



A Day Without Sunshine is like...NIGHT!

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HAL Astro School
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Introduction

Important questions to answer regarding the Sun's role in separating day from night:

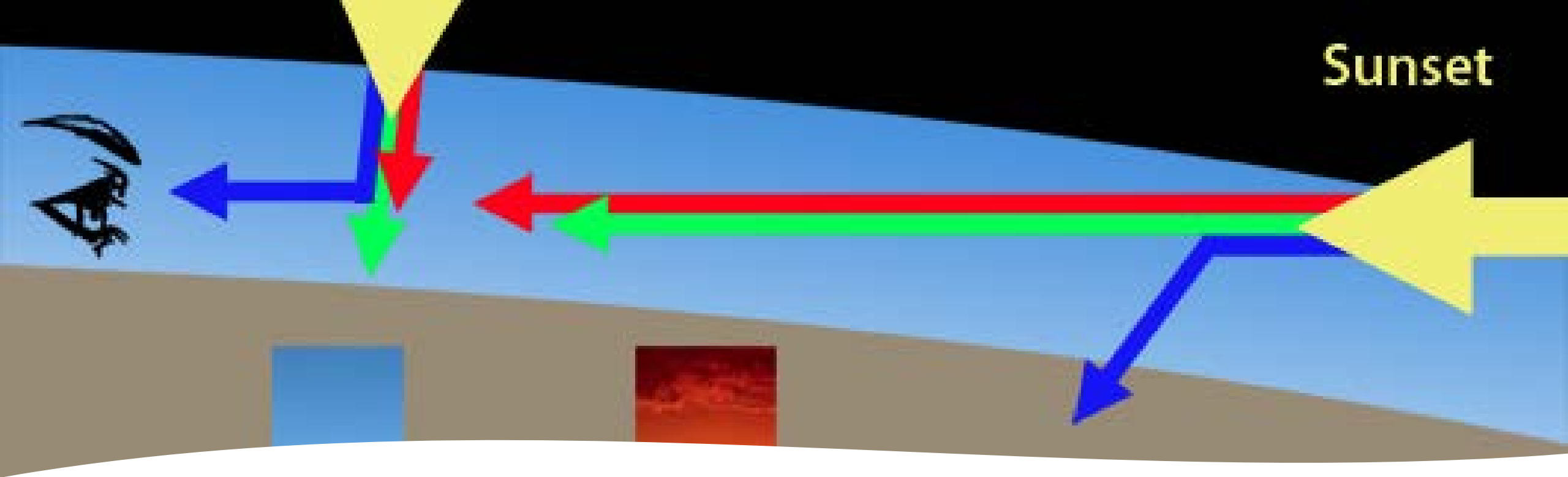
Where do the stars go during the day?

Why are there more daylight hours in the summer than in the winter?

Why is twilight longer in the winter than in the summer?

Casual solar observations





Key Concept: Atmospheric (Rayleigh) Scattering

Blue light is scattered by the atmosphere, while other colors readily penetrate
This is why the sky appears to be blue
This is why the sky is bright

Key Concept: Diurnal Motion

The daily apparent motion of celestial objects, including the Sun, about the celestial poles.

Sun is actually “fixed” in space while the Earth rotates about its axis

Daytime is from sunrise until sunset

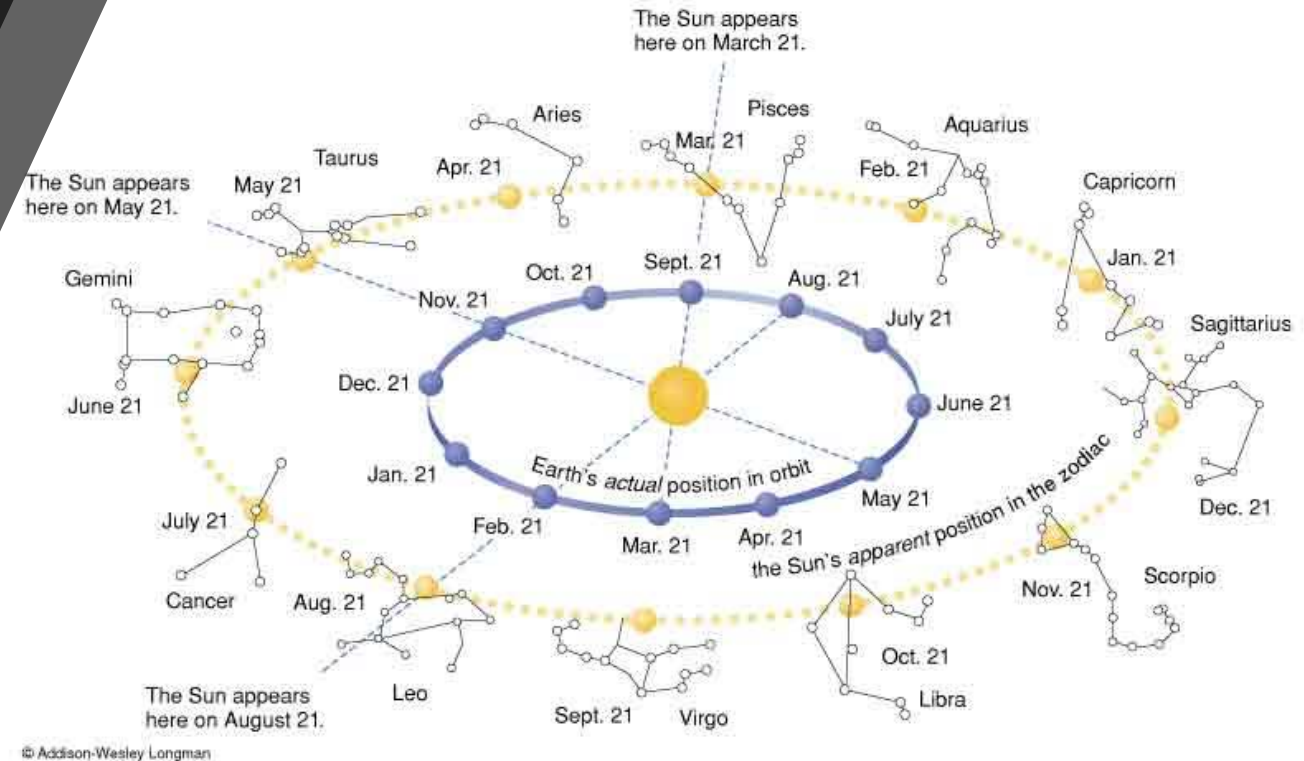
Nighttime is from sunset until sunrise



Key Concept: Annual Solar Motion

As the Earth orbits the Sun, the background stars as viewed from Earth is constantly changing

Result: Different evening constellations are seen as the Earth progresses along its orbital path



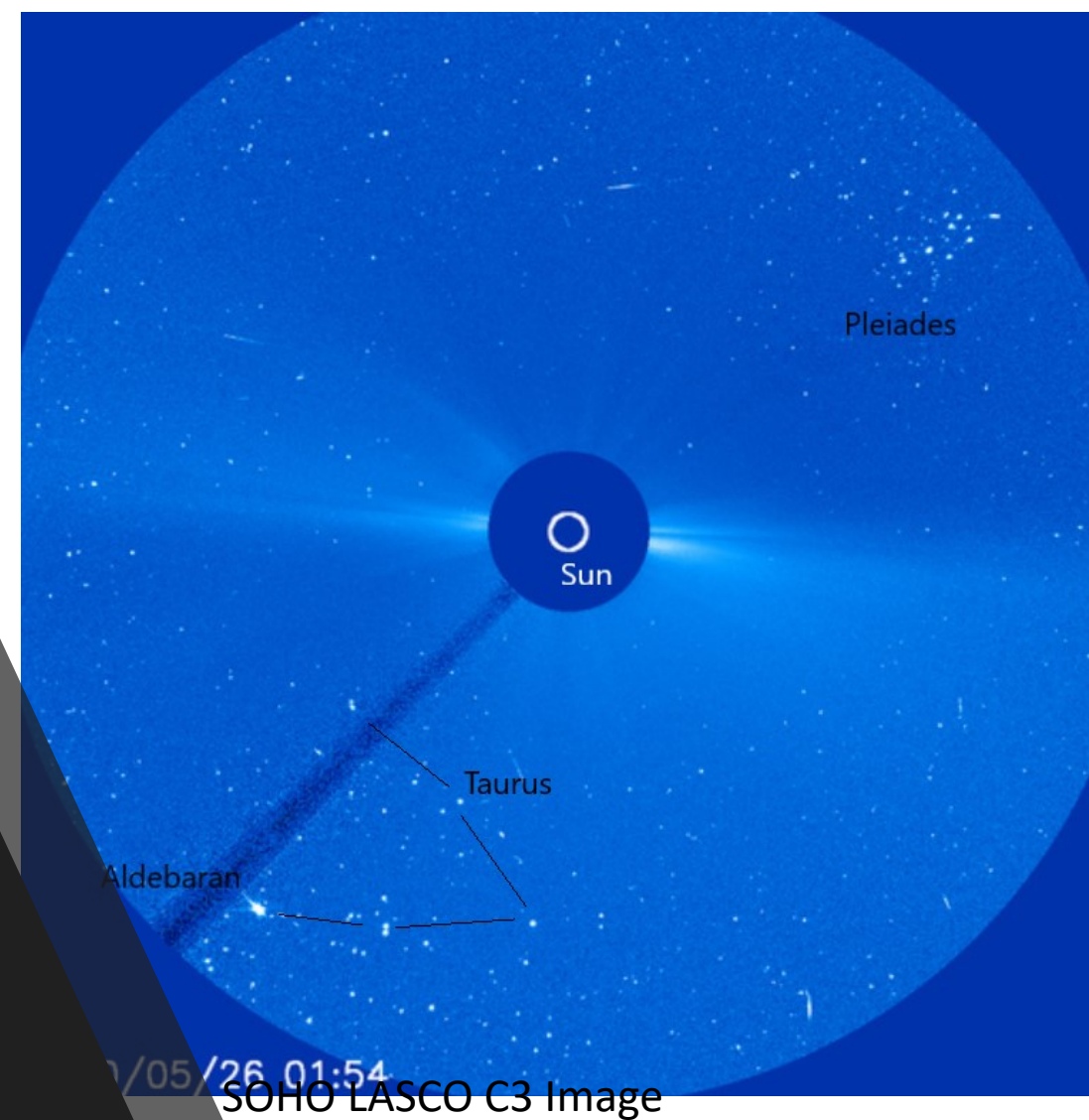
Where to the stars go during the day?

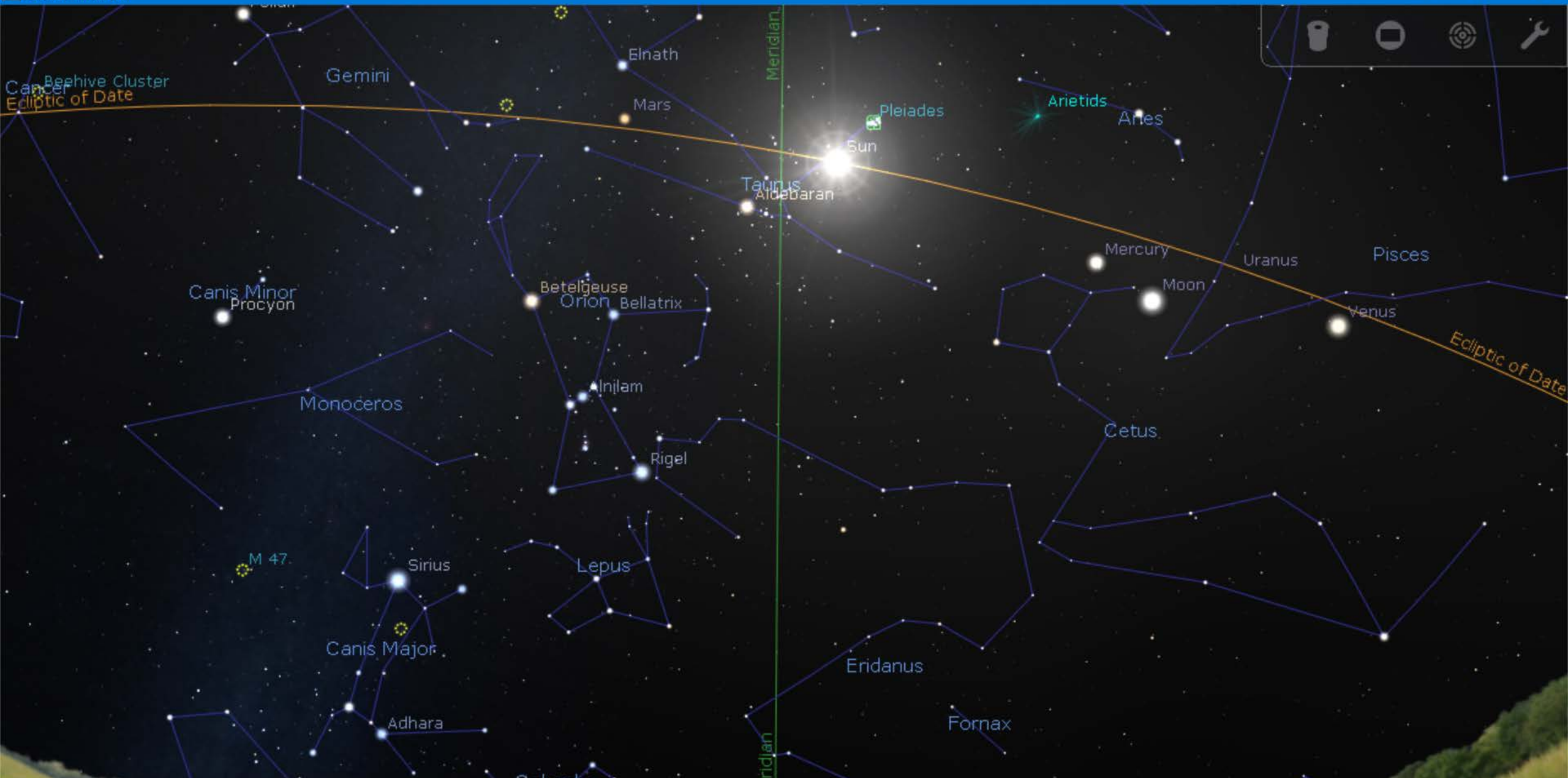
Short answer: They occupy the same Ra/Dec coordinates as they always do, but the sky is brighter than the stars from shortly before sunrise until shortly after sunset

Illustrations:

The brightest stars “come out” first after the Sun sets and as the sky gets darker

Familiar constellations can be seen near the Sun in the background of SOHO imagery





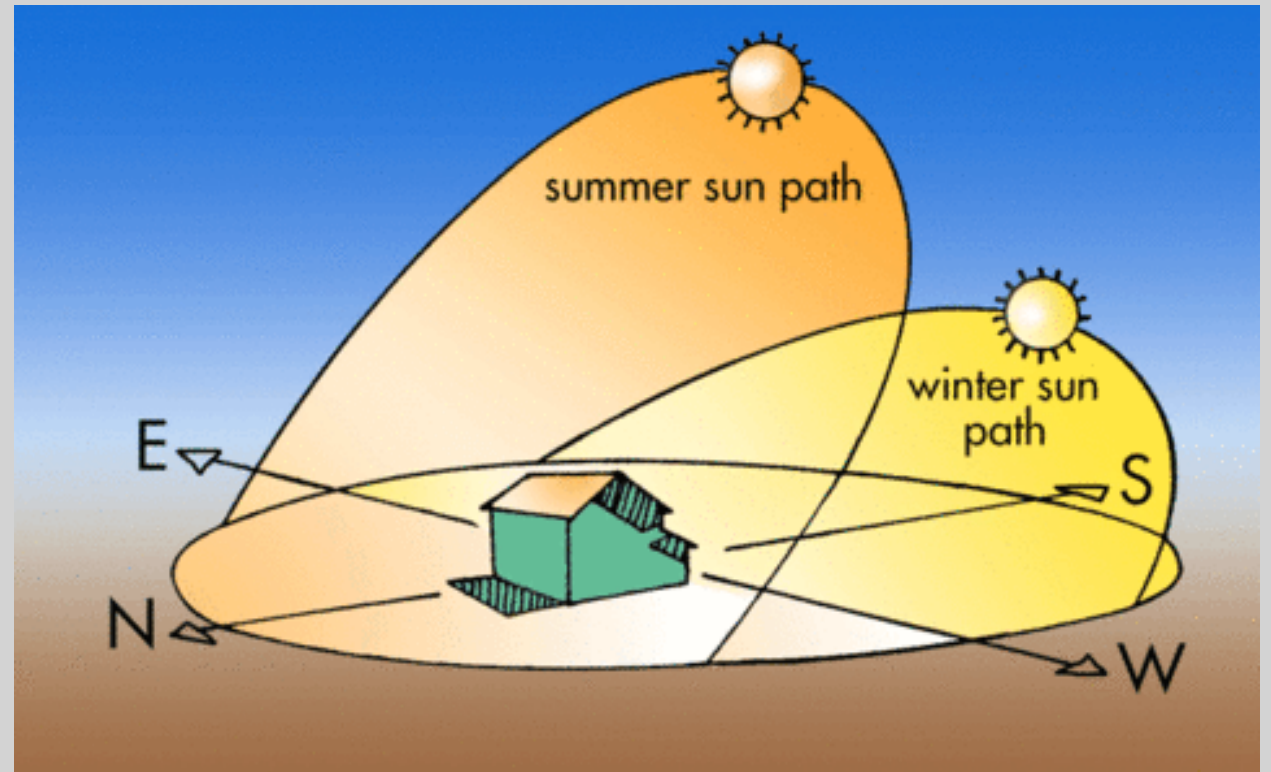
Earth, Ashton, Maryland, 0 m FOV 73.1° 17.9 FPS 2017-05-23 13:25:58 UTC-04:00

Why are there more daylight hours in the summer than in the winter?

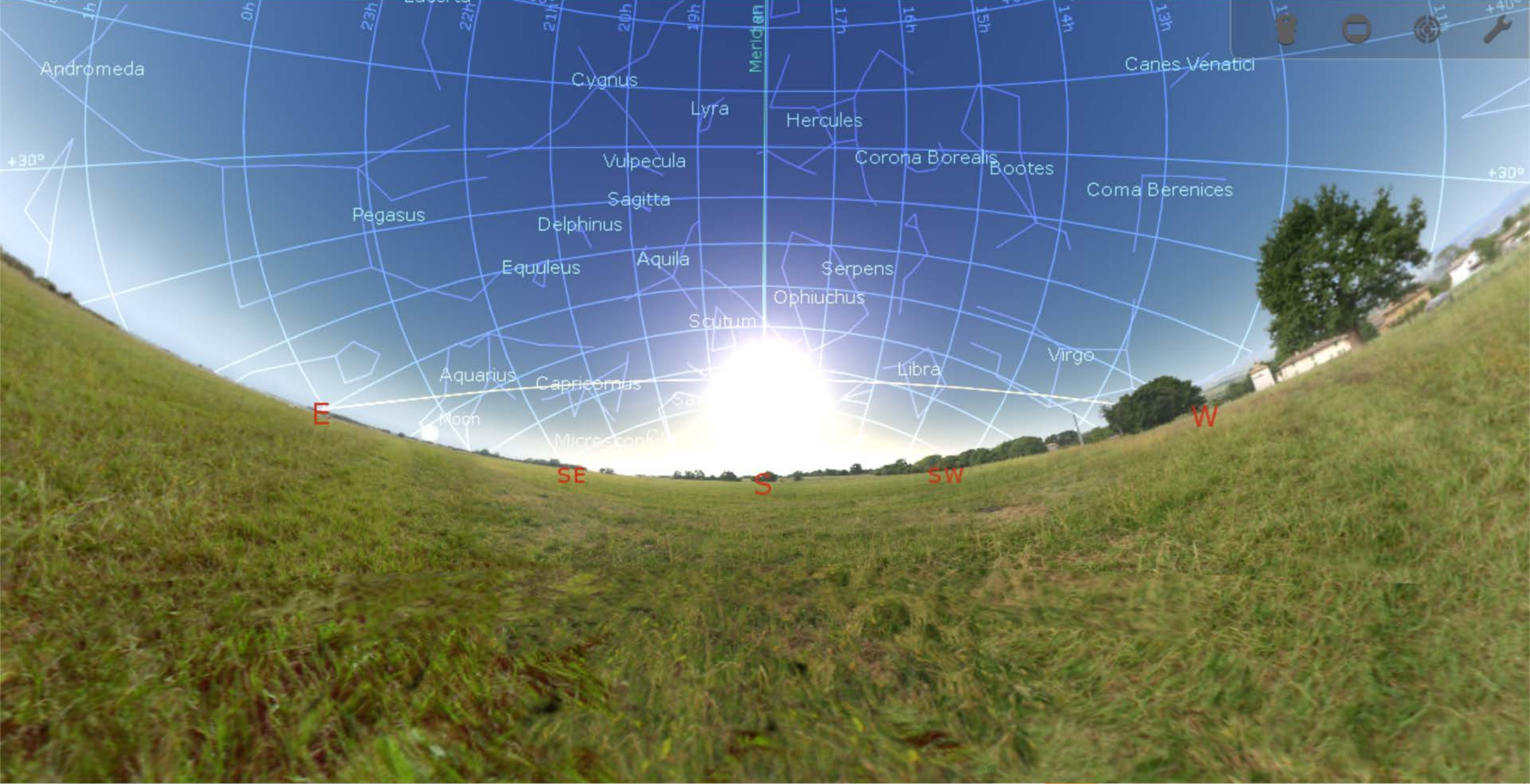
Short answer: Due to the tilt of the Earth's equator relative to its orbital plane (or, the ecliptic), the Sun's apparent path across the sky changes.

Higher in the sky/longer path in the summer

Lower in the sky/shorter path in the winter



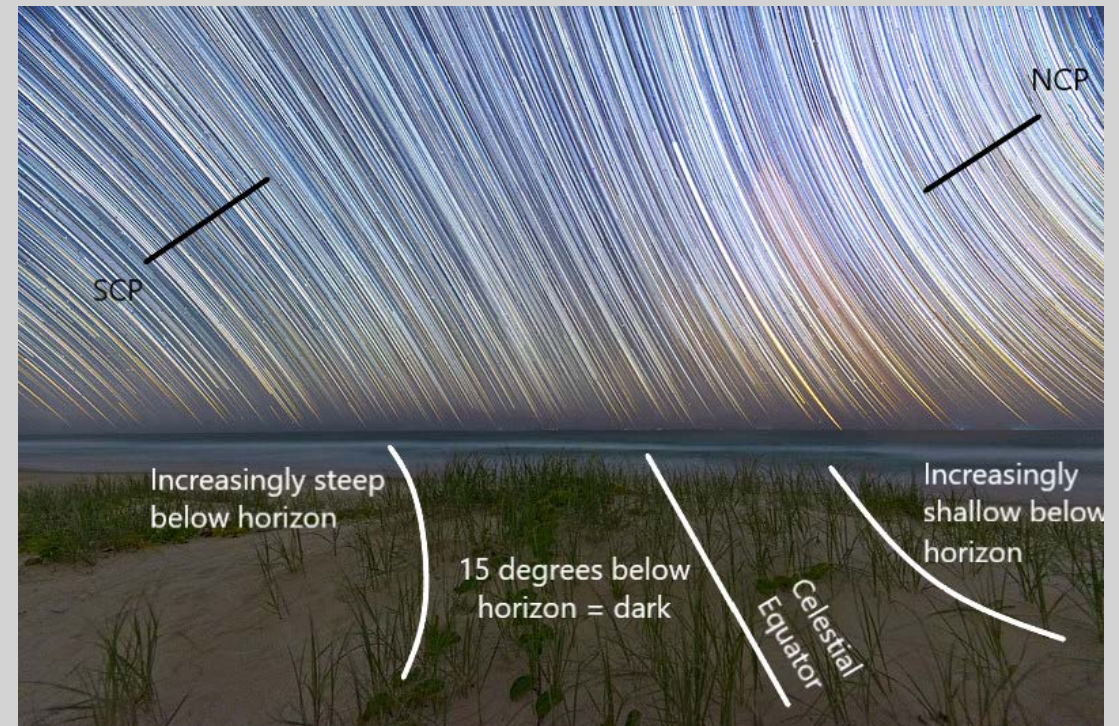




Why is the twilight longer in the summer than in the winter

Short answer: The path that the Sun follows is different when the Sun is in the northern celestial hemisphere (summer) than when it is in the southern celestial hemisphere (winter)

Summer twilight is about 30 minutes longer than winter twilight



Casual solar observations

No optical or photographic equipment required

Over the course of a year note:

Sunrise/sunset point (direction) on the horizon

Solar altitude (distance above the horizon)

Duration of twilight



15 Mar



19 Apr



10 May



7 Jun



Venus and Jupiter in Twilight

Jim Johnson, 20191125 1831

Canon EOS 60Da 55mm f/1.4

Olney, Maryland

Closing

We examined the answers to three questions regarding the Sun and its role in separating day from night, identified opportunities for casual observations

Where are the stars during the daytime?

Why are summer days longer than winter days?

Why is summer twilight longer than winter twilight?

A landscape photograph of a sunset. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon. The foreground is mostly in silhouette, showing a dark line of land or trees. On the right side, a large, dark silhouette of a tree is visible. The word "Questions?" is written in a clean, white, sans-serif font, centered in the lower half of the image.

Questions?