

The Correlation between Surface Temperature and Sea Ice Thickness

Jordan, Ashley

Owen, Austin

For some time now, it has been known that the ice caps on earth have been melting at unprecedented rates. This can affect the energy in the earth's system and be potentially harmful to wildlife, as well as to humans, and cultures that are centered around the ice. This project was conducted to determine a more efficient and inexpensive way of surveying how much ice is left in the Polar Regions. Using data collected by a research team that went to Barrow, Alaska, this project is trying to find a correlation between the surface temperature of the ice and ice thickness. Because heat takes a greater time to travel through a thicker substance, we hypothesized that the thinner the ice, the warmer the surface would be. To analyze the resistivity, drilling and thermal data from Barrow, this project was split into two components. Data was analyzed in Excel and was then entered, along with drilling, data in JMP Student Edition and tested for a linear correlation. This yielded the ability to find an equation that would estimate the depth solely based off of the infrared temperature, the equation found is $\text{Depth} = 2.7563469 - (0.1512419 * \text{Temperature})$. Graphs were produced that plotted temperature over a distance and drill depths over a distance that can be compared with and resistivity data, which provides a fairly reliable graph of thickness over a distance, from the same survey line. The graphs were compared to find a visible trend in the way they dip and peak implying a correlation. The statistical results can be used to quickly determine the approximate ice thickness in any area. Further studies, and improved methods of data collection, are needed to improve the correlation between the two variables being tested, and eliminate the impact of external influence of the data.