

Climate Change Essentials: Selected Resources

[distributed as part of presentation, COMO Conference, 2013]

Climate Change Definitions

- **Glossary of Climate Change Terms.** Environmental Protection Agency (EPA)
<http://www.epa.gov/climatechange/glossary.html>
- **What's in a Name? Global Warming vs. Climate Change.** "Definitions" National Aeronautics and Space Administration (NASA)
http://www.nasa.gov/topics/earth/features/climate_by_any_other_name.html
- **Article 1: Definitions.** United Nations Framework Convention on Climate Change
http://unfccc.int/essential_background/convention/background/items/2536.php
- **IPCC - 4th Assessment Report** (1997, AR4)
Working Group 1 –“The Physical Science Basis” 1007 pages (Glossary, p. 941-954)
http://ipcc.ch/publications_and_data/ar4/wg1/en/contents.html
http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4_wg1_full_report.pdf
- **U.S. Global Change Research Program** – within “Our Changing Planet” (p. 52)
<http://downloads.globalchange.gov/ocp/ocp2013/ocp2013.pdf>
- **National Weather Service Glossary** (part of NOAA, which is part of the Dept. of Commerce)
<http://w1.weather.gov/glossary/>
- **Understanding and Responding to Climate Change:** Highlights of National Academies Reports. 2008 ed. [National Academy of Sciences] , p.2.
http://dels.nas.edu/resources/static-assets/materials-based-on-reports/booklets/climate_change_2008_final.pdf
http://dels.nas.edu/resources/static-assets/materials-based-on-reports/booklets/climate_change_2008_final.pdf
- **Jet Propulsion Laboratory** (NASA) Glossary <http://oco.jpl.nasa.gov/glossary/>

Science Basics

- **Climate change: how do we know?** NASA. Evidence. <http://climate.nasa.gov/evidence>
- **Climate Change Science.** EPA. <http://www.epa.gov/climatechange/science/>
- **Frequently Asked Questions About Global Warming and Climate Change: Back to Basics.**
http://epa.gov/climatechange/Downloads/ghgemissions/Climate_Basics.pdf (8 pages)
- **The science behind climate change: Monitoring, modelling and mitigating climate change.** Met Office Hadley Centre. The Met Office is the UK's National Weather Service
<http://www.metoffice.gov.uk/climate-guide/science/science-behind-climate-change>
- **Climate change: what causes it and how we know.** Jeremy Fyke, Los Alamos National Laboratory. Presented at the Association of Concrete Kiln Recyclers, October 4, 2012 Santa Fe, New Mexico <http://www.osti.gov/scitech/biblio/1052816>
- **Understanding and Responding to Climate Change:** Highlights of National Academies Reports. 2008 ed. [National Academy of Sciences] 28 pages.
http://dels.nas.edu/resources/static-assets/materials-based-on-reports/booklets/climate_change_2008_final.pdf
http://dels.nas.edu/resources/static-assets/materials-based-on-reports/booklets/climate_change_2008_final.pdf
For more recent Academy reports, see: America’s Climate Choices, <http://nas-sites.org/americasclimatechoices/>

Assessment and Publications

- **America's Climate Choices** – Series produced by the National Academy of Sciences, at the request of Congress. <http://nas-sites.org/americasclimatechoices/sample-page/>
- **Global Climate Change Impacts in the United States**. U.S. Global Change Research Program (USGCRP) highlights the second National Climate Assessment (<http://nca2009.globalchange.gov/>) and summarizes the science of climate change and the impacts of climate change on the United States, now and in the future. Print ed. available from Cambridge Univ. Press; or, directly at: <http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf>

A 60-person Federal Advisory Committee (The "National Climate Assessment and Development Advisory Committee" or NCADAC) oversaw the development of this report.

<http://globalchange.gov/> -- Click on What We Do and choose **Assess** the U.S. Climate. Links to full report, and also to a draft of the 3rd edition, scheduled for completion in early 2014.

Southeast summary: <http://nca2009.globalchange.gov/southeast>. Graphic on p. 112 of full report shows Number of Days per Year with Peak Temperature over 90° F. -- webpage shows U.S. regional information, and also links to several supporting datasets.

2013, 3rd edition draft is over 1000 pages, and is directly at:

<http://ncadac.globalchange.gov/download/NCAJan11-2013-publicreviewdraft-fulldraft.pdf>

More specific links within globalchange.gov are to the Library and to the Resources (publications). These subpages also link to many of these reports.

<http://www.globalchange.gov/resources/reports>

- **Our Changing Planet**. U.S. Global Change Research Program (USGCRP). Annual report summarizing achievement, short term plans, and progress towards implantation of long-term plans <http://library.globalchange.gov/products/annualreports>
- ***National Global Change Research Plan 2012-2021: A Strategic Plan for the U. S. Global Change Research Program*** (152 pages). Also called the [USGCRP Strategic Plan for 2012-2012](#). Built around the four strategic goals of Advance Science, Inform Decisions, Conduct Sustained Assessments, and Communicate and Educate. <http://library.globalchange.gov/u-s-global-change-research-program-strategic-plan-2012-2021>
- **IPCC - Fifth Assessment Report [AR5], *Climate Change 2013: The Physical Science Basis***. Intergovernmental Panel on Climate Change (IPCC). Working Group I, <http://www.climatechange2013.org/>

Working Group 1 - assesses the physical scientific aspects of the climate system and climate change <http://www.ipcc.ch/report/ar5/wg1/#.UkVZjWSic0o>

Headline Statements (2 pages, from the Summary for Policymakers):

http://www.ipcc.ch/news_and_events/docs/ar5/ar5_wg1_headlines.pdf

Summary for Policymakers (36 pages), released 9/27/13:

http://www.climatechange2013.org/images/uploads/WGIAR5-SPM_Approved27Sep2013.pdf

or, <http://www.ipcc.ch/report/ar5/wg1/#.UkVZjWSic0o> – select “Summary for Policymakers”

Final Draft (900 or 2000 pages), released 9/30/13 [same URL as above:

<http://www.ipcc.ch/report/ar5/wg1/#.UkVZjWSic0o>] – select “Full Report” or chapter-by-chapter

[IPCC Working Groups and Task Force](#)

- **IPCC - Fourth Assessment Report** (1997, AR4)
Working Group 1 –“The Physical Science Basis” . 1007 pages. (Glossary, p. 941-954)
http://ipcc.ch/publications_and_data/ar4/wg1/en/contents.html (click “pdf version”, and then scroll down the Chapter lists to “full report”. Or, available directly at:
http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4_wg1_full_report.pdf
- **IPCC - Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.** A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, 2012. Almost 600 pages.
http://ipcc-wg2.gov/SREX/images/uploads/SREX-All_FINAL.pdf
- **State of the Climate in 2012.** Jessica Blunden and Derek S. Arndt. [Special Supplement](#) to the *Bulletin of the American Meteorological Society* vol. 94, no.8, August 2013, [S1–S258](#) [about 250 pages] <http://journals.ametsoc.org/doi/abs/10.1175/2013BAMSStateoftheClimate.1>
p S 3 figure – “Geographical Distribution of Notable Climate Anomalies and Events Occurring Around the World in 2012”.
In 2003, The Second Report on the Adequacy of the Global Observing Systems for Climate in Support of the UNFCCC (GCOS 2003) first documented the concept of Essential Climate Variables (ECVs)...Overall, the 2012 average temperature across global land and ocean surfaces ranked among the 10 warmest years on record. The global land surface temperature alone was also among the 10 warmest on record...
This is the 23rd edition of the annual State of the Climate series, from its origin as NOAA’s Climate Assessment, and the 18th consecutive year of its association with the Bulletin of the American Meteorological Society (BAMS)...Beginning this year, time series of major climate indicators are presented in this introductory chapter.
p. S7 - Depending on the dataset, 2012 was eighth or ninth warmest in the record since 1850 at the surface and eighth to eleventh warmest since 1979 in the troposphere. All top ten years in both records have occurred since the large El Niño event of 1998.
p. S11 Although the 2012 global surface temperature (combining land air and sea surface temperature) was not a record-setting value, it remained above the 1981–2010 average—ranking among the top 10 warmest years on record. Globally-averaged, 2012 ranked as the eighth or ninth warmest year since records began in the mid-to-late 1800s
- Global warming has increased risk of record heat, say Stanford scientists by Rob Jordan. *Stanford Report*, September 6, 2013. Researchers calculate that intense heat like that in the summer of 2012 is up to four times more likely to occur now than in pre-industrial America, when there was much less carbon dioxide in the atmosphere.
<http://news.stanford.edu/news/2013/september/record-heat-study-090613.html>
- Climate change on pace to occur 10 times faster than any change recorded in past 65 million years, Stanford scientists say by Bjorn Carey. *Stanford Report*, August 1, 2013.
<http://news.stanford.edu/news/2013/august/climate-change-speed-080113.html> Not only is the planet undergoing one of the largest climate changes in the past 65 million years, Stanford climate scientists Noah Diffenbaugh and Chris Field report that it's on pace to occur at a rate 10 times faster than any change in that period. Without intervention, this extreme pace could lead to a 5-6 degree Celsius spike in annual temperatures by the end of the century.

Policy

- **America’s Climate Choices** (by the Committee on America’s Climate Choices, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies, National Research Council of the National Academies.) [Washington, D.C.: National Academies Press, 2011] http://www.nap.edu/catalog.php?record_id=12781 [click on “read” , because “download” requires a login]
- **Our Changing Planet: The U.S. Global Change Research Program for Fiscal Year 2013** –A Supplement to the President’s Budget for Fiscal Year 2013
<http://downloads.globalchange.gov/ocp/ocp2013/ocp2013.pdf>
And, the : National Global Change Research Plan: 2012 to 2021 - A Strategic Plan for the U. S. Global Change Research Program (USGCRP).
<http://downloads.globalchange.gov/strategic-plan/2012/usgcrp-strategic-plan-2012.pdf>
Both are from the USGCRP (<http://www.globalchange.gov/>) - a Federal program that coordinates and integrates global change research across 13 government agencies to advance climate science and our understanding of how global change is impacting society, both today and into the future.
- **Congressional Research Service** [“CRS”, part of the Library of Congress]
CRS Reports –
 - Climate Change Legislation in the 113th Congress** (Sept. 16, 2013)
<http://fpc.state.gov/documents/organization/214932.pdf>
 - Federal Climate Change Funding from FY2008 to FY2014** (Sept. 13, 2013)
<http://www.fas.org/sgp/crs/misc/R43227.pdf>
 - Changes in the Arctic: Background and Issues for Congress** (Aug. 18, 2013)
<http://www.fas.org/sgp/crs/misc/R41153.pdf>
 - U.S. Global Climate Change Policy: Evolving Views on Cost, Competitiveness, and Comprehensiveness** (Feb 24, 2011)
<http://fpc.state.gov/documents/organization/158521.pdf>
 - Climate Change: Conceptual Approaches and Policy Tools** (Aug 29, 2013)
<http://fpc.state.gov/documents/organization/174216.pdf>
- U.S. House of Representatives – Science, Space, and Technology Committee- Subcommittee on Environment.
Hearing held April 25, 2013: “Policy Relevant Climate Issues in Context”
<http://science.house.gov/hearing/subcommittee-environment-hearing-policy-relevant-climate-issues-context>
Differing points of view from prepared statements of 3 witnesses.

Climate Trends and Extremes

- **Explaining Extreme Events of 2012 from a Climate Perspective.** Special Supplement to the *Bulletin of the American Meteorological Society* Vol. 94, No. 9, September 2013 (about 106 pages) <http://www.ametsoc.org/2012extremeeventsclimate.pdf>
- **Climatic Extremes and Weather Events.** From NOAA's NCDC. <http://ncdc.noaa.gov/oa/climate/severeweather/extremes.html>
- **Not Even Close: 2012 Was Hottest Ever in U.S.** Justin Gillis. Published: January 8, 2013. [New York Times website] <http://www.nytimes.com/2013/01/09/science/earth/2012-was-hottest-year-ever-in-us.html?ref=temperaturerising>
- **Study links warming to some 2012 wild weather.** Seth Borenstein, AP Science Writer. Sept 5, 2013. <http://bigstory.ap.org/article/half-2012-wild-weather-linked-climate-change> "A study of a dozen of 2012's wildest weather events found that man-made global warming increased the likelihood of about half of them...other half...simply reflected the random freakiness of weather"
- **NASA Finds 2012 Sustained Long-Term Climate Warming Trend.** NASA Headquarters press release No. 13-021. NASA's Goddard Institute for Space Studies (GISS) in New York, which monitors global surface temperatures on an ongoing basis. At top of page is: "for media briefing materials, click here" which links to a 10-page PowerPoint that is a pdf : http://www.nasa.gov/pdf/719354main_NOAA%20NASA%20Climate%20Briefing.pdf – p.8 is the chart: "Warmest Year on Record for the Continental U.S."
- **Temperature Rising. The New York Times – Environment.** Series of articles that have been posted to the *New York Times* website about climate change, focusing on central arguments and examining evidence for global warming. <http://topics.nytimes.com/top/news/science/series/temperaturerising/>
- **Natural Systems in Changing Climates.** Special Issue of *Science*, 2 August 2013 vol. 341, issue 6145, pages 425-584. <http://www.sciencemag.org/content/341/6145.toc#SpecialIssue>
Includes article Changes in Ecologically Critical Terrestrial Climate Conditions. The impact of climate on terrestrial ecosystems probably will be dramatic because of the rapid pace of climate change <http://www.sciencemag.org/content/341/6145/486.abstract>
- **Monitoring and Understanding Changes in Heat Waves, Cold Waves, Floods, and Droughts in the United States: State of Knowledge.** *Bulletin of the American Meteorological Society*. Volume 94, Issue 6 (June 2013) p . 821-834 <http://journals.ametsoc.org/doi/pdf/10.1175/BAMS-D-12-00066.1> In recent decades, heat waves have generally become more frequent across the U.S., while cold waves have been decreasing.
- **2011 was costliest year in world disasters** - Doyle Rice, in *USA Today*. Posted 1/4/2012 <http://usatoday30.usatoday.com/weather/news/extremes/story/2012-01-04/world-disasters-costliest-earthquake-tsunami/52377642/1> . Includes map "Worldwide woes" which was used also for 2014 AMS annual meeting theme ("Extreme Weather-Climate and the Built Environment") - background info <http://annual.ametsoc.org/2014/index.cfm/programs-and-events/theme/>
- **Record High 2010 Global Carbon Dioxide Emissions from Fossil-Fuel Combustion and Cement Manufacture,** by Tom Boden and T.J. Blasing. Posted on CDIAC Site. http://cdiac.ornl.gov/ftp/trends/co2_emis/Preliminary_CO2_emissions_2010.xlsx These estimates show that 2010 was by far a record year for CO2 emissions from fossil-fuel combustion and cement manufacture.

- **The Conversion of a Climate-Change Skeptic**, by Richard A. Muller. Published: July 28, 2012 *New York Times* editorial by a physicist at UC Berkeley, who “had been a global warming skeptic”[per the *World Almanac*].
http://www.nytimes.com/2012/07/30/opinion/the-conversion-of-a-climate-changeskeptic.html?_r=0&adxnnl=1&pagewanted=all&adxnnlx=1379618902-FhwjnZSZmkOKmBvI0g7vIw Professor Muller co-founded the [Berkeley Earth](#) Surface Temperature Project
- **Economic woes may mute impact of U.N. report saying warming manmade**, by Alister Doyle and Nina Chestney, Oslo, London , Friday Sep 6, 2013 [Reuters Newswire]
<http://www.reuters.com/article/2013/09/06/us-ipcc-climate-idUSBRE9850JM20130906>
- **Climate Panel Cites Near Certainty on Warming**, by Justin Gillis. Published: August 19, 2013
http://www.nytimes.com/2013/08/20/science/earth/extremely-likely-that-human-activity-is-driving-climate-change-panel-finds.html?pagewanted=all&_r=0 [posted to *New York Times* website] An Intergovernmental Panel on Climate Change draft report states that the authors are 95 percent to 100 percent confident that human activity is the primary influence on planetary warming. A version of this article appears in print on August 20, 2013, on page A1 of the New York edition with the headline: Climate Panel Cites Near Certainty on Warming. [this is the same title as on the website]
- **Our Changing Planet: The U.S. Global Change Research Program for Fiscal Year 2013**. A Supplement to the President's Budget for Fiscal Year 2013. Page 5. "Today's rate of global change far exceeds anything documented in human history"
<http://library.globalchange.gov/our-changing-planet-2013>
- **America's Climate Choices. National Research Council**
http://www.nap.edu/catalog.php?record_id=12781 The National Research Council's most comprehensive study of climate change (2011). Also links to related 2010 titles from the America's Climate Change study:
Adapting to the Impacts of Climate Change
Advancing the Science of Climate Change
Informing an Effective Response to Climate Change
Limiting the Magnitude of Future Climate Change
- **Stern Review Report on the Economics of Climate Change**
http://www.hm-treasury.gov.uk/stern_review_report.htm This report covers impacts of climate change on growth and development (Chapters 3-6), the economics of stabilisation (Chapters 7-13), Policy responses for mitigation (Chapters 14-17), adaptation (Chapters 18-20), as well as International collective action (Chapters 21-27).

Statistics (General sources)

- **ProQuest Statistical Abstract of the United States**. 2013 ed. Online – and print ed.(Bernan Press). Formerly issued annually in print by the Census Bureau. That version ceased; ProQuest compiled the data and produced a database, which the state consortia GALILEO added for its member institutions (check with your local library for online availability). Also available online within ProQuest Statistical Insight database (note: International Statistics is a separate section in that database). The 2014 ed. is due in Dec. 2013. Each Statistical Abstract from 1878-2012 are online at the Census Bureau website, at: <http://www.census.gov/compendia/statab/>
- **World Almanac and Book of Facts**, 2013 ed.

Statistics (In-depth; Data)

- **Climate Change Indicators in the United States, 2012.** 2nd edition. From the EPA.
<http://www.epa.gov/climatechange/science/indicators>
- **United States Historical Climatology Network --**
http://cdiac.ornl.gov/epubs/ndp/ushcn/ushcn_map_interface.html [web interface]
Select a state from the pull-down list and click "Map Sites" to show its stations on the map. Click on a map station or select a station from the state station list to navigate to the daily and monthly data and documentation
- **Carbon Dioxide Information Analysis Center (CDIAC),** Oak Ridge National Laboratory, DOE, Oak Ridge, Tennessee <http://cdiac.ornl.gov/>
The CDIAC has served as the primary climate-change data and information analysis center of the U.S. Department of Energy (DOE) since 1982.
Select "Data" for 9 data focus areas.
- **Energy Information Administration (EIA)**
<http://www.eia.gov/environment/> (select "Data" or "Analysis & Projections" tabs)
- **World Data Center for Meteorology,** Asheville. National Climatic Data Center, National Oceanic and Atmospheric Administration (NOAA). Facilitates international exchange of data.
<http://www.ncdc.noaa.gov/wdc/>
- **Earth System Research Laboratory, Global Monitoring Division** (part of NOAA)
<http://www.esrl.noaa.gov/gmd/> -- Division makes ongoing measurements, from land and sea.
- **World Bank**
<http://data.worldbank.org/topic/climate-change>

Carbon Dioxide [CO₂]

- **CDIAC (Carbon Dioxide Information Analysis Center)** generates estimates of carbon releases from fossil-fuel consumption and cement production. http://cdiac.ornl.gov/CO2_Emission/
- **Historical Carbon Dioxide Record from the Siple Station Ice Core**
<http://cdiac.ornl.gov/trends/co2/siple.html>
Data is from 1744 to 1953 (selected years, plus several large spans of years to 1983). After 1983, observations are from Mauna Loa. *Note:* A much clearer version appears as a table in the World Almanac and Book of Facts, 2013 (p. 324).
- **Earth System Research Laboratory, Global Monitoring Division** (part of NOAA) - Carbon Cycle Greenhouse Gases Group – "Trends in Atmospheric Carbon Dioxide":
<http://www.esrl.noaa.gov/gmd/ccgg/trends/> – weekly and monthly data from Mauna Loa.
- **ProQuest Statistical Abstract of the United States, 2013 – p. 242 and p. 897**
(Online – and – print ed., Bernan Press). Online via Georgia library consortia, GALILEO (check with your local library for online availability). Also available online within ProQuest Statistical Insight database (note: International Statistics is a separate section in that database).
"Carbon Dioxide Emissions by Sector and Source: 1990 to 2009"
Source: Greenhouse Gas Emissions in the United States, 2009, from the EIA.
http://www.eia.gov/environment/emissions/ghg_report [tables also in Excel format]
Note: EIA title: Emissions of Greenhouse Gases in the U. S ; series discontinued after 2009.
Table, "U.S. carbon dioxide emissions from energy and industry, 1990-2009", directly at:
http://www.eia.gov/environment/emissions/ghg_report/pdf/tbl6.pdf
"Carbon Dioxide Emissions from Consumption of Fossil Fuels by Country: 1980 to 2010"
Source: EIA's International Energy Statistics (see below)

- **Energy Information Administration (EIA) – International Energy Statistics** page <http://www.eia.gov/countries/data.cfm> -- [tables also in Excel format]
- **World Bank - CO₂ Emissions** (metric tons per capita) – arranged by country, 2008 to present. <http://data.worldbank.org/topic/climate-change>
Source: CDIAC.

Greenhouse Gases

- **Greenhouse Gas Inventory Data** - from the United Nations – statistics for 6 major sources (carbon dioxide, methane, etc.) plus 1 additional source: <http://data.un.org/Explorer.aspx?d=GHG>
- **Earth System Research Laboratory, Global Monitoring Division** (part of NOAA) - Carbon Cycle Greenhouse Gases Group: <http://www.esrl.noaa.gov/gmd/ccgg/>
- World Almanac and Book of Facts, 2013 – p. 322
“U.S. Greenhouse Gas Emissions from Human Activities, 1990-2010”
 Source: EPA – “Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011”. Prepared annually to comply with existing commitments under the United Nations Framework Convention on Climate Change (UNFCCC).
 Links, chapter-by-chapter – and, two pie charts : <http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html>
 Full report in pdf, 505 pages: <http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf>
Note: EPA definition of sink: “Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol from the atmosphere”
- **ProQuest Abstract of the United States, 2013 – p. 242**
 Available in print and online – in Georgia, directly via GALILEO (Georgia’s library consortia; check with your local library for online access).
 Also available online via ProQuest Statistical Insight database (click on top level “Related Subscriptions”). Latter subscription includes international statistics in separate International Statistics section.
“Emissions of Greenhouse Gases by Type and Source: 1990 to 2009”
Source: Greenhouse Gas Emissions in the United States, 2009, from the EIA.
http://www.eia.gov/environment/emissions/ghg_report [tables also in Excel format]
Note: EIA title: Emissions of Greenhouse Gases in the U. S ; series discontinued after 2009.

Sea Level

- *National Geographic* -- cover story: **“Rising Seas”**: How They are Changing our Coastlines” – (September 2013) (p. 30-37) – By the Time Hurricane Sandy Veered Toward the Northeast (p. 38-57) . Online, both at: <http://ngm.nationalgeographic.com/2013/09/rising-seas/folger-text#>
- Special features: pullout map “If All the Ice Melted” (after p. 42) ; 2-page illustration of a flooded New York City – “A Superstorm in 2100” (p. 50-51). *Also online at above website.* and, the Surging Seas website within Climate Center [see below...]

- **Climate Central** <http://www.climatecentral.org/> An independent organization of leading scientists and journalists researching and reporting the facts about our changing climate and its impact on the American public.

Surging Seas site (<http://sealevel.climatecentral.org/>) State “fact sheets” for states:
<http://sealevel.climatecentral.org/research/reports/surging-seas-state-factsheets/>
For Georgia (3 pages) : <http://slr.s3.amazonaws.com/factsheets/Georgia.pdf>
Full report, March 2012: <http://sealevel.climatecentral.org/research/reports/surging-seas/>
Or: <http://slr.s3.amazonaws.com/SurgingSeas.pdf> - has the tables from the Congressional hearing : Sea level rise – April 19, 2012 - Committee on Energy and Natural Resources (United States Senate): <http://purl.fdlp.gov/GPO/gpo32434> - 79 pages.
- **Climate Risk Information 2013** [New York City Panel on Climate Change; released June 2013] http://www.nyc.gov/html/planyc2030/downloads/pdf/npsc_climate_risk_information_2013_report.pdf

Temperature

- **NASA – Goddard Institute for Space Studies (GISS) - analysis: GISS Surface Temperature (GISTEMP) Analysis.**
<http://cdiac.ornl.gov/trends/temp/hansen/> [link is from the CDIAC – select the “Data” icon]
Data from 1880-current.
“Graph” icon: Global Temperature Anomalies, 1880-2012 (available directly at:
http://cdiac.ornl.gov/trends/temp/hansen/graphics/gl_land_ocean.gif)
- **Climatic Research Unit (CRU)** [in East Anglia, UK]
<http://www.cru.uea.ac.uk/data/>
[link also from: <http://cdiac.ornl.gov/trends/temp/jonescru/jones.html> - select the “Data” icon]
Data from 1850-current.
- **NASA – news release (annual, each January) re Earth’s surface temperature**
<http://www.nasa.gov/topics/earth/features/2012-temps.html> -- which links to a 10-page PowerPoint that is a pdf :
http://www.nasa.gov/pdf/719354main_NOAA%20NASA%20Climate%20Briefing.pdf --
p.8 is a great chart/map/illustration: “Warmest Year on Record for the Continental U.S.”
From the text of news release:
NASA's analysis of Earth's surface temperature found that 2012 ranked as the ninth-warmest year since 1880. NASA scientists at the Goddard Institute for Space Studies (GISS) compare the average global temperature each year to the average from 1951 to 1980. This 30-year period provides a baseline from which to measure the warming

Organizations

- **Climate Central** <http://www.climatecentral.org/> An independent organization of leading scientists and journalists researching and reporting the facts about our changing climate and its impact on the American public
- **Intergovernmental Panel on Climate Change (IPCC).** <http://www.ipcc.ch> Primary international body for the assessment of climate change. IPCC, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988, provides the a scientific view on the current state of knowledge in climate change and its

potential environmental and socio-economic impacts. IPCC produces at regular intervals Assessment Reports of the state of knowledge on climate change, and also Special Reports; Methodology Reports; Technical Papers; and Supporting Material. Left column - "Working Groups/Task Force" and "Publications and Data - Reports"

- **United Nations. Climate Change Portal** <http://www.un.org/wcm/content/site/climatechange/pages/gateway> News, science (facts, causes, changes, consequences, regional impacts, UN resources), mitigation, adaptation, technology, financing, negotiations, publications, take action
- **United Nations Framework Convention on Climate Change** <http://unfccc.int> There are 195 Parties to the Convention and 192 Parties to the Kyoto Protocol. The [UNFCCC secretariat](#) supports all institutions involved in the international climate change negotiations,
- **C2ES – the Center for Climate and Energy Solutions** <http://www.c2es.org/> C2ES, the successor to the Pew Center on Global Climate Change, is an independent, nonpartisan, nonprofit organization. Site includes energy and climate change news, facts & figures, and reports and summaries regarding topics such as extreme weather (hurricanes Katrina and Sandy, drought), short-lived climate forcers, low carbon business innovation, and Climate Change 101.
- **UCAR. Understanding Climate Change - A global warming primer** (NCAR UCAR) <http://www2.ucar.edu/news/backgrounders/understanding-climate-change-global-warming> The University Corporation for Atmospheric Research is a consortium of over 100 member universities and academic affiliates; members set directions and priorities for the National Center for Atmospheric Research, which UCAR manages with sponsorship by the National Science Foundation.
- **Climate Change at the National Academies** <http://nas-sites.org/americasclimatechoices/> Objective information from the National Research Council and the Institute of Medicine, and also from the National Academy of Sciences and National Academy of Engineering. Includes news, NRC reports, The America's Climate Choices Series, summaries & booklets, videos & multimedia. The National Academies Press "Environment and Environmental Studies : Climate Change" - <http://www.nap.edu/topics.php?topic=367>
- **NRC. Climate Change: Lines of Evidence** videos <http://nas-sites.org/americasclimatechoices/videos-multimedia/climate-change-lines-of-evidence-videos/> The National Research Council's video that explains how scientists have arrived at the state of knowledge about current climate change and its causes. Chapters: What is Climate? Is Earth Warming? Greenhouse Gases; Increased Emissions; How Much Warming? Solar Influence. Natural Cycles
- **World Health Organization. Climate change and human health** (WHO) <http://www.who.int/globalchange/en/>
- **World Bank** <http://data.worldbank.org/topic/climate-change>
- **Understanding Climate Change.** A global warming primer from UCAR and NCAR (University Corporation for Atmospheric Research and National Center for Atmospheric Research) <http://www.ucar.edu/climate>
- **Climatic Research Unit** <http://www.cru.uea.ac.uk/> Is one of the world's leading institutions concerned with the study of natural and anthropogenic climate change. University of East Anglia, UK
- **Woods Hole Oceanographic Institution. Climate & Ocean.** <http://www.whoi.edu/main/climate-ocean> Abrupt Climate Change; Global Warming; Ice Ages & Past Climates, Sea Level Rises; Water Cycle

Government Agencies

- **NASA. Global Climate Change: Vital Signs of the Planet.** <http://climate.nasa.gov/> Key indicators, evidence, causes, effects, consensus, uncertainties. "Key Websites" (left column) provide useful links to overviews, news, science & research, and policy.
- **EPA. Climate Change.** <http://www.epa.gov/climatechange> EPA climate change information - climate change indicators, science (causes, indicators, future), greenhouse gas emissions, health and environmental effects, climate economics, regulatory initiatives for greenhouse gas emissions, U.S. climate policy, what you can do
- **EPA. Individual Greenhouse Gas Emissions Calculator** <http://www.epa.gov/climatechange/ghgemissions/individual.html> EPA's personal GHG emissions calculator provides a rough "ballpark" estimate of your personal or family's greenhouse gas emissions and explore the impact of taking various actions to reduce your emissions.
- **ORNL. Climate Change Science Institute at Oak Ridge National Laboratory** <http://climatechangescience.ornl.gov> ORNL is managed for the U.S Department of Energy by UT-Battelle, LLC.
- **Carbon Dioxide Information Analysis Center (CDIAC)**, Oak Ridge National Laboratory, DOE, Oak Ridge, Tennessee <http://cdiac.ornl.gov/>
- **Earth System Research Laboratory**, Global Monitoring Division (part of NOAA) <http://www.esrl.noaa.gov/gmd/ccgg/> - Division makes ongoing measurements, from land and sea. In particular, see "Trends in Carbon Dioxide" – weekly and monthly data from Mauna Loa.
- **Energy Information Administration (EIA)** <http://www.eia.gov/environment/>
- **U.S. Global Change Research Program.** <http://www.globalchange.gov/> The USGCRP is a Federal program that coordinates and integrates global change research across 13 government agencies to advance climate science and our understanding of how global change is impacting society, both today and into the future. Agencies include: USDA, DoD, Commerce (NOAA), DOE, EPA, NASA. The USGCRP is overseen by the White House Office of Science and Technology Policy (OSTP).

The U.S. Global Change Research Program (USGCRP) Online Resource Library

This links to:

Our Changing Planet : The U.S. Global Change Research Program for Fiscal Year 2013 – A Supplement to the President's Budget for Fiscal Year 2013

<http://downloads.globalchange.gov/ocp/ocp2013/ocp2013.pdf>

and, links to the : National Global Change Research Plan: 2012 to 2021 - A Strategic Plan for the U. S. Global Change Research Program (USGCRP).

<http://downloads.globalchange.gov/strategic-plan/2012/usgcrp-strategic-plan-2012.pdf>

- **Reduce Climate Change** <http://www.fueleconomy.gov/feg/climate.shtml> U.S. Department of Energy. Source for fuel economy information.
- **The White House. Climate Change** <http://www.whitehouse.gov/energy/climate-change>
- **Department of the Interior (U.S.). Climate Change.** Includes links to resources and DOI Regional Climate Science Centers <http://www.doi.gov/whatwedo/climate/index.cfm>
- **Conservation in a Changing Climate. U.S. Fish & Wildlife Service.** <http://www.fws.gov/home/climatechange/> Climate change and consequences for wildlife.
- **NOAA Research** <http://www.research.noaa.gov/climate>
- **National Climate Change & Wildlife Science Center (NCCWSC)** <https://nccwsc.usgs.gov/> NCCWSC and the eight Climate Science Centers (CSCs). Science - Data & Tools
- **Met Office Hadley Centre** <http://www.metoffice.gov.uk/climate-guide/science/science-behind-climate-change/hadley> Provides guidance on the science of climate change and is the primary focus in the UK for climate science. The Met Office is the UK's National Weather Service.

For Teachers and Students

- **Climate Literacy: The Essential Principles of Climate Science (2009)**, a resource for teachers, students, and community leaders to use as a topic for discussion within local communities, and as a guide for developing informal learning resources and science curriculum standards
<http://www.globalchange.gov/resources/educators/climate-literacy>
http://downloads.globalchange.gov/Literacy/climate_literacy_highres_english.pdf
The Essential Principles of Climate Science presents important information for individuals and communities to understand Earth's climate, impacts of climate change, and approaches for adapting and mitigating change. Principles in the guide can serve as discussion starters or launching points for scientific inquiry. The guide can also serve educators who teach climate science as part of their science curricula
- **Resources for Educators** - <http://www.globalchange.gov/resources/educators/toolkit>
Select “Climate Change Science” Zip file: The Carbon Cycle and its Role in Climate Change. 3 “Activity” sessions for Grades 5-8 ; each 45 minutes.
- **NASA - Climate Kids** <http://climatekids.nasa.gov/>
- **Global Climate Change for Educators. Tips and Tricks for Teachers**
<http://climate.nasa.gov/education/tips>
- **NASA. What Is Climate Change?**
<http://www.nasa.gov/audience/forstudents/k-4/stories/what-is-climate-change-k4.html#.UkjlWH9QD-K>
NASA "More About Climate Change" links: Climate Kids ; Climate Poem and Resources ;
[What Are Climate and Climate Change? Grades 5-8](#)
- **Science News for Kids** -- <http://www.sciencenewsforkids.org/>
Select “Earth & Sky” and then “Weather & Climate” – or, go to:
<http://www.sciencenewsforkids.org/category/earthsky/>
- **MetOffice**, the UK's National Weather Service. Learning – Education
<http://www.metoffice.gov.uk/learning>

Books

- ***Climate Change Science: A Modern Synthesis***. Vol. 1 – *The Physical Climate*. By G. Thomas Farmer and John Cook. Springer, 2013. 564 pages (194 illus., 133 in color). ISBN: 978-94-007-5756-1 (Print) – also available online via SpringerLink. Per Springer, this (text) book is “designed for an introductory science course”.
- ***Encyclopedia of Weather and Climate Change***. Berkeley, Calif. : University of California Press, 2010.
- ***Encyclopedia of Climate and Weather***. 2d. ed. New York : Oxford University Press, 2011.
- ***Encyclopedia of Weather and Climate***. Rev. ed. Facts on File, 2007.
- ***Encyclopedia of Global Warming and Climate Change***. 3 vols. SAGE, 2012.
- ***Encyclopedia of Global Warming Science and Technology***. Greenwood Press/ABC-CLIO, 2009.
- ***Encyclopedia of Global Warming***. Salem Press, 2010.
- ***Climate & Oceans*** [“derivative of *Encyclopedia of Ocean Sciences*” – 2nd ed., Academic Press, 2010.
- ***Climate Change: An Encyclopedia of Science and History***. 4 vols. Santa Barbara, Calif. : ABC-CLIO, 2013.

Graphics

- **Climate Change: What Causes it and How We Know** – by Jeremy G. Fyke [of Los Alamos National Laboratory]. Date: Oct. 4, 2012. From Association of Concrete Kiln Recyclers – Conference – Santa Fe, New Mexico. Bibliographic info.:
<http://www.osti.gov/scitech/biblio/1052816> - upper right, links to full text:
<http://permalink.lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-12-25256>
or: <http://www.osti.gov/scitech/servlets/purl/1052816>
[we used 2 slides - #47 and #48 - “What Forcings are Relevant Today?” – which shows Human CO₂ emissions are the only explanation left plus the next slide – re changes due to something else??]
- NASA – “**Here’s What “disagreement” looks like**” –
http://climate.nasa.gov/climate_resource_center/9 -- or, on Facebook: [go.nasa.gov/climate365](https://www.facebook.com/go.nasa.gov/climate365)
- NASA – Press release, 1/15/13 -- <http://www.nasa.gov/topics/earth/features/2012-temps.html> -- slide: “**Warmest Year on Record for the Continental U.S.**”
http://www.nasa.gov/pdf/719354main_NOAA%20NASA%20Climate%20Briefing.pdf – p.8 is a great chart/map/illustration:
- **Greenhouse Effect** – from: Frequently Asked Questions About Global Warming and Climate Change: Back to Basics (PDF, 8 pp, 1.6 MB, About PDF) p. 2 [issued by EPA - April 2009]
http://epa.gov/climatechange/Downloads/ghgemissions/Climate_Basics.pdf
- **How Do we Know?** – from: <http://climate.nasa.gov/evidence>
Per NOAA: This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO₂ has increased since the Industrial Revolution. (Source: NOAA)
- **Earth System Research Laboratory**, Global Monitoring Division (part of NOAA)
<http://www.esrl.noaa.gov/gmd/ccgg/trends/> -- Division makes ongoing measurements, from land and sea. In particular, see “Trends in Carbon Dioxide” – weekly/monthly data from Mauna Loa.
- **Carbon Dioxide Hits New High** [shows same graph as at the NOAA page; adds comment : “The last time carbon dioxide concentrations were this high...was in the Pliocene.” And, it shows an extinct mammal.
http://climate.nasa.gov/climate_resource_center/7
- **Global and Hemispheric Annual Temperature Anomalies, 1850-2012**
<http://cdiac.ornl.gov/trends/temp/jonescru/graphics/glnhsh.png>
- **Total U.S. Greenhouse Gas Emissions by Economic Sector in 2011** [pie chart]
U.S. Greenhouse Gas Emissions in 2011 [pie chart]
<http://www.epa.gov/climatechange/ghgemissions/sources.html>
- **2008 Global CO₂ Emissions from Fossil Fuel Combustion and some Industrial Processes** [pie chart]
<http://www.epa.gov/climatechange/ghgemissions/global.html>
- **CO₂ Emissions from Fuel Combustion, 2008** [pie chart showing U.S., China, India]
<http://www.inl.gov/portal-files/fuel-use.jpg> (link from Idaho National Laboratory newsroom
https://inlportal.inl.gov/portal/server.pt?open=514&objID=1269&mode=2&featurestory=DA_567068)

Selected Blogs

- **Real Climate** -- <http://www.realclimate.org/> “Climate Science from Climate Scientists” (winner of 2005 web award from “Scientific American”)
- **My big fat planet blog**, hosted by Dr. Amber Jenkins, editor of NASA's Climate Change website <http://climate.nasa.gov/blog/970>

For different points of view:

Search “climate uncertainty” as a keyword phrase.
Climate Audit (<http://climateaudit.org/>)

Key Words to Search

Climate change
Climatic changes
Global warming
Sea level
Global temperature changes
Greenhouse effect

Keeping Current

- **National Academy of Sciences** - <http://nas-sites.org/americasclimatechoices/subscribing/> - email list signup
- **The New York Times - Environment** section <http://www.nytimes.com/pages/science/earth/index.html> Links to “**Temperature Rising**” series ; “Greenhouse Gas Emissions” ; “Global Warming”
- **Science.gov** – sign up for Alerts (via email) – <http://www.science.gov/scigov/login.html>
- **NASA website for Climate Change** - <http://climate.nasa.gov>
- **NASA has a newsletter** (via email) register at: http://climate.nasa.gov/newsletter_signup
- **NOAA Portal** -- <http://www.climate.gov>
Includes useful Latest News updates, such as 2012 global temperatures are 10th highest on record; January [2013] global temperatures ninth highest on record; Climate change impacts to U.S. coasts threaten public health, safety and economy
- **USA Today** series – “**Weathering the Change**”: <http://climatechange.usatoday.com> – articles grouped by “Tech”; “Nation” ; “Politics” ; “Opinion”.
- **White House** website: <http://www.whitehouse.gov/energy/climate-change>

This bibliography of selected resources, compiled by Patricia Kenly and Bette Finn, accompanied the [presentation](#) – “Climate Change Essentials: Don’t Sweat the Research”. It is available on the Government Information Research Guide at <http://libguides.gatech.edu/government> - “Presentations” box.