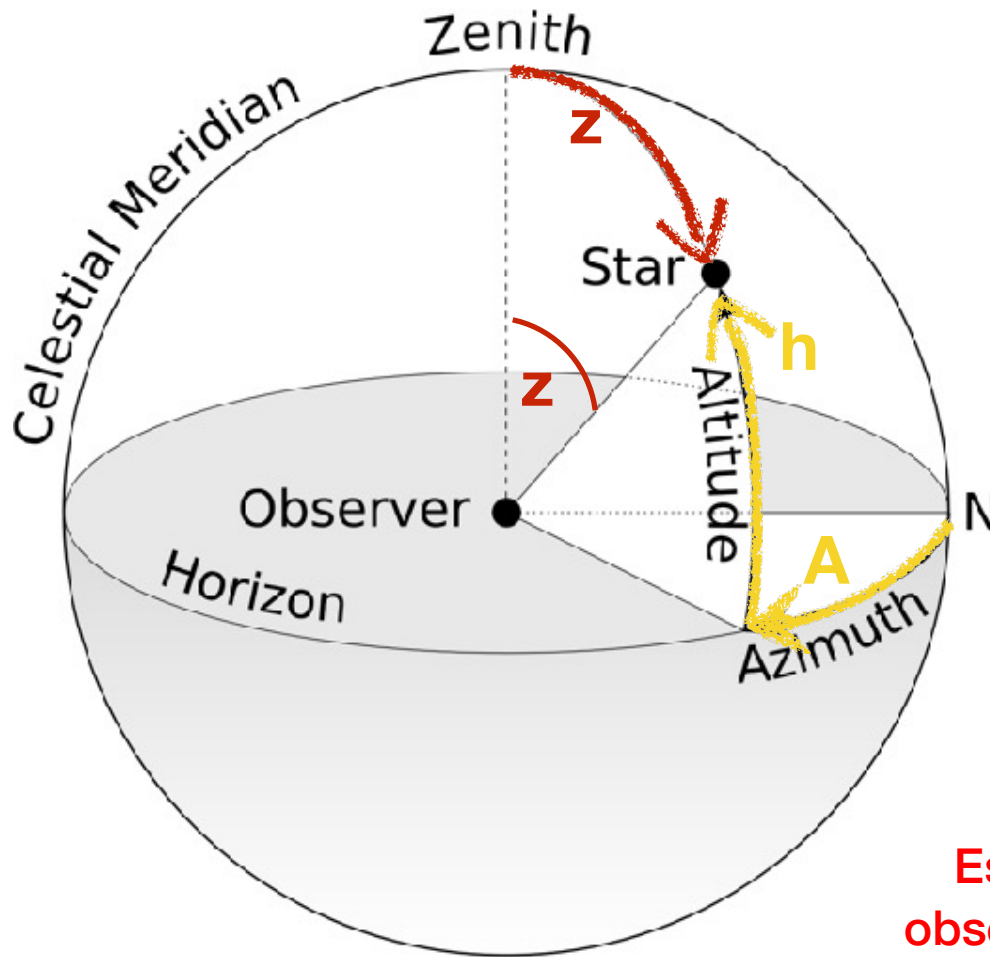


Coordenadas de importancia
para la observación

Coordenadas Alt-Azimutales:

(h, A)



Plano Fundamental: Horizonte

Punto Cero: Punto cardinal N

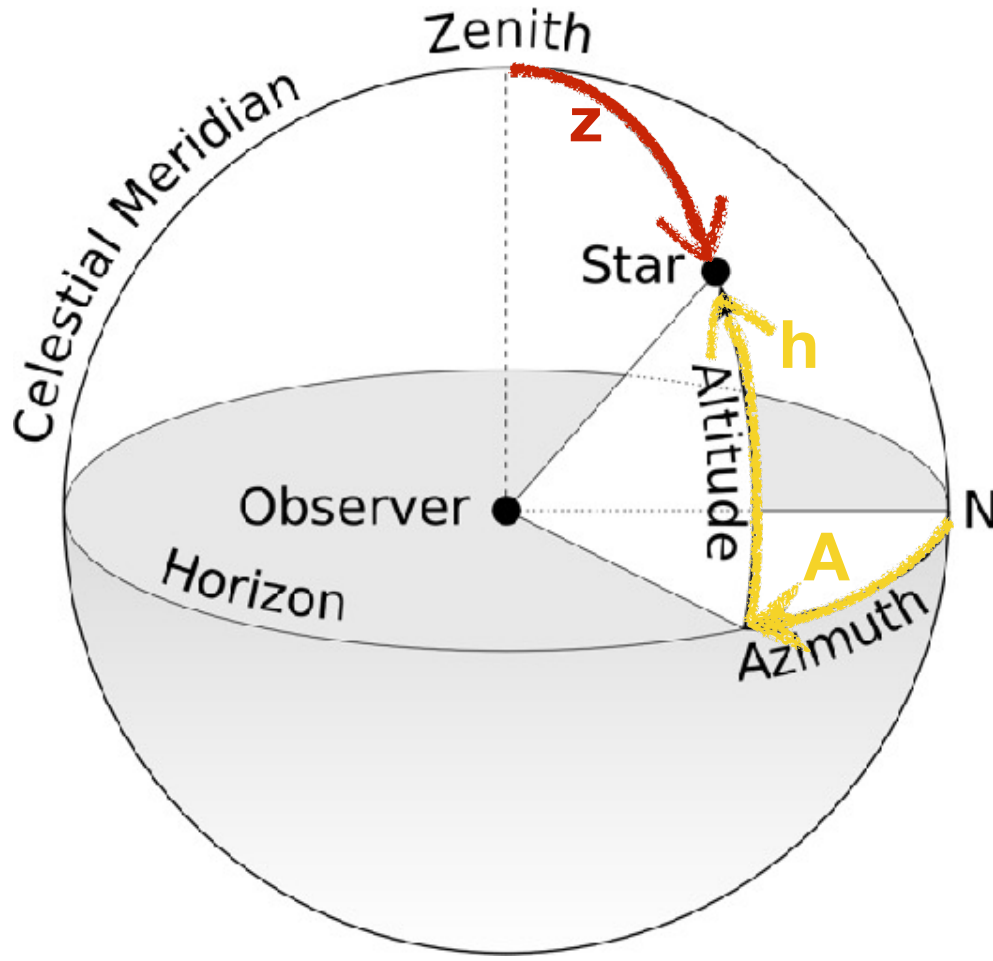
- **Altura (h):** altura (ángulo de elevación) respecto al plano del horizonte
- **Azimut (A):** medido sobre el plano del horizonte, desde el N en sentido horario (hacia el E)
- **Ángulo zenital (z):**

$$z = 90^\circ - h$$

Es un sistema relativo o solidario al observador, por lo tanto las estrellas se mueven (cambian de coordenadas) en este sistema con el tiempo

Coordenadas Alt-Azimutales:

(h,A)

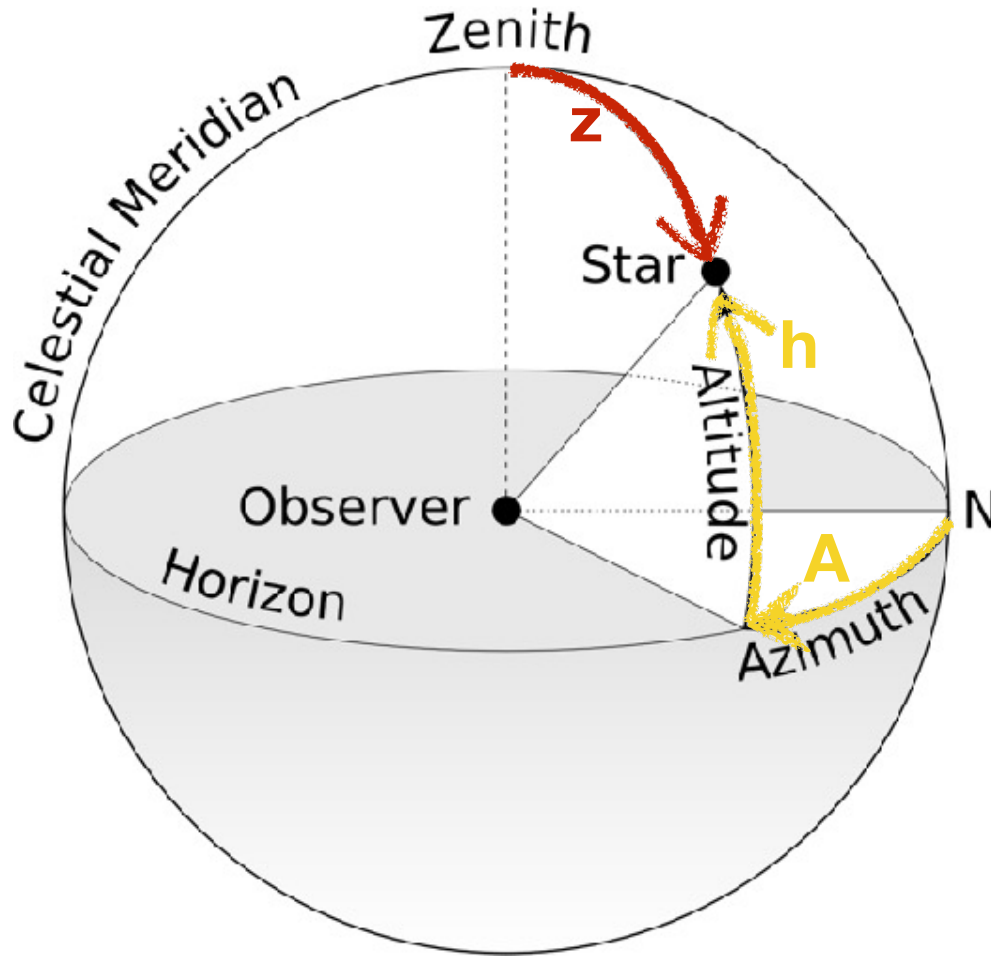


Preguntas:

- (h,A) y z de:
- Punto cardinal N:
- Punto Cardinal E:
- Zenith:
- Nadir:

Coordenadas Alt-Azimutales:

(h,A)

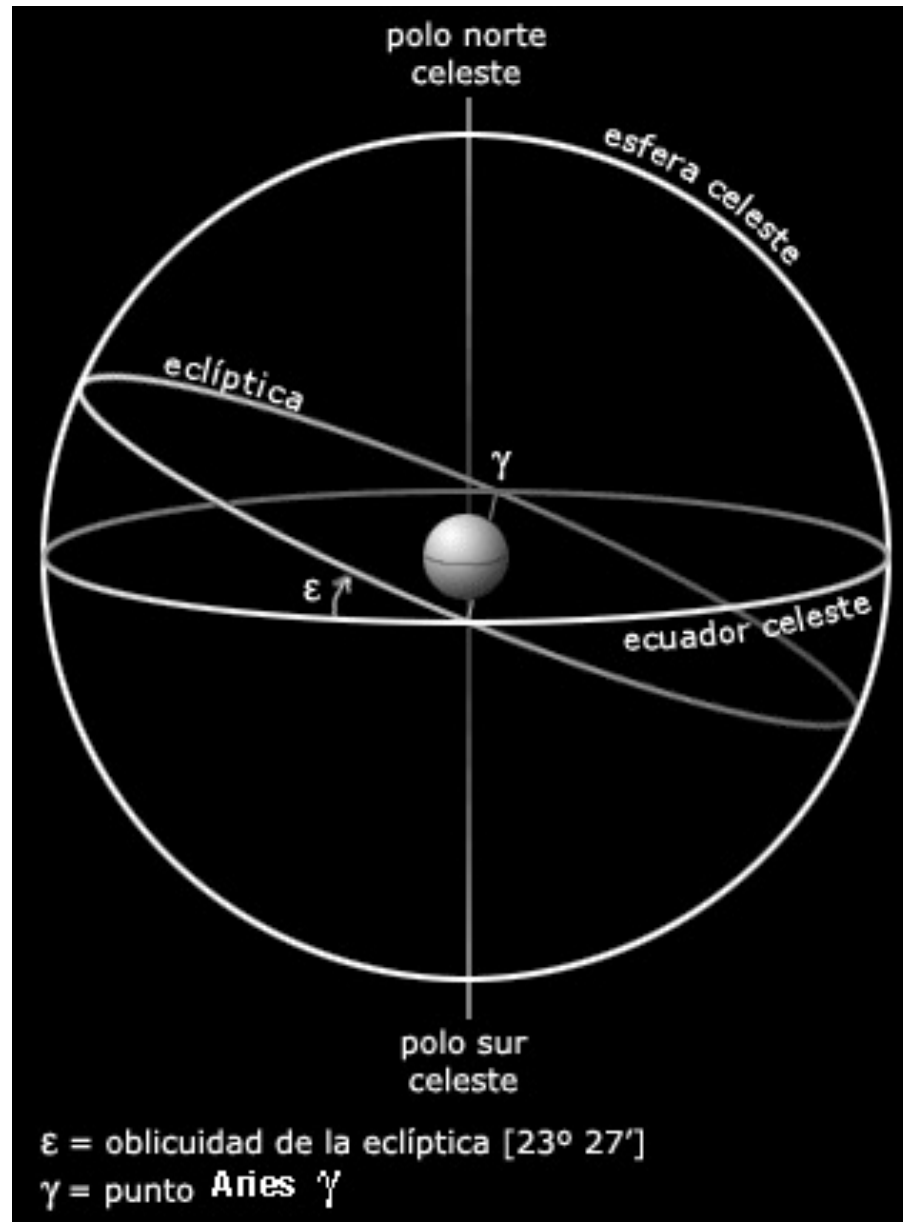


Preguntas:

- (h,A) y z de:

- Punto cardinal N:
($0^\circ, 0^\circ$), $z=90^\circ$
- Punto Cardinal E:
($0^\circ, 90^\circ$), $z=90^\circ$
- Zenith:
(90° , indef), $z=0^\circ$
- Nadir:
(-90° , indef), $z=180^\circ$

Ecuador y eclíptica



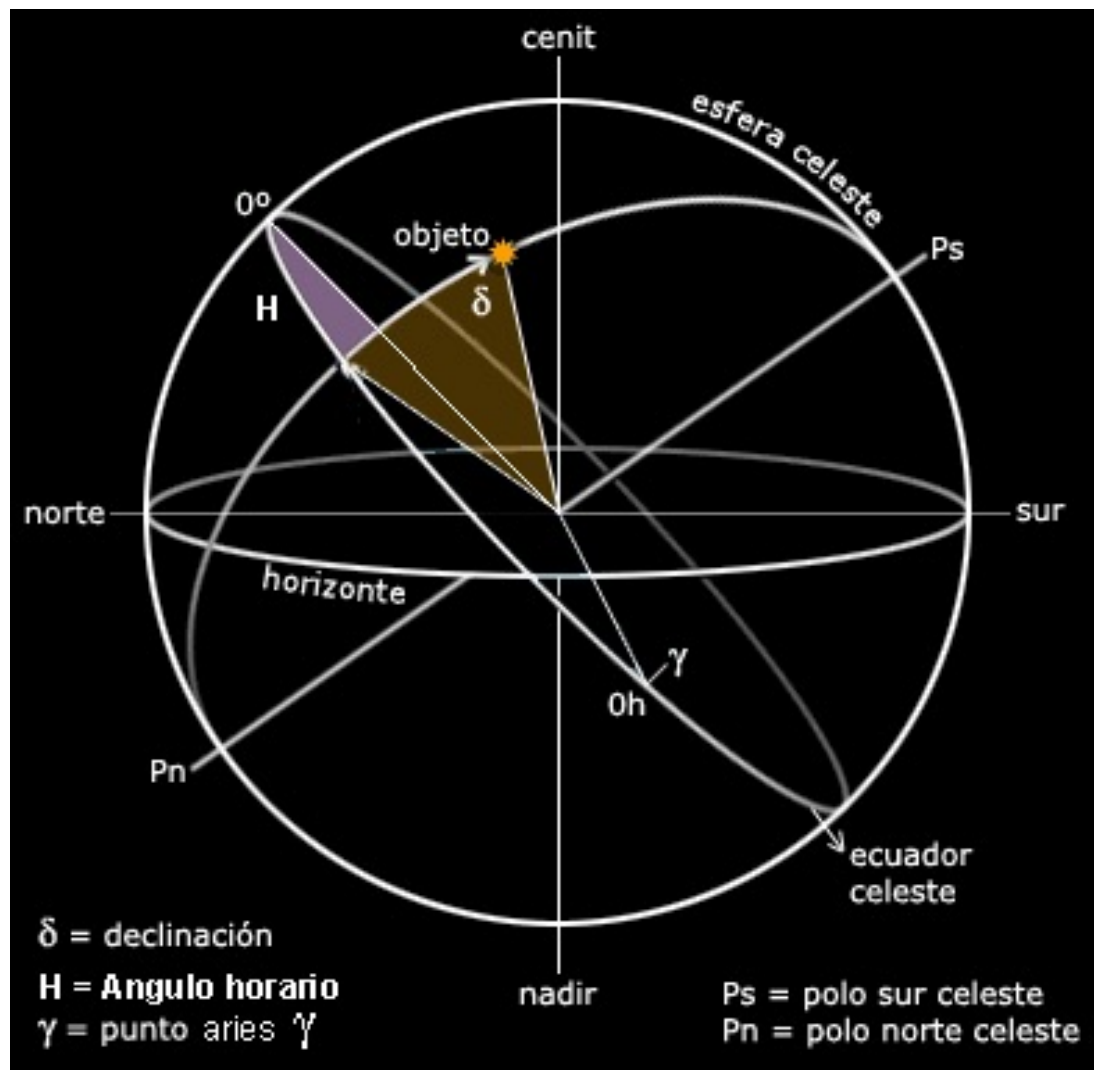
Coordenadas ecuatoriales relativas u horarias

Plano Fundamental: Ecuador Celeste
Punto Cero: Cruce del Ecuador con el Meridiano elevado

Coordenadas

- **Declinación (δ):** altura respecto al plano del Ecuador Celeste
- **Ángulo Horario (AH):** ángulo medido sobre el plano del Ecuador Celeste, desde el meridiano del observador en dirección Oeste

Es un sistema **mixto** - una coordenada es absoluta (DEC) y la otra (AH) depende del observador (y del tiempo)



Coordenadas ecuatoriales absolutas

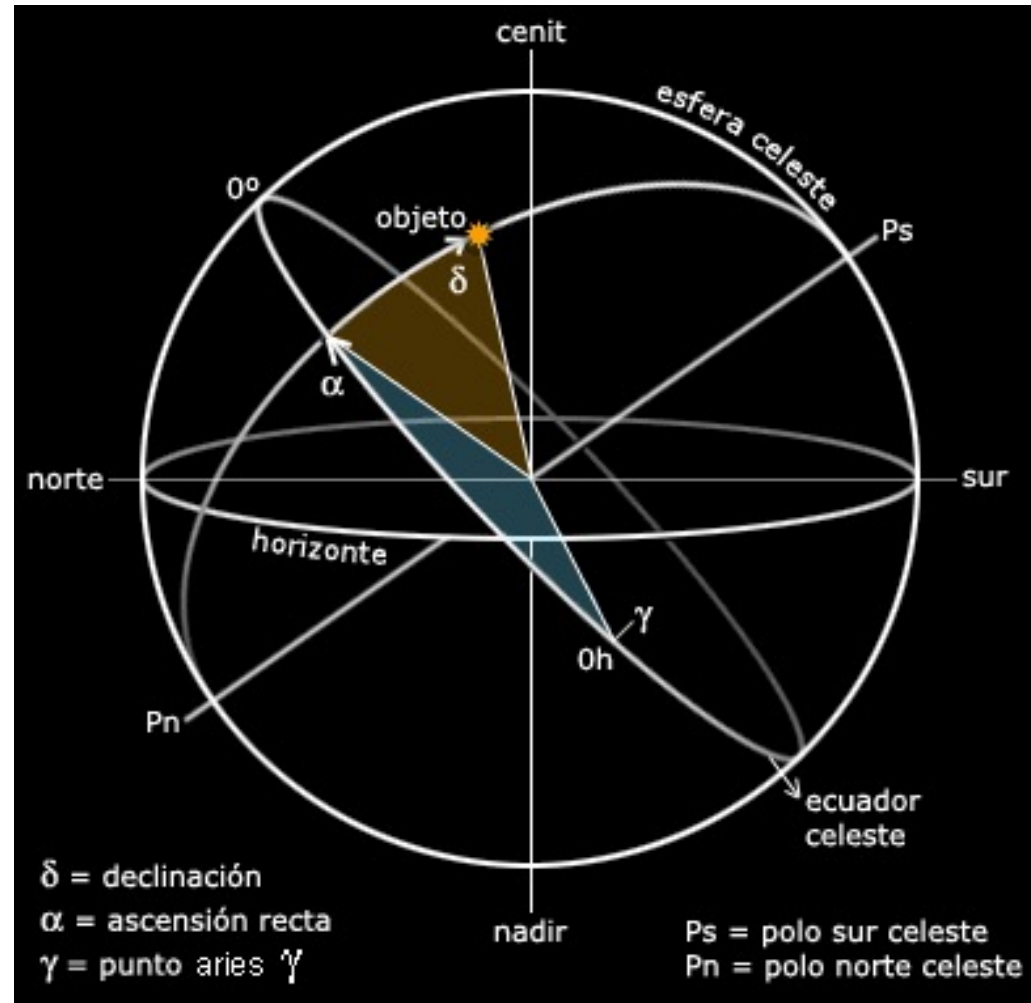
Plano Fundamental: Ecuador Celeste

Punto Cero: Punto vernal γ

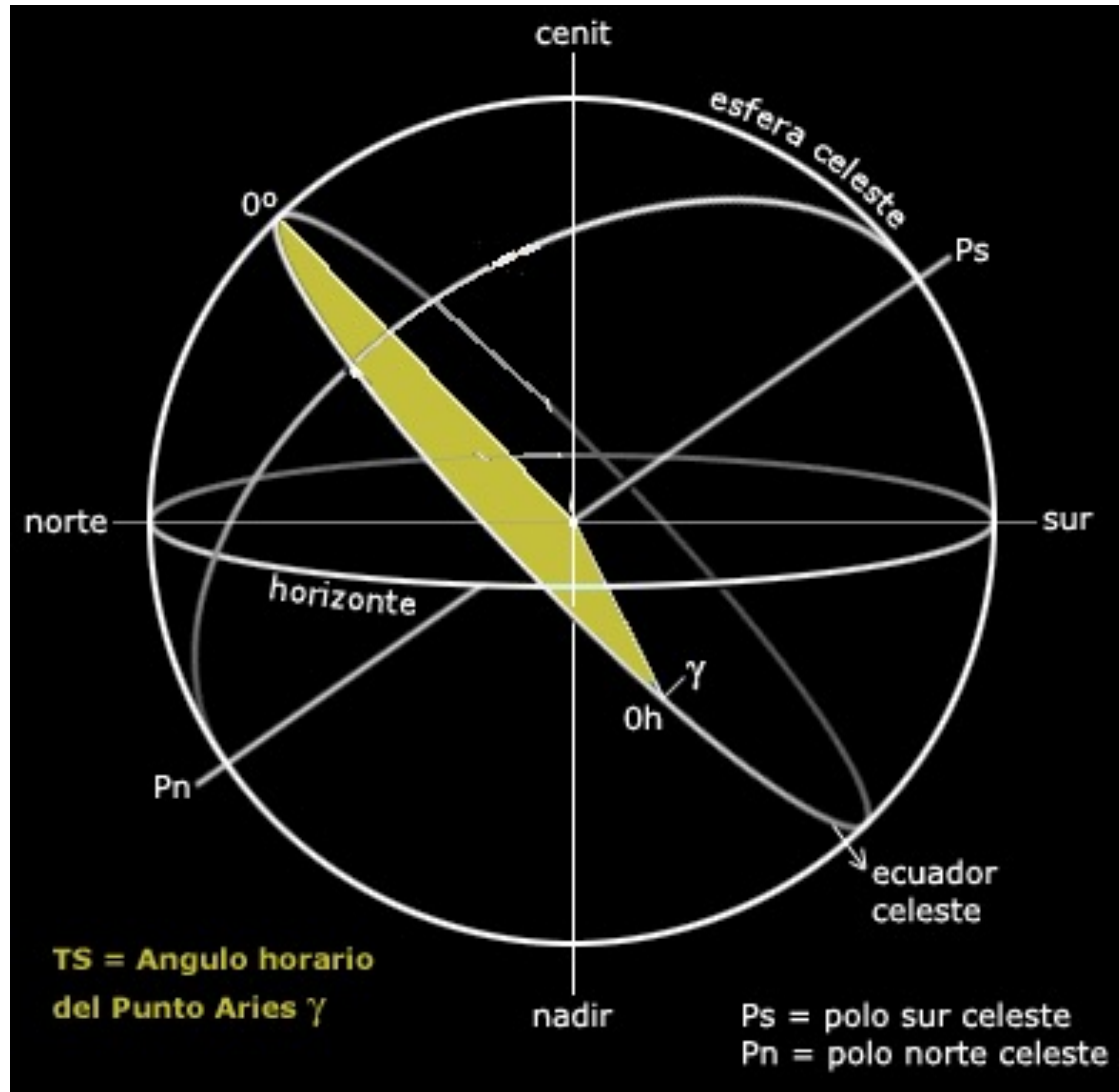
Coordenadas

- **Declinación (δ):** altura respecto al plano del Ecuador Celeste
- **Ascensión Recta (AR o α):** ángulo medido sobre el plano del Ecuador Celeste, desde el punto vernal γ

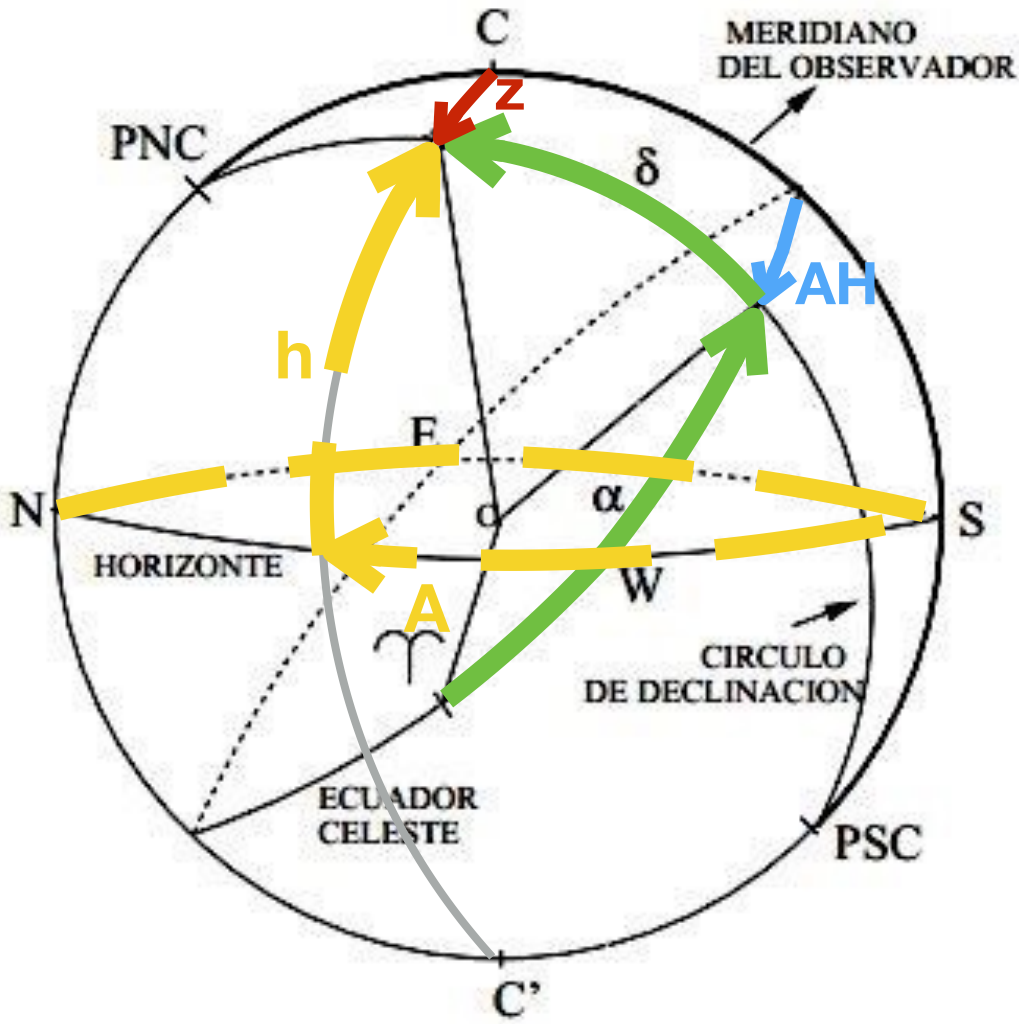
Es un sistema absoluto - la posición de un objeto celeste *no* depende del observador ni del tiempo en este sistema



Tiempo Sidéreo Local



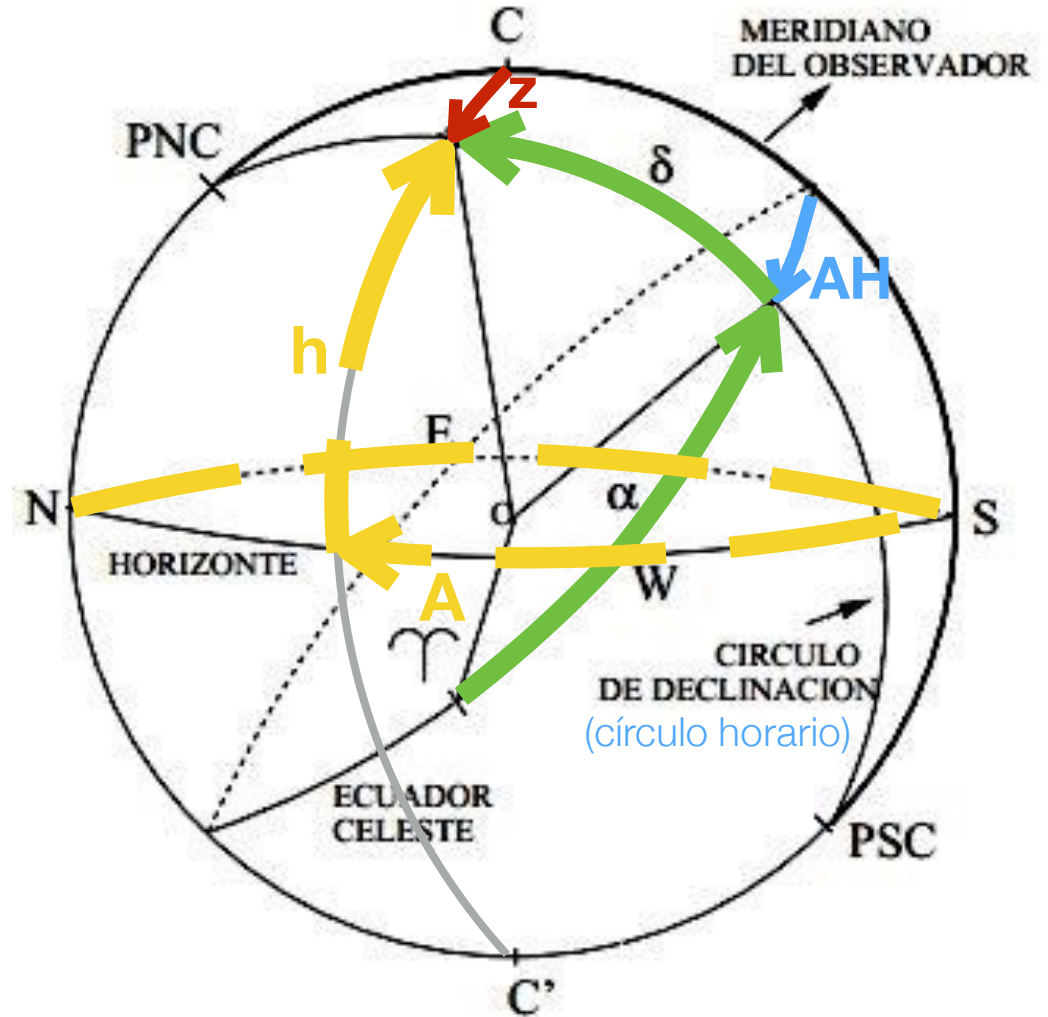
Coordenadas - Resumen



Coordenadas Ecuatoriales: (α, δ) ó (AR, DEC)

Preguntas:

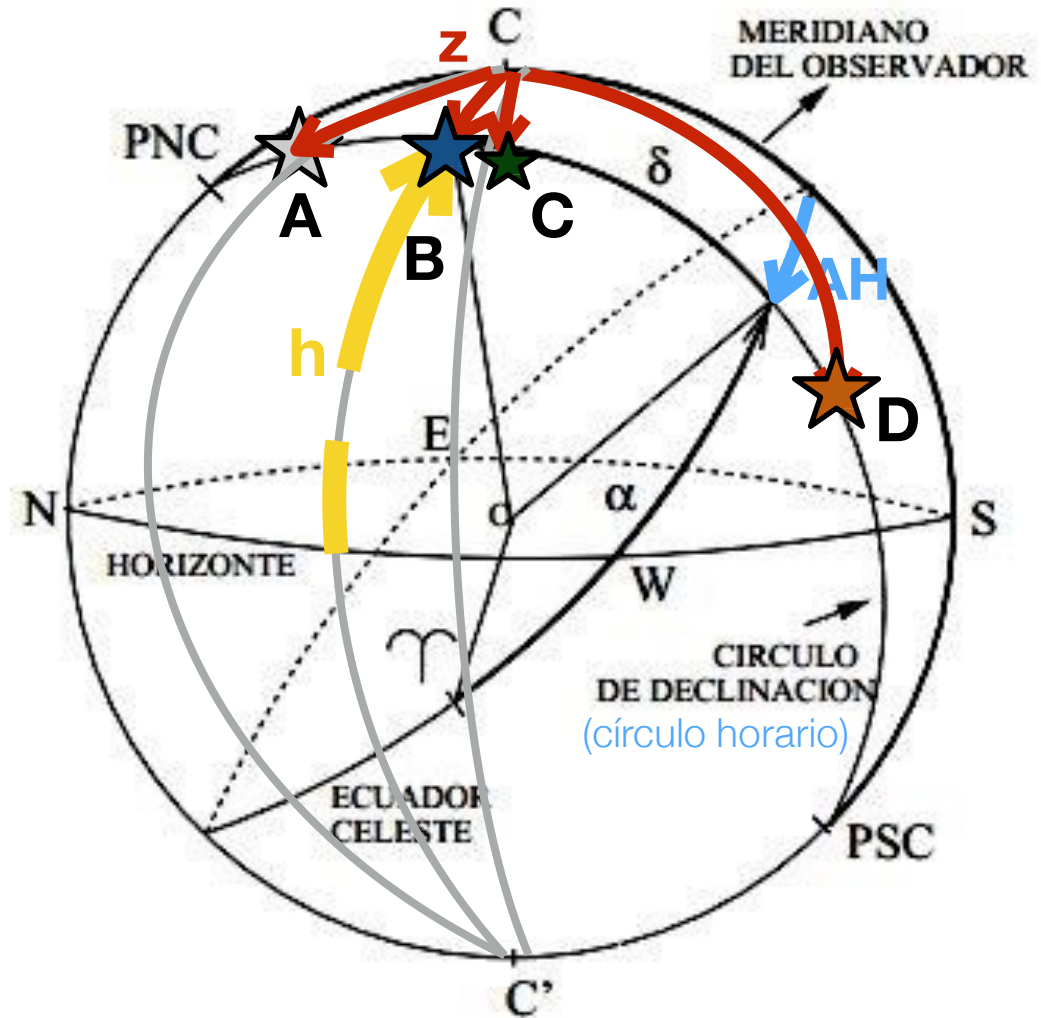
1. **AH** del Meridiano:
2. **AH** del Punto Cardinal W:
3. AH de un objeto que se está poniendo:
4. AH de un objeto que está naciendo:



Coordenadas Ecuatoriales: (α, δ) ó (AR, DEC)

Preguntas:

1. Comparar el ángulo zenital z para objetos con el mismo **AH** y diferente **DEC**
A, B, C, D
2. Para una **DEC** dada, cuál es el mínimo ángulo zenital z ?
(parte de una pregunta del práctico)



Visibilidad y culminaciones

- Astros visibles en el Hemisferio Sur

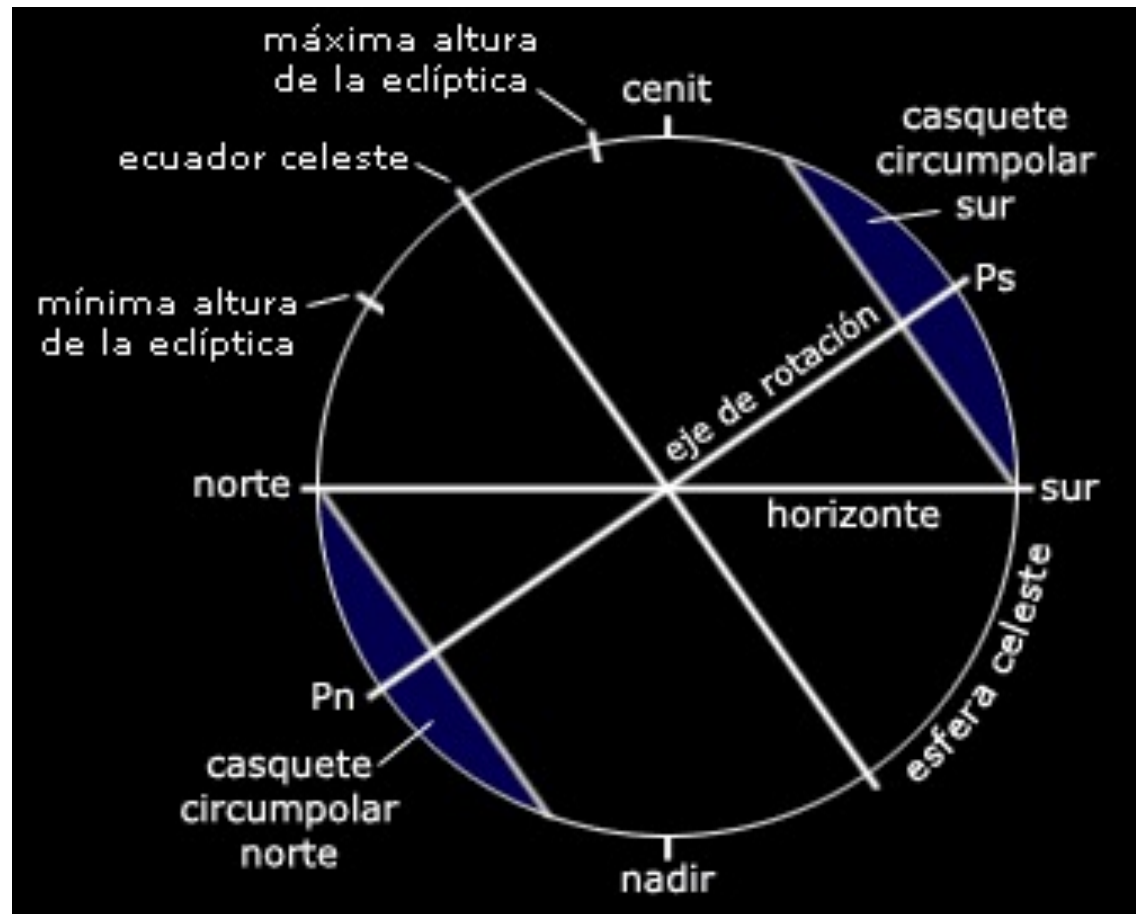
$$\delta < 90 + \varphi \quad (\varphi \text{ con su signo})$$

- Perpetuamente visibles si

$$\delta < -(90 + \varphi)$$

- Culminación para

$$TSL = \alpha$$



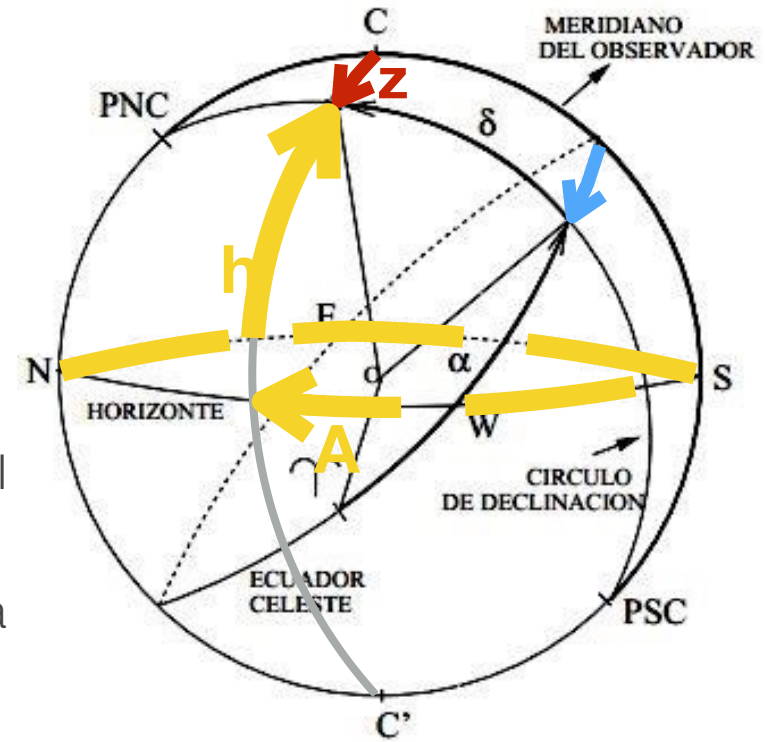
Criterios de visibilidad

- **Objeto a una altura mínima sobre el horizonte:**

- Altura $h > 30^\circ$ ($\Leftrightarrow z < 60^\circ$)

- **Condiciones óptimas:**

- Observar lo más cerca posible del paso por el meridiano ($AH=0^\circ$) \rightarrow garantiza el mínimo ángulo zenital
- Mínima iluminación de la Luna y/o máxima distancia a ésta
- Máxima cantidad de horas efectivas de observación



Dado un objeto: buscar sus coordenadas

- Sabemos qué objeto queremos observar: e.g. Nube Grande de Magallanes (LMC), cúmulo Omega Centauri (NGC 5272), asteroide Vesta, ...

The screenshot shows the SIMBAD Astronomical Database interface. At the top, there is a navigation bar with links for Portal, Simbad, VizieR, Aladin, X-Match, Other, and Help. The main heading is "SIMBAD Astronomical Database - CDS (Strasbourg)".

Below the heading, there is a section titled "What is SIMBAD ?". To the left of this section, there are two arrows pointing to the "Queries" table: a red arrow pointing to "by identifier" and an orange arrow pointing to "by coordinates".

Queries	Documentation	Information
basic search	User's guide	Presentation
by identifier		Image thumbnails
by coordinates	Query by urls	
by criteria	Nomenclature Dictionary	
reference query	Object types	
scripts	List of journals	SimWatch
TAP queries	Measurement description	Release:
options	Spectral type coding	SIMBAD4 1.7 - May-2016
Display all user annotations	User annotations documentation	Release history
	Acknowledgment	

Below the "Queries" table, there is a "Content" section with the following text:

The SIMBAD astronomical database provides basic data, cross-identifications, bibliography and measurements for astronomical objects outside the solar system. SIMBAD can be queried by object name, coordinates and various criteria. Lists of objects and scripts can be submitted. Links to some other on-line services are also provided.

To the right of the "Content" section, there is a "Basic search" section with a search form. The form has a text input field with the placeholder text "identifier; coordinates (radius=10 arcmin), or bibcode". Below the input field, there are three buttons: "SIMBAD search", "clear", and "help". At the bottom of the "Basic search" section, there is a link: "Install the Simbad basic search in your tool bar".

Visibilidad: Calculador StarAlt

The screenshot shows a web browser window with the URL `catserver.ing.iac.es`. The page header features the logo for the Isaac Newton Group of Telescopes (ING) and a navigation menu with links for 'About ING', 'Astronomy', 'Developments', 'Public Information', and a search bar. The breadcrumb trail indicates the current location: 'Home > Astronomy > Object Visibility'.

Object Visibility – STARALT

Staralt is a program that shows the observability of objects in various ways: either you can plot altitude against time for a particular night (**Staralt**), or plot the path of your objects across the sky for a particular night (**Startrack**), or plot how altitude changes over a year (**Starobs**), or get a table with the best observing date for each object (**Starmult**). For further information, click on the "help" button at the bottom of the page.

Mode	Staralt
Night	02 November 2018 or date when the local night starts. <i>Staralt, Startrack only.</i>
Observatory	Cerro Tololo Observatory (Chile) Select one above or specify your own site with this format: Longitude(*E) Latitude(*N) Altitude(metres) UT-offset(hours) Ex.: 285.2767 -30.2283 2725 -4 -56.1 -34.0 100 -3
Coordinates	Formats can be any of these: name hh mm ss tcd mm ss name hh:mm:ss tcd:mm:ss name ddd.ddd dd.ddd name must be a single word with no dots, avoid using single numbers. Every entry must be in the same format, do not use different formats with different entries. We recommend a maximum of 100 targets per submission. OCBlanco1 00:04:07 -29:50:00 OCESC24509 01 53:43 -45:57:12 GCNGC288 00:52:45 -26:34:57.4 Whiting1 02:0: 57 -03:15:10

Visibilidad: Calculador StarAlt

The screenshot shows the StarAlt calculator interface with several green annotations:

- Fecha:** A green oval highlights the date selection fields: "02", "November", and "2013".
- Datos del lugar:** A green oval highlights the location input field containing "-56.1 -34.0 100. -3".
- coordenadas (RA,DEC):** A green arrow points to the "Coordinates" text area, which contains a list of target names and their coordinates in RA, Dec, Alt, and HA format.

Mode: Staralt

Night: 02 November 2013

Observatory: Cerro Tololo Observatory (Chile)
Longitude(°E) Latitude(°N) Altitude(metres) UT-offset(hours)
Ex: 289.2767 30.2283 2725 -4
-56.1 -34.0 100. -3

Coordinates:
OCBlanco1 00:04:07 -29:50:00
OCES024509 01:53:43 -45:57:12
CCNOC268 00:52:45 -26:34:57.4
Whiting1 02:0:57 -03:15:10

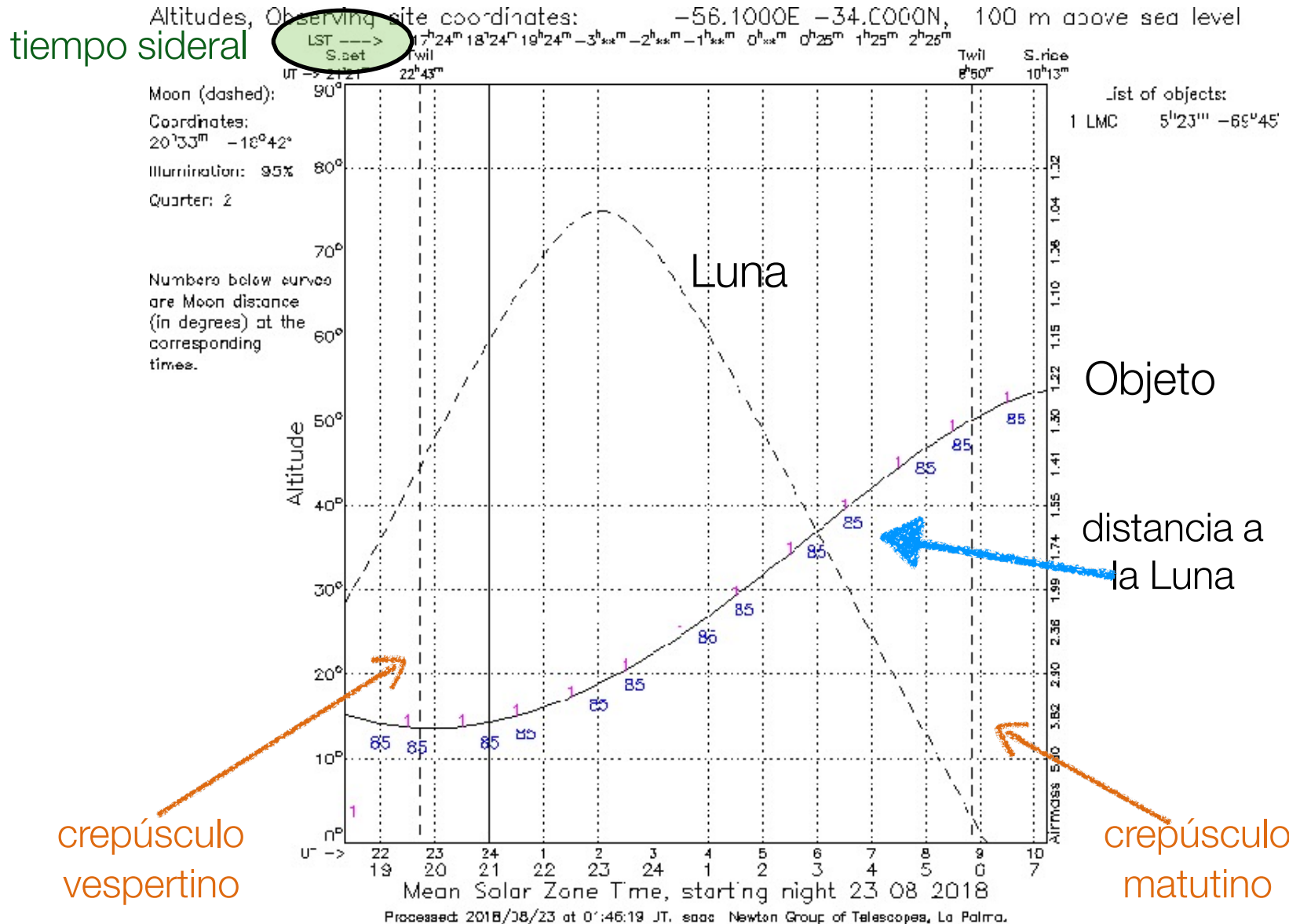
Options:
Moon distance: Included on plot. Moon coordinates at ~02:00 UT. *Staralt only.*
30°, X=2.0: Min. elevation (or max. airmass X). *Starobs, Starmuli only.*
GIF [inline]: Output format

Submit: Retrieve Help

ING telescope limits:
WHT: 09.8° < Altitude < 12° (plot). Targets with +28:57:40>Dec>+28:33:40 won't be accessible when transiting the zenithal blind spot (-0.2° size).
INT: 90° < Altitude < 33° (20° if lower shutter raised), -6h < HA < +6, +90°>Dec>-30° 09' 30" (-HA Dec plot - lower shutter raised; lowest altitude Dec plot).

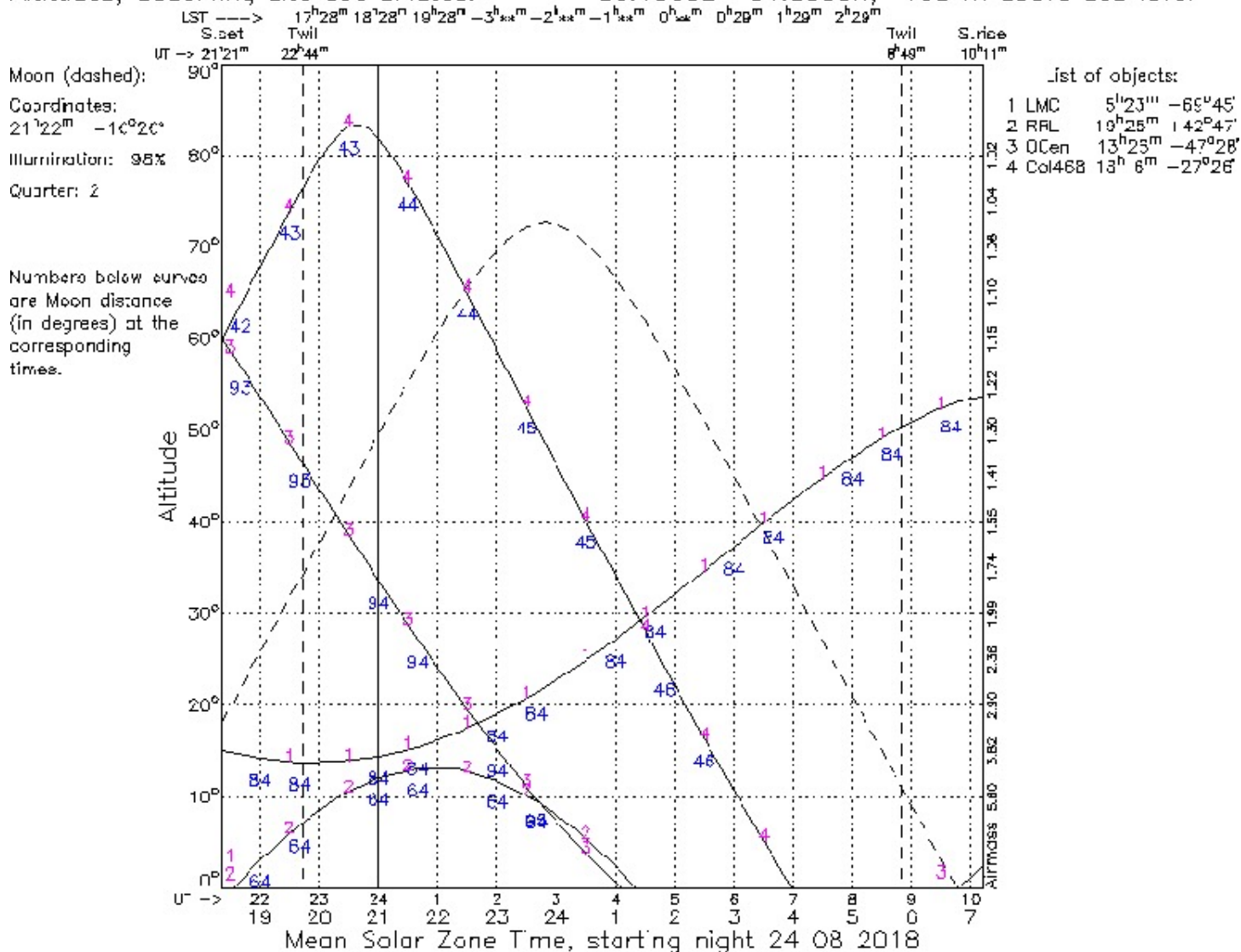
More: These are other useful resources for planning observations: [Observe](#), [astronomy tools](#), [JSkyCalc](#), [obstools](#), [NOT's visplot](#).

Visibilidad: Calculador StarAlt



Visibilidad: Calculador StarAlt

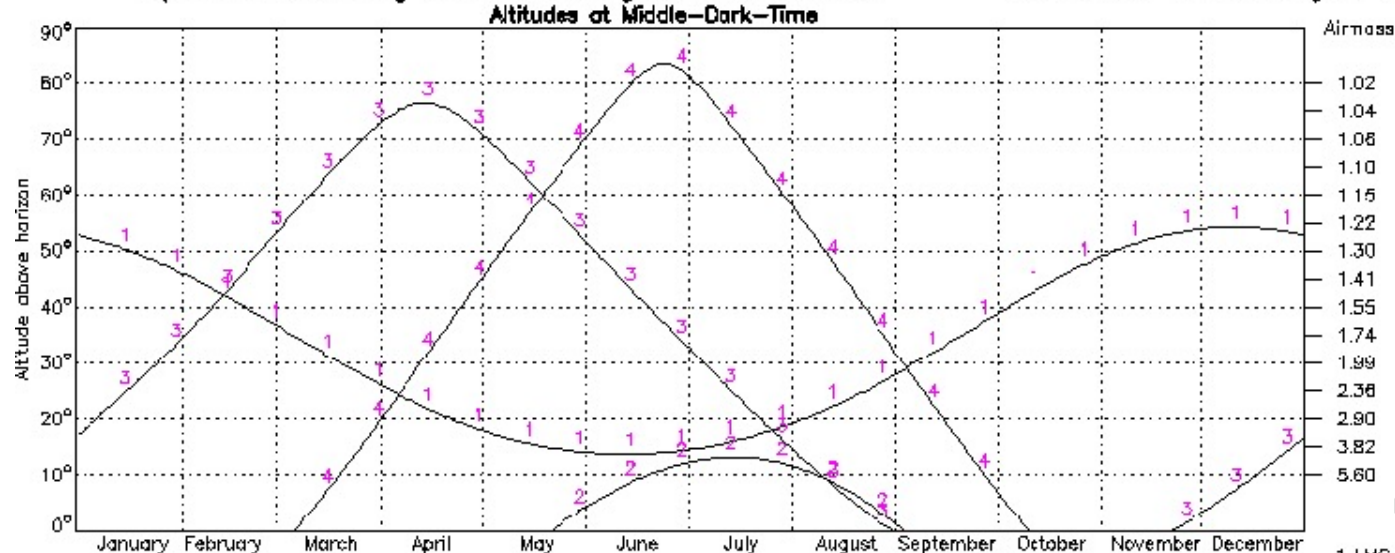
Altitudes, Observing site coordinates: $-56.1000E$ $-34.0000N$, 100 m above sea level



Visibilidad durante el año: Calculador StarObs

Optimum observing time, Observing site coordinates:

-56.1000E -34.0000, year 2018

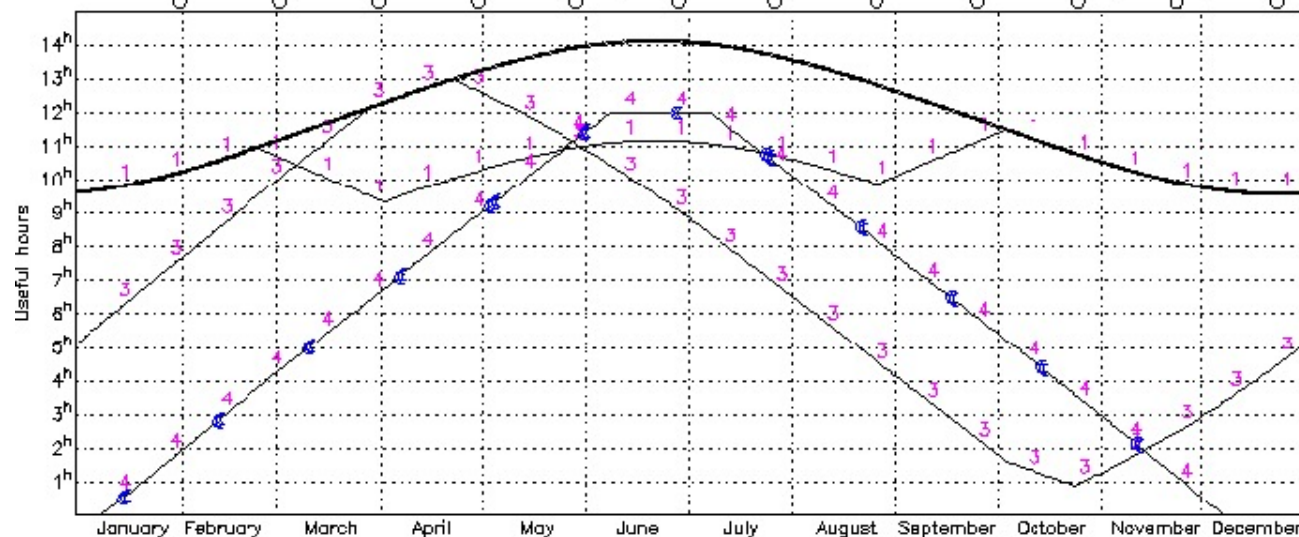


List of objects

- 1 LMC 5^h23^m -89°45'
- 2 RRL 19^h25^m +42°47'
- 3 OCen 13^h26^m -47°28'
- 4 Col468 18^h 6^m -27°26'

Sunless hours above altitude 15°

Circles above frame represent Full Moon and the "C" symbol on a curve means the Moon is closer than 15°
The thick dotted line above the curves represents the total sunless hours for each day of the year



Tiempo sidéreo

$$\text{TSL} = H_{\gamma} = \alpha + H \quad \text{TSL} - \text{Tiempo sidéreo local}$$

$$\text{TSL} = \text{TSG}_t + \lambda^{\circ}/15 \quad (\lambda: + E, - W)$$

TSG_t – Tiempo sidéreo de Greenwich a un tiempo t

$$\text{TSG}_t = \text{TSG}_0 + 1.0027379 \text{ TU}$$

TSG_0 – Tiempo sidéreo de Greenwich a 0h de TU

TU – Tiempo Universal

TU = Hora Legal – Huso (Huso: -3h Invierno)

$$\text{TU} = (\text{TSG}_t - \text{TSG}_0)/1.0027379$$

$$\text{TSG}_0 = 18.697374558 + 24.06570982441908 D_0$$

$D_0 = \text{JD}_0 - 2451545.0$ (2000 Enero 1, 12h TU, J2000)

JD_0 – Día Juliano a 0h TU

Días Julianos

- JD 0 : 1/1/-4712 (4713 AC) 12h TU
- 1/1/2000 12hTU: JD 2451545.0 (J2000)
- 1/1/2020 0h TU: JD 2458849.5
- 1/1/2021 0h TU: JD 2459215.5