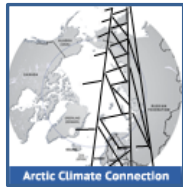


# Research Group A: AIR TEMPERATURE (EUREKA, Canada / year: 2010)

Temperature, daily average, Celsius





# Research Group A: AIR TEMPERATURE (EUREKA, Canada / year: 2010)

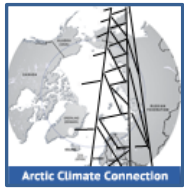
## About the data:

Air temperature varies throughout the day in response to direct solar heating and from day to day as weather systems move around the globe. Average air temperature also changes with the seasons. Scientists want to know both the extremes of temperature and the average temperature for some periods ranging from 24 hours to a month, a year, or longer.

The Eureka project measured air temperature at 2, 6, and 10 meters above the ground surface. This data is from 2 meters above the ground surface.

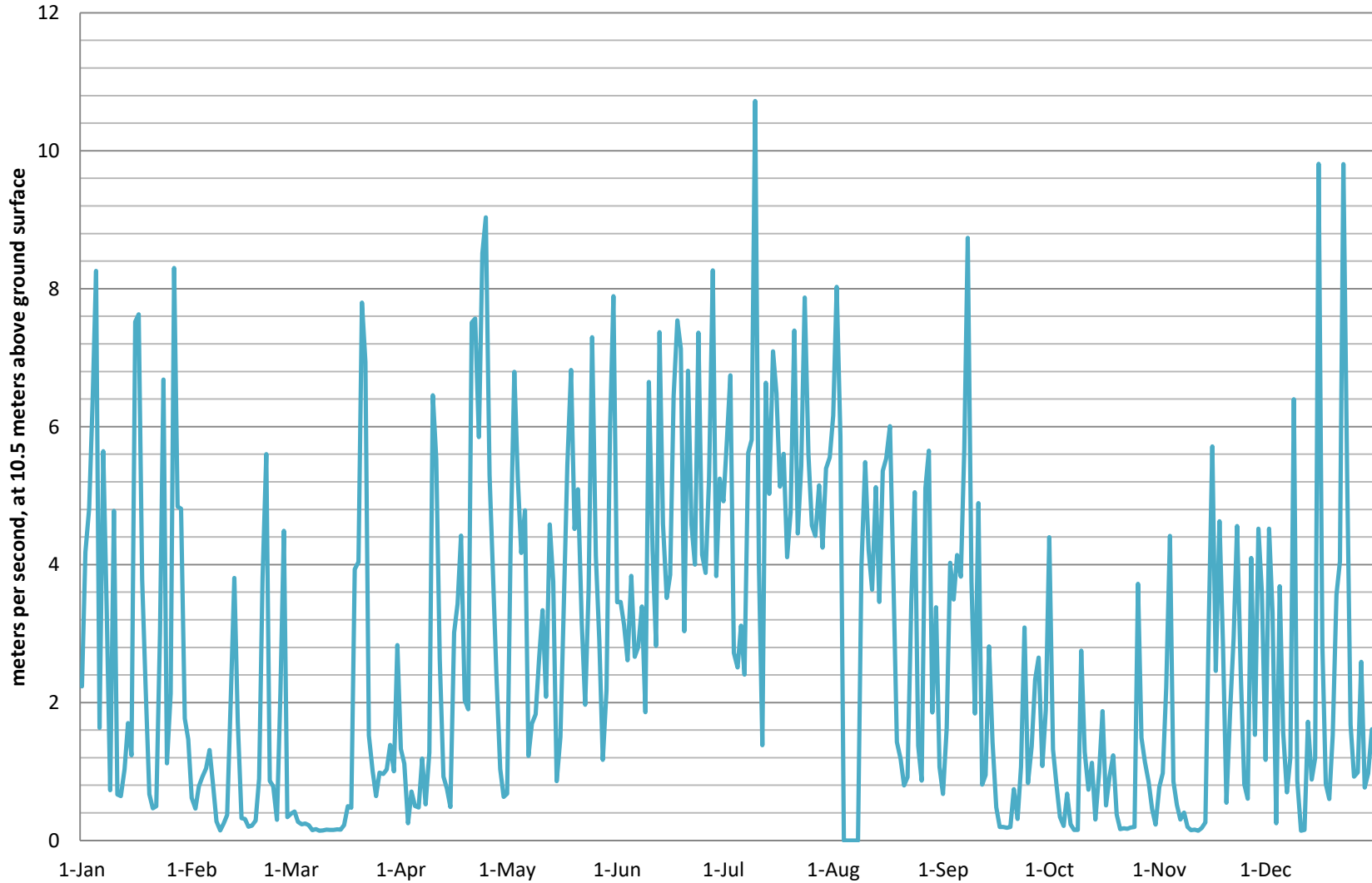
**Analysis tip:** This data is the *average daily temperature* from readings taken every minute and then averaged together to give one reading for the day. This means that the high temperature for the day was warmer than this value, and the low temperature was colder than this value.

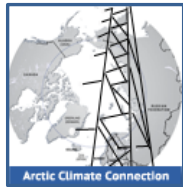
Note that there was a period from August 4-8 when data was not collected. This is shown as a gap on the line on the graph.



# Research Group B: WIND SPEED (EUREKA, Canada / year: 2010)

Wind Speed, daily average, m/sec





# Research Group B: WIND SPEED (EUREKA, Canada / year: 2010)

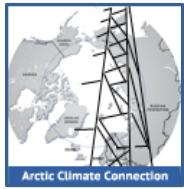
## About the data:

Winds are a result of uneven heating of Earth's atmosphere. Winds can accompany weather fronts and storms, or they can be steady throughout a number of days.

The Eureka project measured wind speed at a height of 10.5 meters above the ground surface. Wind direction was also measured but is not included here, just to keep things simple.

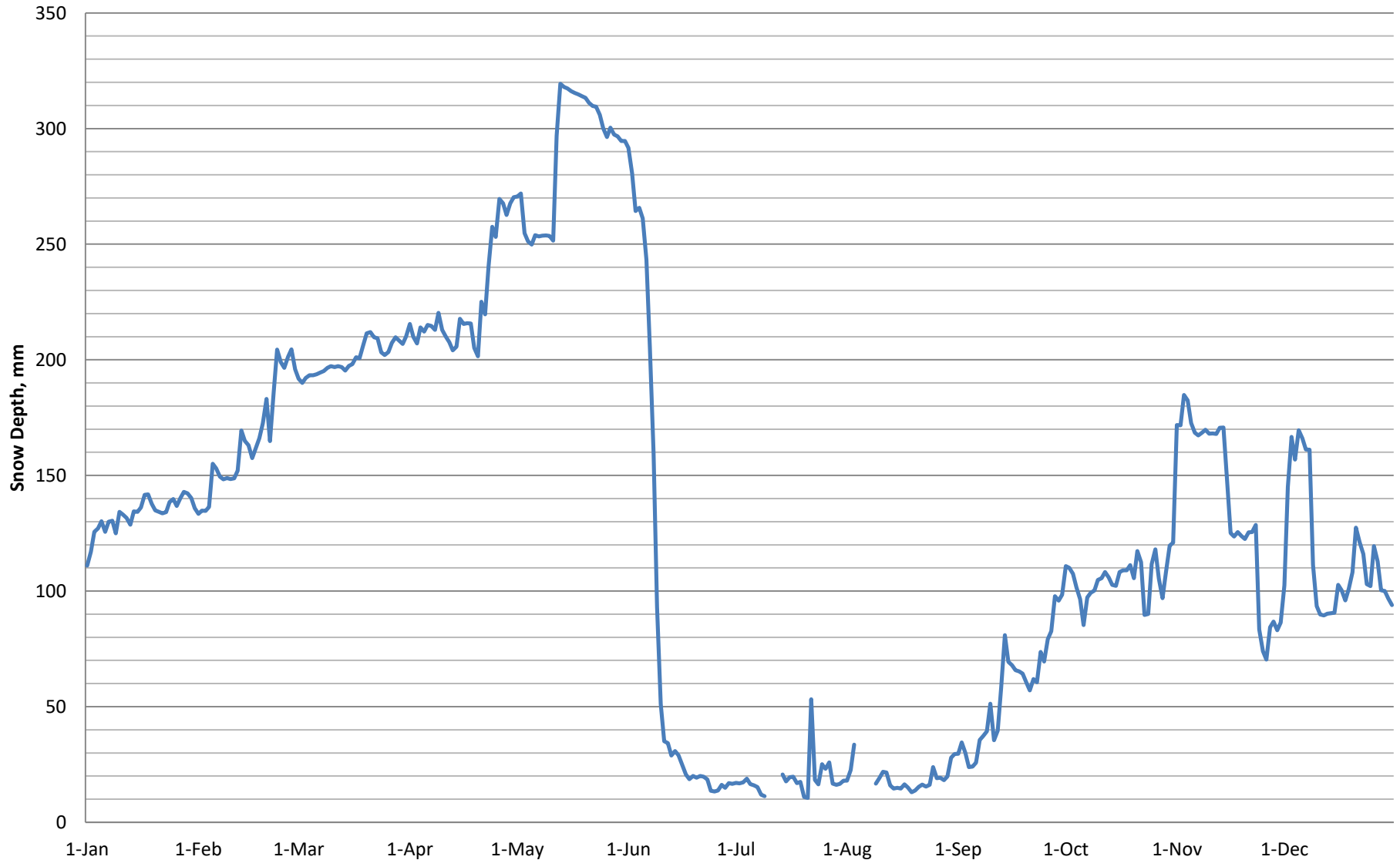
**Analysis tip:** This data is the ***average daily wind speed*** from readings taken every minute and then averaged together to give one reading for the day. This means that the highest wind speed for the day was greater than this value, and the lowest wind speed was lower than this value.

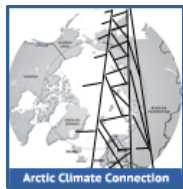
Note that there was a period from August 4-8 when data was not collected. This is shown as a gap on the line on the graph.



# Research Group C: SNOW DEPTH (EUREKA, Canada / year: 2010)

Snow Depth, mm





# Research Group C: SNOW DEPTH (EUREKA, Canada / year: 2010)

## About the data:

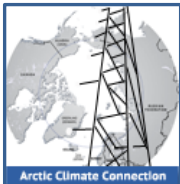
Snowfall and snow depth may vary significantly over distances less than 10 km. In order to understand the local, regional, and global weather patterns, scientists must know how much precipitation falls at many different locations around the world. Topography, winds and other local effects can create large differences in snow depth.

**Analysis tip:** This data is the *average daily snow depth* from readings taken every minute and then averaged together to give one reading for the day.

Note that there was a period from July 10-13 and August 4-8 when data was not collected. These are shown as a gaps on the line on the graph.

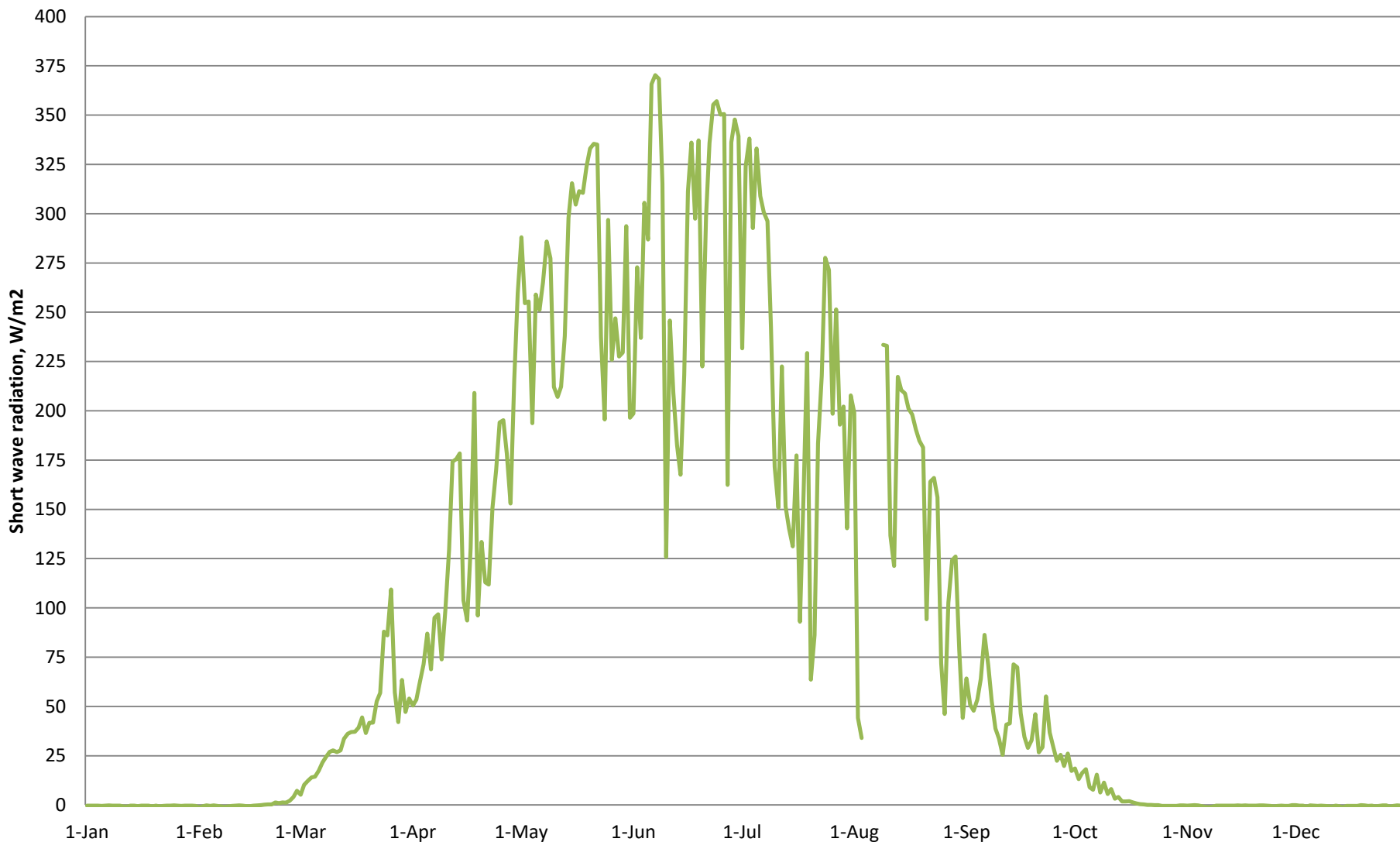
This dataset has an error in it, which is a normal part of scientific data collection. During the summer months, you can see that the snow depth never goes all the way down to zero. This is partly because of the way the instrument detects snow (by sending sound waves from the tower down to the ground and measuring the response time) and partly because the instrument experienced “drift” where the instrument loses accuracy over time. The instrument was re-calibrated in August. Corrections for these kinds of calibration drifts are often necessary, and this is a good example of real-world decisions scientists have to make when looking at data.

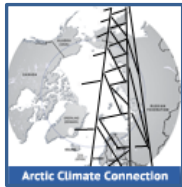
There is a spike of snow depth in late July. To confirm if this is real, other factors need to be considered. In Activity 3, you will look at albedo along with snow depth. But to keep things simple for now, we can safely say that there are no other indications that it snowed in July. Given all of that, question 6 on the worksheet asks you to estimate the snow-free season in Eureka in 2010.



# Research Group D: INCOMING SHORTWAVE RADIATION (EUREKA, Canada / year: 2010)

## Incoming Short-wave Radiation, W/m<sup>2</sup>





# Research Group D: INCOMING SHORTWAVE RADIATION (EUREKA, Canada / year: 2010)

## About the data:

Energy from the Sun reaches Earth as visible light and ultraviolet radiation. These electromagnetic waves have a short wavelength. Some of this inbound energy is reflected or absorbed by the atmosphere and some makes it all the way to Earth's surface. The amount of incoming solar energy varies by:

Season - Due to the tilt of Earth's axis, more solar energy falls on parts of the Earth that are tilted toward the Sun (this is the definition of summer).

Latitude - More solar energy reaches tropical latitudes compared to the poles.

Weather - Clouds tend to reflect the incoming radiation so that less of it reaches the ground.

Time of day - Solar radiation only hits parts of the Earth that are facing the Sun. Thus, there is no incoming shortwave radiation at night, while that part of the Earth is facing away from the Sun.

Once shortwave radiation hits the surface of the Earth, some of it bounces off, and some of it gets absorbed by the surface of Earth, which warms the surface. Energy in the form of longwave radiation is then re-emitted from the warmed surface. The Earth then radiates much of this longwave radiation back out to space. (Incidentally, the ability of the atmosphere to capture and retain some of this longwave radiation is called the *Greenhouse Effect*.)

**Analysis tip:** This data is the ***average daily incoming shortwave radiation*** from readings taken every minute and then averaged together to give one reading for the day. This means that the highest incoming solar energy for the day was greater than this value, and the lowest incoming solar energy was lower than this value. This graph is for data collected in 2010.

There was a period from August 4-8 when data was not collected. This is shown as a gap in the line on the graph.