Climate and global warming: Student worksheet

How has the average global temperature changed since 1950?

In this investigation you will look at real statistics about global average temperatures.

Open the spreadsheet *NMD_secondary_climate_temperatures.xls*.

The table on the left shows the average global temperature measurements for each year from 1950 to 2012, the most recently available. The large graph presents these as a line graph. How has the average global temperature changed since 1950?

The smaller graph shows the changes since 1880. How has the average global temperature changed since 1880?

What is the average rate of change of the mean global temperature?

The large graph has a black line drawn on it, called a 'trend line' or 'linear regression line' or 'line of best fit'. It has been calculated to show the line that most closely fits the trend by removing all the variability.

To find the equation for this line, use the two yellow cells. The top one gives the starting value. Make sure it shows the temperature for 1950.The other gives the rate of change for each year.

Change the rate until the red line fits over the black line.

1950 temperature _____   Steady increase each year _____

What is likely to be the global temperature in the future if this historical rate does not change?

Use the equation of the line to work out what the average global temperature would be in the years 2050, 2100, 2150 and 2200 if the rate continued. Type your answers into the yellow cells across the top. These cells will turn green when the answer is correct.

How can a few degrees increase in temperatures increase 'extreme weather events'?

Many people think that a few degrees change will make little difference to them.

Open the spreadsheet *NMD_secondary_climate_globalwarming.xls*.

The explanation should open first. This shows global weather as it is – normally distributed. Cold temperatures are on the left and hot ones on the right. There are two graphs, one for our previous climate and one for the new climate, which is the old graph moved to the right.

There will be much less cold weather and much more hot weather. Extremely hot weather events will increase, leading to cyclones, hurricanes, tornadoes and droughts. This is shown by the increase in the area under the graph.

Use the tab at the bottom of the screen to open the exploration.

This is the same graph, but now it can be changed. The area under the curves shows the probability of an event of that type occurring. So 'average' events are most likely and extremes (cold or hot) are much less likely.

Make the red mean bigger than the blue mean. You could use the global means that you predicted on the earlier spreadsheet.

There is a black vertical line. You can shift this right or left using the number in 'value'.

It will show the probability of the temperature being hotter than 'value' in the previous climate using the area under the blue graph, and the same for the red graph.

The ratio shows how many times greater the red area is than the blue area.

Explore this. Also explore the effect of changing the spread (the standard deviation).

Can you draw any conclusions?