Apparent to Actual Motions

How do celestial objects appear to move across the sky and how do they actually move across the sky?
Early Astronomy
Apparent Motions

- **Geocentric Universe** - idea that Earth was at the center of the solar system
  - Also called the Ptolemaic System
  - Stars all rotate around the Earth on a single large sphere at 15°/hour
  - Planets travel on smaller spheres around their own larger sphere in epicycles
Geocentric Universe
Apparent Motions

- Problems with the Geocentric Model:
  - Locations of the planets could not accurately be predicted
  - Changes in the apparent diameter of the Moon and Sun could not be explained
Apparent Motions

• Apparent Motion - the way in which celestial objects appear to move across the sky
Apparent Motions

- **Celestial Sphere** - the visible portion of the sky that celestial objects appear to travel on
- **Celestial Object** - any of the natural objects that can be seen in the sky
Apparent Motions

- **Horizon** - the edge of the visible portion of the celestial sphere
- **Zenith** - highest point on the celestial sphere which is directly over the observer
Apparent Motions

• All objects [except Polaris] appear to move across the celestial sphere from east to west at 15 °/hour or 360°/24 hours
Apparent Motions

• **Star Trails** - long exposure photos of stars as they appear to move across the sky

• **Circumpolar Stars** - stars that move around a polar star

• **Polar Star** - star directly above the North or South Pole
Apparent Motions
Apparent Motions

- Locating positions on the celestial sphere:
  - **Altitude** - angular distance above the horizon [0° to 90°]
  - **Azimuth** - angular distance along the horizon measured from due north [0° to 360°]
Altitude and Azimuth
Apparent Motions

• The Sun’s path changes throughout the seasons
  • The greater the Sun’s path the increased amount of daylight hours an area receives
  • The shorter the Sun’s path the decreased amount of daylight hours an area received
Apparent Motions

- What’s Charlie’s approximate latitude if this photo was taken at noon on June 21?
Actual Motions

- **Heliocentric Model** - current model of the solar system where the Sun is at the center
  - Also called the Copernican Model
  - Planet revolve around the Sun in circular paths
Heliocentric Model Universe