Comparing Microclimates

Using IoT@School technology it is possible to compare microclimates across a school campus and to make comparisons with different parts of the world. In this introductory activity, weather stations and sensors are used to compare the microclimates.

Intentions

Decide on a definition of microclimate and the factors that could affect microclimate.
Develop a strategy for analyzing complex graphs by breaking the task down into simple steps.
Explore the relationship between different variables.
Look for patterns and differences in data collected from different locations

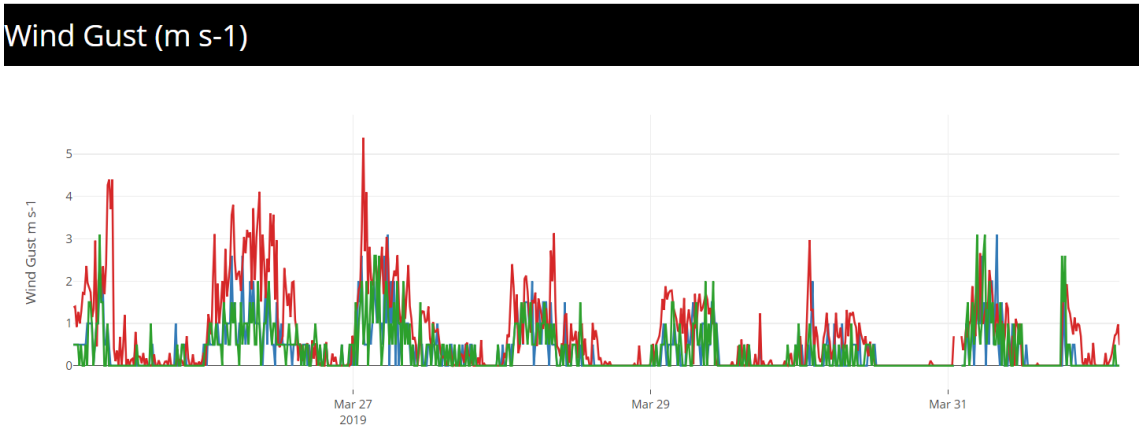
Preparation

Data should be collected for a period of 7 days at 2 or 3 different locations. Record the location, either in writing, on a plan or by taking a photograph if the location is local to you. One location could be surrounded by vegetation, as in a garden or border, another may be a built up area such as near a car park or path.

Collecting the data set

Data can be collected from the IoT@School Exploratory which can be found at the following URL https://exploratory.sciencescope.uk/exploratory/.
There are a wide range of devices collecting data from location around the world that can be utilized for this investigation. Always select similar devices and sensors for comparison to ensure the results are as clear as possible.

Example data can be found at the following URL link; https://bit.ly/31ufrED.
This data selection includes 3 weather stations located on a teacher training campus in Singapore.



Learning activities to analyse data from a single site

The following scientific analysis activities with pupils would be useful:

1. Pupils **describe** the pattern of temperature change over a 24 hour period, looking at the data from just one sensor, to ensure that pupils know how to use the graphs to identify patterns and trends.
2. Pupils then **explain** the patterns detected, within the same 24 hour period of the graph from the same sensor.
3. Increase the complexity of the task by comparing the pattern shown by each of the sensors over the same 24 hour period. Pupils should be able to link the patterns in data from different sensors, and explain how changing one variable is likely to influence other variables.
4. Then analyse the pattern over other days in the data collection period to find out if the same patterns existed on each day.
5. Explain the Stats tab on the data set, particularly the values for 'mean', 'minimum' and 'maximum'. Use this data plus data from the graphs to summarise 'normal' conditions in this microclimate.

Taking it further

1) Discuss what is meant by microclimate and decide on a definition for your school. It could be just a 1m2 area of the school grounds, or it could be the entire area around a city. You may decide to use 'microclimate' to mean different areas in the school grounds for this activity, but later to include a much larger area so you could compare the microclimate of different schools in Singapore, or the microclimate of Singapore with that of a city in UK.

2) This detailed analysis of a small amount of data should then allow pupils to make a comparison with the data collected in the other location. They should identify differences and similarities in the two sites and suggest possible reasons for any differences.

3) You may also want pupils to explore the relationship between humidity and temperature data. This can be done using the using the plot tools and adding a 2nd axis. Changes in the humidity levels within a microclimate are probably caused by temperature changes rather than changes in weather patterns.

4) By comparing the two sites you have sampled, pupils can be encouraged to suggest other sites to compare. They should be encouraged to predict differences between sites, and to plan how they would collect sufficient accurate data to provide evidence.