

# Glossary I: The Sky and Its Motions

<b>celestial sphere</b>	The celestial sphere is simply another name for the apparent sky. We always see one half of the celestial sphere – the dome of the sky overhead. The other half is hidden by the earth beneath our feet.
<b>circumpolar</b>	Stars near the poles which neither rise nor set. These stars show up as circles on long exposure photographs
<b>constellations</b>	Patterns the stars appear to form on the celestial sphere. The modern definition of a constellation is a specific area of the sky marked off with a boundary. There are 88 official constellations.
<b>dark cloud constellations</b>	Figures formed by the dark areas in the Milky Way. Dark cloud constellations are not common in European cultures but are prominent in the traditional cultures of Central and South America.
<b>diurnal motion</b>	The <b>daily</b> motion of the sky. It appears that the daily motion is due to the rotation of the celestial sphere. Today we realize that this apparent motion is actually due to the rotation of the earth.
<b>draconic month</b>	The time it takes for the moon to return to the same node, approximately 27.2 days
<b>ecliptic</b>	The apparent path of the sun on the celestial sphere.
<b>equinox</b>	Two <b>equinoxes</b> occur each year, one when the sun crosses the celestial equator going north and one when the sun crosses the equator going south. For northern latitudes the March crossing is known as the <b>vernal equinox</b> , while the September crossing is known as the <b>autumnal equinox</b> .
<b>fixed star</b>	This is an older term used to distinguish stars which remain at fixed positions on the celestial sphere, as opposed to the "wandering stars", <b>planets</b> , which move around the celestial sphere.
<b>helical rising</b>	The day on which a star first appears on the eastern horizon just before sunrise.
<b>helical setting</b>	The last day a star is visible on the western horizon

right after sunset.

<b>intercalation</b>	The technique of inserting extra days, weeks, or months into a calendar to insure that it stays synchronized with the motions of the sun. The most familiar example is our leap year.
<b>lunar calendar</b>	A calendar based on the motion of the moon. For most lunar calendars the month always begins with the new moon. A strictly lunar calendar cannot stay synchronized with the seasons.
<b>lunar standstill</b>	A full moon when the moon's position on the celestial sphere is at its maximum distance from the ecliptic (about 5 degrees).
<b>magnitude</b>	The apparent brightness of celestial objects. In ancient times the magnitude scale ran from 1 (the brightest stars) to 6 (the faintest star visible to the eye). Today magnitude has a precise meaning: a magnitude difference of 1 is equal to a brightness difference of 2.5. With this definition the magnitude scale includes all objects from the sun to the faintest stars which can be seen only in the largest telescopes.
<b>Metonic cycle</b>	A period of 19 years which almost exactly equals 235 synodic months. The Hebrew calendar is based on the Metonic cycle and has 7 years with 13 months and 12 years with 12 months.
<b>Milky Way</b>	A hazy band of light spanning the sky. The Milky Way is easily visible from dark sky sites, but too faint to be seen from urban locales.
<b>nadir</b>	The point on the celestial sphere directly opposite the zenith. The nadir is not visible because our view of it is blocked by the earth.
<b>nodes</b>	The nodes are the points where the path of the moon on the celestial sphere crosses the ecliptic.
<b>planet</b>	Literally, a "wandering star". To the unaided eye planets look just like stars. To ancient peoples the only obvious difference between a star and a planet was that planets moved through the constellations,

while stars remained fixed on the celestial sphere.

**precession of the equinoxes**

The intersection between the ecliptic and the celestial equator does not remain fixed with respect to the background constellations, but slowly move through them. Since this intersection is the position of the sun at the time of the equinoxes, this slow shift of position is called ***precession of the equinoxes***.

**retrograde motion**

When a planet reverses its usual direction of travel (west to east) for a few weeks. When the planet is traveling in the reverse direction (east to west) it is said to be ***retrograding***. After a few weeks the planet reverses again and resumes its normal course.

**saros cycle**

A period of 18 years 11.3 days between eclipses with very similar alignment geometries (same time of year, same nodes). The saros cycle = 223 synodic months = 242 draconic months = 239 anomalistic months.

**sidereal month**

The time required for the moon to return to the same location on the celestial sphere (approximately 27.3 days)

**solar calendar**

A calendar based on the motion of the sun around the celestial sphere. A successful solar calendar is always synchronized with the seasons. The calendar we use today is solar – January is always winter and July is always summer, etc.

**solstices (June and December)**

The maximum north and south location of the sun on the celestial sphere. The June solstice (6/21) is maximum north and the December solstice (12/21) is maximum south. In the northern hemisphere the ***summer solstice*** occurs in June while the ***winter solstice*** is the one in December.

**synodic month**

The period between successive new moons (approximately 29.5 days)

**Tropic of Cancer  
Tropic of Capricorn**

A *tropic point* is the sun's *position* on the celestial sphere at the *time* of a solstice. The ***Tropic of Cancer*** is the location of the sun at the June solstice and the ***Tropic of Capricorn*** is the location of the sun at the time of the December solstice. Note: ***a solstice is a time, a tropic is a place***. Terrestrial

latitudes directly under the celestial tropics have the same name – the latitude 23.5 degrees north is called the Tropic of Cancer and the latitude 23.5 degrees south is called the Tropic of Capricorn.

**Venus Year**

The synodic period of Venus, the period between successive helical risings of Venus in the east (approximately 584 days).

**zenith**

the point on the celestial sphere directly above the observer

**zenith passage**

the day on which the sun is at the zenith at noon. This can occur only in latitudes between the Tropic of Cancer (23.5 degrees north) and the Tropic of Capricorn (23.5 degrees south).

**zodiac**

The set of constellations through which the sun appears to pass during the course of a year. The twelve official constellations are: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius, Pieces. In addition, the modern definition of the constellations places the sun in the constellation of ***Ophiuchus*** for 10 days in December.