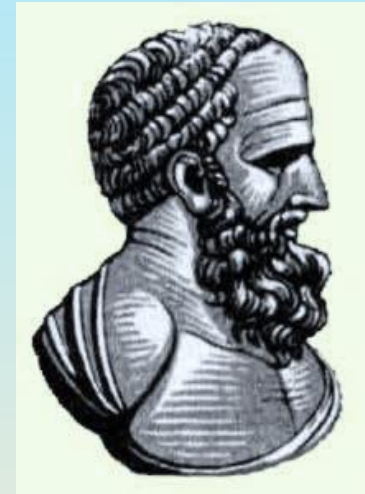




Hipparchus of Nicaea

Ancient Greek astronomer, mathematician
and geographer
(190 – 127 BCE)



Hipparchus made fundamental contributions to the advancement of astronomy as a mathematical science and to the foundations of trigonometry.

Most of Hipparchus's life has been spent carrying out a program of astronomical observation and research on the island of Rhodes.

Hipparchus achievements

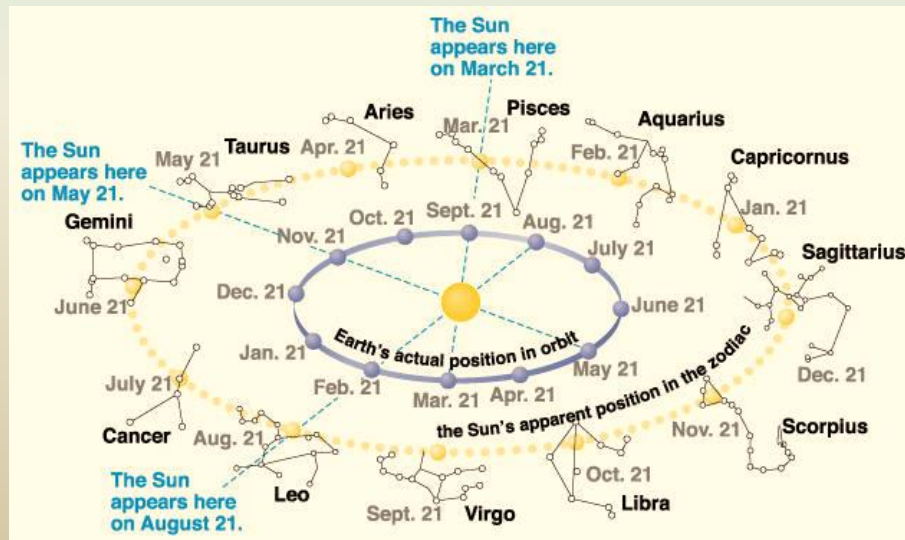
- He made precise measurements of the orbits of the Sun and the Moon. He studied the eclipses.
- He calculated the length of the lunar month with an error of less than one second and estimated the solar year with an error of six minutes.
- He discovered the Precession of Equinoxes.
- He introduced the star brightness magnitude system.
- He improved the main astronomical instruments.



Precession of the Equinox

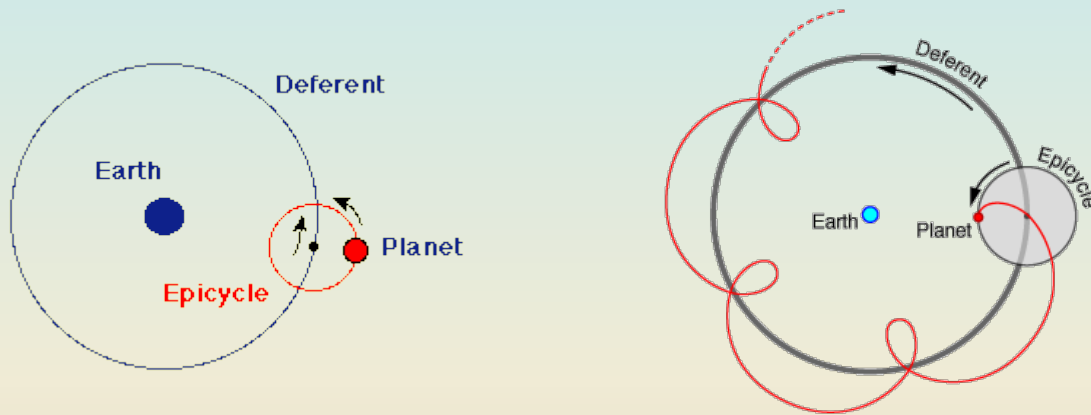
Comparing positions of stars recorded by his predecessors, Hipparchus noticed that the position of Equinoxes (location of the Sun in the sky at the Equinox) was changing.

Hipparchus concluded that the equinoxes were moving at a rate of about 1° in a century.



Hipparchus geocentric model

Hipparchus rejected Aristarchus heliocentric model. He promoted a geo-centric model based on epicyclical motion of planets (first proposed by Apollonius).



Hipparchus improved the calculations of Aristarchus of the sizes and distances of the sun and moon: he calculated the distance of the moon from the earth with an error of only five per cent.

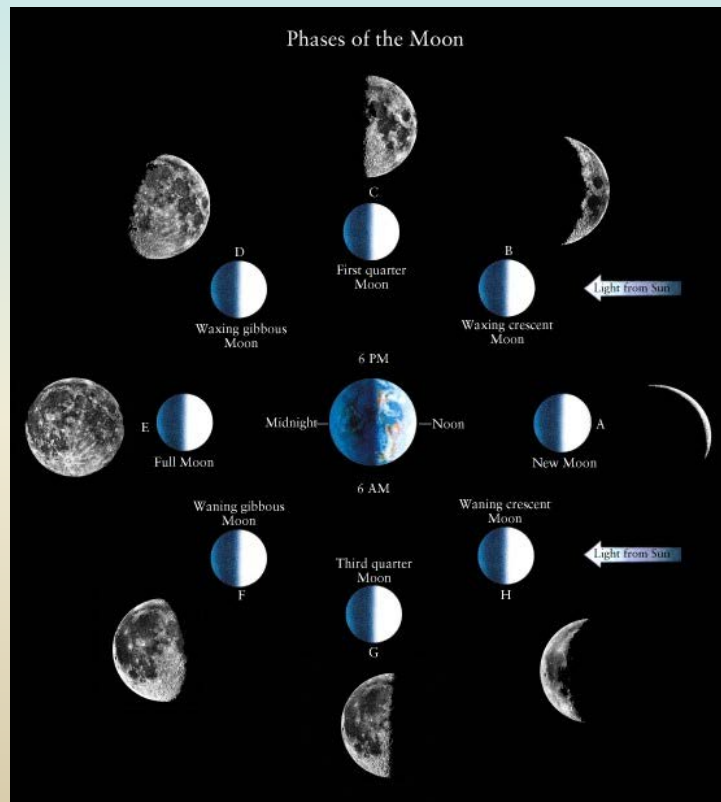
Hipparchus star catalogue

He made a catalogue of the sky providing the positions of 1080 stars by stating their precise celestial latitude and longitude. He recorded their relative brightness (magnitude) on a 1 to 6 scale, where 6 is barely visible and 1 is very bright. Astronomers today continue to use a similar system for star magnitudes.



The Moon's motion

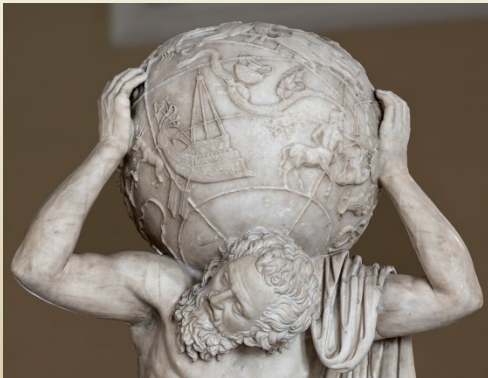
Hipparchus also analyzed the more complicated motion of the Moon in order to construct a theory of eclipses



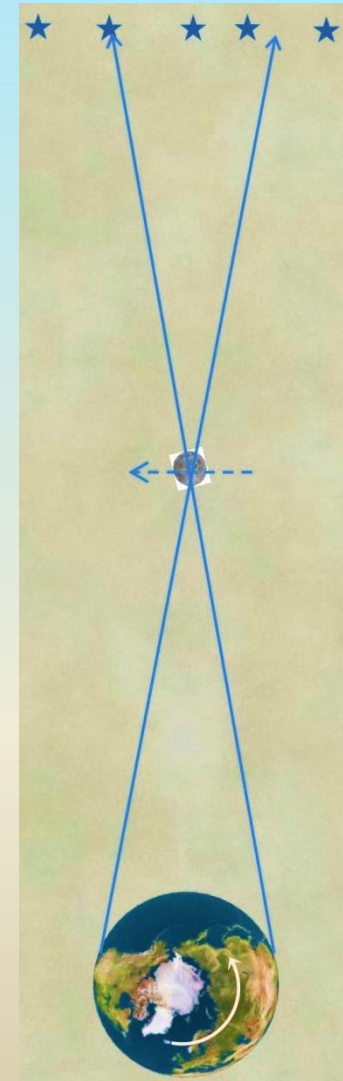
Moon's parallax

Hipparchus measured the Moon's parallax, and estimated the distance to the moon to be between 59-67 Earth radii. (actual value 30)

He also constructed a celestial globe, showing constellations and stars arranged on a sphere.



A statue of Atlas carrying the celestial globe of Hipparchus.



Parallax of the Moon, between moonrise and moonset.

References:

- <http://www.hellenicaworld.com/Greece/Person/en/Hipparchus.html>
- <https://en.wikipedia.org/wiki/Hipparchus>
- https://www.ancient.eu/Hipparchus_of_Nicea/
- <https://people.highline.edu/iglozman/classes/astronotes/cycles.htm>
- <https://www.timetoast.com/timelines/the-cosmic-engine-ancient-models-of-the-universe>
- <https://earthsky.org/astronomy-essentials/what-is-stellar-magnitude>
- <https://www.sciencelearn.org.nz/images/684-moon-phases>

This presentation was created by students taking part in the programme
"Four Seasons in the Sky"

