


June Skies over the Pinnacles

June 2024
by Jeff Hutton

June's Four Principal Phases of the Moon

June 6	New Moon	
June 14	First Quarter	
June 22	Full Moon	
June 28	Last Quarter	

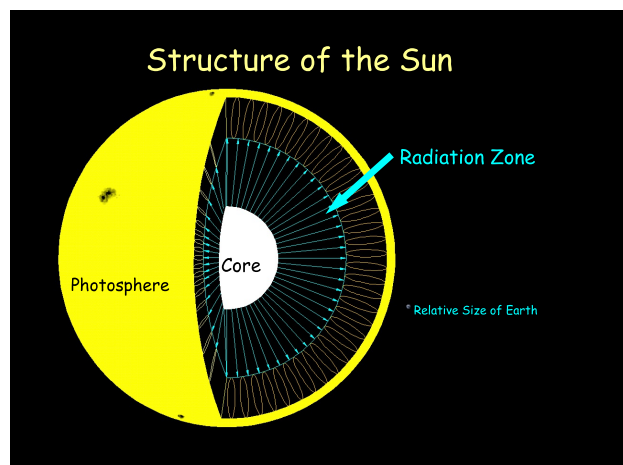
Borealis Double-Whammy

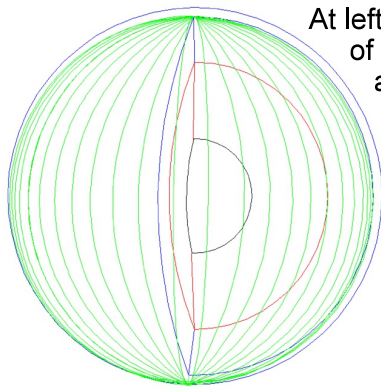
The word '**borealis**' comes Latin for 'northern'. So anything with that name is associated with the north, like the term, 'boreal forests', like those forests found in Alaska or Canada. This month our attention turns to northern skies. I hope you were able to get outside on May 10 to experience something rare at our latitude. Commencing right after dark until after 11PM, the skies literally lit up with shades of green, red and purple. Anywhere one looked skyward, some new shape or patch of color would burst into view! The southern hemisphere also experiences aurora, only centered around the south pole. They are called the **aurora australis**.



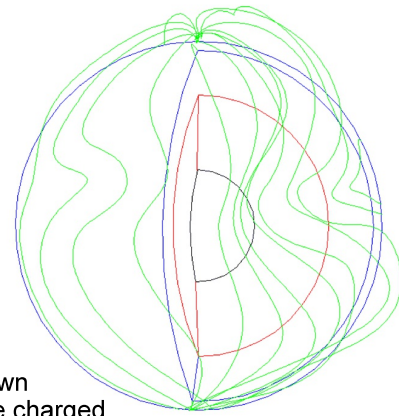
How does all this happen? Here's a short (and incomplete) explanation. It starts with the Sun. Our star goes through a cycle of magnetic activity that ranges from a quiet period where it's own magnetic field is symmetrical, to a period of time when its **magnetic field** turns chaotic.

The Sun isn't a solid body like the Earth. It is made of superheated **plasma** which isn't exactly liquid and isn't exactly gas and only exists at temperatures at millions of degrees. It also has physical layers and a powerful **magnetic field**. Because the Sun isn't a solid body, different regions spin about it's axis at different speeds. That causes its magnetic fields to go from being well behaved and concentric to going wild! We are now experiencing the 'wild' time called **solar maximum**. The whole cycle takes about 11 years from 'mild' to 'wild'.





At left is a diagram of the Sun (in blue) at solar minimum. The green lines represent lines of magnetism.



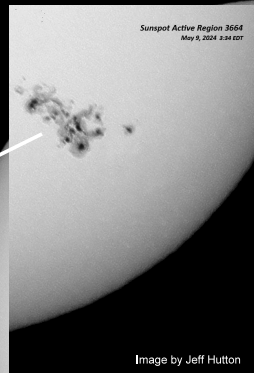
At right, the Sun is shown at solar maximum. The charged lines of magnetism are whipping around and often "short-out" against each other.

So when these magnetic lines touch each other, they can trigger a gigantic explosion that can send charged solar plasma rocketing into space. Sometimes the plasma heads straight for Earth! Yikes!

Sunspot Complex 3664, Where It All Started

WHITE LIGHT IMAGE

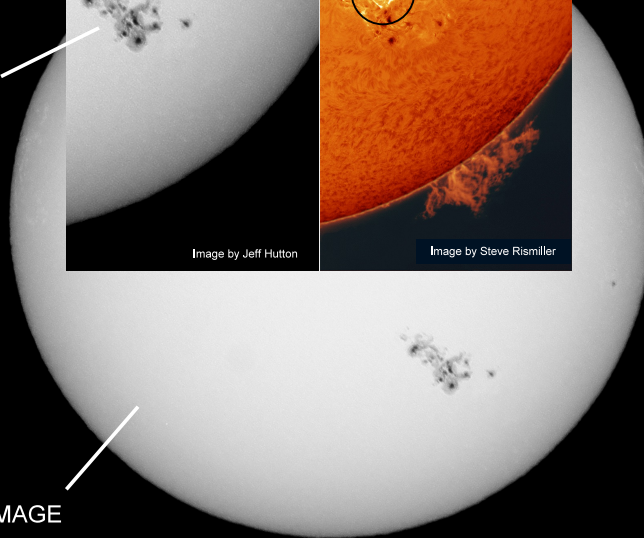
SITE OF TWISTED-UP MAGNETIC LINES!



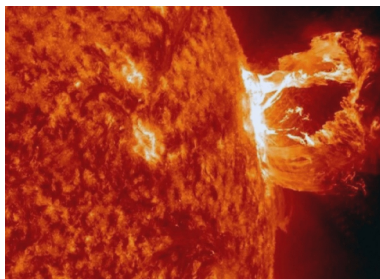
HYDROGEN ALPHA IMAGE



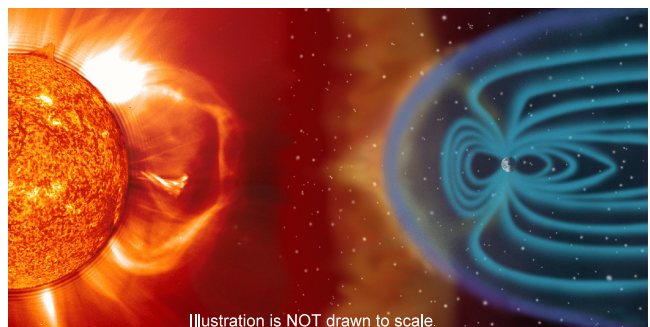
FULL SUN IMAGE



On May 9 I took this white light picture of the Sun. The area in the black circle is probably responsible for an earlier eruption that sent charged particles that resulted in the tremendous display of Northern Lights seen here on May 10.

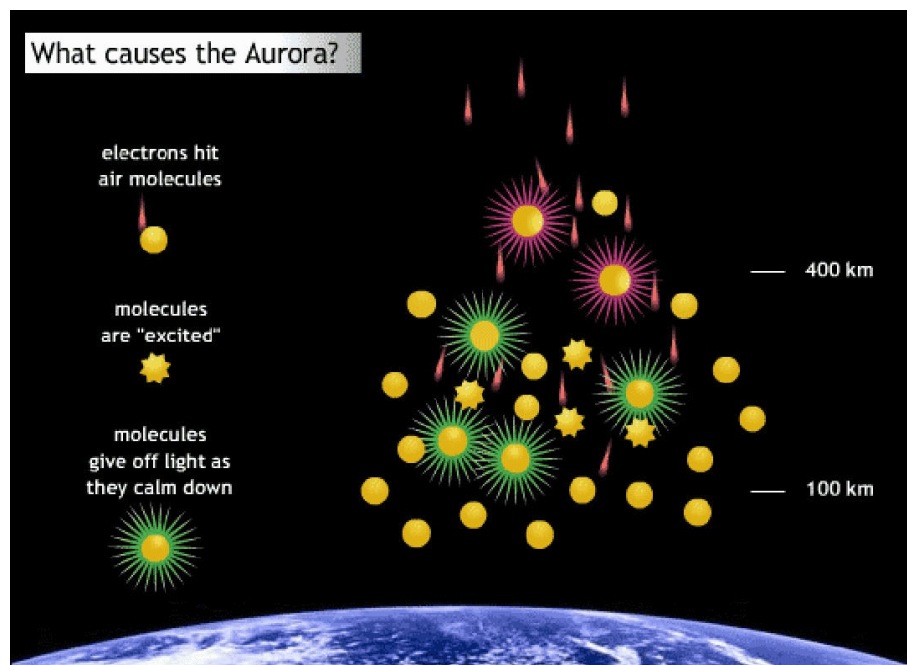


Viewed from the side, the circled area above might have looked like this image on the left, as recorded from space.

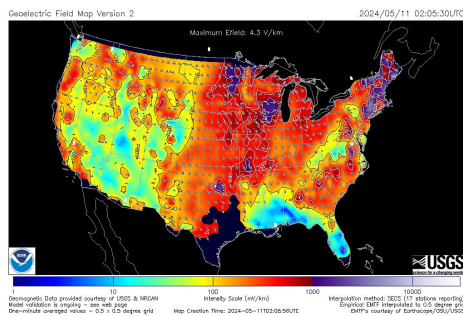


In the illustration at right, we see how the charged particles hurled from the Sun makes impact with the Earth's own magnetic field and some of the particles slide down the Earth's lines of magnetism

Illustration is NOT drawn to scale.



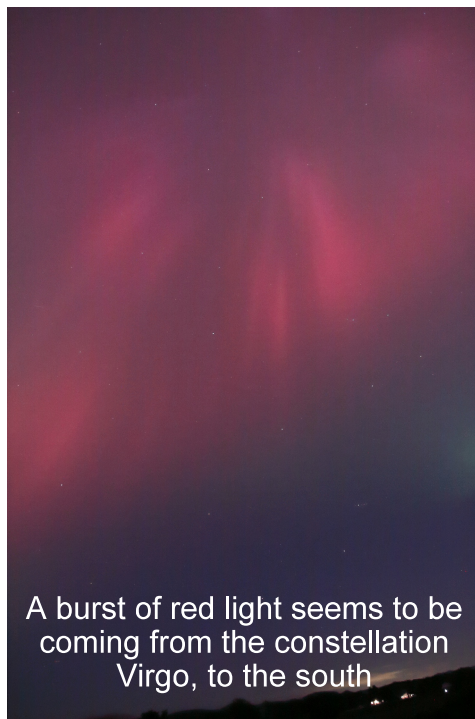
In the illustration above, we see that the lights of the aurora are produced by atoms in our atmosphere get "excited" after being struck by a charged particle from the Sun. The added energy gets "shaken off" by the atom when the atom's electron(s) resume the normal, lower, orbit around the nucleus. Each time this happens, one photon is released for us to enjoy.



Here is a map of the United States that shows another effect of the May 10 solar storm that caused the bright aurora. There is normally some electrical activity going on in the ground we stand on. On this night and the morning after this activity was up to 10 thousand times greater than usual, which would be indicated by the color blue.

Here are some more pictures from the night of May 10.



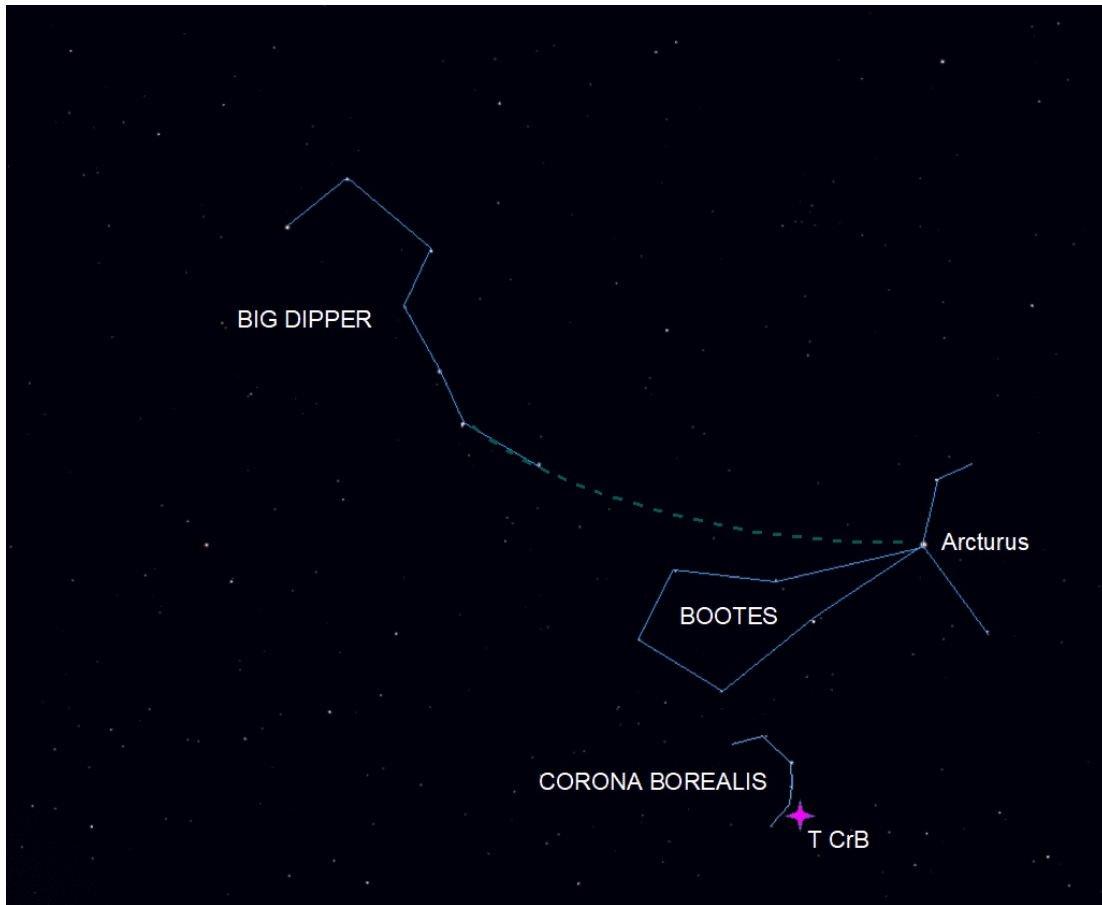


Hold on, there's more!

We may yet have more aurora to marvel at, but the Cosmos has *another* treat in store for us this summer. In the constellation **Corona Borealis**, or Northern Crown, a new wonder is brewing. There is a star called T Coronae Borealis that is about to blow it's top as a **nova**. There are many types of novae (plural for **nova**). T CrB is a special kind known as a **recurring nova**. Instead of blowing itself to bits in a final flash of light, the explosion happens over and over. T CrB is a double star. One star is a small and dense white dwarf star that is caught in the gravity of a much larger red star (or is it the other way around?). The dwarf star peels off material from its companion until it can't hold any more. Then, like clockwork, it blows its top with a huge explosion that doesn't seem to reduce either star to stardust. The last time this happened was in 1946 and it is due to go off again this summer or fall. T CrB is 3000 light years away so this "latest" tantrum was 3000 years ago.



Here's the good part. You don't even need a telescope or binoculars to watch T CrB going nova! You just need to know where to look.



First, find the Big Dipper. It will be nearly standing on its handle early at night in early June. Imagine an arc that follows the bend of the Big Dipper's handle south, to the bright orange star, Arcturus. Now, look for a kite-shaped star pattern extending north. Look east of the widest part of the kite and find a neat little backwards "C". That's Corona Borealis. I've marked the location of T CrB, our nova star, in magenta. No one knows exactly when the nova will happen, but it will only last a few weeks. That is based on the astronomer's view of it in 1946. T CrB should get nearly as bright as one of the stars of the Big Dipper and may temporarily outshine each star in Corona Borealis. I recommend binoculars.

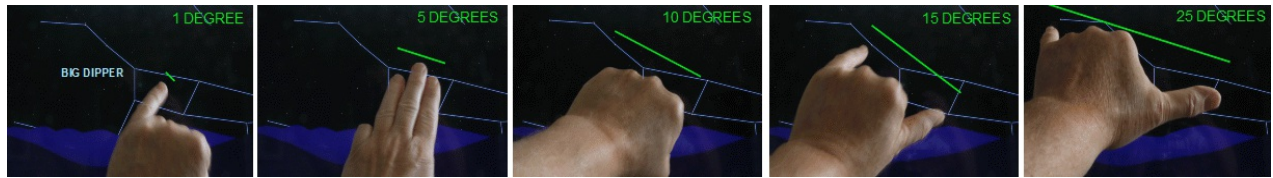
I'll leave you with one more picture. I call it the **"Two Borealis-es"** (Sorry, English teachers.)



On the left side, we see the bright green aurora, topped with magenta above. At times, the ground was lit up green on May 10. On the right is the *other* borealis, the constellation, Corona Borealis.

Attractions in June

When you hold your hand all the way out and hold three fingers out, like the scout's salute in panel 2, your fingers create an **angular distance** of 5 degrees, about the width of the bowl of the Big Dipper. When I talk about the angular distance between, say, the Moon and a star or planet, I'll say that they are separated by a certain number of degrees. Sky and Telescope magazine is my source for most of the following information.



All summer and fall Keep an eye on Corona Borealis!

June 8

This evening is a nice one for cosmic symmetry. First find the thin crescent Moon with the stars Pollux and Castor above. Then look farther to the left and right and catch the bright stars, Procyon (left) and Capella (right) before they are lost the the sun's glare until next fall.



June 11

This evening the Moon still has it's crescent shape, though almost at first quarter, is a snugged close to first magnitude star Regulus, brightest of the constellation Leo the lion. Just 3 degrees separate the two tonight.



June 14

Star Party in Winchester. Join the members of the Pinnacles Astronomy Club as they host a public star party at Legacy Park. Last year there were over a hundred visitors, many of whom brought their own telescopes. This year, the “star” of the show will be the first quarter Moon, along with double stars, star clusters and remnants of exploded stars. Sorry planet lovers, we’ll have to wait until this fall before our next easy glimpse of a planet. Come at dusk and watch the stars come out. Members will be on hand to point out constellations and offer help with uncooperative telescopes.



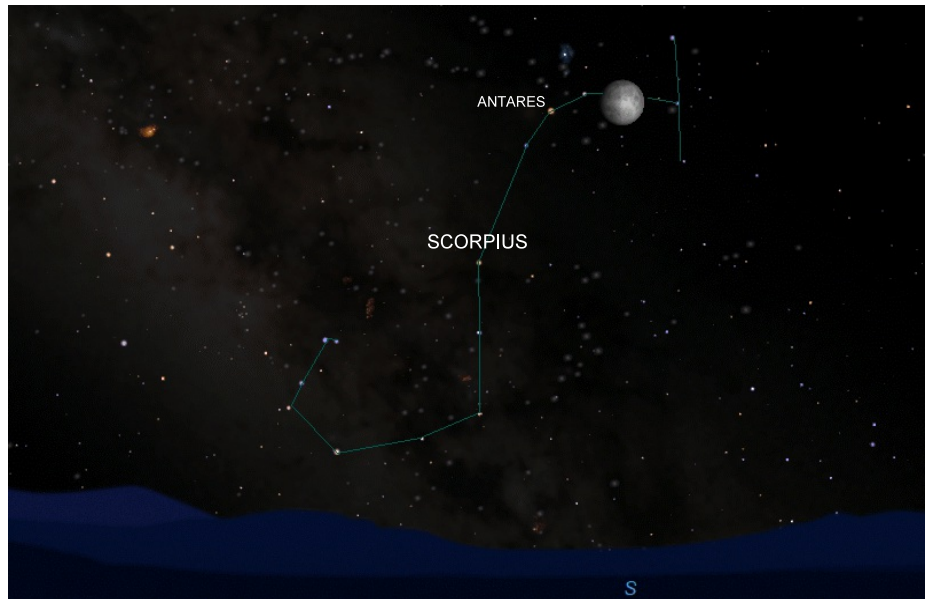
June 16

This evening, the gibbous Moon seems to visit the star the star Spica, brightest star in the constellation Virgo.



June 19

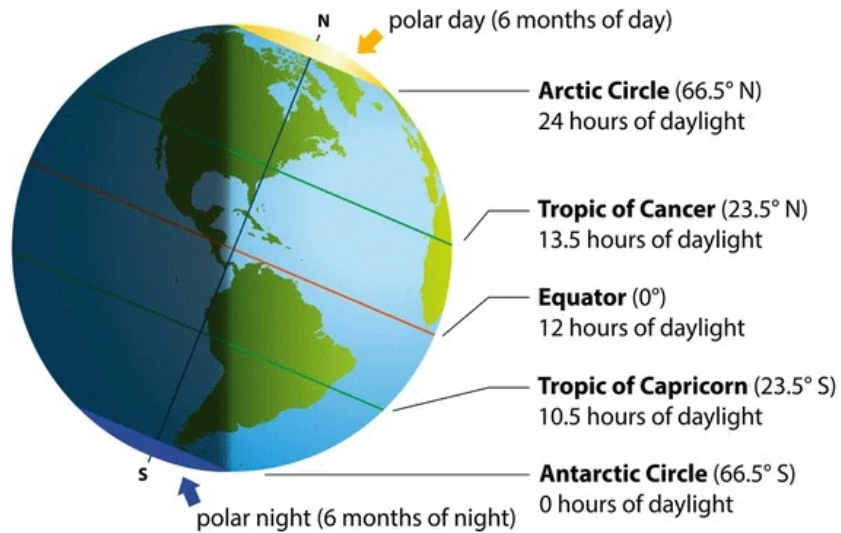
The Moon seems to be visiting all the bright stars this month! Tonight's 'guest' is the red star Antares which beats as the the heart of the constellation Scorpius.



June 20

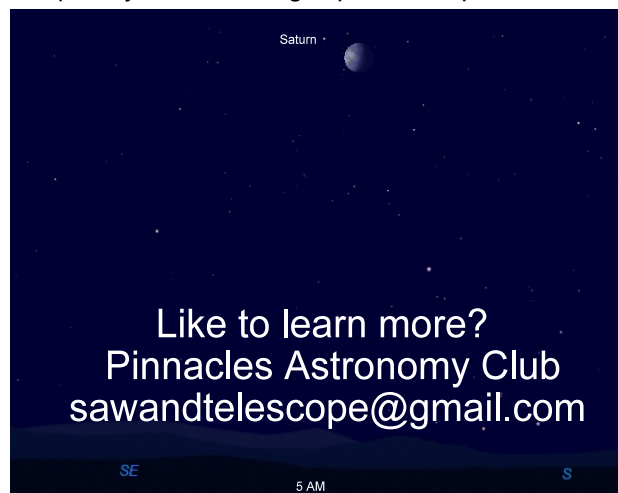
Happy Summer Solstice! Today the northern hemisphere is fully tilted toward the sun at 23.5 degrees. That's the angle the Earth is tilted against the plane of our orbit around the Sun.

summer solstice



June 27

Get up early and catch a glimpse of the planet, Saturn just 3 degrees away from the Moon.



Like to learn more?
Pinnacles Astronomy Club
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