

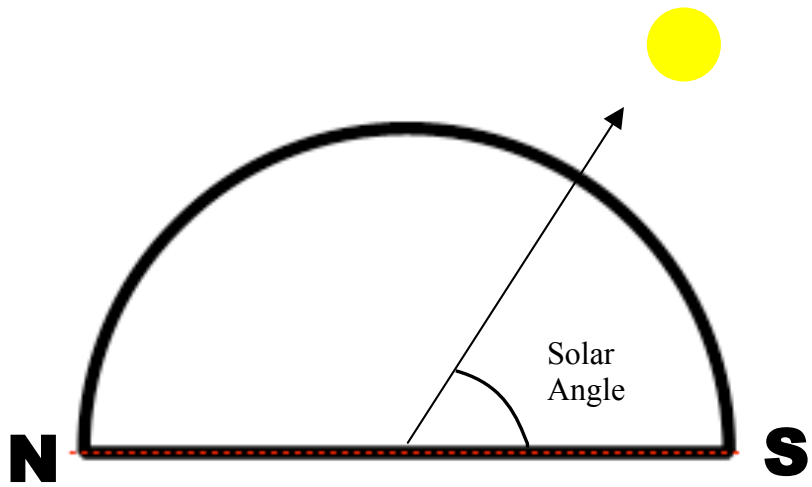
Radiation, Temperature, and Seasons



Part 1: How does the angle of the sun affect the amount of radiation the Earth receives?

To explore the concept of sun angle and seasons, you are given an “Earth” with a solar cell attached. The solar cell is connected to a multimeter that measures the current flowing through the solar cell. So, the higher the current, the more energy the cell is receiving.

- Take your Earth outside and point the solar cell directly at the sun, and then towards an area of shade.
 - Do you see a difference in the amount of current?
 - Why do you still measure current in the shade?
- The sun angle is measured in degrees from true south, as pictured in the diagram below. You are given the approximate sun angle over Fort Collins for the equinox and the summer and winter solstices. Estimating as best you can, point the Earth so that the solar angle best matches the given angles.
 - Note the current that you read at each angle.
 - How does the amount of radiation that the Earth receives change depending on the sun angle?
 - Is this what you expected?



Date	Max Solar Angle
Summer Solstice (June 21st)	64.5°
Equinox (March 20th and Sept. 23rd)	41.5°
Winter Solstice (Dec. 21st)	30°

Part 2: How does the sun's radiation affect the surface temperature?

Now that you have seen how radiation changes from month to month, it is time for you to plot it, and see how it affects the temperature. You are given monthly maximum solar radiation and average temperature. All of the data have been collected from the Fort Collins weather station on campus and averaged over a 10 year period (2000-2009).

- Plot both fields and answer the following questions:
 - In what month is solar radiation a maximum in Fort Collins? Temperature?
 - Why do you think they are different?
- Now plot the data for Bloomington, IL. Bloomington is located at nearly the same latitude as Fort Collins.
 - How are the temperature graphs different?
 - What reason(s) can you think of to explain this?

Fort Collins, CO

	Solar Radiation (W/m²)	Temperature (°F)
Jan	527.38	30.86
Feb	681.68	32.80
Mar	813.83	40.85
Apr	884.49	49.21
May	961.37	58.64
Jun	981.75	67.27
Jul	966.81	74.11
Aug	866.73	69.63
Sep	806.82	60.52
Oct	690.81	47.84
Nov	553.85	37.36
Dec	474.65	26.43

Bloomington, IL

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp (°F)	26	28	39	53	62	71	74	73	66	54	42	28