Ocean Temperatures

Measurement

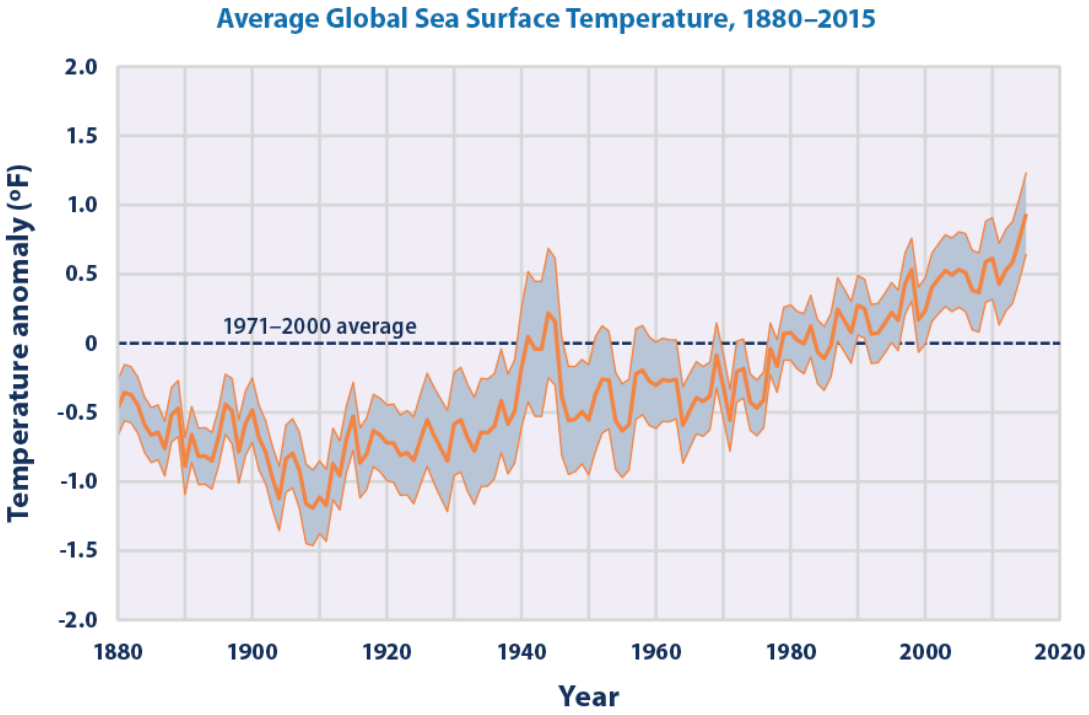
- Sea Surface Temperature (SST) is the temperature of sea water at the surface.
- In the 1880s, SST was collected by lowering a canvas or wooden bucket from a ship, which meant the water was significantly cooled by the time the thermometer took the measurement. Modern data is collected through a mixture of buoys, engine inlets, hull sensors, and insulated buckets. A physical-empirical method has been used to adjust measurements collected before 1940 to compensate for the differences in technology (Trenberth).

Climate Change

- SST has increased an average of 0.13°F per decade from 1901 through 2015 (US EPA).
- Generally, SST has been higher in the past three decades than at any other time in the data collection. (US EPA).
- As demonstrated in Figure 2, ocean warming is prevalent at all latitudes and oceans, although some regions such as the North Atlantic have experienced cooling.

Impacts

- Marine ecosystems:
  Changes in ocean temperatures can affect marine ecosystems by threatening biodiversity, such as coral and algae, and reducing nutrient circulation. Coral reefs have been particularly impacted, as well as fish supply (US EPA).
- Global Climate:
  Increases in SST have caused an increase in atmospheric water vapor, thereby increasing the risk of heavy rain and snow. SST can also impact weather patterns, leading to drought and natural disasters ("Executive Summary - AR4 WGI Chapter 3: Observations: Surface and Atmospheric Climate Change").



Data source: NOAA (National Oceanic and Atmospheric Administration). 2016. Extended reconstructed sea surface temperature (ERSST.v4). National Centers for Environmental Information. Accessed March 2016. www.ncdc.noaa.gov/data-access/marineocean-data/extended-reconstructed-sea-surface-temperature-ersst.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

Figure 1: Average Global Sea Surface Temperature, 1880-2015 (US EPA)

"The shaded band shows the range of uncertainty in the data, based on the number of measurements collected and the precision of the methods used" (US EPA)

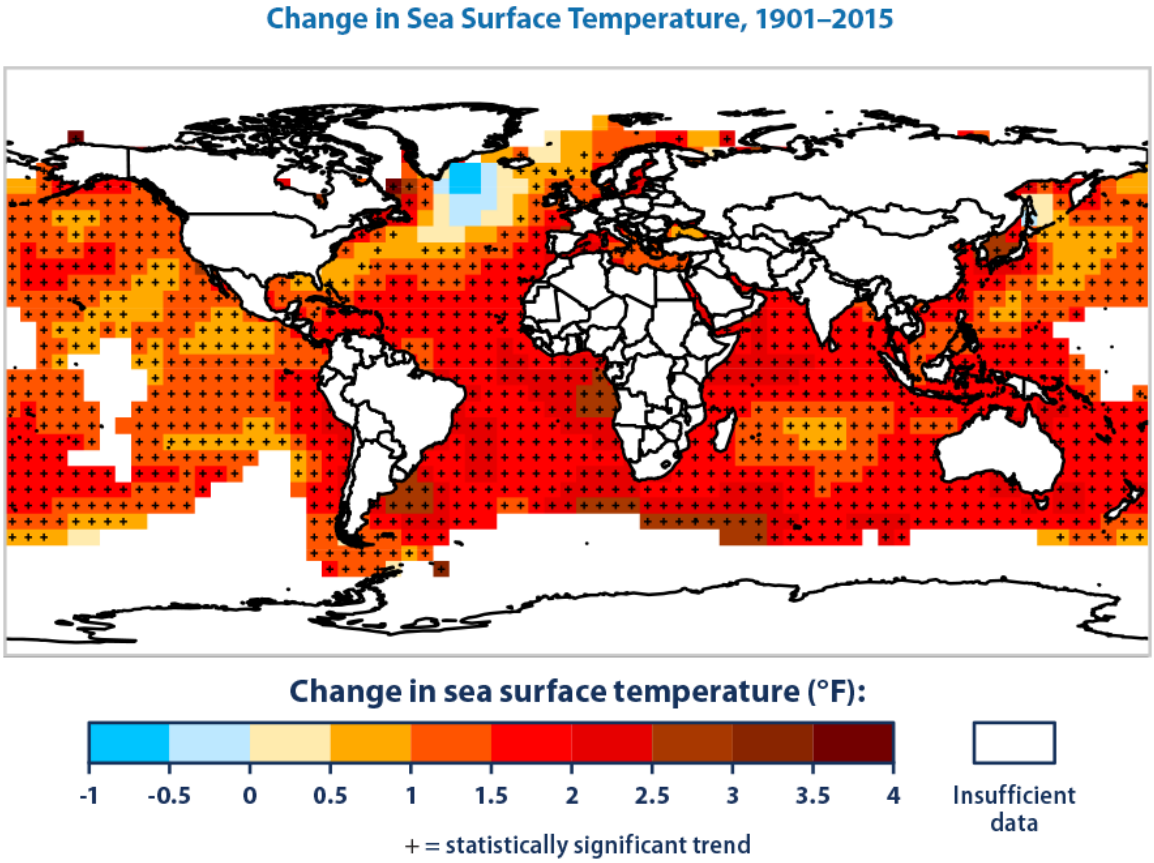


Figure 2: Change in Sea Surface Temperature 1901-2015 (US EPA)

Works Cited

"Executive Summary - AR4 WGI Chapter 3: Observations: Surface and Atmospheric Climate Change." N.p., n.d. Web. 4 Feb. 2017.

Trenberth, K.E., P.D. Jones, P. Ambenje, R. Bojariu, D. Easterling, A. Klein Tank, D. Parker, F. Rahimzadeh, J.A. Renwick, M. Rusticucci, B. Soden and P. Zhai, 2007: Observations: Surface and Atmospheric Climate Change. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

US EPA, OA. "Climate Change Indicators: Sea Surface Temperature." Reports and Assessments. N.p., n.d. Web. 4 Feb. 2017.