

## Greek Astronomy—29 Aug

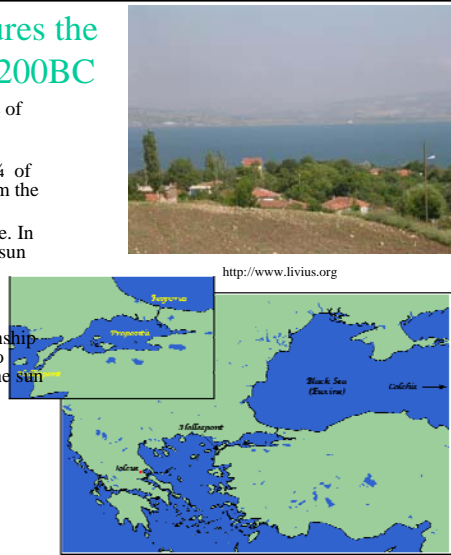
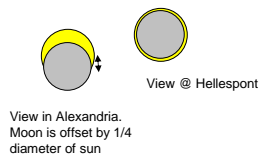
- Erathosthenes’ measurement of the Earth
- Hipparchus’ measurement of distance to the moon
- Motions of the sky that we have seen with our naked eyes. A model to explain the motions.
- Homework 1
  - Due Friday, Sept 5.
  - You may work with your Ast207 buddies, but you must write your own homework. (No copies.)

## Erathosthenes ~200 BC

- A correspondent in Syene reports that at noon on the summer solstice, the sun illuminates the bottom of a well. In Alexandria (where Erathosthenes lived), a stick makes a  $7^\circ$  shadow.
- It takes a camel 50 days to travel from Syene to Alexandria. A camel can travel 100 stadia/day.
  - Guess that a stadium is 100m.
  - What is the distance between Alexandria & Syene in km?
    - $100\text{m/stadium} \times 100\text{stadia/day} \times 50\text{days} = 500,000\text{m} = 500\text{km}$
- “A clear picture is 90% of clear thinking.”
- Draw a picture that shows the relationship between the sun, the well, the stick, and the two locations.
- What is the circumference of the earth?

## Hipparchus measures the moon’s distance~200BC

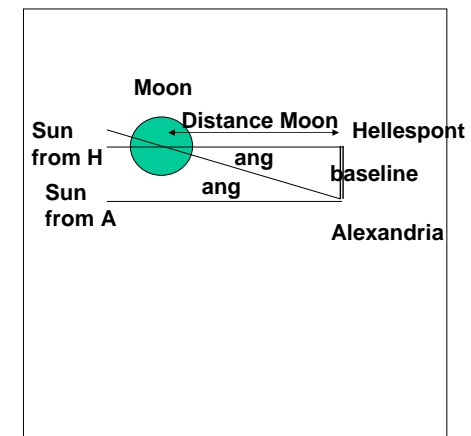
- At the Hellespont, the solar eclipse of 189BC was total. (Sparta defeated Athens there in 405 BC.)
- In Alexandria, the moon covered  $\frac{3}{4}$  of the sun. Alexandria is 1000km from the Hellespont.
- The diameter of the sun is  $\frac{1}{2}$  degree. In Alexandria, the angle between the sun and moon is  $\frac{1}{4} * \frac{1}{2} = \frac{1}{8}$  degree.
- “A clear picture is 90% of clear thinking.”
- Draw a picture to show the relationship between the sun, the moon, the two locations, and the angle between the sun and moon in Alexandria.



[http://mkatz.web.wesleyan.edu/medea\\_lecture/hellespont.gif](http://mkatz.web.wesleyan.edu/medea_lecture/hellespont.gif)

## What triangle did Hipparchus use?

- Parts of triangle
  - Angle is due to parallax: moon in foreground shifts with respect to sun in the background.
  - One leg of triangle is the baseline.
  - Other leg is distance to moon.



## Changes in the Sky

1. Name two motions of objects in the sky or changes in the sky that you have observed.