Note:

Because of the far distance between the Earth and other planets compared to the Earth diameter, the Earth is presented as (dot) at the center of the celestial sphere.

Who to describe the observer position, (terrestrial position)?

There are some terms which describe the observer's position:

Zenith: The ***zenith*** point is located on the celestial sphere directly overhead the observer. The point 180° opposite the ***zenith***, directly underfoot, is the ***nadir***.

Horizon: is a horizontal plane through the eyes of the observer or telescope of the theodolite or the center of the earth, at right angle to the direction of gravity.

Celestial Horizon: is a great circle on the celestial sphere obtained by the intersection of the observer horizon plan and the celestial sphere.

Meridian or ***Celestial meridian***: is a great circle on the celestial sphere, passes through the poles, the zenith and the nadir, crosses the horizon as well as the equator at right angles.

Vertical circles: all the great circles in the celestial sphere which pass through the zenith and nadir. One of this vertical circle is interesting as it passes through the NCP and the SCP, known the observer meridian or celestial meridian. Additionally, there is another interesting vertical circle known "prime vertical" which is at the right angles to the celestial meridian, and intersects the horizon at the ***east and west*** points

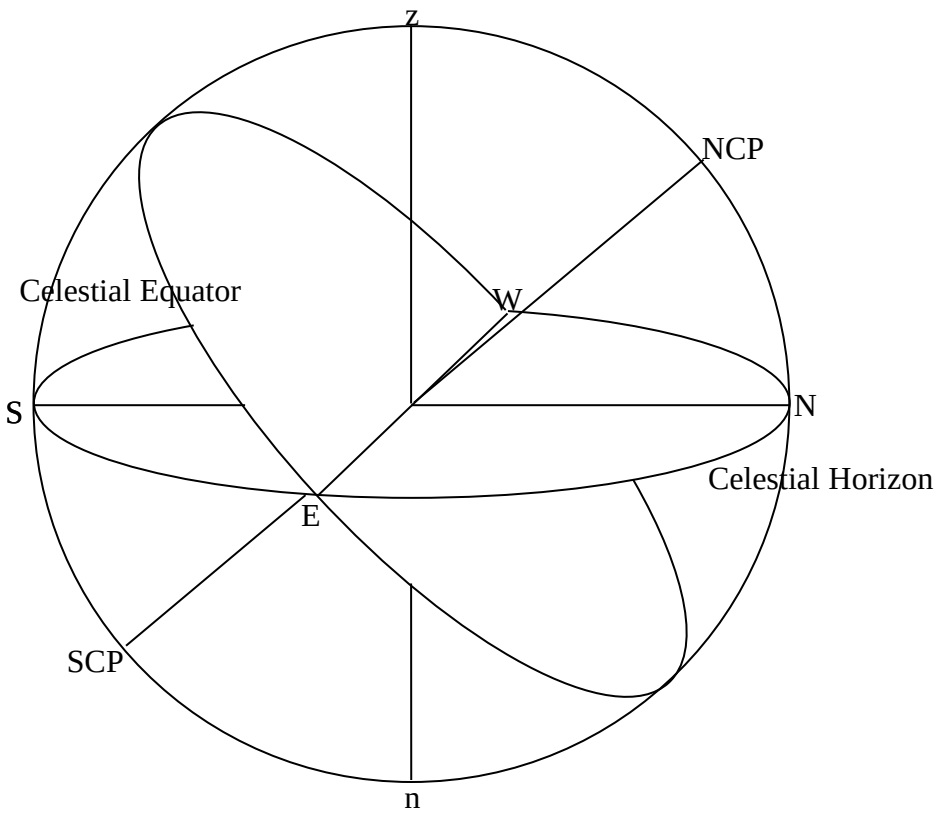
East and west points: the points on which the prime vertical meets the horizon are known as the east (E) and west (W) points, respectively. These points may also be obtained by the intersections of the equator and the horizon.

Celestial equator: is a great circle resulting from the intersection between the plane of the equator and celestial sphere.

altitude of NCP = observer's latitude

altitude of SCP = (observer's latitude)

max. altitude of celestial equator = 90 - (observer's latitude)



Practical Astronomy Lecture no. 4

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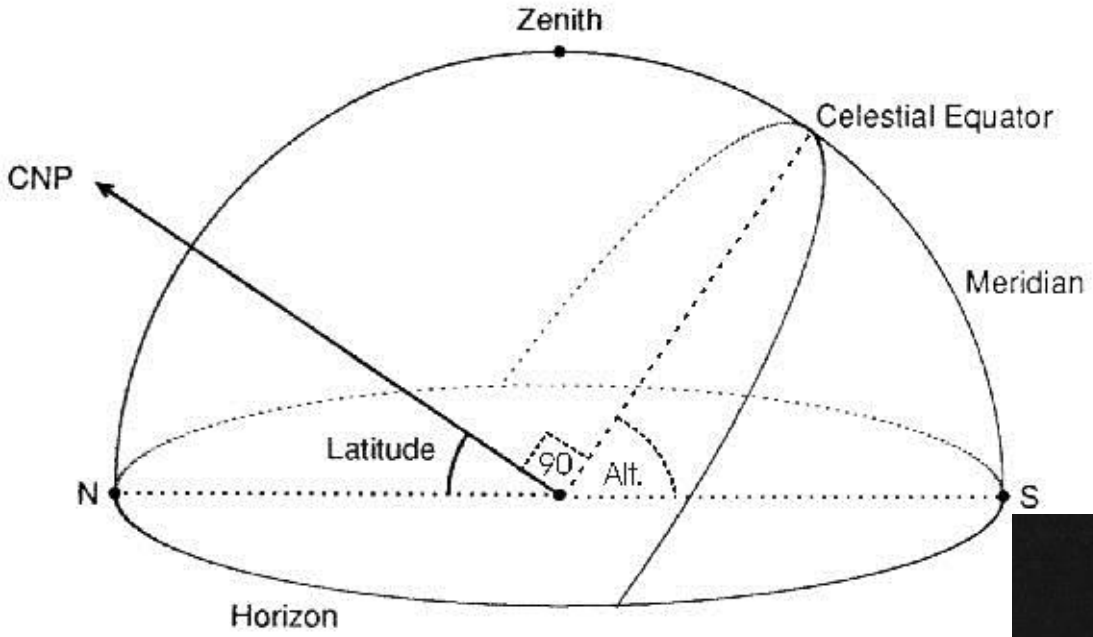
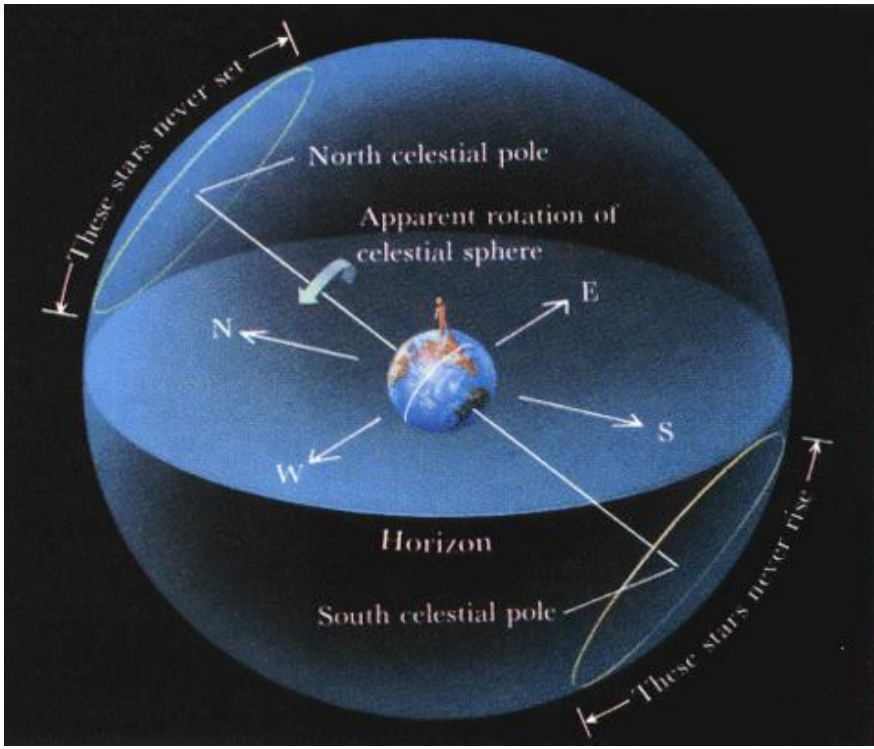
By Dr. Oday Alhamadani





Parallel of Declination: the small circles, which are parallel to the terrestrial equator, are so called the latitudes. The projection of these parallel latitudes on the celestial sphere is the parallel of declinations (or declination circle).

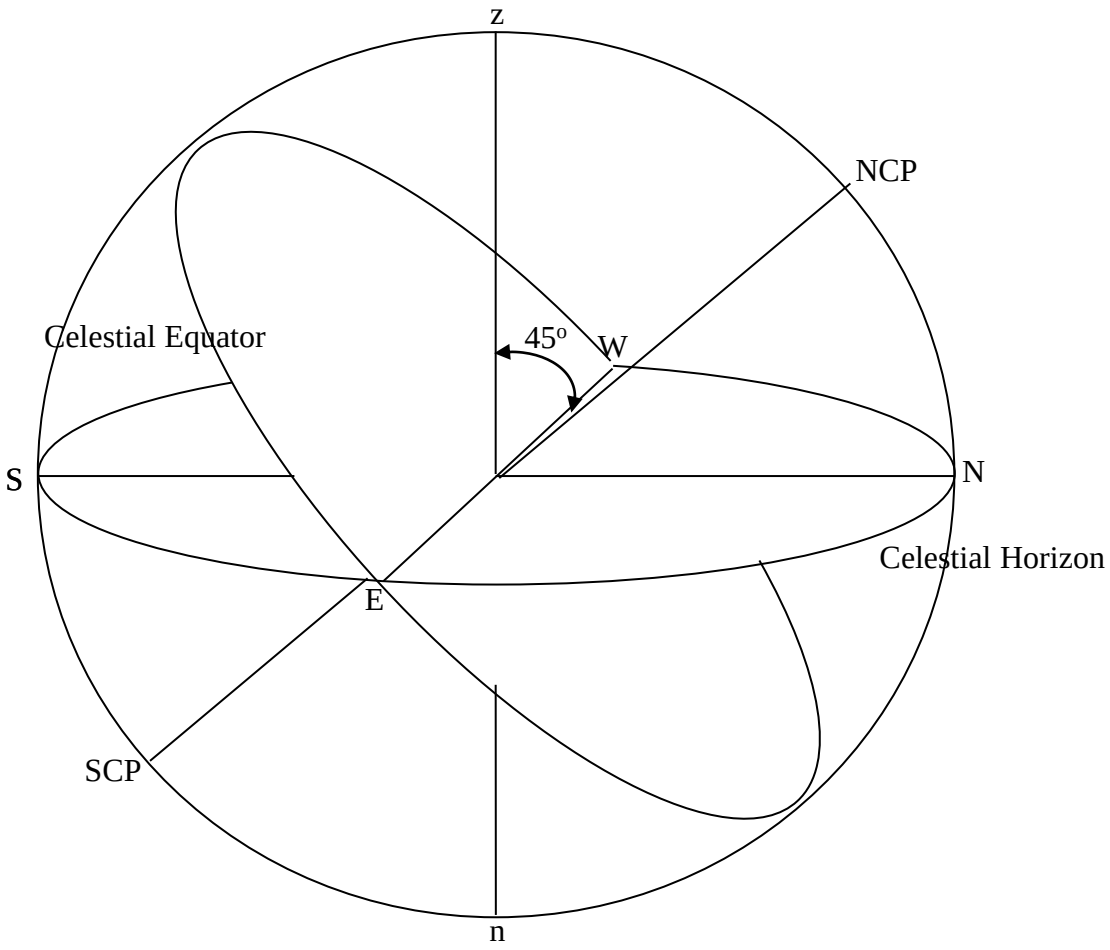
The altitude (α): it is the angular distance which is measured on the vertical circle passing the celestial body, above the horizon to the celestial body.

Zenith distance (z): also called co-altitude, is the complement of the altitude and equals to 90^{o}-altitude.

Azimuth (A): is the angular distance, ranges from 0^o to 360^o, measured on the celestial horizon, from the observer meridian, clockwise, to the vertical circle which passes throughout the celestial body.

The declination (δ)**:** is the angular distance, ranges from 0^o to 90^o, measured on the hour circle, from the celestial equator, northward (0^o to 90^o) or southward (0^o to -90^o) to the celestial body.

Polar distance (δ')**:** also called co-declination, is the complement of the declination and equals to 90^o- δ.


z
NCP
Celestial Equator
45°
W
S
N
Celestial Horizon
E
SCP
n