Circle of equal altitude

The **circle of equal altitude** also called circle of position, CoP, is the real line of position in <u>celestial navigation</u>. It is defined as the locus of the Earth on which an observer sees a star, at a given time, with the same observed altitude.

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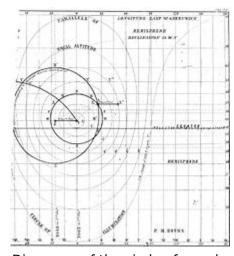
References

External links

Parameters

The center of the CoP, is the substellar point or geographical position of the observed body, and its radius is the great circle distance equal to the zenith distance of the body.

- Center = geographical position of the body: (B, L) = (Dec, GHA)
- Radius = zenith distance: zd [nm] = $60 \cdot (90 Ho)$



Discovery of the circle of equal altitude - A New and Accurate Method of Finding a Ship's Position at Sea, by Projection on Mercator's Chart, Capt. Thomas H. Sumner, July 1843, Thomas Groom & Company of Boston

Equation

The equation links the following variables^[1]

- The position of the observer: B, L.
- The coordinates of the observed star, its geographical position: *GHA*, *Dec*.
- The true altitude of the body: *Ho*.

$$\sin(Ho) = \sin(B) \cdot \sin(Dec) + \cos(B) \cdot \cos(Dec) \cdot \cos(LHA)$$

Being B the latitude (+N/S), L the longitude (+E/-W). LHA = GHA + L is the local hour angle, Dec and GHA are the declination and Greenwich hour angle of the star observed. And Ho is the true or observed altitude, that is, the altitude measured with sextant corrected for dip, refraction, parallax.

Special cases

- Parallel of latitude by Polaris altitude.
- Parallel of latitude by altitude of the sun at noon, or meridian altitude.
- Meridian of longitude known the time and latitude.
- Circle of illumination or terminator

See also

- Navigation
- Celestial navigation
- Intercept method
- Longitude by chronometer
- Sight reduction

References

1. <u>Vector equation of the Circle of Position</u>
http://sites.google.com/site/navigationalalgorithms/papersnavigation)



Parameters of a circle of equal altitude

External links

- Navigational Algorithms http://sites.google.com/site/navigationalalgorithms/
- Correction to the sextant altitude Archivo:CorrecionHs.jpg

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