**Climate Change Graphs**

This document provides original climate change graphs and planning worksheets to use when creating an illustrated graph. Each title contains a link to the original graph, where you can access the data and a short description.

Graphs contained in this document include:

I. Global Carbon Emissions from Fossil Fuels, 1900-2011

II. Atmospheric CO2 Levels: 2005-Present (direct measurement)

III. Atmospheric CO2 Levels During Last Three Glacial Cycles (indirect measurement)

IV. Global Land-Ocean Temperature Index

V. Average September Extent of Arctic Sea Ice, since 1979

VI. Antarctic Ice Mass Variation Since 2002

VII. Greenland Ice Mass Variation Since 2002

VIII. Sea Level Rise: 1993-Present (satellite data)

IX. Sea Level Rise: 1870-2000 (coastal tide gauge data)

X. Global Surface Temperature (top, blue) Vs. Sun's Energy Received

 at the Top of Earth's Atmosphere (red, bottom), From 1978 to 2009

**Brainstorming Sheet: Global Carbon Emissions from Fossil Fuels, 1900-2011**

Access original graph at <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>.



*Source: Boden, T.A., Marland, G., and Andres R.J. (2015). Global, Regional, and National Fossil-Fuel CO2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, doi 10.3334/CDIAC/00001\_V2015*

Spaces for thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable)

|  |  |  |
| --- | --- | --- |
| Global Carbon Emissions from Fossil-fuels 1900-2011(b).jpg | Global Carbon Emissions from Fossil-fuels 1900-2011(b).jpg |  |

**Graph Template**

*For use when creating full-scale illustrated graph. May be printed and traced or photocopied onto a transparency and cut out for use with watercolor paper, etc.*



**Brainstorming Sheet: Atmospheric CO2 Levels: 2005-Present (direct measurement)**

Access original graph at <http://climate.nasa.gov/vital-signs/carbon-dioxide/>.



Create thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable).

|  |  |  |
| --- | --- | --- |
| Carbon Dioxide Direct MeasurementsL 2005-Present(b).jpg | Carbon Dioxide Direct MeasurementsL 2005-Present(b).jpg |  |

**Graph Template**

*For use when creating full-scale illustrated graph. May be printed and traced or photocopied onto a transparency and cut out for use with watercolor paper, etc.*



**Brainstorming Sheet: Atmospheric CO2 Levels During Last Three Glacial Cycles (indirect measurement)**

Access original graph at <http://climate.nasa.gov/vital-signs/carbon-dioxide/>.



*Data source: Reconstruction from ice cores. Credit: NOAA*

Create thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable).

|  |  |  |
| --- | --- | --- |
| Atmospheric Carbon Dioxide- Proxy (Indirect) Measurements(b).jpg | Atmospheric Carbon Dioxide- Proxy (Indirect) Measurements(b).jpg |  |

**Graph Template**

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**Brainstorming Sheet: Global Land-Ocean Temperature Index**

Access original graph at <http://climate.nasa.gov/vital-signs/global-temperature/>.



 Data source: NASA's Goddard Institute for Space Studies (GISS). Credit: NASA/GISS

Create thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable).

|  |  |  |
| --- | --- | --- |
| GlobalTemp(a).png | GlobalTemp(a).png |  |

**Graph Template**

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**Brainstorming Sheet: Average September Extent of Arctic Sea Ice**

Access original graph at <http://climate.nasa.gov/vital-signs/arctic-sea-ice/>.



Data Source: Satellite Observations. Credit: NSIDC

Create thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable).

|  |  |  |
| --- | --- | --- |
| SeaIce.jpg | SeaIce.jpg |  |

**Graph Template**

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**Brainstorming Sheet: Antarctica Ice Mass Variation, since 2002**

Access original graph at <http://climate.nasa.gov/vital-signs/land-ice/>.



Data source: Ice mass measurement by NASA’s GRACE satellites. Credit: NASA

Create thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable).

|  |  |  |
| --- | --- | --- |
| AntarcticIceMass.jpg | AntarcticIceMass.jpg |  |

**Graph Template**

*For use when creating full-scale illustrated graph. May be printed and traced or photocopied onto a transparency and cut out for use with watercolor paper, etc.*



**Brainstorming Sheet: Greenland Ice Mass Variation Since 2002**

Access original graph at <http://climate.nasa.gov/vital-signs/land-ice/>.



Data source: Ice mass measurement by NASA’s GRACE satellites. Credit: NASA

Create thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable).

|  |  |  |
| --- | --- | --- |
| Greenland Ice Mass Variations(b).jpg | Greenland Ice Mass Variations(b).jpg |  |

**Graph Template**

*For use when creating full-scale illustrated graph. May be printed and traced or photocopied onto a transparency and cut out for use with watercolor paper, etc.*



**Brainstorming Sheet: Sea Level Rise Satellite Data (1993-Present)**

Access original graph at <http://climate.nasa.gov/vital-signs/sea-level/>.



Data source: Satellite sea level observations. Credit: NASA Goddard Space Flight Center

Create thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable).

|  |  |  |
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| SeaLevel(b).jpg | SeaLevel(b).jpg |  |

**Graph Template**

*For use when creating full-scale illustrated graph. May be printed and traced or photocopied onto a transparency and cut out for use with watercolor paper, etc.*



**Brainstorming Sheet: Sea Level Rise Ground Data (1870-2000)**

Access original graph at <http://climate.nasa.gov/vital-signs/sea-level/>.



Data source: Coastal tide gauge records. Credit: [CSIRO](http://www.cmar.csiro.au/)

Create thumbnail sketches of ideas for final illustrated graph (blank box for creative positioning/use of graph, if applicable).

|  |  |  |
| --- | --- | --- |
| SeaLevelCoast(b).jpg | SeaLevelCoast(b).jpg |  |

**Graph Template**

*For use when creating full-scale illustrated graph. May be printed and traced or photocopied onto a transparency and cut out for use with watercolor paper, etc.*



**Brainstorming Sheet: Global surface temperature vs. sun's energy received at the top of Earth's atmosphere, from 1978 to 2009**

Access original graph at <http://climate.nasa.gov/faq/>, under the question “Is the sun causing global warming?”.

Create thumbnail sketches of ideas for final illustrated graph. Use detailed, jagged curve(s) or simplify and just use best-fit curve(s).

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**Graph Template**

*For use when creating full-scale illustrated graph. May be printed and traced or photocopied onto a transparency and cut out for use with watercolor paper, etc.*

