Global Warming: How Hot Is It Really?

IST 722 - Andrew Zelazny
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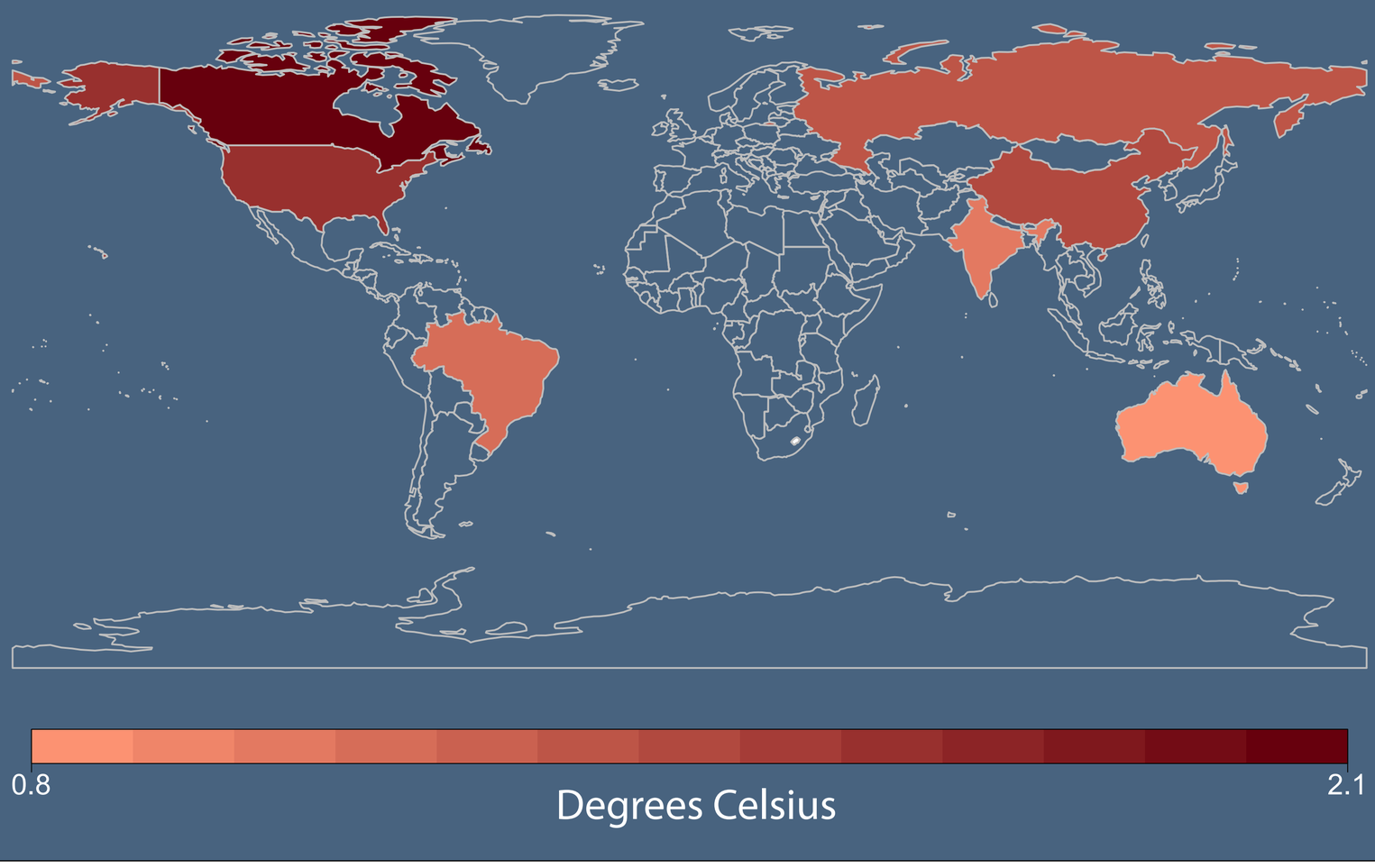
We've all heard about global warming and climate change, how they're going to change the face of the planet we live on and impact all of our lives. But how hot is it really getting?

Since 1855, global surface temperatures have increased between 1 and 2 degrees Celsius in major countries across the world.

Hey, 2 degrees doesn't seem like much, temperatures vary by more than that in a single day?

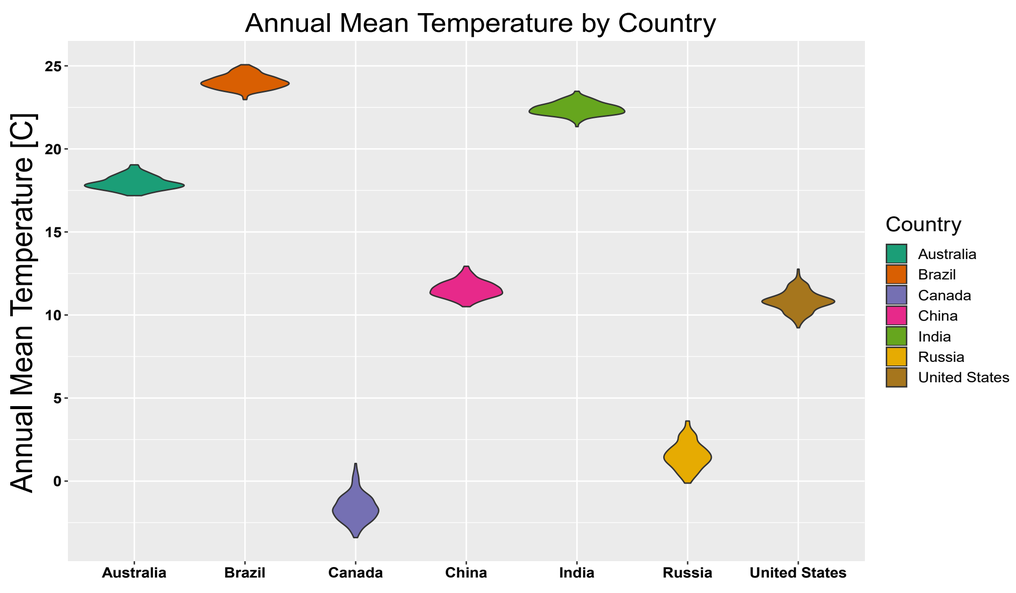
And how do we know the changes we are seeing now aren't part of the natural cycles on Earth?

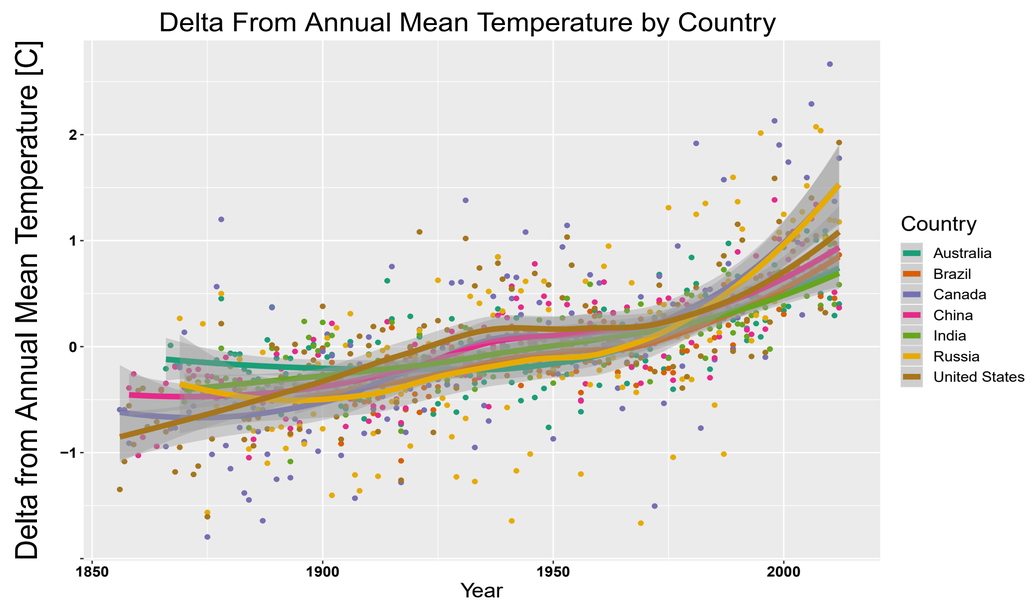
Average Change in Temperature Since 1855



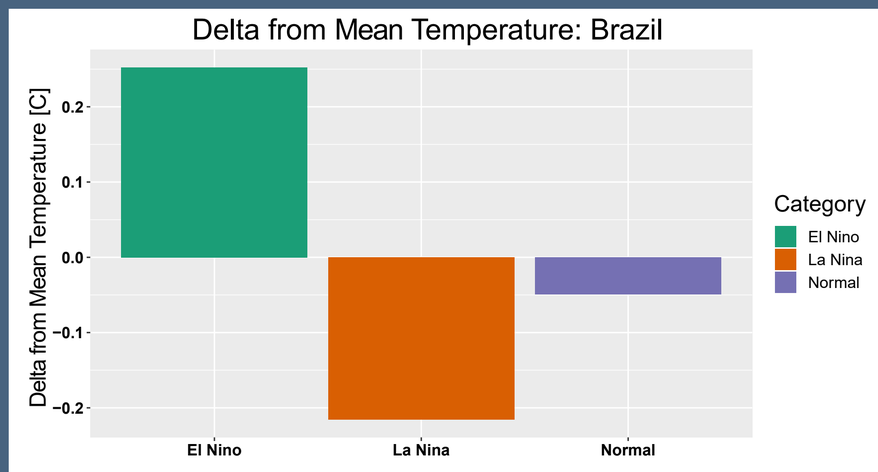
Countries all across the world vary in temperature, from tropical countries like Brazil, to temparate places like the United States, or even the far North in Canada and Russia.

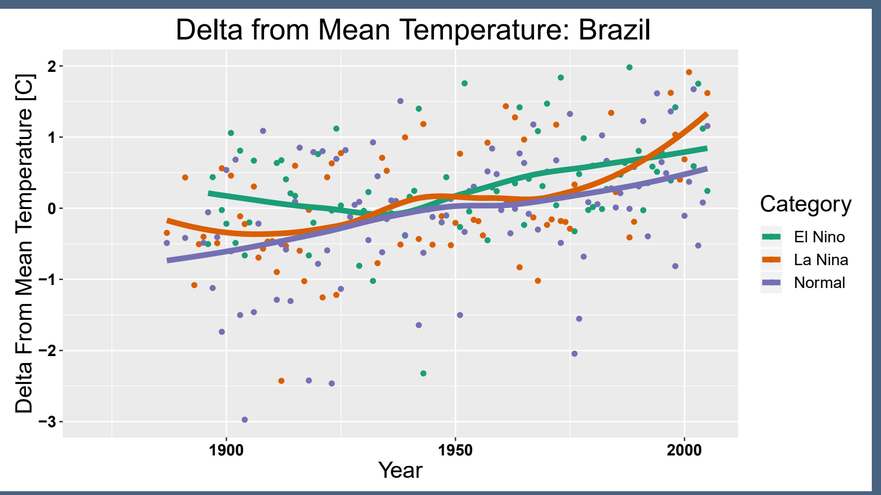
But when temperatures are normalized, we see that there is a common trend among ALL countries of an increase in temperatures, on the order of 1 to 2 degrees Celsius.





The El Nino/La Nina phenomenon is the result of a cycle in the oceanic and atmospheric conditions in the Pacific that can have far reaching impact on the global climate. Even in Brazil which doesn't border the Pacific Ocean, El Nino drives warmer than average temperatures, while La Nina drives them lower than average. However, the long term trend shows that temperatures in both El Nino and La Nina years increasing over time.





Data Sources:

https://www.kaggle.com/berkeleyearth/climate-change-earth-surface-temperature-data
- Global surface temperature data. 645,676 total points, time series data for 241 states across 7 countries, most data from 1855 onward

https://www.esrl.noaa.gov/psd/enso/mei.ext/table.ext.html
- Normalized scores for El Nino and La Nina cycle impacts on global climate, mapped by year and month from 1871 to 2005

Plots generated in R Studio, using ggplot2, lubridate, zoo, tidyverse, rworldmap, RColorBrewer, and plotrix. Poster created in Adobe Illustrator 2019.