
Solar cycle practical

EG5513 : Climate & Climate Change

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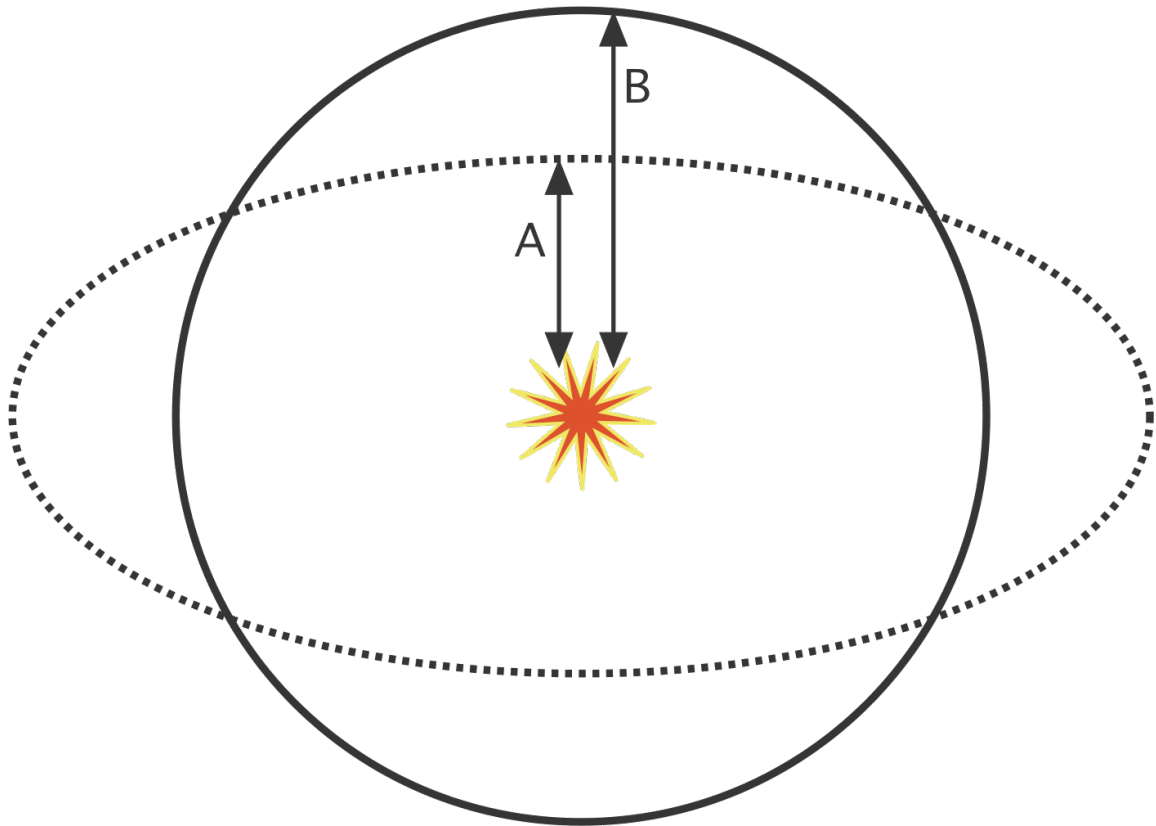


FIGURE 1: diagram showing the exaggerated difference between (A) PERIHELION (when the Earth is closest to the Sun) and (B) APHELION (when the Earth is farthest from the Sun)

Introduction

You will be familiar (from the lecture) with the concept of orbital forcing. This is the natural variation in solar energy received at the Earth's surface due to the configuration (orbit) of the Earth and the Sun. The collective term for this is *Milankovitch Cycles* and can explain a degree of natural variability in the Earth's climate.

In this practical you will obtain data (Earth - Sun distances) from a solar system simulation tool and examine the effects of distance on solar intensity and the variation in the so called *solar constant*.

Some Basic Information

At perihelion (closest point), the Earth is 147×10^6 km (147,000,000 km) from the Sun¹

At aphelion (farthest point), the Earth is 152×10^6 km (152,000,000 km) from the Sun²

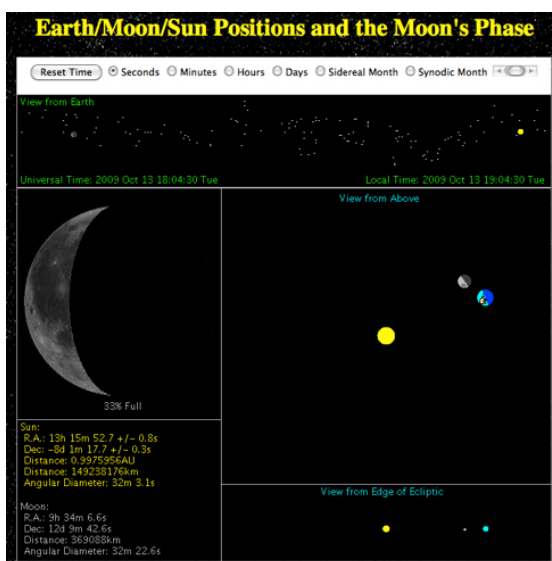
Mean distance between Earth and Sun is 149.5×10^6 km

Mean annual solar constant value = 1,367 watts per square metre (Eumetsat, 2009)

Intensity = $1/(\text{distance})^2$ (where distance is between Earth and Sun)

Earth - Sun Distance Simulator

Go to: <http://jove.geol.niu.edu/faculty/stoddard/JAVA/moonphase.html>

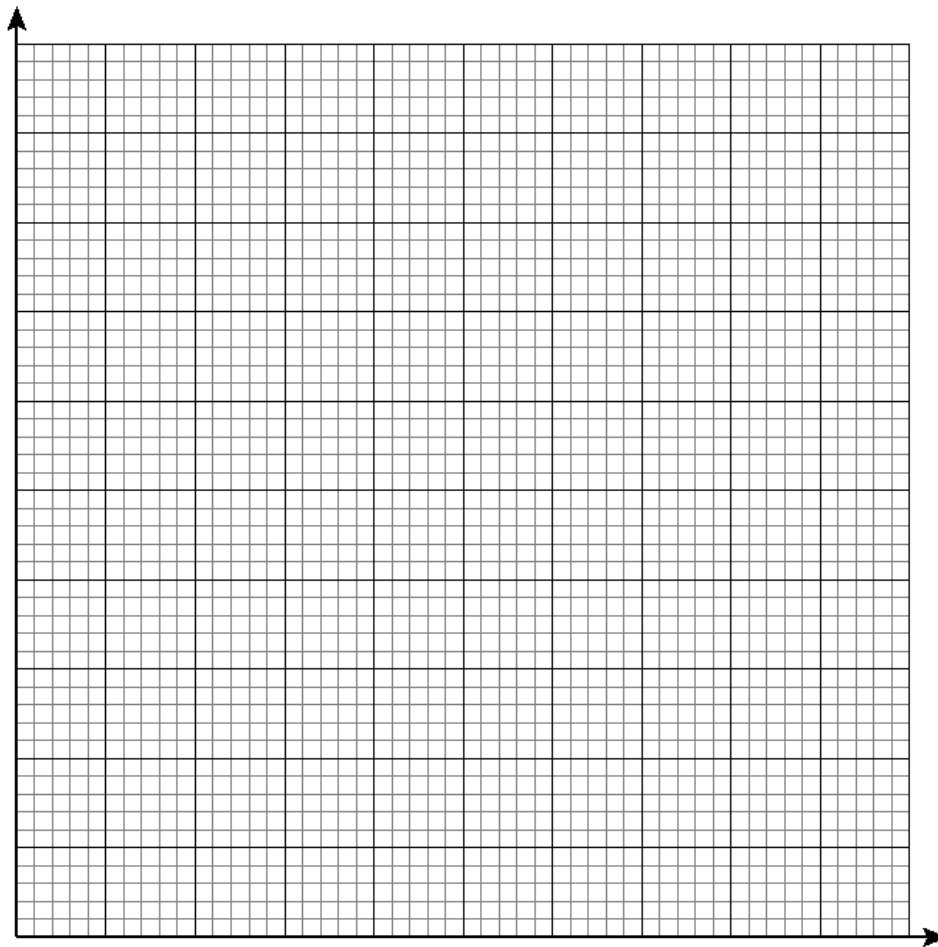


You can fast forward many years by selecting the *Month* option and using the slider bar. To slow down and then halt the date, just move the slider bar the other way and select *Seconds*

¹ for a typical year

² for a typical year

Plot your data below



References

Universities Space Research Association. How does the distance between the Sun and a planet affect the amount of energy it receives? http://space.hsv.usra.edu/TRESTE/teaching_resources/faculty_teaching_boxes/perkey/ess_lab_exercise_resources/15_radiation_distance.pdf. Accessed 13th October 2009.

Northern Illinois University. Earth/Moon/Sun Positions and the Moon's Phase: <http://jove.geol.niu.edu/faculty/stoddard/JAVA/moonphase.html>. Accessed 13th October 2009.