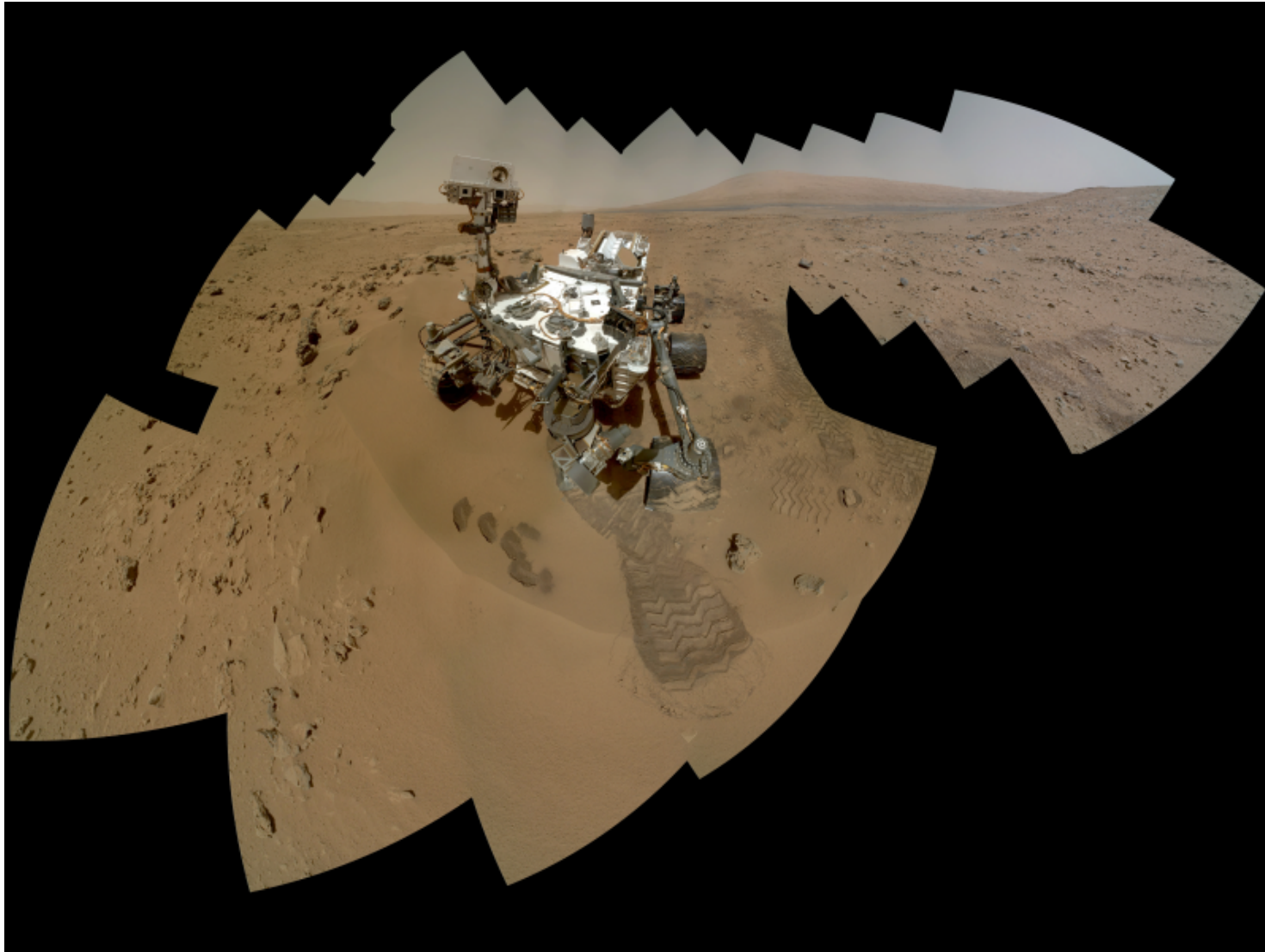


Lecture 1 ... August 26, 2013



Mars Science Laboratory “Curiosity” lands in Gale Crater on Mars, August 2012



Coordinate systems in astronomy

1.2 Coordinate Systems on a Sphere

The horizon coordinate system

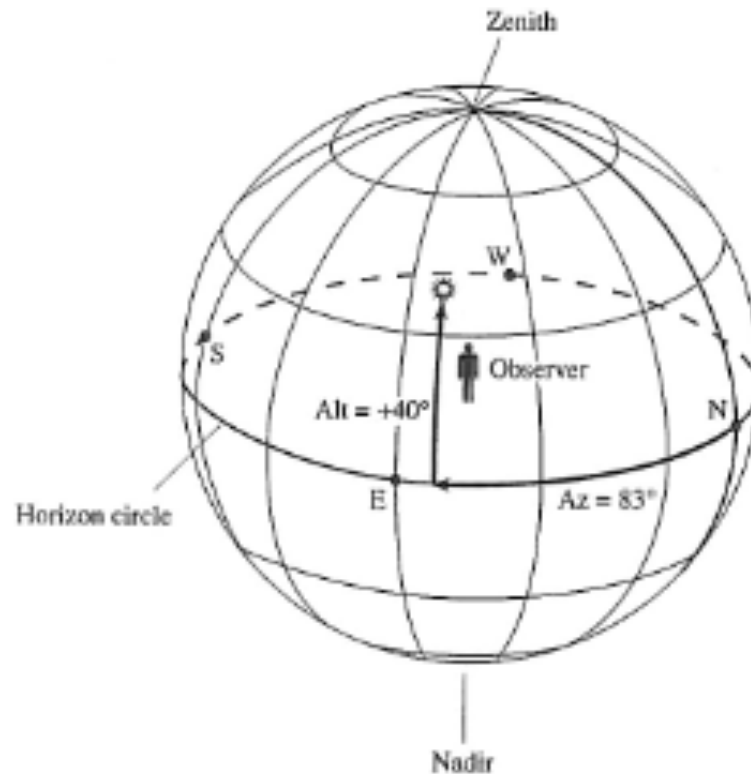


FIGURE 1.3 Altitude (Alt) and azimuth (Az) of a point on the celestial sphere, as seen by an observer on Earth.

Diurnal motion of celestial objects in horizon system

Chapter 1 Early Astronomy

Objects move on *diurnal circles* centered on the celestial pole

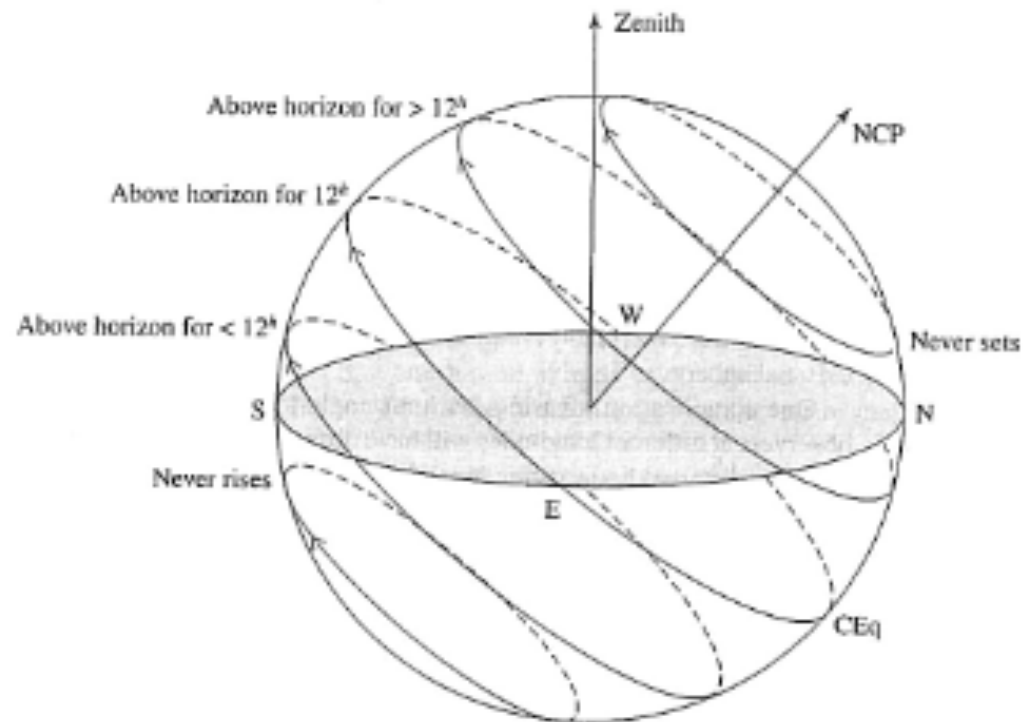


FIGURE 1.4 Diurnal circles of stars as seen by an observer in the northern hemisphere. Circumpolar stars near the north celestial pole never set; similarly, stars near the south celestial pole never rise. Stars on the celestial equator are above the horizon for 12 hours and below the horizon for 12 hours.

Why sky changes appearance in different places on the Earth

Chapter 1 Early Astronomy

As the Earth rotates, the zenith points in different directions

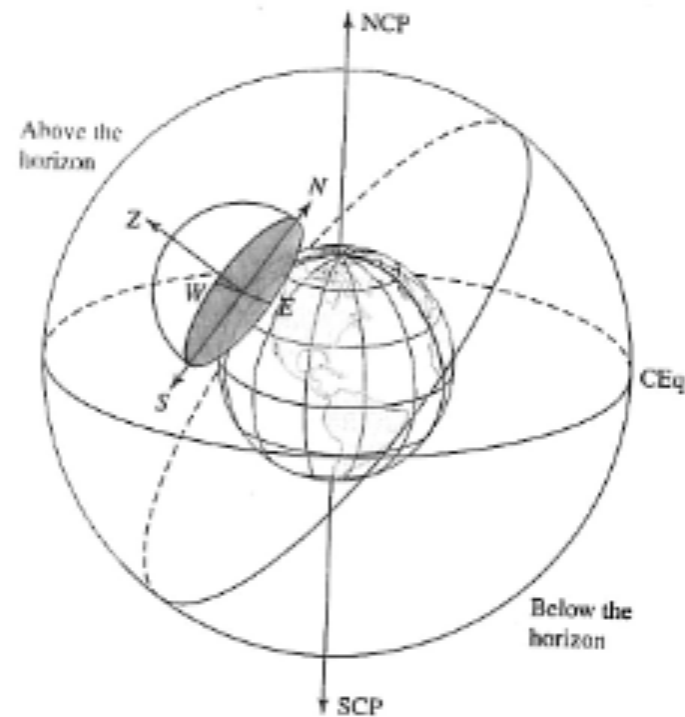


FIGURE 1.1 The celestial sphere surrounding the Earth. The Earth's north pole, south pole, and equator project onto the north celestial pole (NCP), south celestial pole (SCP), and celestial equator (CEq), respectively. For any observer, the horizon plane is tangent to the observer's location, and the zenith (Z) is directly overhead.

The equatorial coordinate system

a system like
latitude and
longitude for
the celestial
sphere

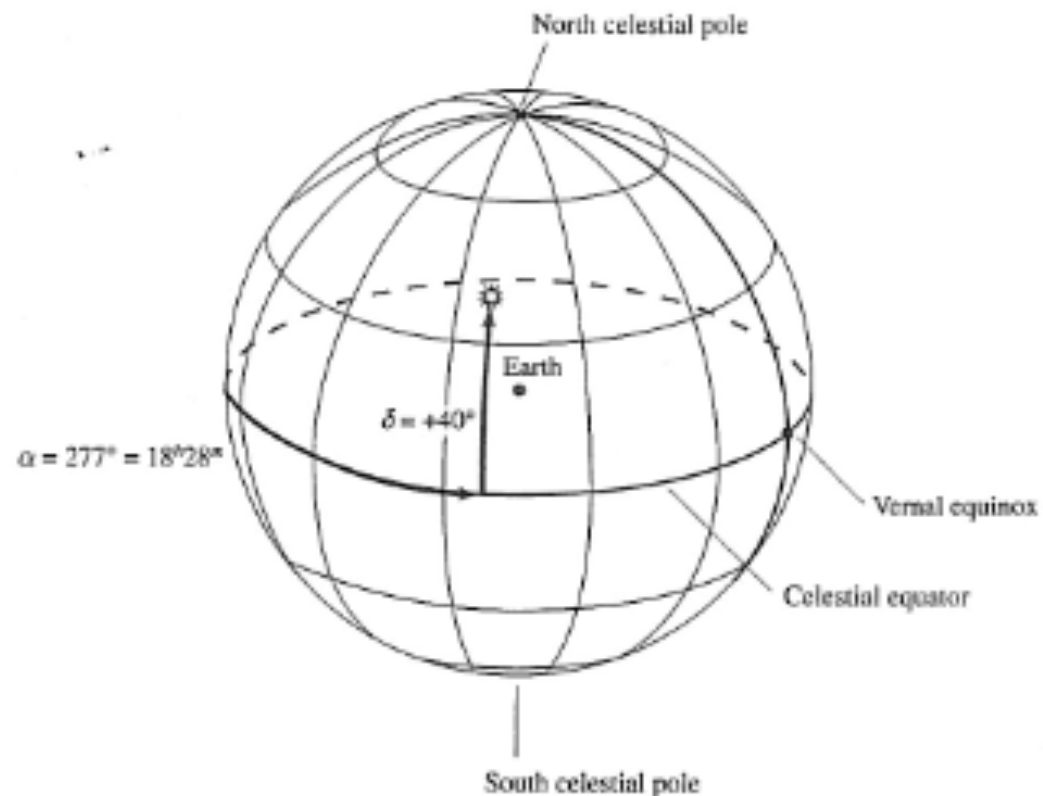


FIGURE 1.5 The right ascension (α) and declination (δ) of a point on the celestial sphere.

Two lines on the sky: the celestial equator and the ecliptic

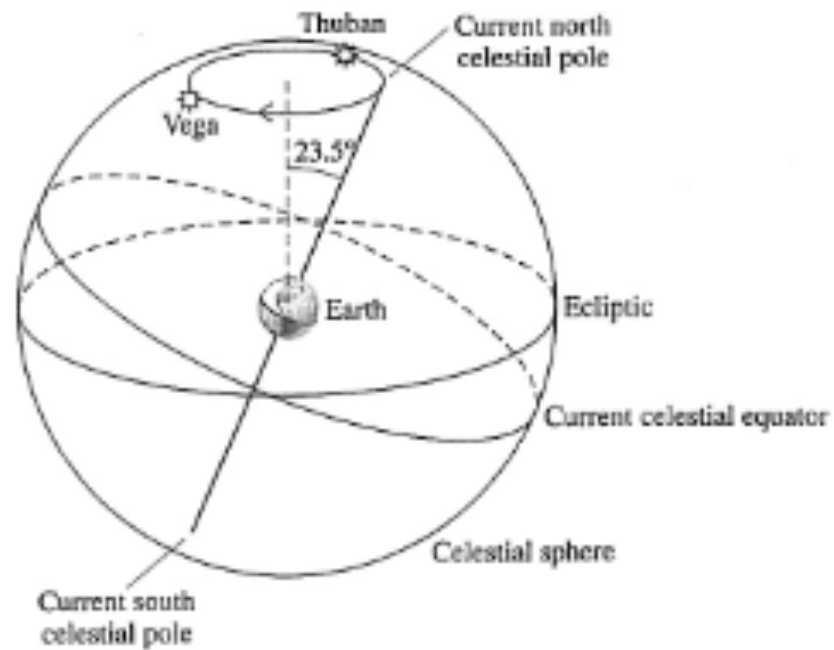


FIGURE 1.10 Precession of the Earth's rotation axis, with the resulting motion of the north celestial pole on the celestial sphere.