

Mapas y Objetos Celestes

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Palma de Mallorca, 21-10-2021



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3 Calidad de Cielo:

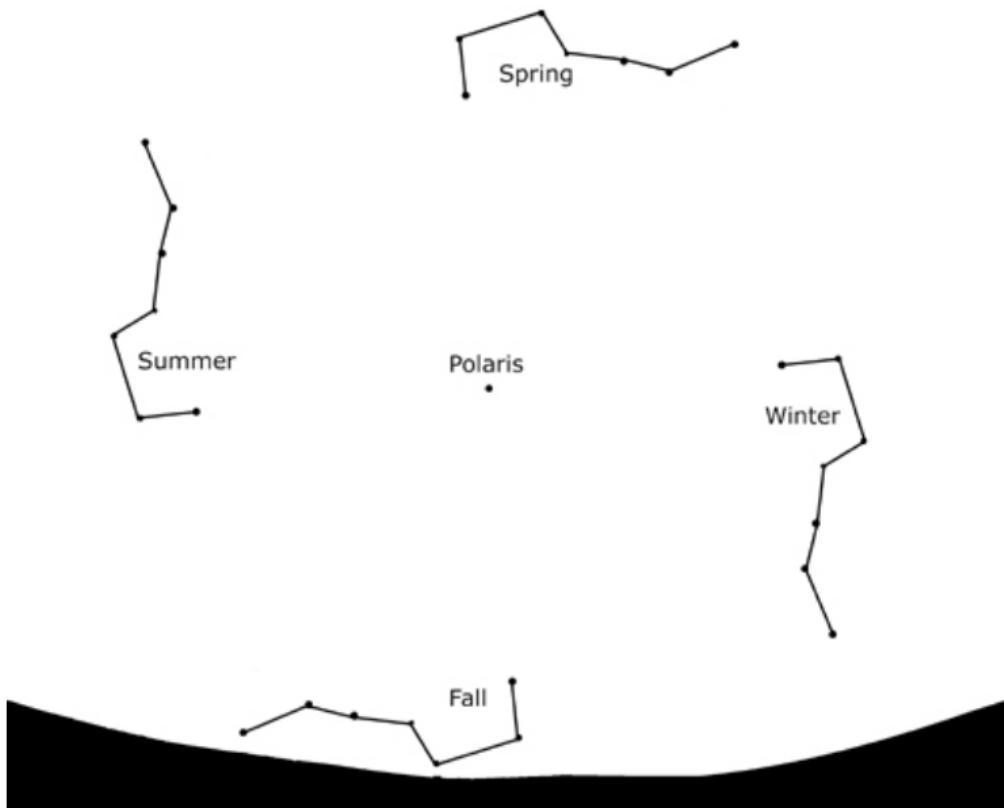
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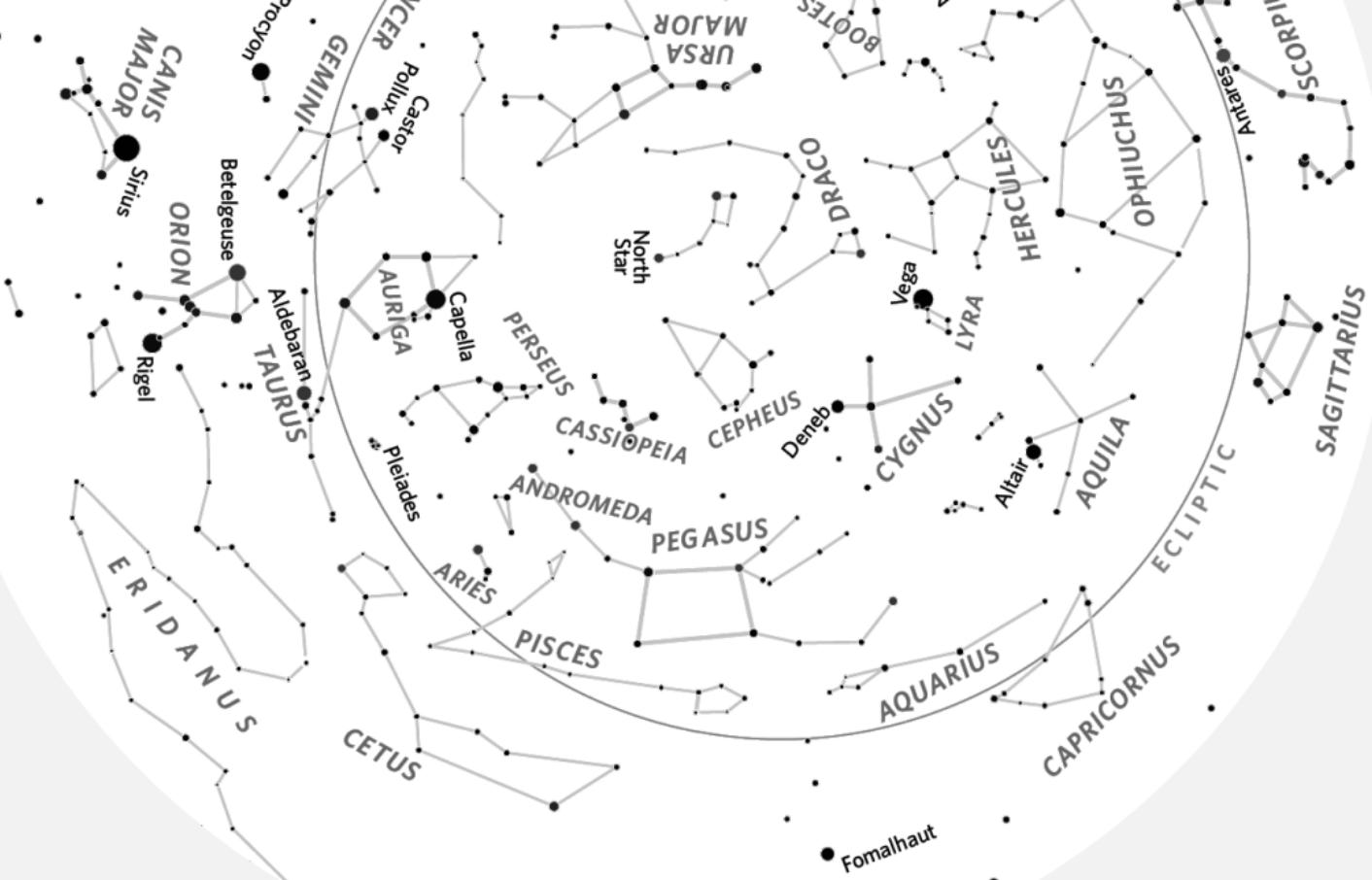
1. Mapas del Cielo

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El Cielo de cada Estación

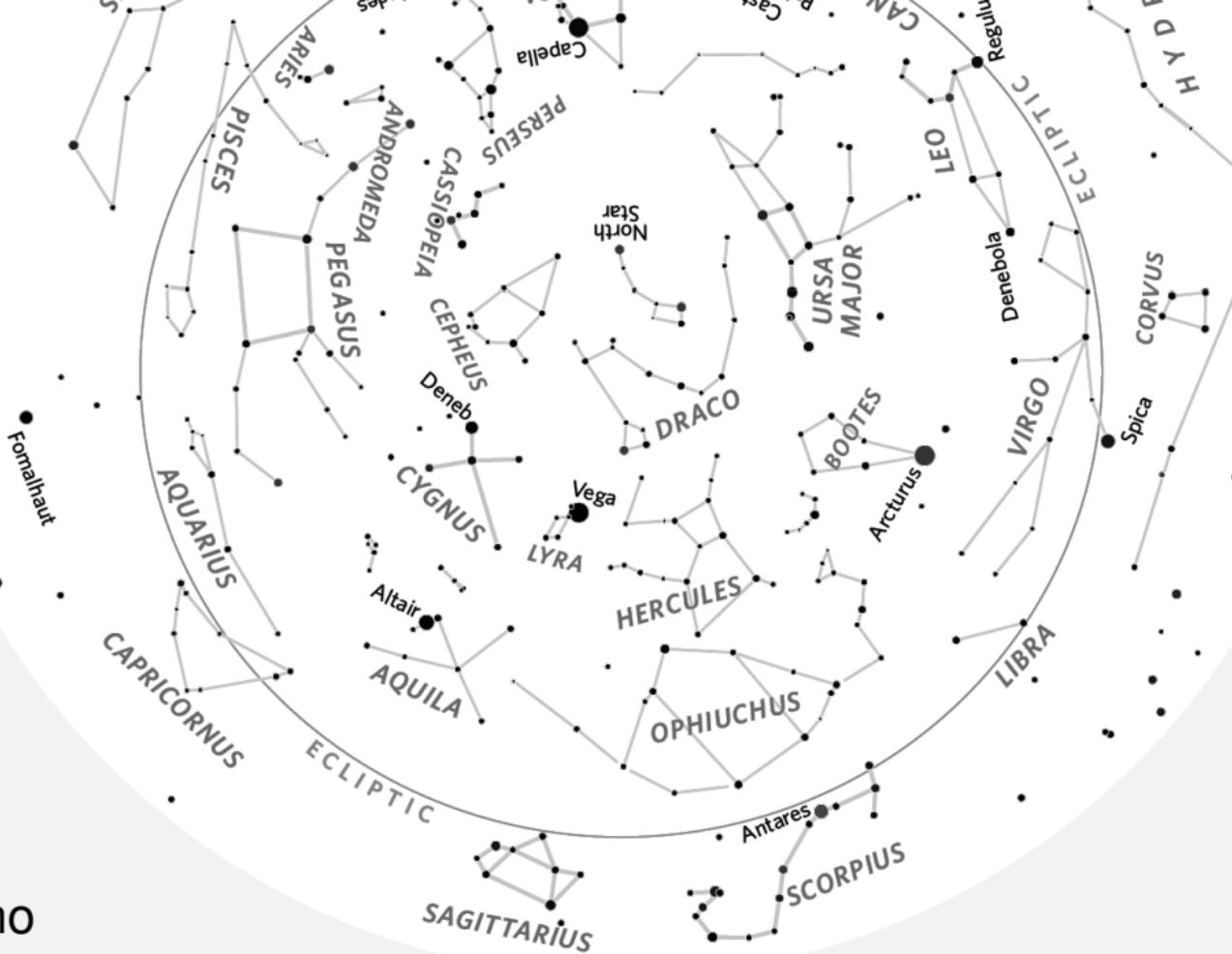
Ubicación de la Osa Mayor a lo largo del Año



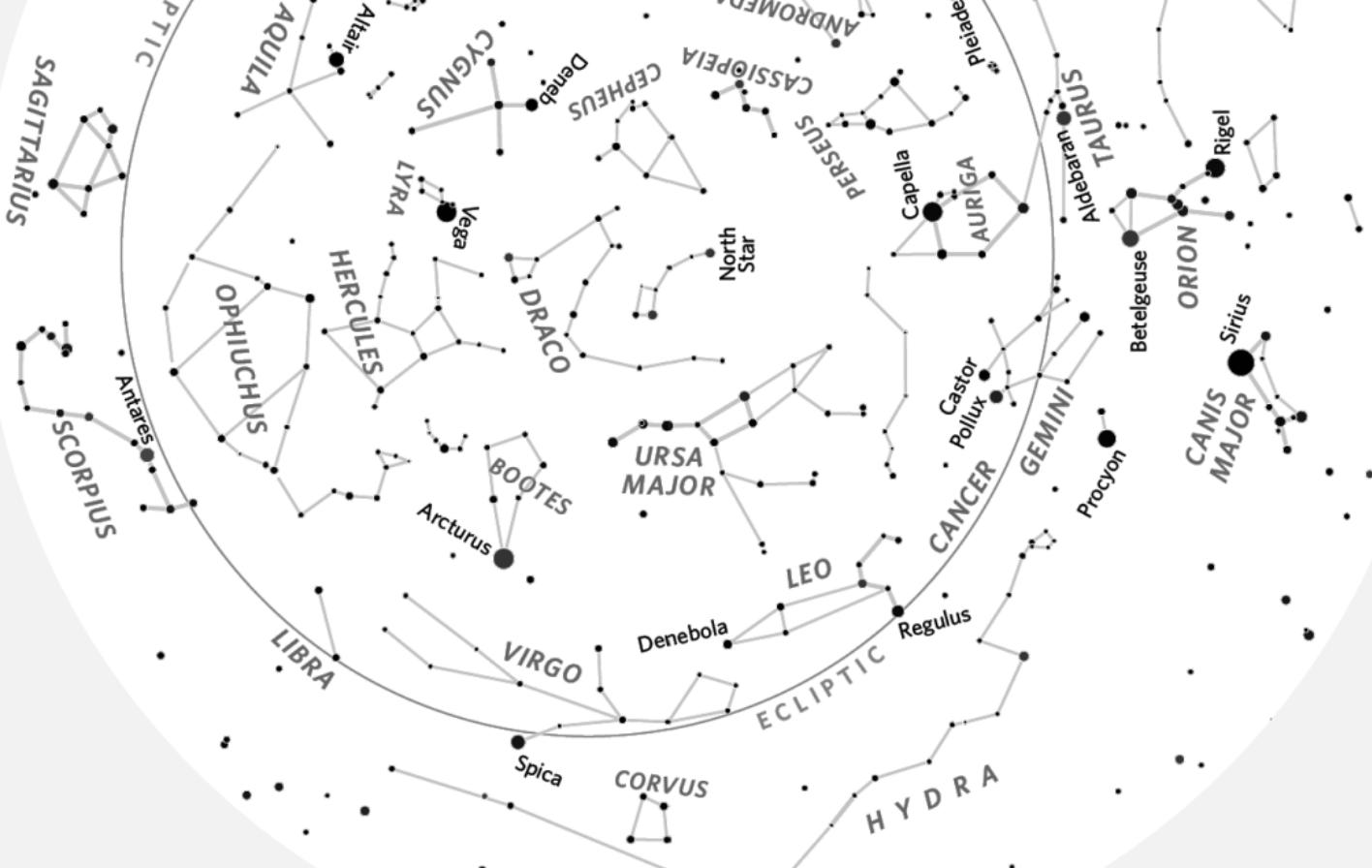


Primavera

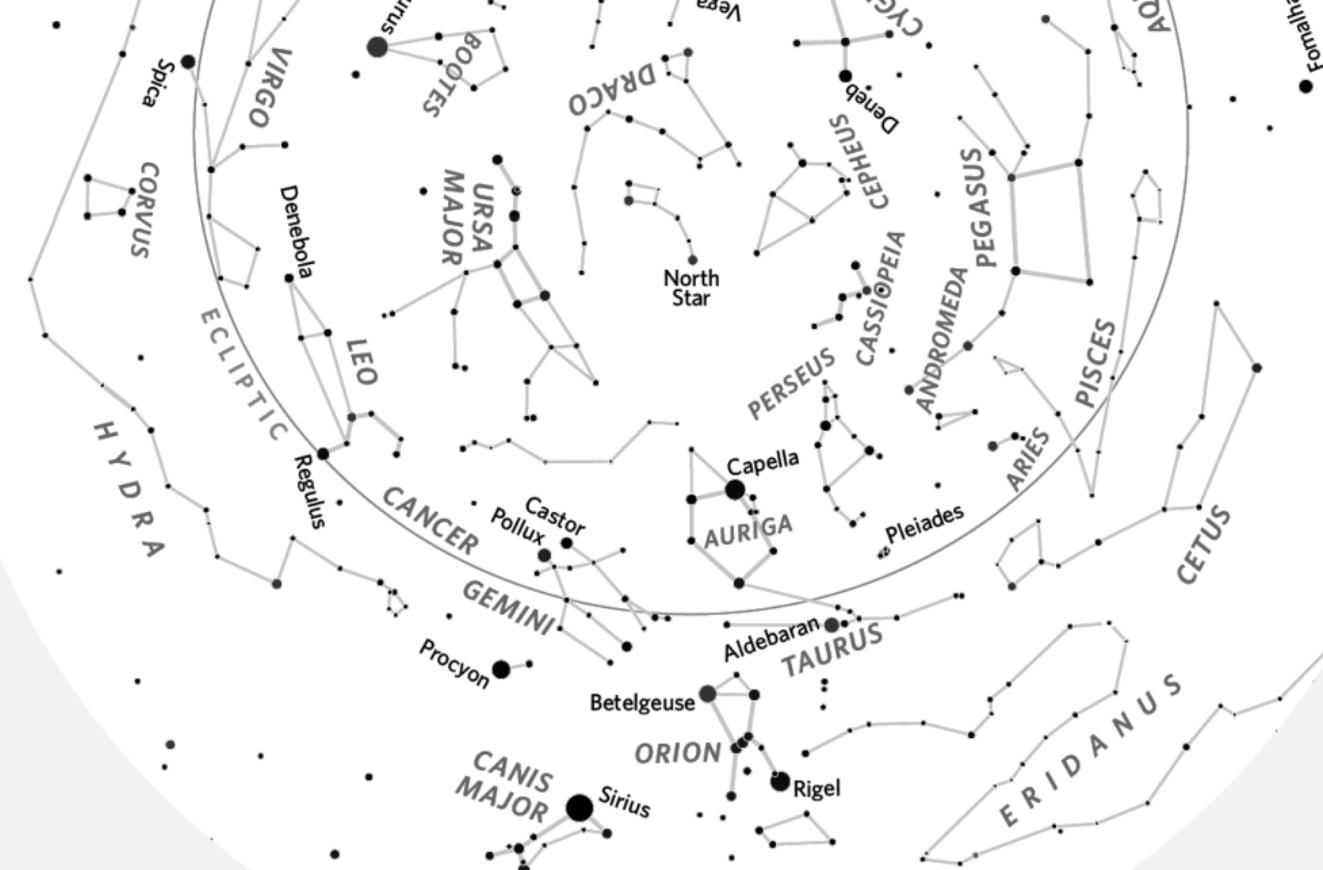
Verano



Otoño

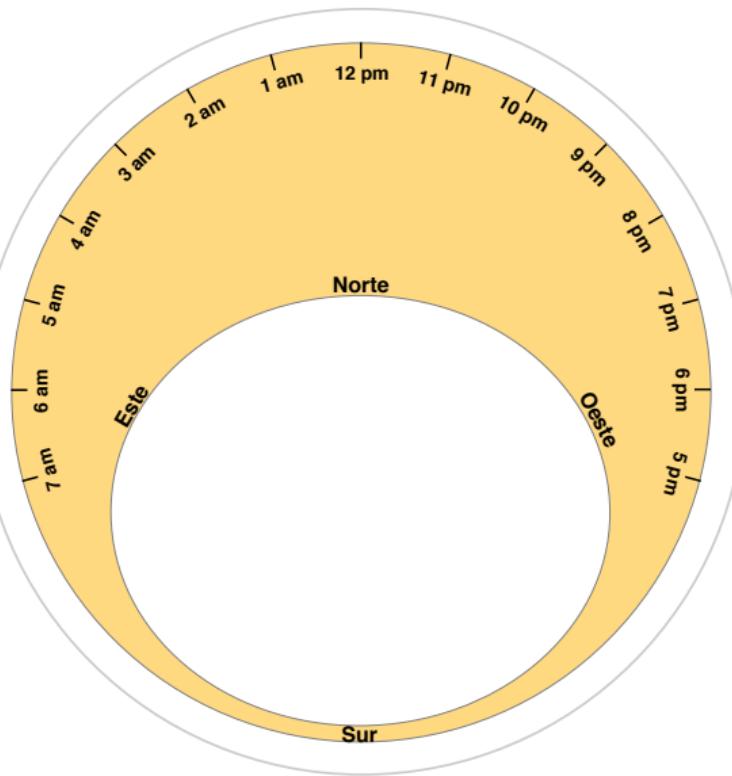
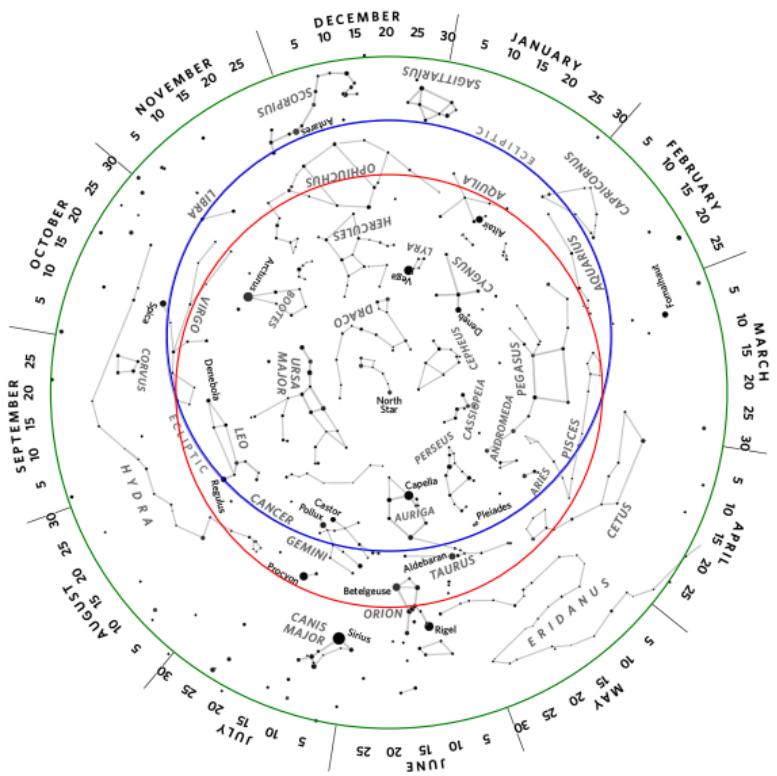


Invierno

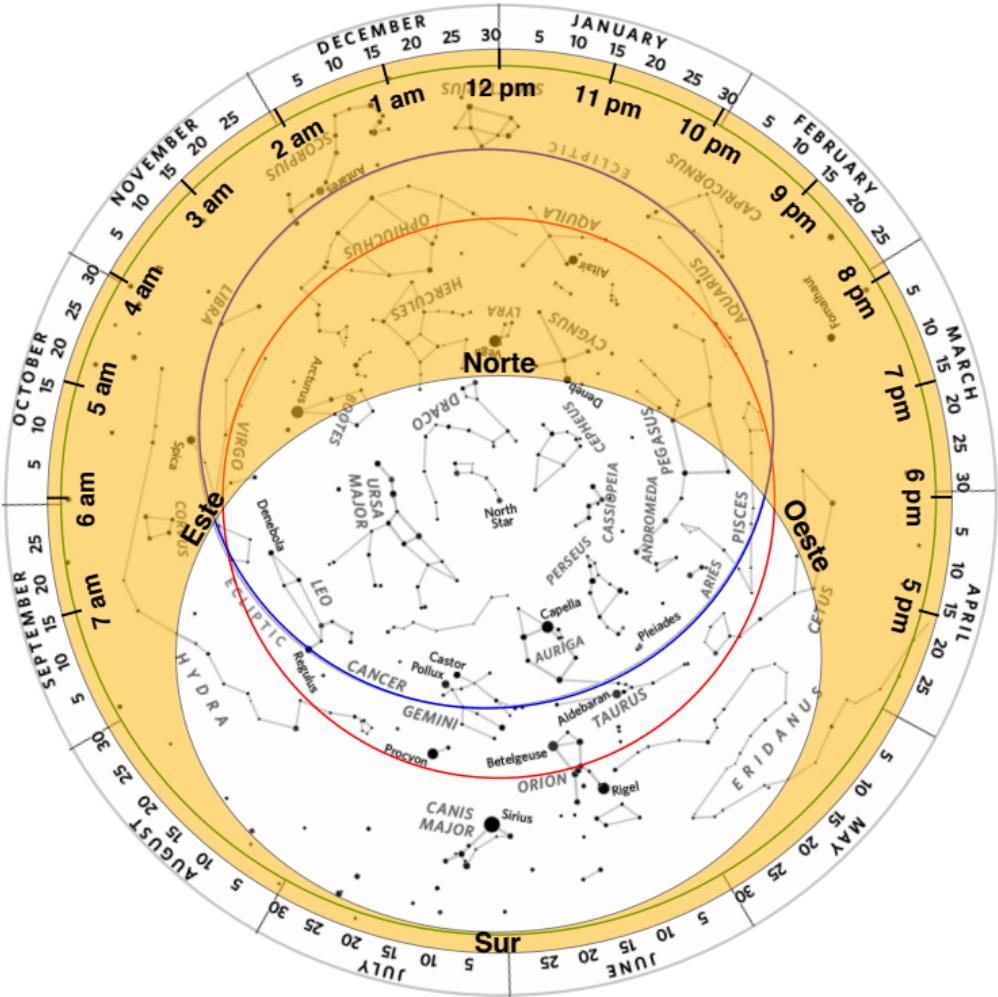


1. Mapas del Cielo

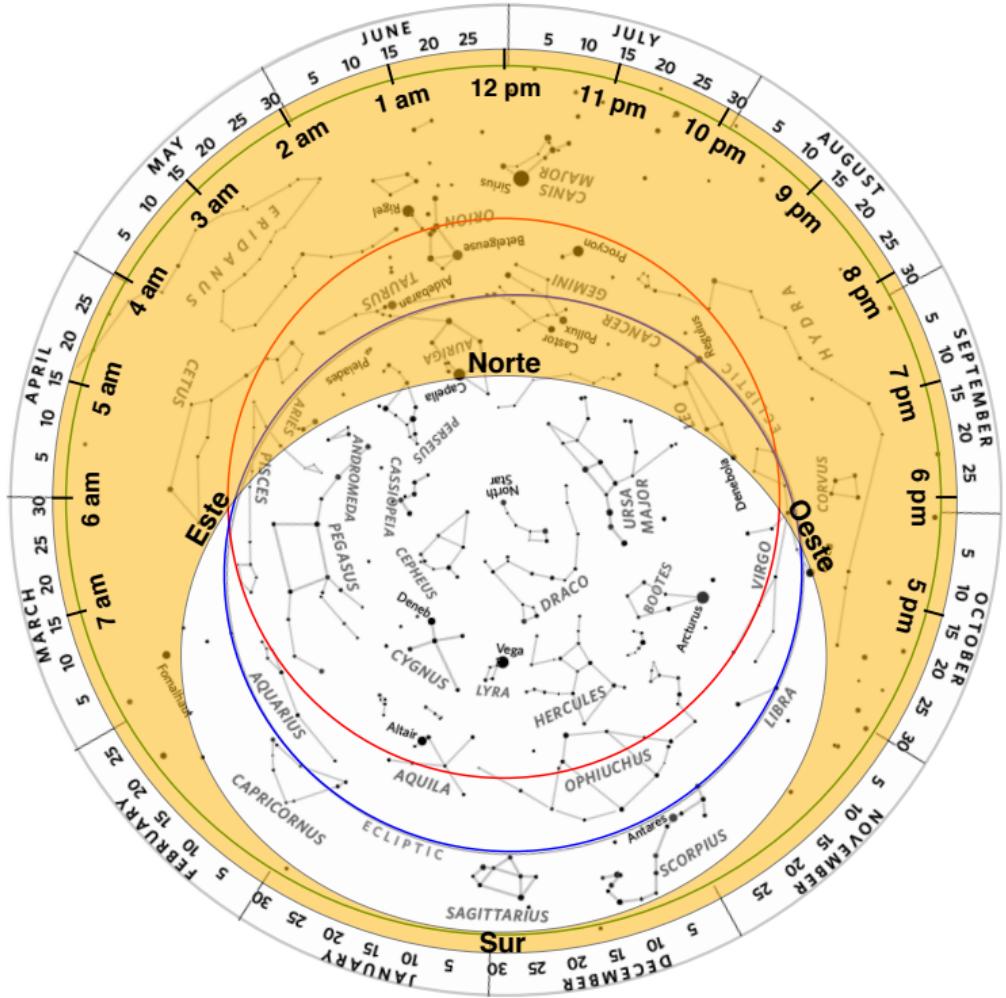
¿Cómo funciona un Planisferio?



1º ene. 12 pm



1° jul. 12 pm



1. Mapas del Cielo

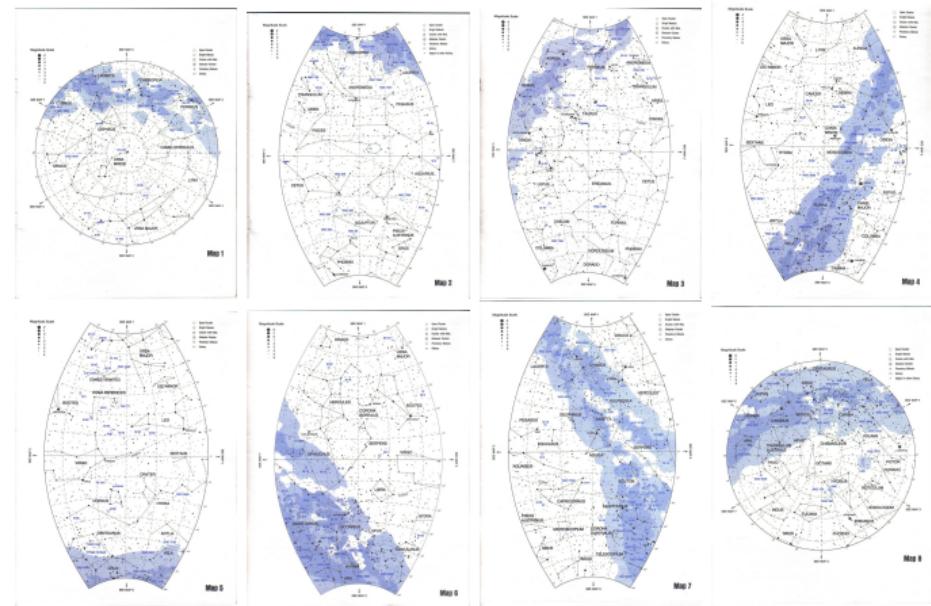
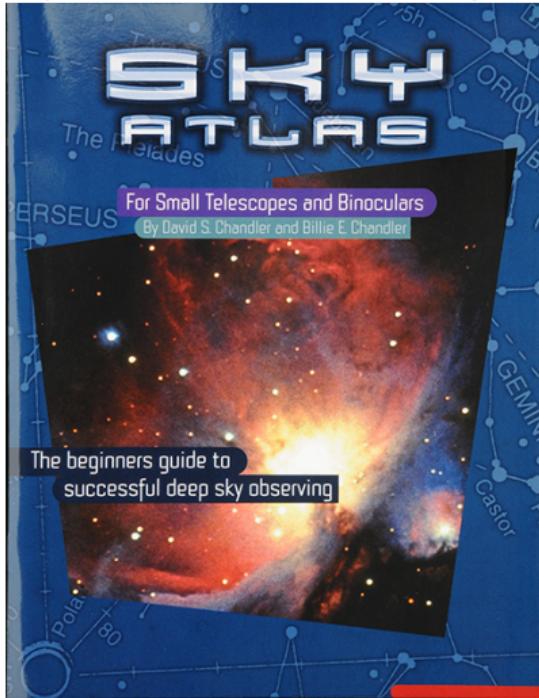
¿Qué es un Atlas Celeste?

¿Qué es un Atlas del Cielo?

- ¿Qué es un atlas celeste?
 - Es una colección de mapas relacionados que típicamente cubren todo el cielo
- Hay atlas del cielo con distintos niveles de detalle:
 - ① Atlas para ser usados a **simple vista** (planisferios!)
 - Típicamente es un único mapa
 - ② Atlas para **binoculares y telescopios pequeños**
 - Normalmente contienen una decena de mapas celestes
 - ③ Atlas para **telescopios**
 - Usualmente contienen centenares de mapas (100 o más mapas)
- ¡Existen varios atlas del cielo muy buenos!

Ejemplo de Atlas Celeste para Binoculares

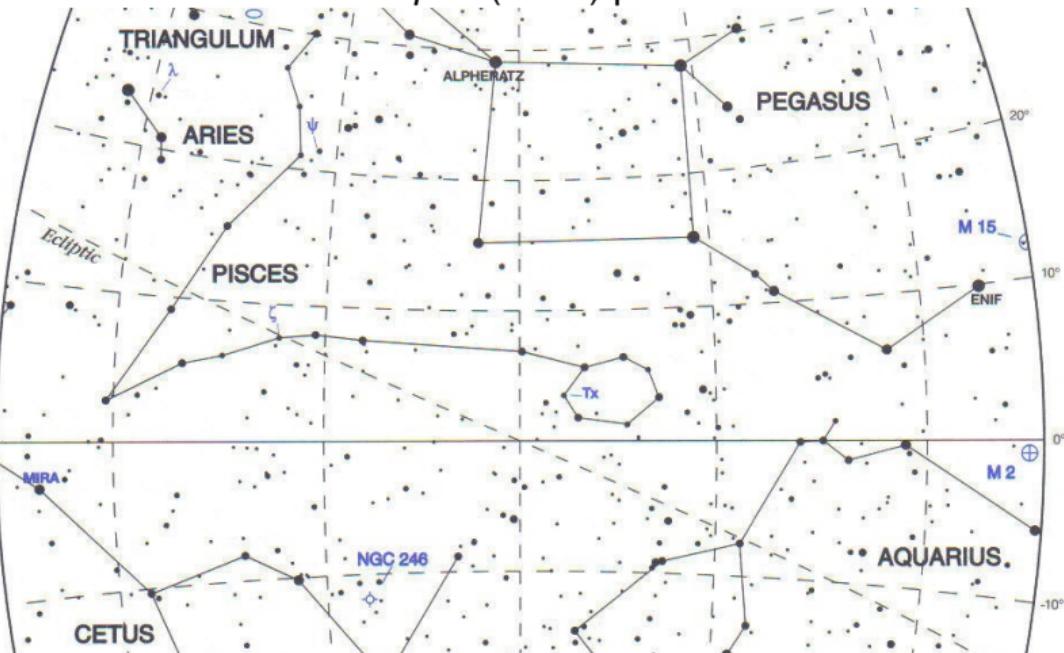
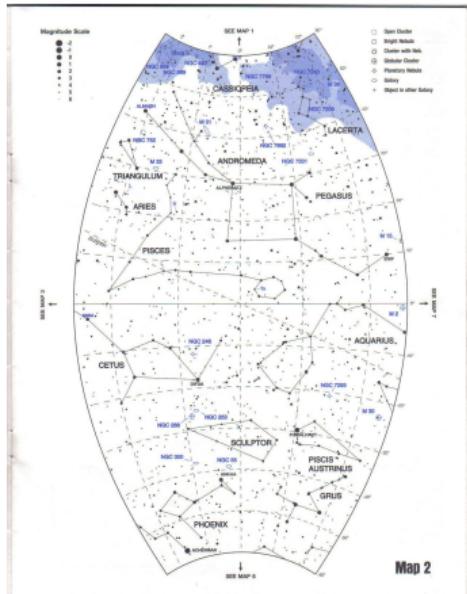
Sky Atlas for Small Telescopes (2007) por Chandler:



- Contiene 8 mapas (dos polares y el resto alrededor del Ecuador celeste; cada 60°)
→ ¡un tamaño perfecto para binoculares!

Ejemplo de Atlas Celeste para Binoculares

Ejemplo de un mapa del *Sky Atlas for Small Telescopes* (2007) por Chandler:



2. Objetos del Cielo

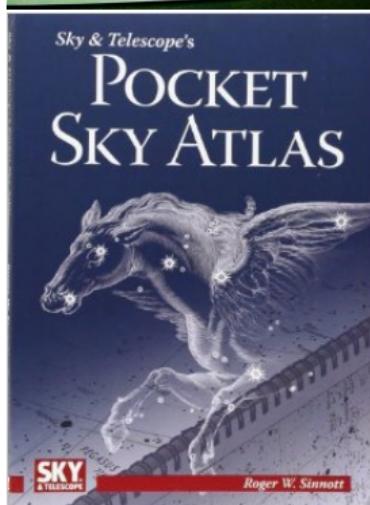
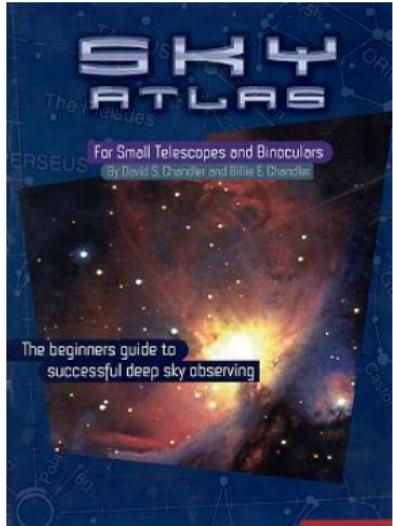
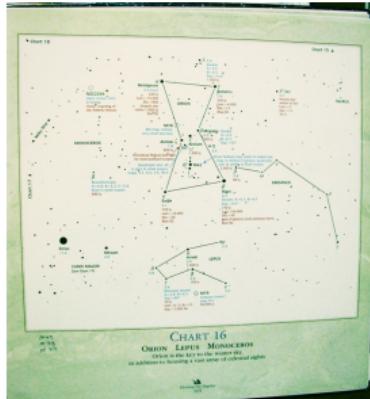
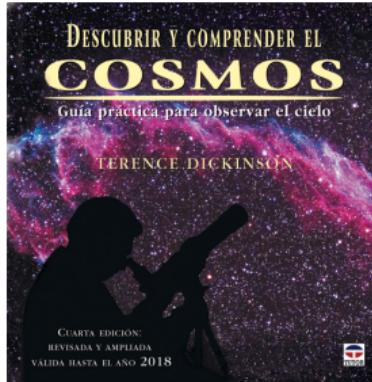
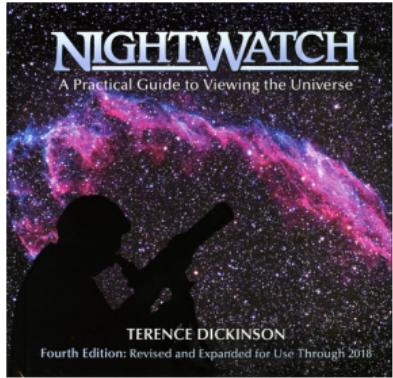
2. Objetos del Cielo

¿Cómo encuentro los objetos en el cielo?

¿Cómo encuentro los objetos en el cielo? Planisferio

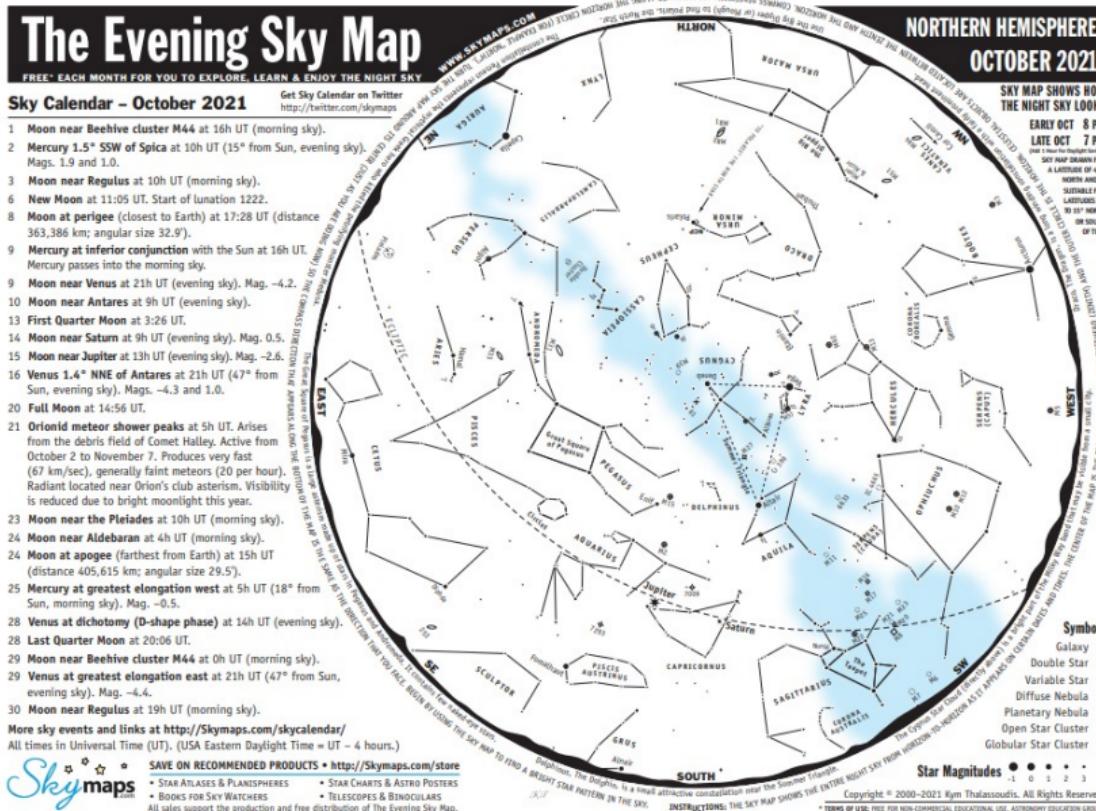


¿Cómo encuentro los objetos en el cielo? **Atlas del Cielo**



¿Cómo encuentro los objetos en el cielo? Material Online

<http://skymaps.com/downloads.html> (un archivo pdf al mes):



¿Cómo encuentro los objetos en el cielo? Material Online

<http://skymaps.com/downloads.html> (un archivo pdf al mes):

About the Celestial Objects

Listed on this page are several of the brighter, more interesting celestial objects visible in the evening sky this month (refer to the monthly sky map). The objects are grouped into three categories. Those that can be easily seen with the naked eye (that is, without optical aid), those easily seen with binoculars, and those requiring a telescope to be appreciated. Note, all of the objects (except single stars) will appear more impressive when viewed through a telescope or very large binoculars. They are grouped in this way to highlight objects that can be seen using the optical equipment that may be available to the star gazer.

Tips for Observing the Night Sky

When observing the night sky, and in particular deep-sky objects such as star clusters, nebulae, and galaxies, it's always best to observe from a dark location. Avoid direct light from street lights and other sources. If possible observe from a dark location away from the light pollution that surrounds many of today's large cities.

You will see more stars after your eyes adapt to the darkness—usually about 10 to 20 minutes after you go outside. Also, if you need to use a torch to view the sky map, cover the light bulb with red cellophane. This will preserve your dark vision.

Finally, even though the Moon is one of the most stunning objects to view through a telescope, its light is so bright that it brightens the sky and makes many of the fainter objects very difficult to see. So try to observe the evening sky on moonless nights around either New Moon or Last Quarter.

Astronomical Glossary

Conjunction – An alignment of two celestial bodies such that they present the least angular separation as viewed from Earth.

Constellation – A defined area of the sky containing a star pattern.

Diffuse Nebula – A cloud of gas illuminated by nearby stars.

Double Star – Two stars that appear close to each other in the sky; either linked by gravity so that they orbit each other (binary star) or lying at different distances from Earth (optical double). Apparent separation of stars is given in seconds of arc (").

Ecliptic – The path of the Sun's center on the celestial sphere as seen from Earth.

Elongation – The angular separation of two celestial bodies. For Mercury and Venus the greatest elongation occurs when they are at their most angular distance from the Sun as viewed from Earth.

Galaxy – A mass of up to several billion stars held together by gravity.

Globular Star Cluster – A ball-shaped group of several thousand old stars.

Light Year (ly) – The distance a beam of light travels at 300,000 km/sec in one year.

Magnitude – The brightness of a celestial object as it appears in the sky.

Open Star Cluster – A group of tens or hundreds of relatively young stars.

Opposition – When a celestial body is opposite the Sun in the sky.

Planetary Nebula – The remnants of a shell of gas blown off by a star.

Universal Time (UT) – A time system used by astronomers. Also known as Greenwich Mean Time. USA Eastern Standard Time (for example, New York) is 5 hours behind UT.

Variable Star – A star that changes brightness over a period of time.

NORTHERN HEMISPHERE OCTOBER 2021

CELESTIAL OBJECTS



Easily Seen with the Naked Eye

- | | |
|------------|---|
| Aql | • Brightest star in Aquila. Name means "the flying eagle". Dist=16.7 ly. |
| Capella | • The 6th brightest star. Appears yellowish in color. Spectroscopic binary. Dist=42 ly. |
| Antares | • Orange, giant K star. Name means "bear watcher". Dist=367 ly. |
| δ Cephei | • Cepheid prototype. Mag varies between 3.5 & 4.4 over 5,366 days. Mag 6 companion. |
| Deneb | • Brightest star in Cygnus. One of the greatest known supergiants. Dist=1,400±200 ly. |
| α Herculis | • Semi-regular variable. Magnitude varies between 3.1 & 3.5 over 90 days. Mag 5.4 companion. |
| Vega | • The 5th brightest star in the sky. A blue-white giant. Dist=25.0 ly. |
| Altair | • Famous eclipsing binary star. Mag varies between 2.1 & 2.7 over 2,867 days. |
| Algol | • Eclipsing binary star in Perseus. In Arabic "the "Fairy's mouth". Dist=25 ly. |
| Fomalhaut | • Brightest star in Pisces Australis. In Arabic "the "Fairy's mouth". Dist=25 ly. |
| Platiades | • The Seven Sisters. Spectacular cluster. Many more stars visible in binoculars. Dist=380 ly. |
| Tau | • Polaris |
| UMi | • The North Pole Star. A telescope reveals an unrelated mag 8 companion star. Dist=433 ly. |

Easily Seen with Binoculars

- | | |
|----------------|--|
| M31 | • Andromeda Galaxy. Most distant object visible to naked eye. Dist=2.93 million ly. |
| M2 | • Resembles a fuzzy star in binoculars. |
| η Aquilae | • Bright Cepheid variable. Mag varies between 3.8 & 4.5 over 7,166 days. Dist=1,200 ly. |
| ζ Cephei | • Herschel's Gavet Star. One of the reddest stars. Mag 3.4 to 5.1 over 720 days. |
| γ Cygni | • Long period pulsating red giant. Magnitude varies between 3.3 & 14.2 over 407 days. |
| M39 | • May be visible to the naked eye under good conditions. Dist=100 ly. |
| γ Draconis | • Wide pair of white stars. One of the finest binocular pairs in the sky. Dist=100 ly. |
| M13 | • Best globular in northern skies. Discovered by Halley in 1714. Dist=23,000 ly. |
| M92 | • Fainter and smaller than M13. Use a telescope to resolve its stars. |
| r Lyrae | • Famous Double Double. Binoculars show a double star. High power reveals each a double. |
| R Lyrae | • Lyr |
| M12 | • Semi-regular variable. Magnitude varies between 3.9 & 5.0 over 46.0 days. |
| M12 | • Oph |
| M10 | • Close to the brighter M12. Both may be glimpsed in binoculars. Dist=18,000 ly. |
| IC 4665 | • Oph |
| 6633 | • Large, scattered open cluster. Visible with binoculars. |
| M15 | • Oph |
| Peg | • Only globular known to contain a planetary nebula (Mag 14, d=1"). Dist=30,000 ly. |
| Double Cluster | • Per |
| M8 | • Double Cluster in Perseus. NGC 869 & 884. Excellent in binoculars. Dist=7,300 ly. |
| M25 | • Sgr |
| M22 | • Sgr |
| Mizar & Alcor | • A spectacular globular star cluster. Telescope will show stars. Dist=10,000 ly. |
| Cr 399 | • UMa |
| Vul | • Good eyeshot or binoculars reveals 2 stars. Not a binary. Mizar has a mag 4 companion. |
| | • Coathanger asterism or "Brocchi's Cluster". Not a true star cluster. Dist=218 to 1,140 ly. |

Telescopic Objects

- | | |
|---------------|---|
| γ Andromedae | • And |
| 7009 | • Attractive double star. Bright orange star with mag 5 blue companion. Sep=9.8". |
| 7293 | • Aqr |
| | • Saturn Nebula. Requires 8-inch telescope to see Saturn-like appendages. |
| | • Aqr |
| | • Helix Nebula. Spans nearly 1/4 deg. Requires dark sky. Dist=300 ly. |
| γ Arietis | • Ari |
| | • Impressive looking double blue-white star. Visible in a small telescope. Sep=7.8". |
| M51 | • CN |
| | • Whirlpool Galaxy. First recognized to have spiral structure. Dist=25 million ly. |
| η Cassiopeiae | • Albireo |
| Alnilam | • Yellow star mag 1.6 & orange star mag 2.7. Dist=19 to 30 light years. Sep=12". |
| 61 Cygni | • Cyg |
| | • Beautiful blue-white star. Dist=11.4 ly. Sep=2.4". |
| β Delphini | • Del |
| | • Appears yellow & white. Mag 4.3 & 5.2. Dist=200 ly. Struve 2725 double in same field. |
| β Lynæ | • Lyr |
| | • Eclipsing binary. Mag varies between 3.7 & 4.3 over 12,940 days. Fainter mag 7.2 blue star. |
| M57 | • M57 |
| | • Ring Nebula. Magnificent object. Smoke-ring shape. Dist=400 ly. |
| M23 | • Sgr |
| | • Elongated star cluster. Telescope required to show stars. Dist=2,100 ly. |
| M20 | • Sgr |
| | • Trifid Nebula. A telescope shows 3 dust lanes trisecting nebula. Dist=5,200 ly. |
| M21 | • Sgr |
| | • A fine and impressive cluster. Dist=4,200 ly. |
| M17 | • Sgr |
| | • Omega Nebula. Contains the star cluster NGC 6618. Dist=4,900 ly. |
| M18 | • Set |
| | • Wild Duck Cluster. Resembles a globular through binoculars. V-shaped. Dist=5,600 ly. |
| M16 | • Set |
| | • Eagle Nebula. Requires a telescope of large aperture. Dist=8,150 ly. |
| M33 | • Tri |
| | • Pinwheel galaxy. Requires a large aperture telescope. Dist=2.3 million ly. |
| M81 | • UMa |
| | • Beautiful spiral galaxy visible with binoculars. Easy to see in a telescope. |
| M27 | • Vul |
| | • Dumbbell Nebula. Large, twin-lobed shape. Most spectacular planetary. Dist=975 ly. |

2. Objetos del Cielo

Tamaño y Brillo de los Objetos

Tamaño y Brillo de los Objetos del Cielo

Los objetos del cielo difieren tanto en **tamaño aparente** como en su **brillo superficial**:

- Tamaño aparente
 - El tamaño aparente de los objetos del cielo varía enormemente.
 - La Vía Láctea es la estructura más grande que podemos observar en el cielo.
 - Algunas nebulosas y cúmulos estelares abiertos pueden ser también muy grandes.
 - La Luna y el Sol tienen un diámetro aparente de $1/2^{\circ}$.
 - Las galaxias y nebulosas planetarias que podemos observar típicamente tienen un tamaño aparente pequeño.
- Brillo superficial ("luminosidad")
 - La Luna y los planetas Venus, Júpiter, Saturno y Marte son típicamente muy brillantes.
 - Algunas estrellas también son muy brillantes.
 - Las nebulosas y galaxias típicamente son poco brillantes.
 - La contaminación lumínica afecta negativamente la visibilidad de los objetos poco brillantes al reducir el contraste entre ellos y el fondo de cielo.
 - Para poder observar objetos poco brillantes son necesarios telescopios (y binoculares) de gran apertura.

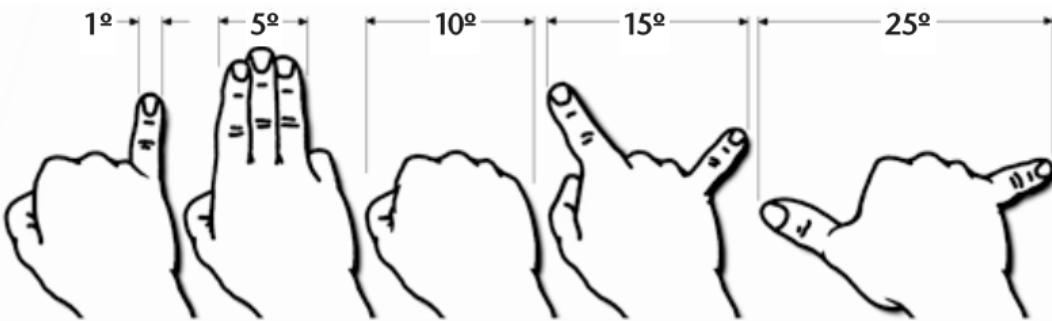
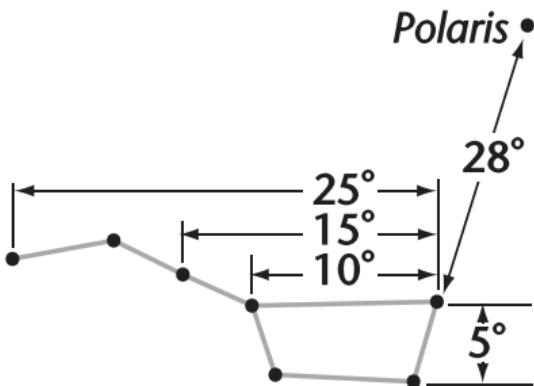
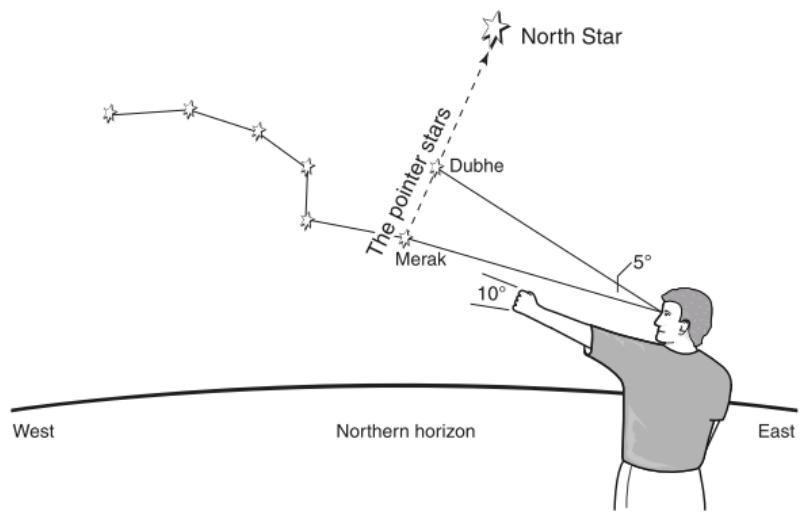
Comparativa de Tamaño de distintos objetos del cielo

¿Qué pasaría si los objetos del cielo profundo tuvieran todos el mismo brillo superficial?



- 1. Luna
- 2. Galaxia de Andromeda (M31)
- 3. Galaxia del Triángulo (M33)
- 4. Nebulosa de Orión (M42)
- 5. Nebulosa de la Laguna (M8)
- 6. Galaxia del Molinete (M101)
- 7. Galaxia de Sculptor (NGC 253)
- 8. Remanente de Supernova (SN 1006)
- 9. Nebulosa del Velo
- 10. Nebulosa de la Hélice (NGC 7293)
- 11. Galaxia del Sombrero (M104)
- 12. Nebulosa del Cangrejo (M1)
- 13. Cometa Hale-Bopp (c. 1997)
- 14. Venus
- 15. Júpiter
- 16. International Space Station

Midiendo Ángulos en el Cielo



2. Objetos del Cielo

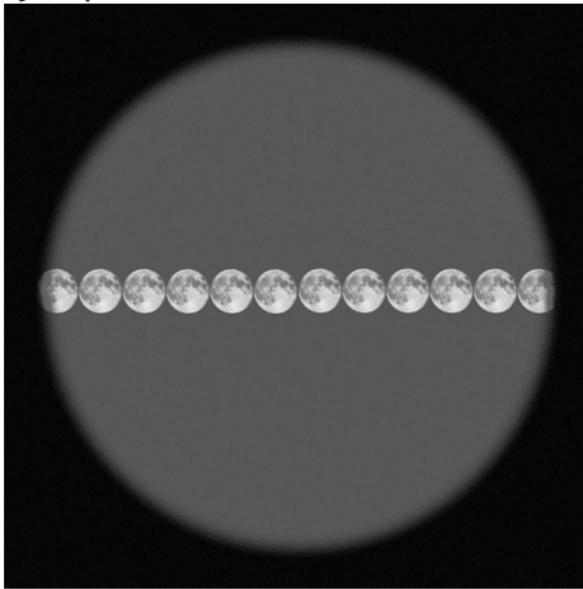
Observando los Objetos del Cielo

¿Dónde están los objetos del cielo que puedo observar?

- "Cerca": Dentro de nuestro sistema solar
 - La Luna
 - Los Planetas
 - Cometas?
- "Lejos": Objetos del cielo profundo
 - Nebulosas
 - Cúmulos Estelares (Abiertos y Globulares)
 - Galaxias

Sistema Solar: Luna

Ejemplo de observación lunar con binoculares:

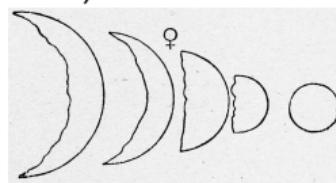


- La Luna mide aproximadamente $\frac{1}{2}^{\circ}$ (entra 16 veces en un binocular de 8°)
- Algunas cosas interesantes para ver con binoculares:
 - **Tierras altas lunares versus maria** (gris claro, viejo versus gris oscuro; más nuevo)
 - **Mare Imbrium, Serenitatis y Tranquillitatis**
 - **Sinus Iridum** (Bahía del Arco-iris)
 - Cráteres **Tycho** y **Kepler**

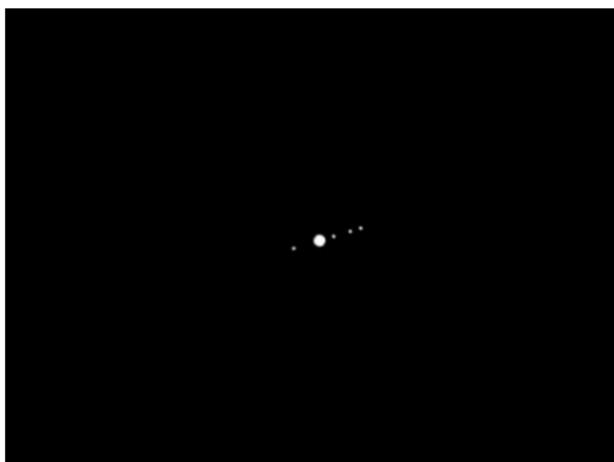
Sistema Solar: Planetas

Ejemplos de observación planetaria con binoculares:

- Venus (fases; al atardecer o amanecer)



- Marte (rojizo)
 - Júpiter (cambio de posición de las cuatro lunas galileanas)



- Saturno (se ve de forma ligeramente ovalada)

¿Cómo clasificamos los objetos del cielo profundo?

Los objetos del cielo profundo que podemos observar a simple vista, con binoculares o con telescopios se pueden clasificar en:

1 Nebulosas (estructuras difusas)

- Nebulosas de Emisión
- Nebulosas de Reflexión
- Nebulosas Oscuras (también llamadas: Nebulosas Absorción)
- Nebulosas Planetarias (también llamadas: Nebulosa de Eyección)
- Remanentes de Supernova

2 Cúmulos Estelares (acumulaciones de estrellas)

- Cúmulos Abiertos (también llamados: Cúmulos Galácticos)
- Cúmulos Globulares
- Asociaciones Estelares (ejemplo: Asociaciones OB)

3 Galaxias

2. Objetos del Cielo

Objetos del Cielo Profundo en Binoculares

Objetos del Cielo Profundo en Binoculares



Lornetka 10x50

Galaxia: Andrómeda



Lornetka 10x50

Nebulosa: Nebulosa de Orión

Objetos del Cielo Profundo en Binoculares

NGC 884-869

in Perseus

Cseh Viktor
Nagyvarsány/Hungary

W

N

2011-10-18 18:22UT 10X50 binoculars+HAMA tripod Fov.: 6° S/T - 6/4
www.viktorcsehdraws.blogspot.com

Cúmulo Abierto: Doble Cúmulo de Perseo



Cúmulo Abierto: Las Pléyades

Objetos del Cielo Profundo en Binoculares



Lornetka 10x50

Asterismo: La Percha (Coathanger)



Newton 130/900 + okular 20mm

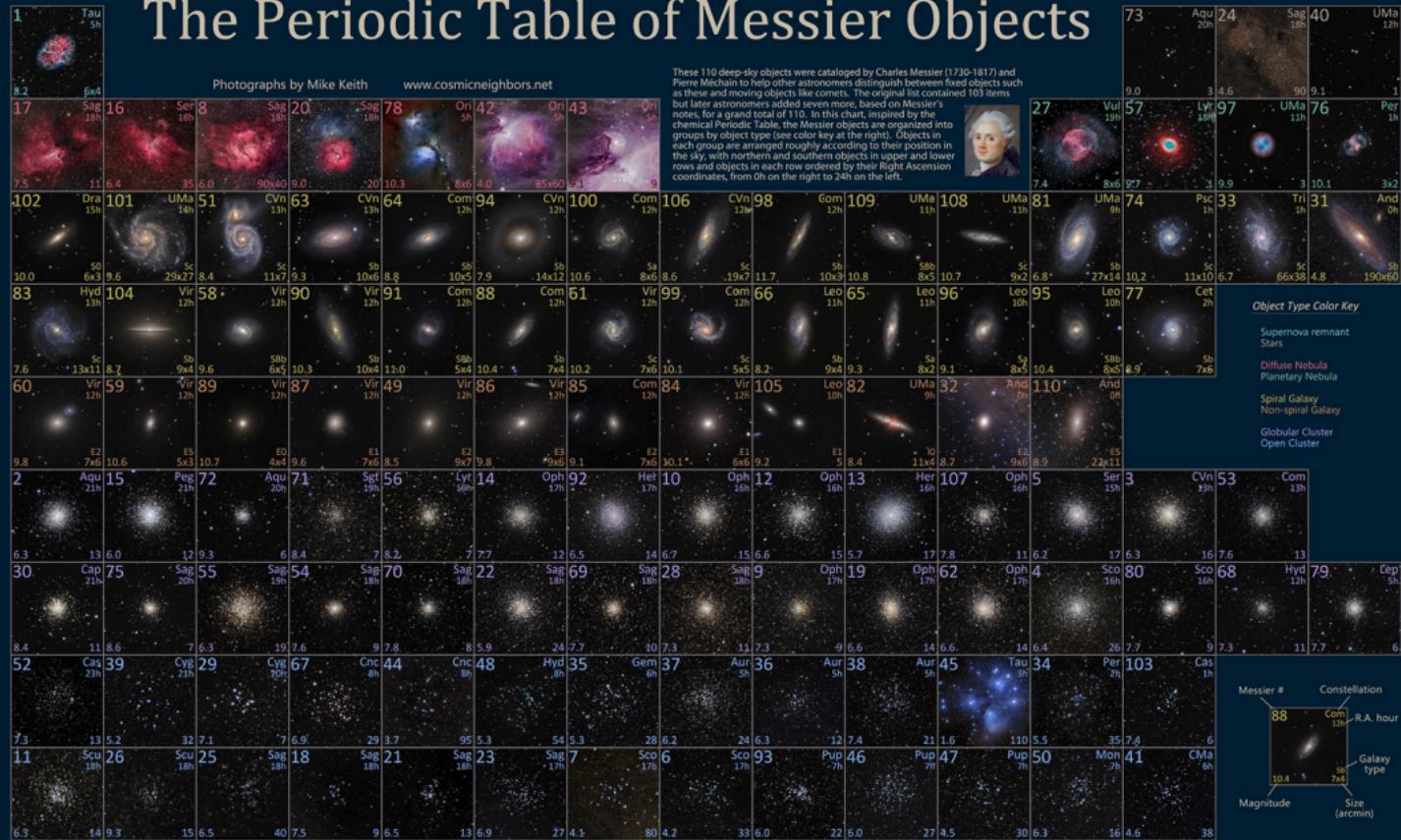
Cúmulo Globular: Messier 13 en Hércules

Objetos del Cielo

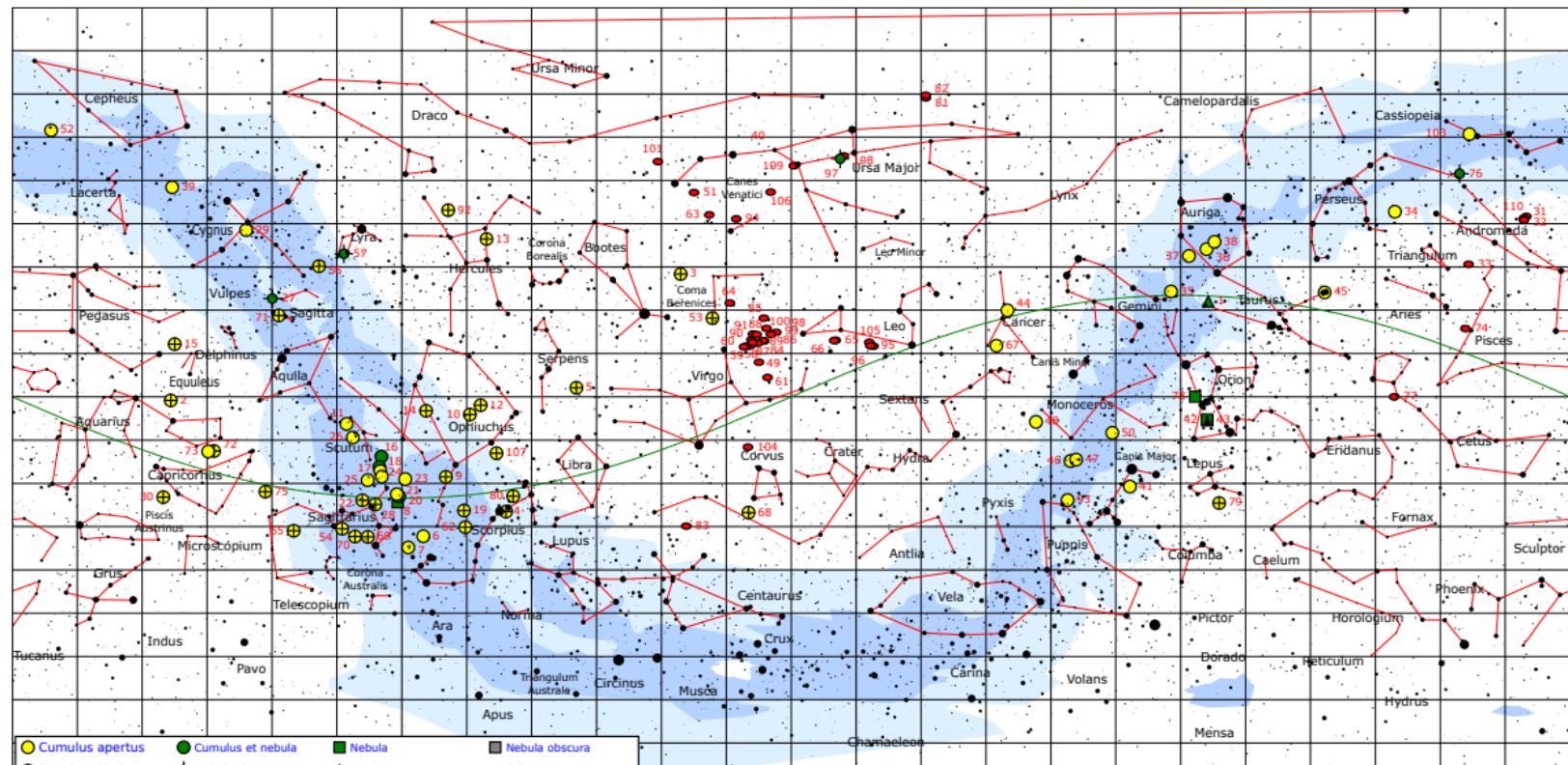
Objetos del Cielo Profundo en Telescopios

Objetos del Cielo Profundo con Telescopios: Objetos Messier

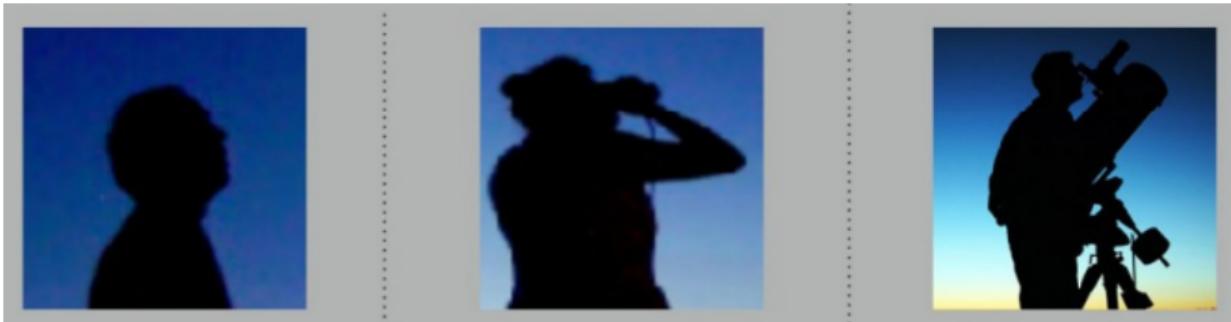
The Periodic Table of Messier Objects



Objetos del Cielo Profundo con Telescopios: Objetos Messier



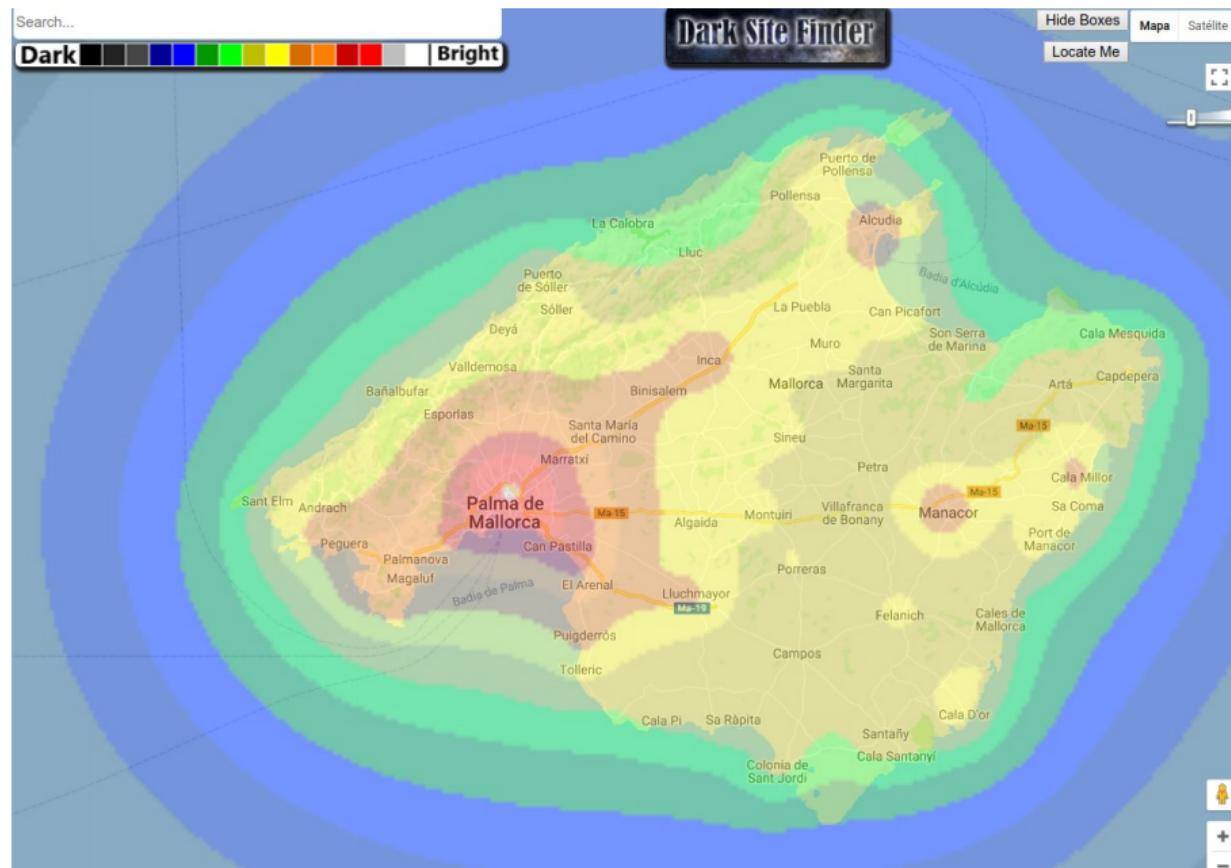
¿Qué se puede observar?: Simple vista vs. Binoculares vs. Telescopio



	Simple vista	binocular	telescopio
Luna	poco detalle	cientos de detalles	miles de detalles
Planetas	3/4 (como puntos)	5/6 (discos c/lunas)	8 (c/detalles) & asteroides
Galaxias	2 o 3	varias	cientos/miles
Cúmulos	unos pocos	decenas	cientos/miles
Nebulosas	unas pocas	varias	decenas
Vía Láctea	Banda difusa	Nubes de estrellas	Nubes de estrellas

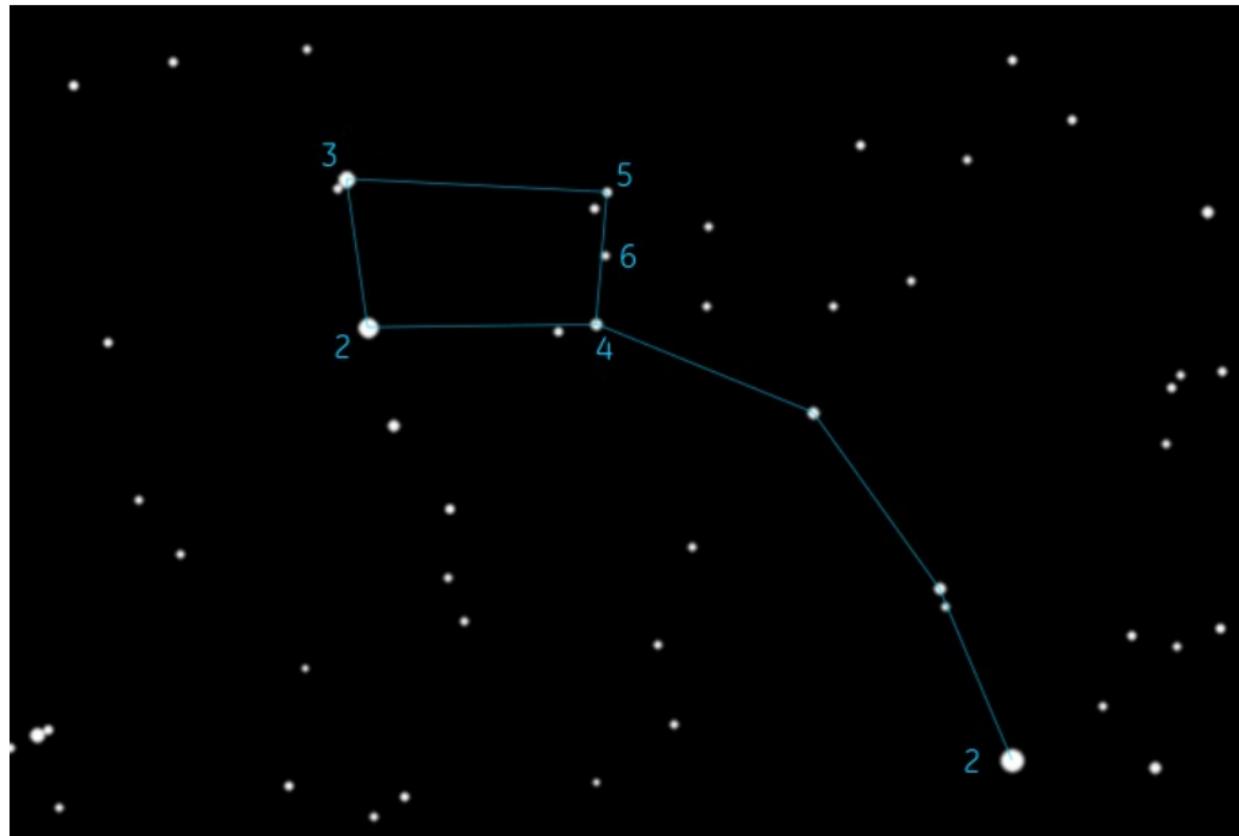
3. Calidad de Cielo: Contaminación Lumínica

Contaminación Lumínica: ¿Dónde observar en Mallorca?



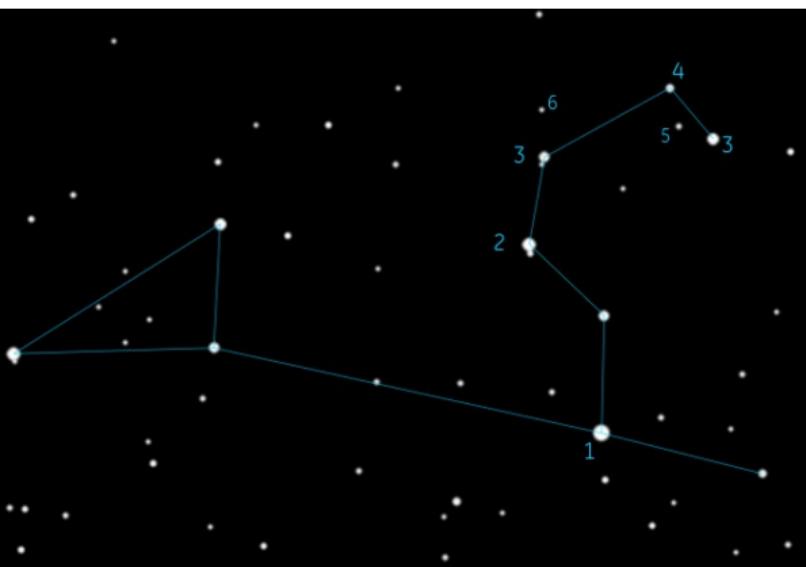
<http://darksitefinder.com> y <https://www.lightpollutionmap.info>

Evaluando la Calidad de Cielo



Todo el Año: Osa Menor

Evaluando la Calidad de Cielo

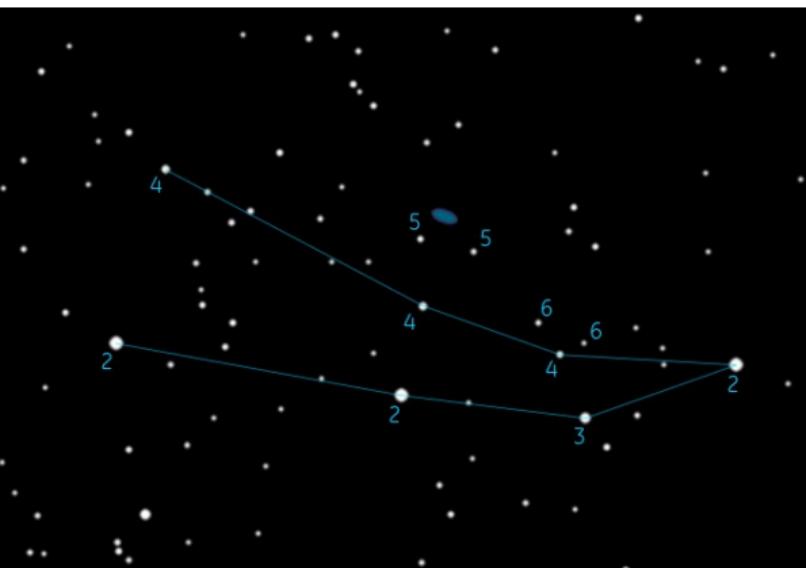


Primavera: Leo

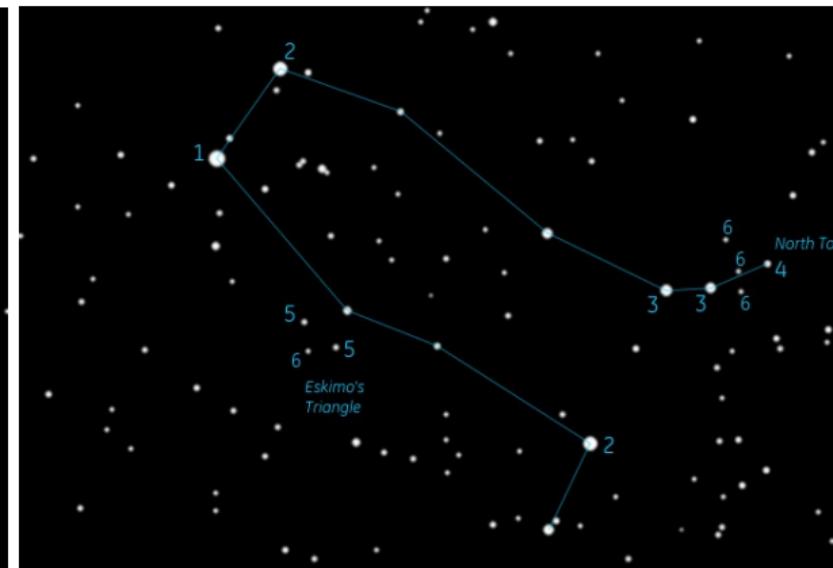


Verano: Cygnus

Evaluando la Calidad de Cielo



Otoño: Andromeda



Invierno: Gemini