What is Climate Change?

Climate change is a change in global or regional climate patterns.

Climate scientists study weather conditions over the long-term to find patterns, see if those patterns are changing, and project how the patterns might change in the future.

For instance, we can look at a regional history of high temperatures in the summer to estimate how hot it will be next summer. If the pattern of high temperatures changes—perhaps unusually hot summer nights are becoming more common—this trend indicates the summer temperature in that region might be increasing.

Not too long ago (on Earth's timescale anyway—a mere 55 million years ago), the planet was having a *long* heat wave. It was so warm for so long, there were palm trees growing in the Arctic. Climate scientists want to know: what caused this heat wave? Why did the heat wave end? Will there be another one? Are humans having an impact on how soon that might happen?
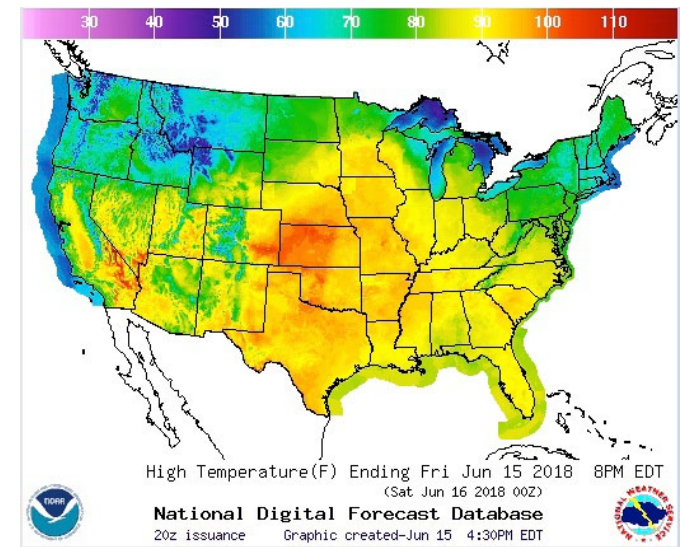
Climate scientists strive to answer that question by looking at data from the past (ice cores, lake sediments, leaf fossils, and more) and they project future trends based on current observations.

How do data visualizations help?

Data visualizations are representations of data in pictorial or graphical format. Sometimes we draw a simple line graph, like this graph of global surface temperature; sometimes we use maps, like the high temperature map for the United States for June 15, 2018. Other types of visualization include bar graphs, scatter plots, pie charts, bubble charts, heatmaps, treemaps, cloropleth maps, sankey diagrams, and more. Even art can visualize data.

Visualizations help because they convey a lot of information quickly, and can expose patterns that aren't always visible in raw data sets, which are typically tables of numbers. If you want to know which area of the United States is warmest on June 15, 2018 using the raw data, you'd have to do a painstaking review of the recorded high temperatures and compare them all. However, if you look at a high temperature map visualization you can quickly see that the warmest temperatures are in the southwest region (California and Nevada), and in the midwest (Kansas, Oklahoma, and Colorado).

High temperature map

High Temperature(F) Ending Fri Jun 15 2018 8PM EDT
(Sat Jun 16 2018 00Z)
National Digital Forecast Database
20z issuance   Graphic created—Jun 15 4:30PM EDT

Global surface temperature

Data source: NASA's Goddard Institute for Space Studies (GISS). Credit: NASA/GISS
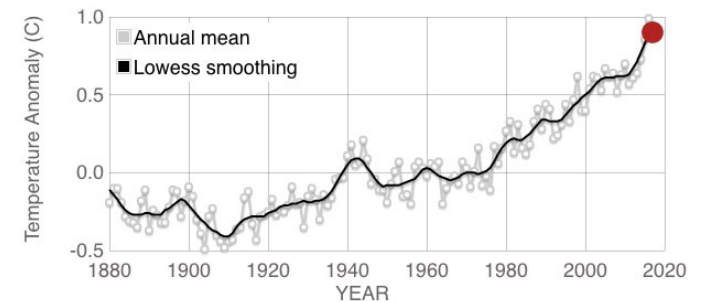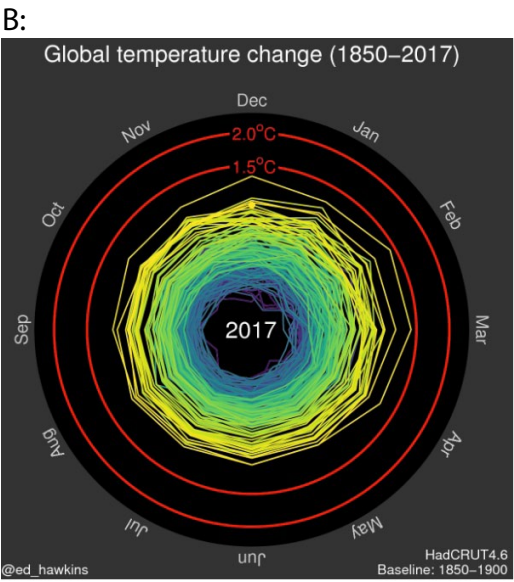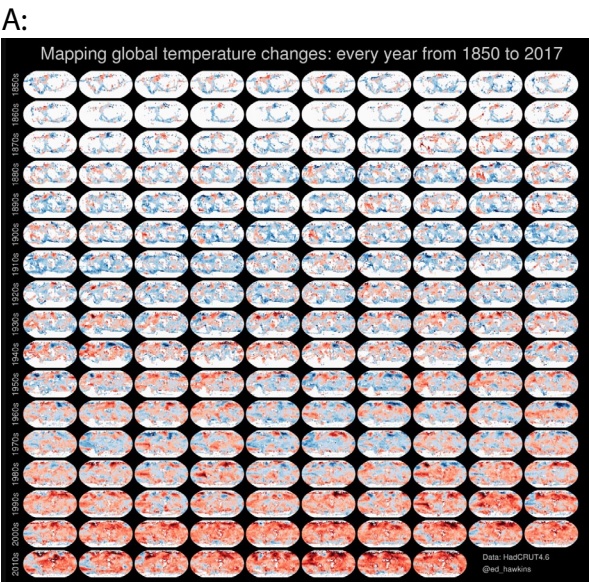
Do the Work: Explore Visualizations of Climate Change Data

Each of the visualizations below depicts the change in annual global temperatures from 1850 or 1880 to 2017. While the visualizations depict essentially the same data, each does so in a different way, using a different visualization technique. Review the visualizations below and consider the following questions:
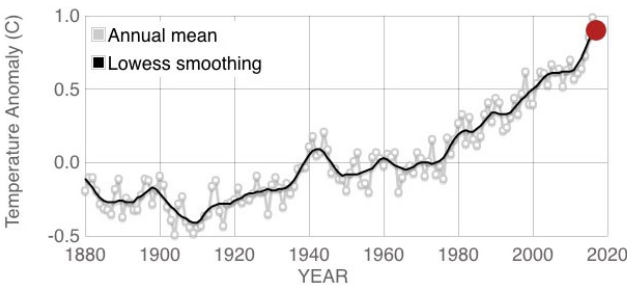
Circle your answer

Which visualization catches your eye first?	A	B	C	D
Which visualization best conveys the information that the global temperature is warming?	A	B	C	D
Which makes the most effective use of color?	A	B	C	D

C:

Line graph by NASA

A:

Small multiples map chart by Ed Hawkins

B:

Spiral animation by Ed Hawkins

D:

Color band chart by Ed Hawkins