ARCTIC SEA ICE CHANGE
1953 - 2021

INTRODUCTION / BACKGROUND

Much has been written about the loss of arctic sea ice. Pictures of pitiful polar bears, wasting away, shocking videos of glaciers being replaced with rocky terrain and ice shelves breaking off and falling into the ocean where they bob along like misplaced, misshapen ice cubes.

Are the losses significant? When we view these images, are we being manipulated into thinking that the loss of arctic ice is a harbinger of coming doom? The numbers tossed around are large, but what do they really mean? After all, the extent of arctic ice is measured in millions of square kilometers!

To examine the losses, we are going to use data collected over a long period of time by scientists using several different methods of measurement. Most of the data that you will use has been measured by examination of monthly (or more often) satellite images. These images have been compiled into yearly averages to account for the fact that, just like more southern latitudes, there is seasonal variation in the amount of ice cover. It's hard to imagine that the Arctic has a summer, but that is, in fact, the case.

Rather than examine the extent of ice using very large numbers, scientists often use a calculation they call standardized anomaly. To calculate the standardized anomaly in this data set, a yearly average was calculated for the period of 1981-2010. This cumulative average was subtracted from the yearly ice extent average for each calendar year. That value was then divided by the standard deviation obtained by the cumulative average. The data effectively show the yearly average of how many standard deviations (above or below) the ice extent is from the baseline calculation.

DIRECTIONS

Open the data files and use Excel or Google Sheets to format and analyze the yearly mean arctic ice anomaly data. You will want to evaluate the information to see how the extent of Arctic sea ice has changed over many years. You should graph the data, generate a trendline (exponential, linear, other) by determining with your data partners which representation is most appropriate. Be able to justify your choice. Include the equation of the trendline and its r^2 value. Establish a growth rate (positive or negative) using rolling data approximations. You may choose to add error bars to the data representation if it lends more confidence to your findings.

Be sure to keep track of any "noticings." What do you notice as you examine the data? What is significant to you? Is the trendline predictive of the future? Why or why not? Are you confident that the data represents what is really happening? Are there data that you would like to see?

Prepare a poster that includes an appropriate title for your data analysis, a representation of your data with its trendline, a claim about the trend that you discover, based in evidence. Your group should be able to justify the insights from your analysis. You may be asked to share your ideas with the larger KAMSC student group, so do your best!

REFERENCES:

Meier, W.N., Stroeve, J., Barrett, A., Fetterer, F., A simple approach to providing a more consistent Arctic sea ice extent time series from the 1950s to the present. The Cryosphere, 6, 1359-1368, doi:10.5194/tc-6-1359-2013. 2012.

http://www.the-cryosphere.net/6/1359/2012/

http://nsidc.org/cryosphere/sotc/sea_ice.html

https://nsidc.org/arcticseaicenews/2017/07/ Data beyond July, 2017 was compiled from monthly archives of the National Snow and Ice Data Center (NSIDC). Missing data reflects variation in reporting monthly statistics.