Climate Change and the Carbon Cycle

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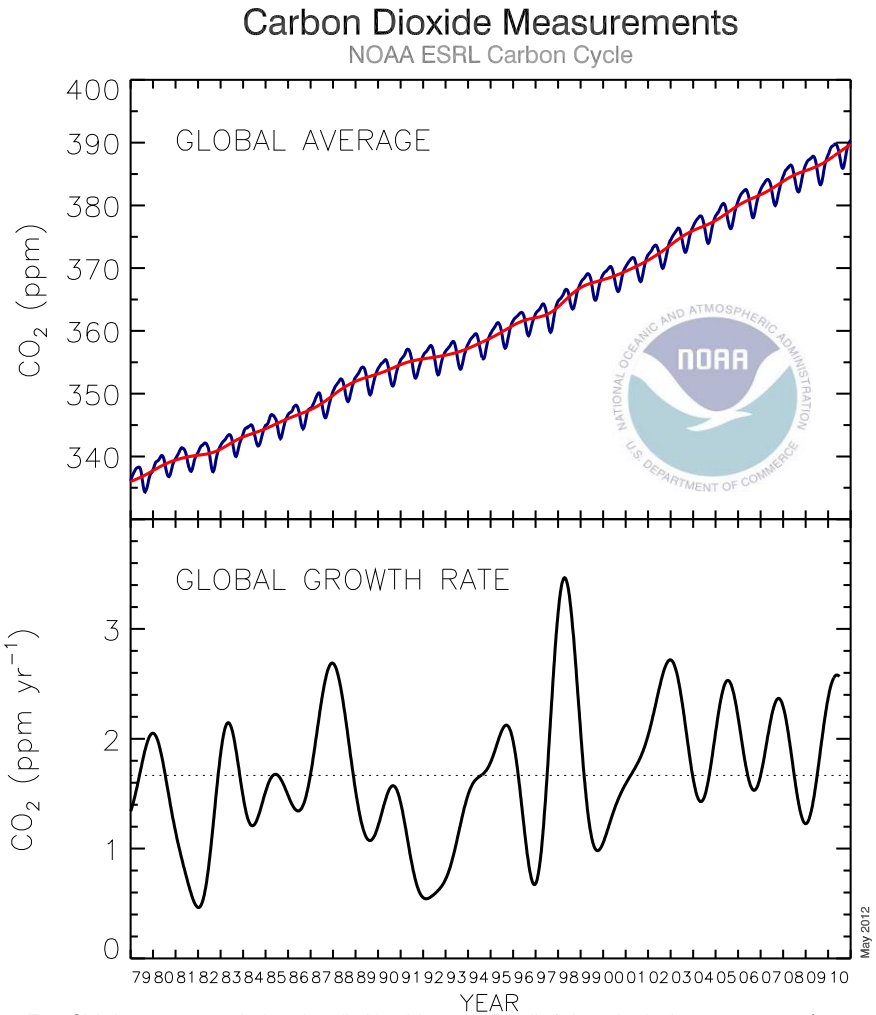
Background

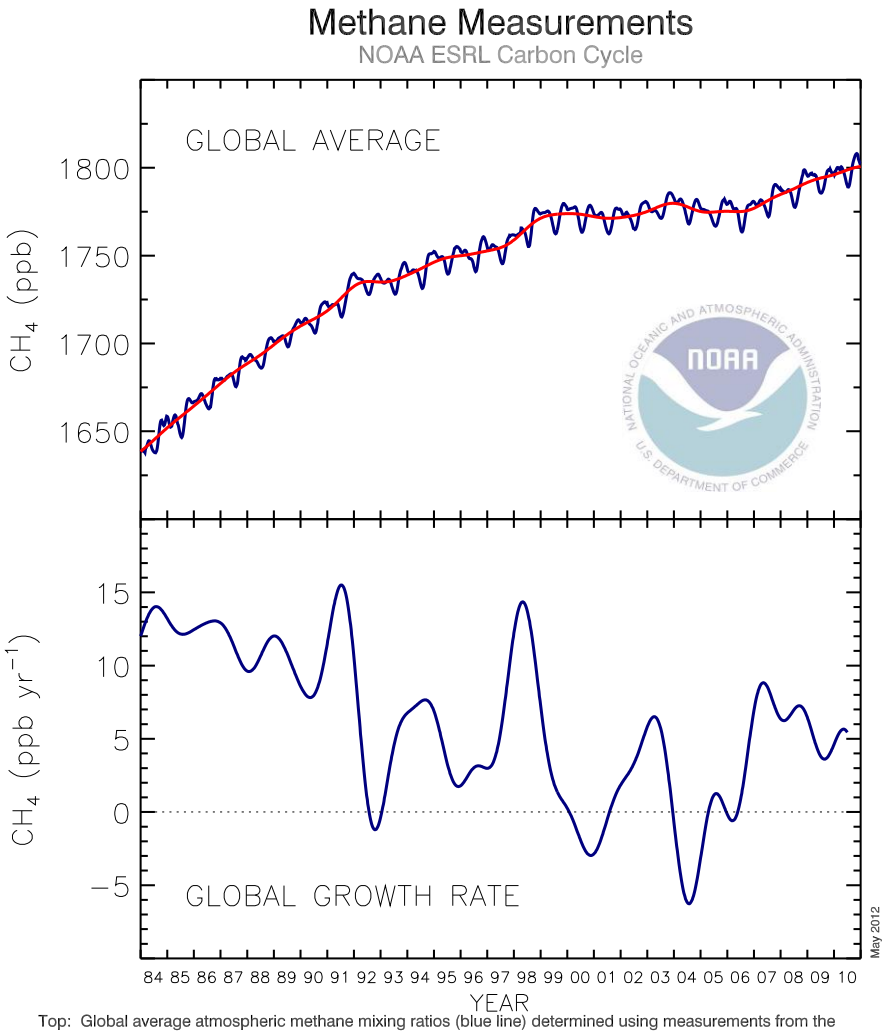
- Graduate, Colorado State University
- 20 years at National Center for Atmospheric Research, Boulder, Colorado
- Founding Director, Max-Planck-Institute for Biogeochemistry, Jena, Germany
- Co-recipient, Nobel Peace Prize as IPCC Convening Lead Author for the Carbon Cycle
- Fellow, American Geophysical Union

Carbon dioxide over the past decades



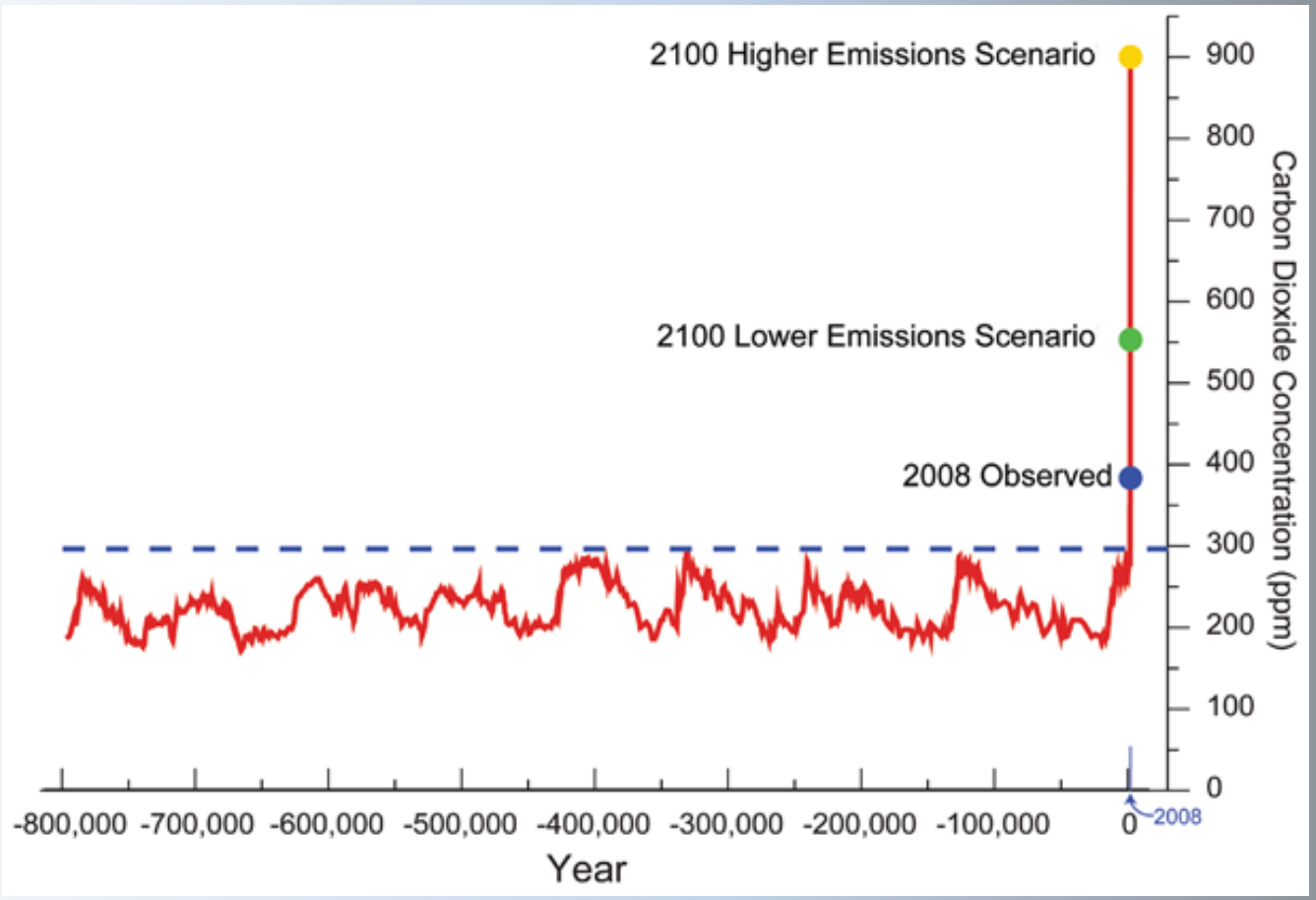
Top: Global average atmospheric carbon dioxide mixing ratios (blue line) determined using measurements from the Carbon Cycle cooperative air sampling network. The red line represents the long-term trend. Bottom: Global average growth rate for carbon dioxide. Contact: Dr. Pieter Tans, NOAA ESRL Carbon Cycle, Boulder, Colorado, (303) 497-6678, pieter.tans@noaa.gov, http://www.esrl.noaa.gov/gmd/ccgg/.

Increasing methane in the atmosphere



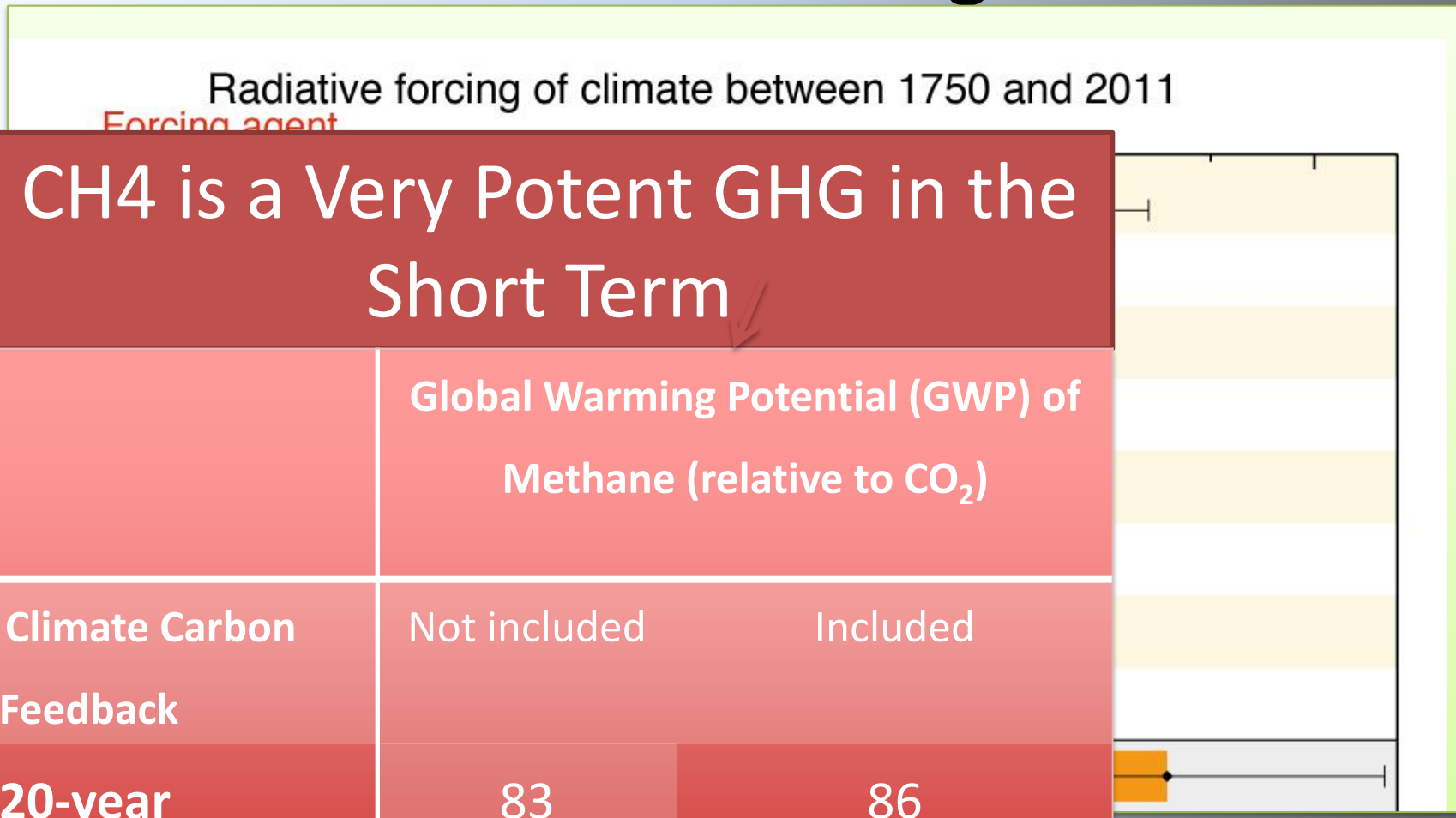
Top: Global average atmospheric methane mixing ratios (blue line) determined using measurements from the Carbon Cycle cooperative air sampling network. The red line represents the long-term trend. Bottom: Global average growth rate for methane. Contact: Dr. Ed Dlugokencky, NOAA ESRL Carbon Cycle, Boulder, Colorado, (303) 497-6228, ed.dlugokencky@noaa.gov, http://www.esrl.noaa.gov/gmd/ccgg/.

Carbon dioxide over the past millenia



From: USGCRP Global Climate Change Impacts in the United States 2009 Report

Comparing different sources of climate change

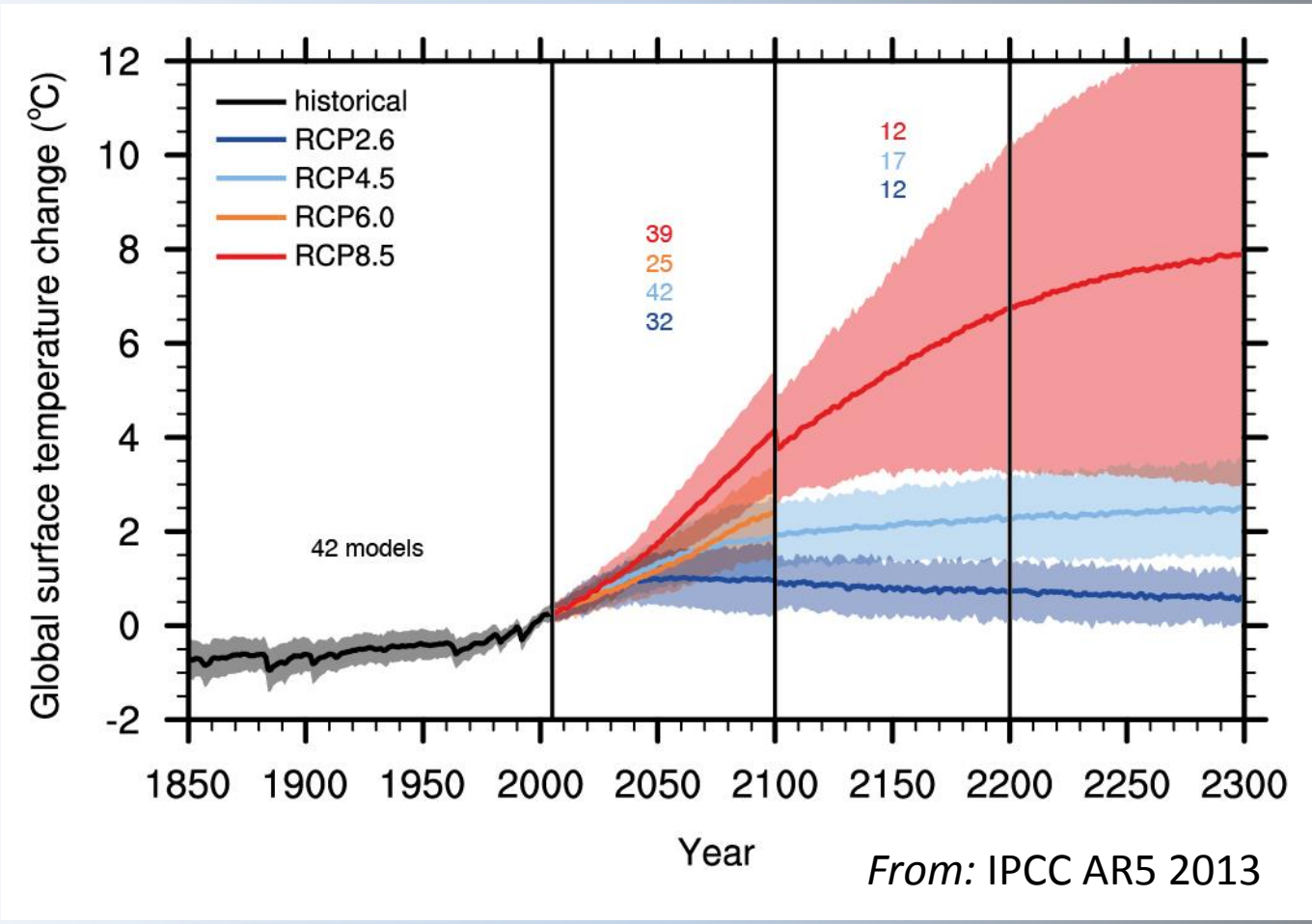


CH4 is a Very Potent GHG in the Short Term

	Global Warming Potential (GWP) of Methane (relative to CO_2)	
Climate Carbon Feedback	Not included	Included
20-year	83	86
100-year	28	34

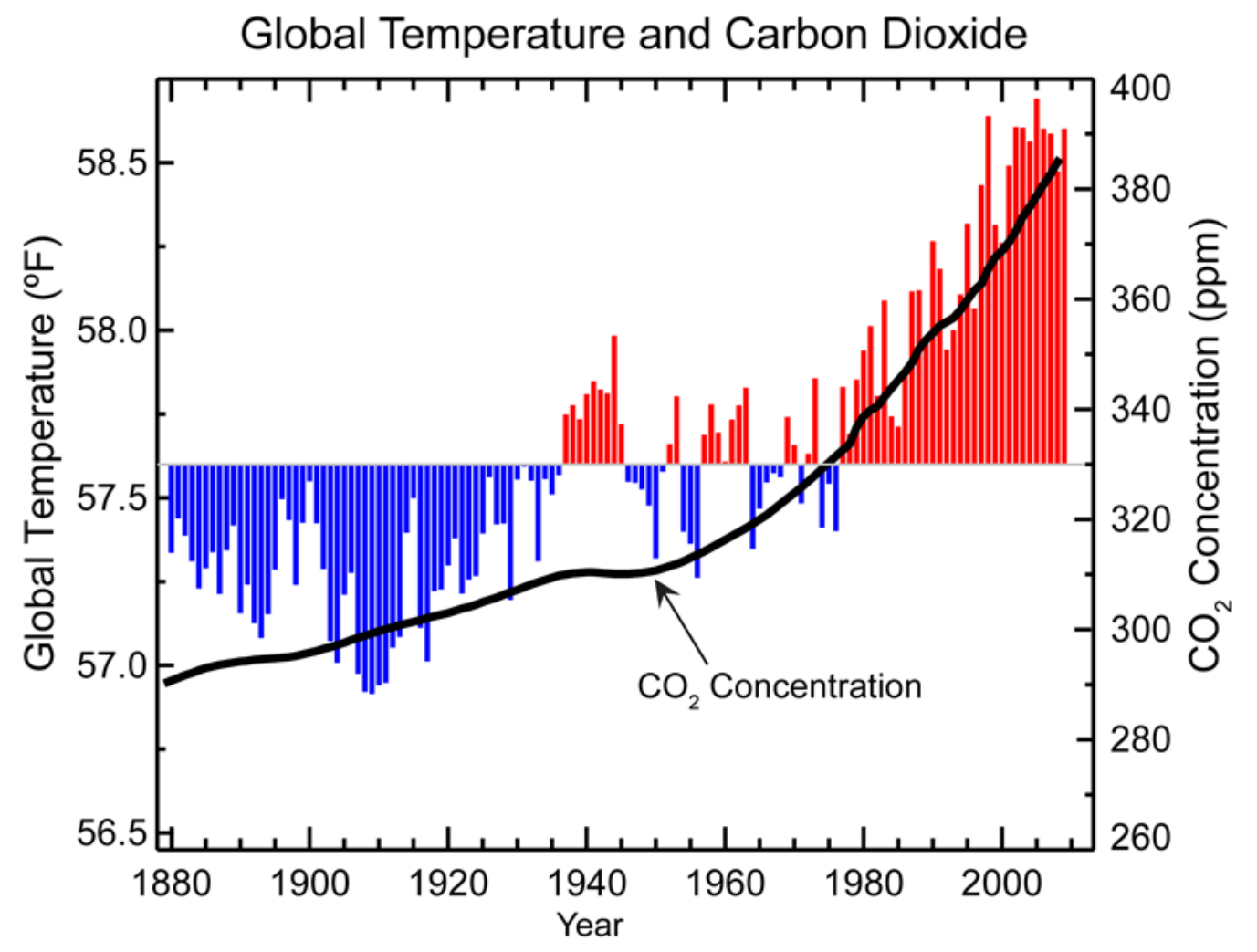
Climate futures depend mostly on human decisions (like the one to be made by this Commission)

WGI_AR5_Fig12-5.jpg (JPEG Image, 1044 × 701 pixels) http://www.climatechange2013.org/images/figures/WGI_AR5_...



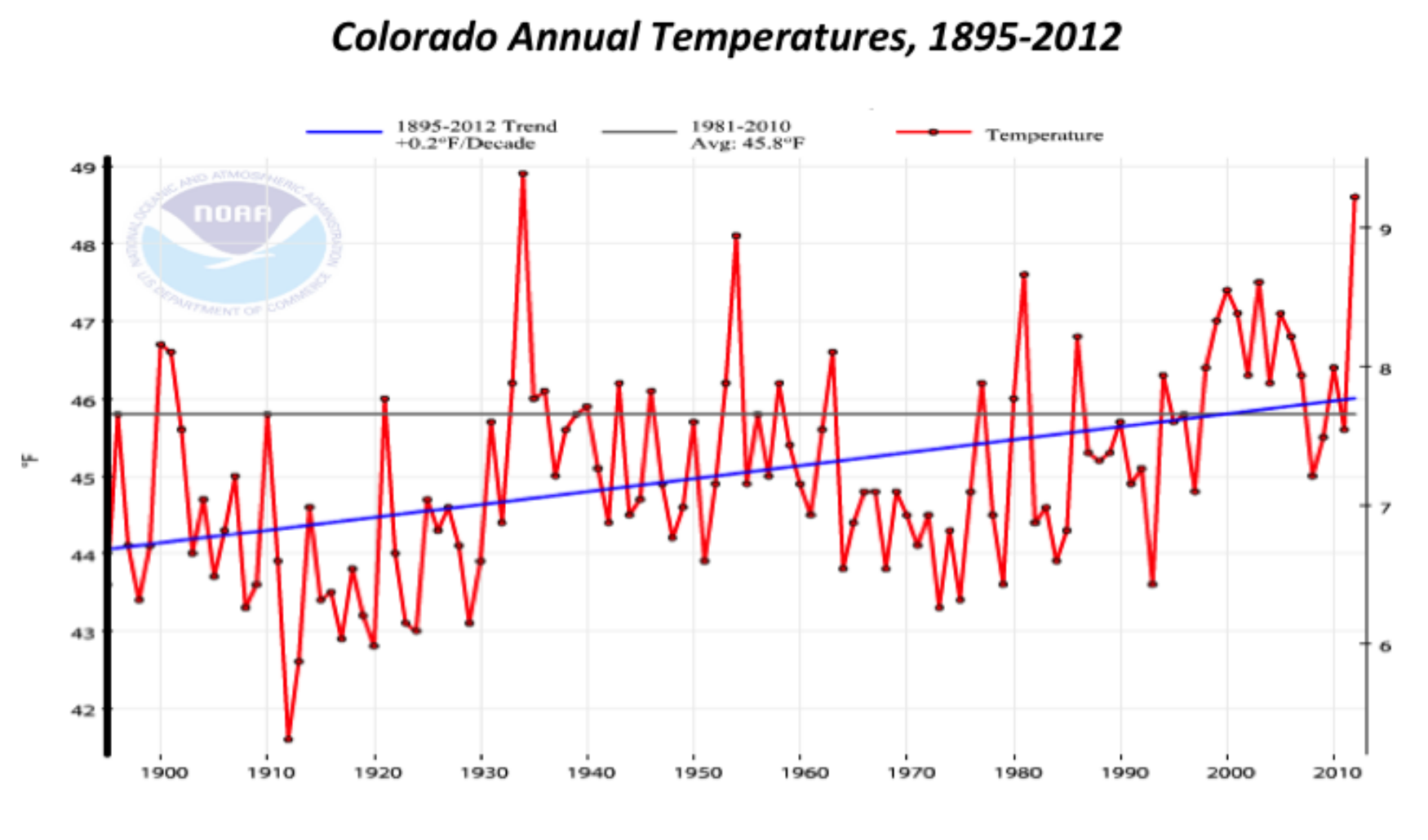
From: IPCC AR5 2013

Global temperatures



From: NOAA National Climate Data Center

Temperature change in Colorado

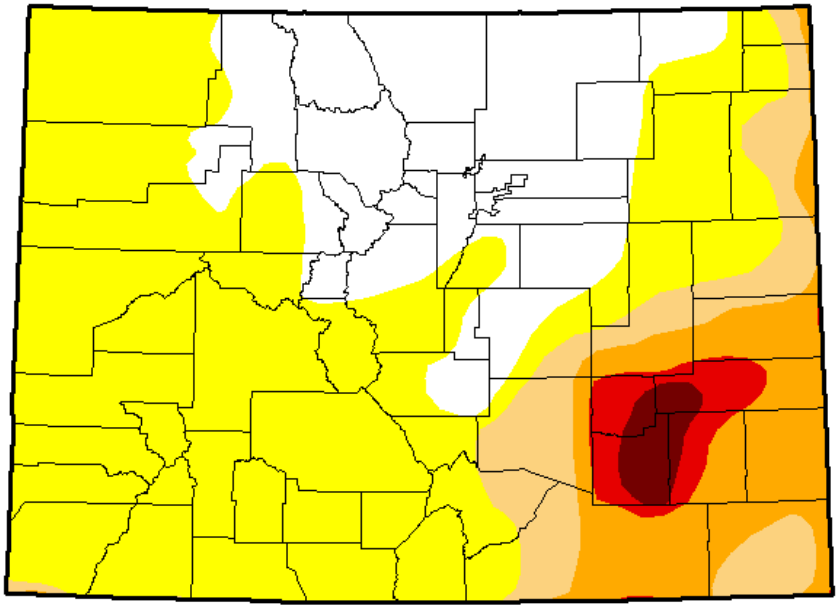


From National Climate Data Center, NOAA

Colorado's climate: Drought

U.S. Drought Monitor

Colorado



February 11, 2014

(Released Thursday, Feb. 13, 2014)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	25.06	74.94	22.62	13.82	4.06	1.47
Last Week *2/4/2014*	25.06	74.94	22.62	13.82	4.06	1.47
3 Months Ago *11/12/2013*	26.04	73.96	21.01	12.01	4.01	1.47
Start of Calendar Year *12/31/2013*	32.04	67.96	22.33	13.56	4.01	1.47
Start of Water Year *10/1/2013*	24.91	75.09	37.88	12.01	4.01	1.47
One Year Ago *2/12/2013*	0.00	100.00	100.00	91.30	50.99	24.92

Intensity:

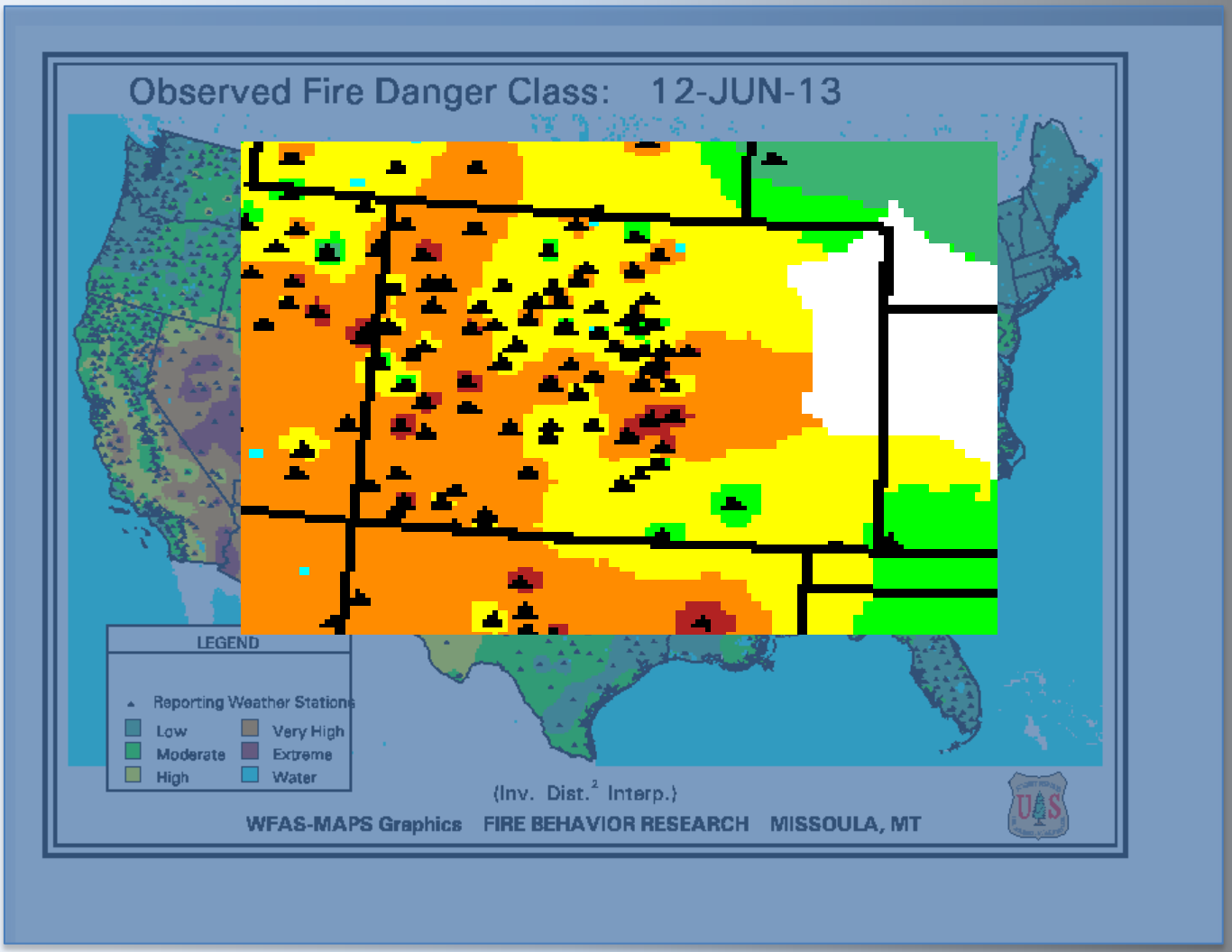
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
David Miskus
NOAA/NWS/NCEP/CPC

http://droughtmonitor.unl.edu/

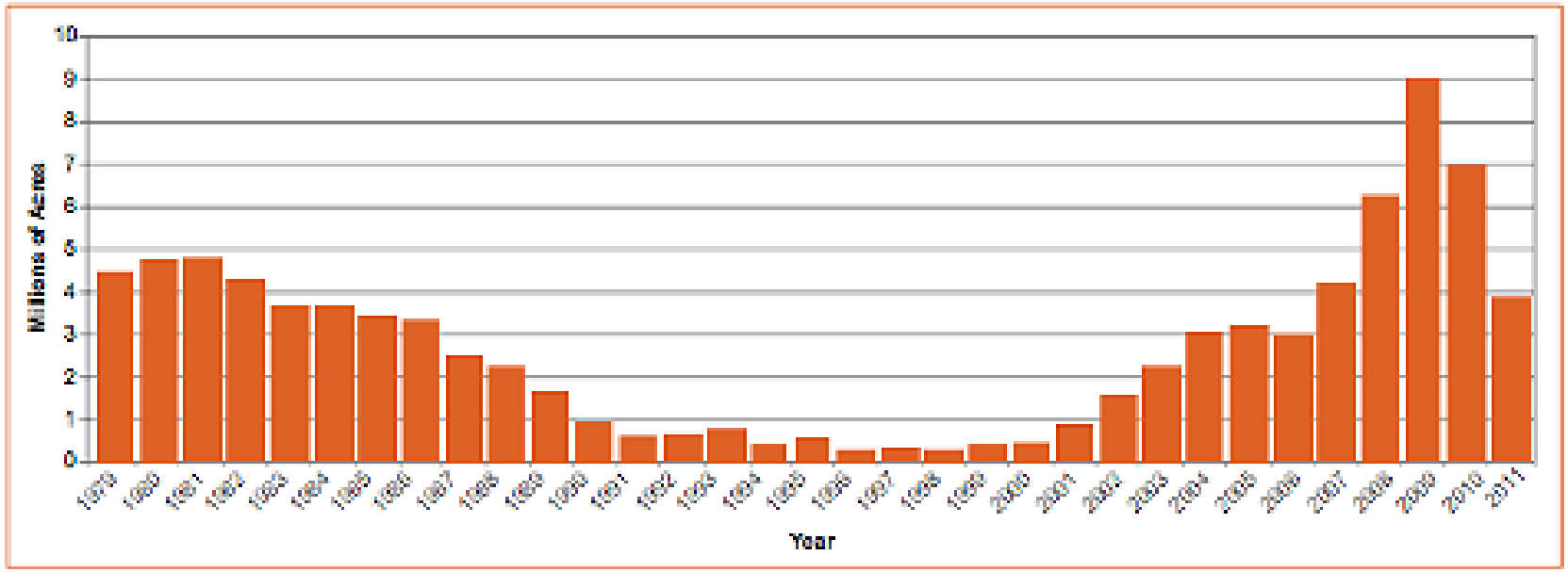
Colorado's climate: Fire Risk



From: USFS Wildland Fire Assessment System

Warming temperatures *stack the deck*

Figure 1.—*Mountain pine beetle activity decreased significantly in 2011 in much of the Western United States.*



Climate change puts Colorado at risk

- Risk to agriculture
- Threats to wildlife and bio-diversity
- Threats to fauna
- Threats to recreation (skiing, fishing, hunting)
- Threats to tourism due to impacts at parks
- Worsening ozone
- Higher risk of flooding
- Higher risk of fires
- Great risk of infestations, leading to other damage

Climate change increases the odds of extreme conditions

Think globally-act locally

Climate change is a global problem, but fixing it must be done one well, one pipeline, one state at a time