Coordinate Systems

Astronomers use 2 main systems.

1. **The Horizon System:**

   - **Altitude** – degrees (0 – 90°) above the horizon.
   - **Azimuth** – degrees (0 – 360°) around the horizon from the north point.

   This coordinate system serves to answer the question – where is a particular star, planet or other object at one moment, at one location.

   See picture.

**Examples:**

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Azimuth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zenith</td>
<td>90°</td>
</tr>
<tr>
<td>South Point</td>
<td>0°</td>
</tr>
<tr>
<td>Polaris</td>
<td>Latitude</td>
</tr>
</tbody>
</table>
2. **Celestial Equatorial System:**

A generalization of the **longitude-latitude** system. **Except**, the coordinate grid is **not** fixed to the rotating Earth; it’s fixed on the **celestial** sphere.

See picture.

Some terms:

**Vernal Equinox** – origin of the coordinate system. Defined as the point where the **ecliptic** crosses the **celestial equator** with the Sun moving northward (i.e., spring).

**Right Ascension** – like longitude. It is measured **eastward** in hours (0-23), minutes and seconds from the vernal equinox. *(Time units are convenient for east-west measurements. Why?)*
Declination - like latitude. It is measured from the equator in degrees (0 – 90°), minutes, seconds or arc.

- The C.E. system “factors out” the rotation of the Earth, and its revolution around the Sun.

- It does not factor out precession. The Earth’s equator, and thus the C.E., wobble with a period of 26,000 yr. relative to the ecliptic. The wobbling of the C.E. coordinate grid relative to the fixed stars requires astronomers to update catalog positions about every 50 yrs. Computer programs provide more accurate corrections, as needed.