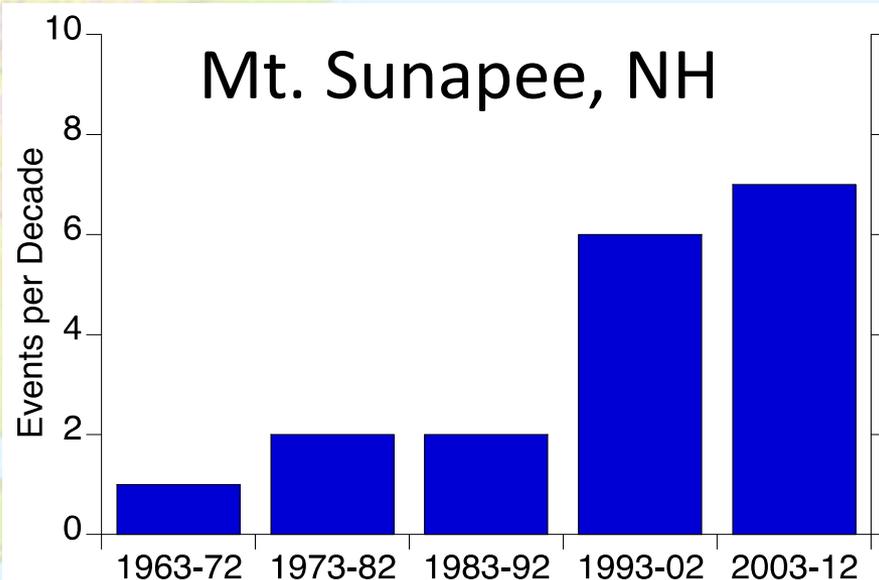
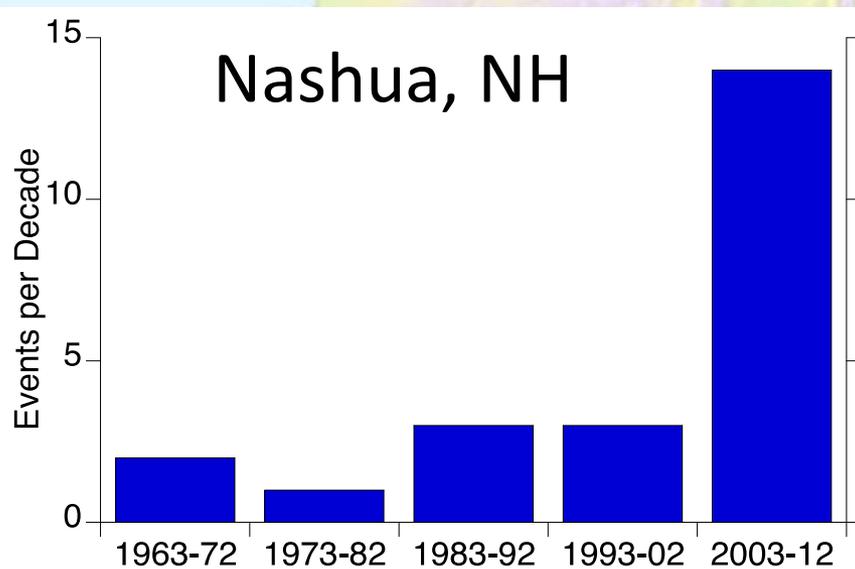
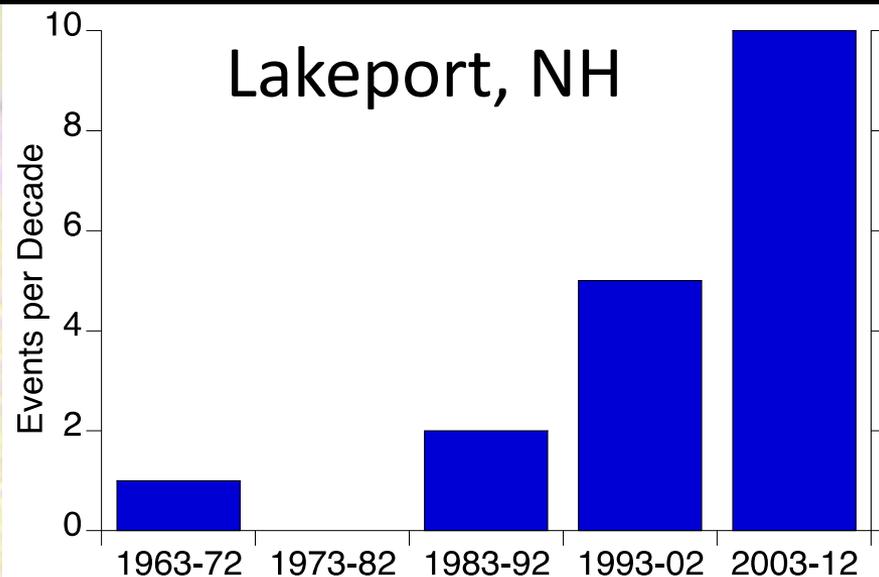
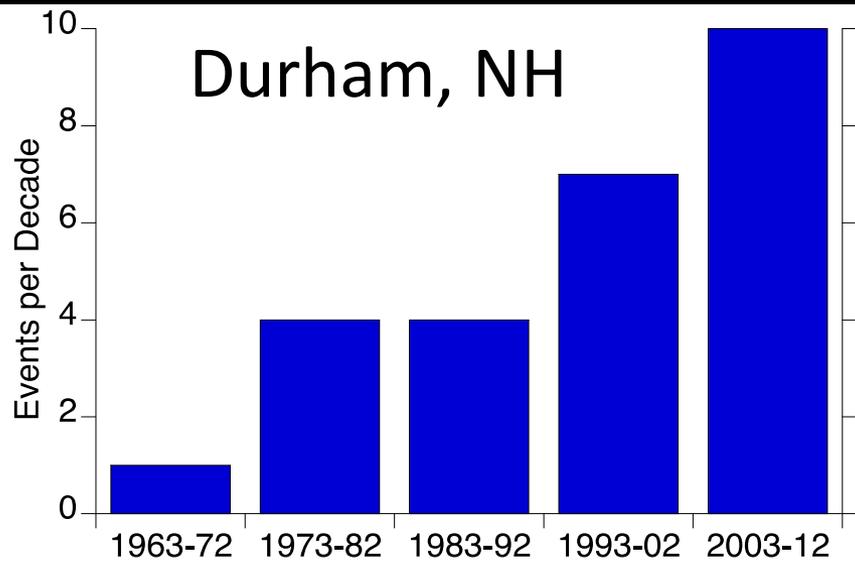
NH/VT has Warmed: 2-4°F since 1895

Winter is Warming the Fastest

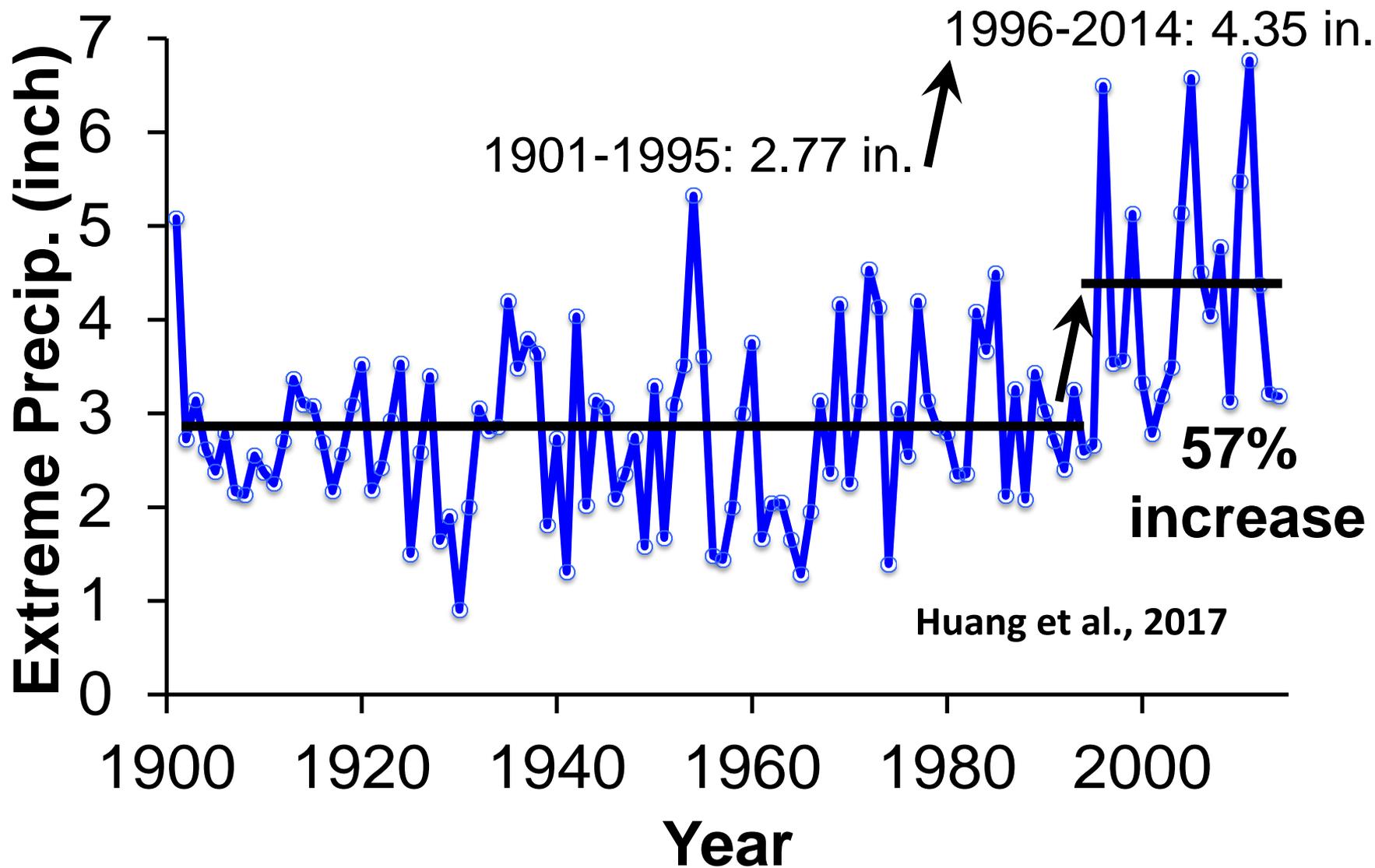


Extreme Storms are Becoming More Frequent (Extreme is $>4''$ in 48 Hours)

Wake et al., 2014



New England Extreme Rainfall Jumped ~50% in 1996 – But Why??



Hurricane Irene: August, 2011



~50% of the jump since 1996 is from MORE Hurricanes due to warmer ocean waters

July 2013 & 2017 Thunderstorms

+3" Rain for Each Event

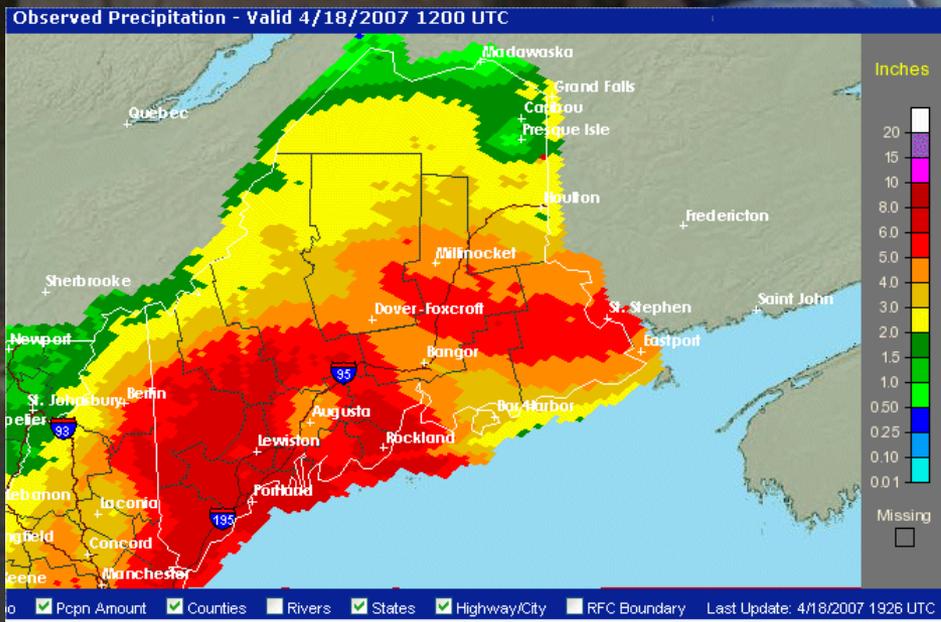
Route 25A • Orford, N.H.
July 1, 2017 • Courtesy Peter Bouchard



~25% of the jump
since 1996 is from
MORE cold front
thunderstorms in
summer-fall

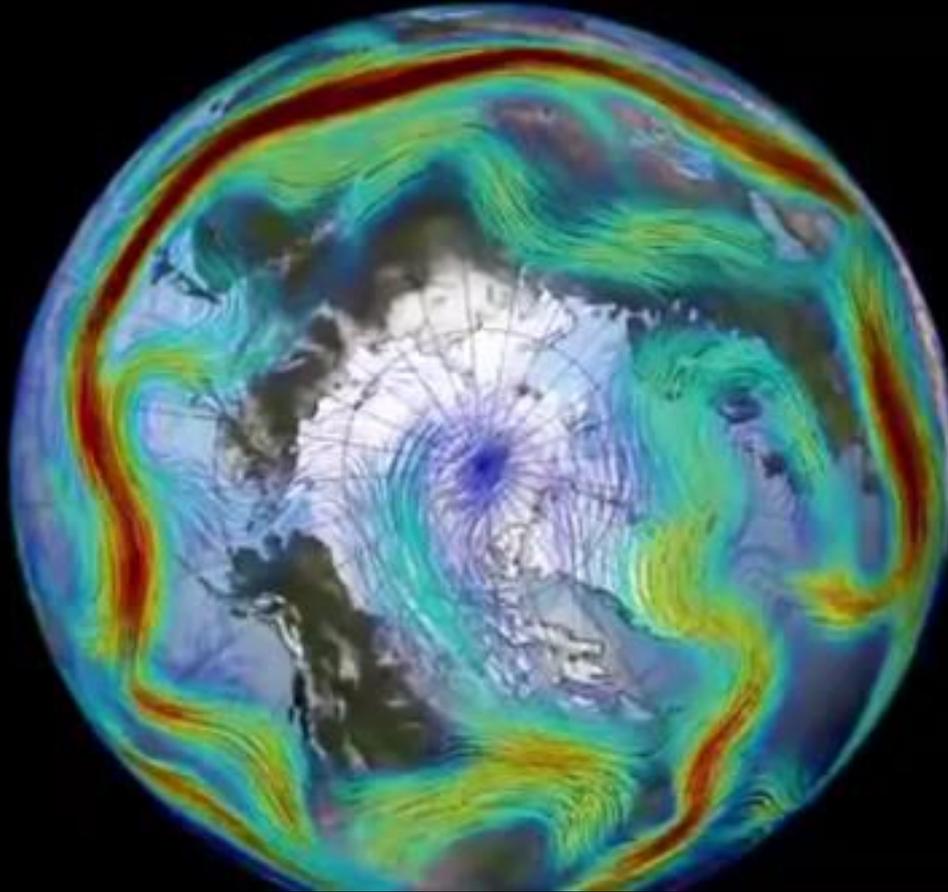
President's Day 2007 Nor'easter

Newmarket, NH: 6" rain



~15% of the jump since 1996 is from MORE Nor'easters in all seasons

The Jet Stream is Getting Wavier with Climate Change

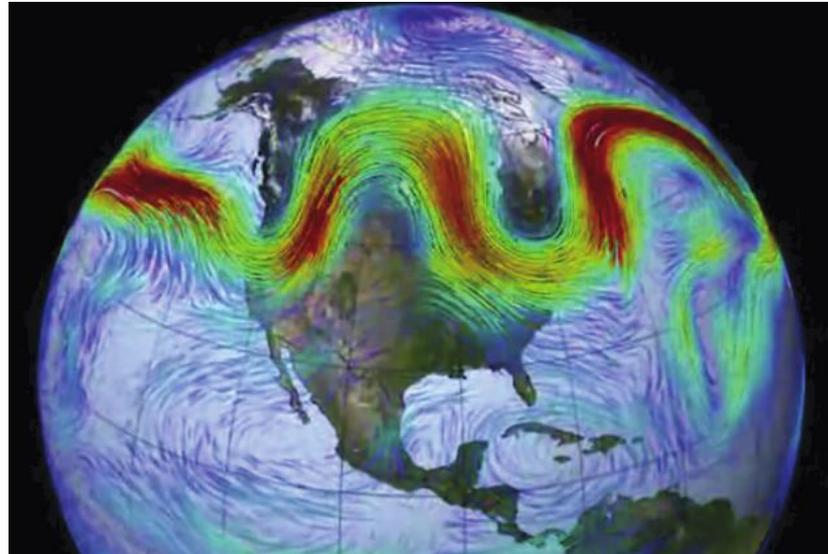


Wed Nov. 15th 3:30-4:30, Steele 006

The Arctic Meltdown and Extreme Weather: How Are They Connected?

Dr. Jennifer Francis

Department of Marine and Coastal Sciences, Rutgers University



SO₂ Global Emission Trends

