* CAS *
Charlottesville Astronomical Society

November 2013

Welcome New Member(s)

Lisa Clore-Taylor
John Rovnak

Tonight's Speaker

Tom Field

Real Time Spectroscopy (Rspec)

Club Business

- 84 paid active members
- 6 Educational Membership – Astro Op

- Checking account and Cash on Hand: $2,630.59

- See Ed Preston for information on discounted subscriptions to Astronomy and Sky and Telescope

Club Scopes

- Club Scopes available for use by members http://cvilleastro.com/club-telescopes-available-for-club-member-use/ – See Rich for information richard@drummdigital.com

Club Elections
Elections Tonight

Unless there is someone present tonight interested in running for an office, the current slate of officers is willing to serve one more year

- President: Steve Layman
- Vice President: Rich Drumm
- Secretary: Larry Saunders
- Treasurer: Ed Preston

Future Club Events

Friday, November 8, 7 to 9 pm – Discover Homeschool Group, 10 children from 6 to 16 year olds with 11 adults and Boy Scout Troop 54 with 10 children from 7 to 10 years old and 10 adults.

Larry Saunders
Rich Drumm
Ed Preston
Steve Layman

Future Club Events

Saturday, November 9, 7 to 11 pm

UVA Astronomy Club
Trip to Fan Mountain

They need drivers

Contact Alex Bixel
dab8fz@virginia.edu

Future Club Events

Friday, November 22, 7 to 9 pm, Covenant School, 35 children all 9 to 10 year olds and 35 adults.

Volunteers???

Future Club Events

Sunday, November 24

Build a Telescope

at McCormick Observatory

12 students enrolled

Astronomical League Awards

Have you participated in any of the following?

- Fall Fan Mountain
- Hollymead Star Party
- Ivy Creek
- Rockfish Valley Star Gaze
- Open Doors session
- McCormick Group Nights

If so……..

Astronomical League Awards

The Astronomical League Outreach Award

Some of you are getting close…….

Astronomical League Awards

Lunar Observing Award

* observe 100 objects on the moon

* log your observations

*

http://www.astroleague.org/al/obsclubs/lunar/lunar2.html

Member of the Month
November 2013

- Born and raised in Atlanta, Georgia.
- Graduated from Georgia Tech with a Bachelor Degree in Mechanical Engineering, 1964, and a Master of Industrial Management, 1966.
- US Air Force 1966 - 1969, Langley AFB, in Hampton VA. Captain at time of separation.
- Mechanical Engineer at Allied Chemical, Hopewell, VA 1969 - 1970. Hobby was model railroading.

- Mechanical Engineer at Coor's Brewing Co., 1970 - 1973. Hobbies were geology and photography (both good in Colorado).
- Married Barbara, a Virginia girl in 1971.
- Returned to Allied Chemical, 1973 - 1980.
- Sought better job opportunity in 1980. Began career as Project Engineer, at Celanese Chemical Co., in Houston, TX
- Saw M5 through 17" truss-tube Dob in 1986. Dropped model railroading and took up astronomy.

- Began acquiring telescopes. Currently have 4.
- Joined the Houston Astronomical Society. Served 2 years as Club Treasurer. Also served as Observatory Treasurer 1990 - 2008.
- Lived and worked in Germany, 1998 - 2000, as a project manager for construction of a world-class acrylic acid manufacturing plant.
- Have built two telescopes. One for a friend (13.1" truss-tube Dob), and a 10" (which is currently being rebuilt).
- Retired from Celanese in 2007.

- Moved to Charlottesville to be closer to two children and one grandchild living in Norfolk (but still be away from the Norfolk-Richmond light dome).
- Joined CAS in 2008. Began serving as CAS Treasurer in 2009.

Meet……

Ed Preston

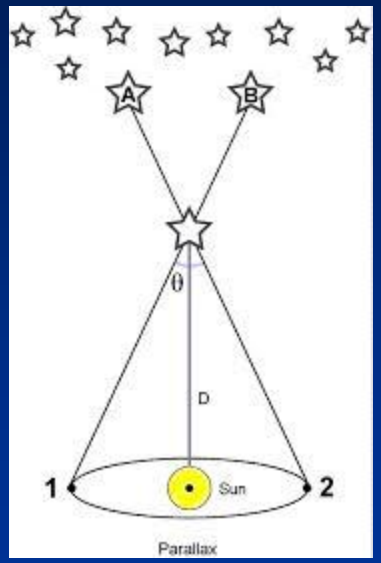
Library Project

See Steve to Check Books Out tonight !

McCormick History Project

Waiting for movement from UVA

Parallax Display Project



Painting is done is the basement ☺

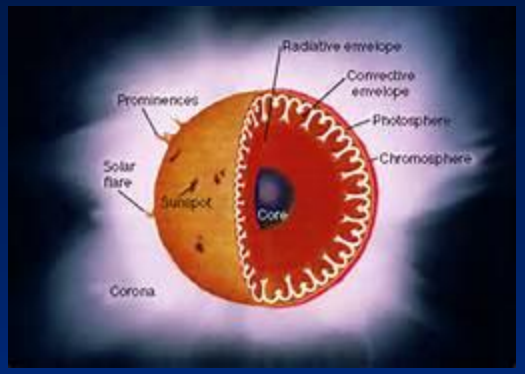
Next move is up to….. You guessed it, UVA

My Favorite Object
Kathleen Manual

THE SUN

Core: center to 0.2 solar radii. Temperatures reach 13.6 million Kelvins and hydrogen is fused into helium.
Radiative zone: 0.2 to 0.7 solar radii. Heat can only travel by radiation.
Convective zone: 0.7 to 1 solar radii. Heat can only travel by convection. The movement of the heat creates the sun's magnetic field.
Photosphere: the surface that we see. Temperatures are around 6,000 Kelvins.

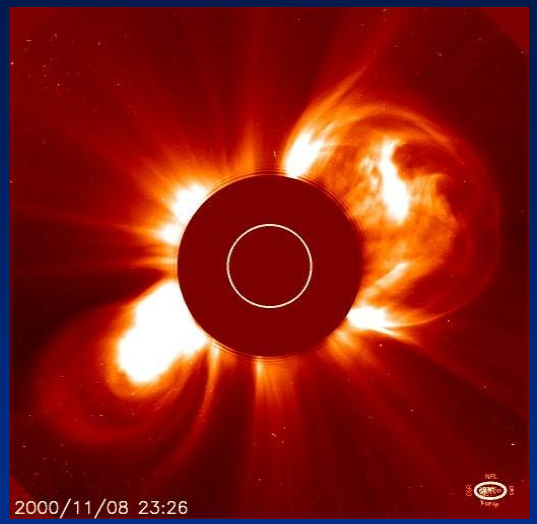
The photons that get made in the Sun are actually a million years old plus by the time they emerge because they have spent their entire life being bombarded around and absorbed and reabsorbed, *ad infinitum* almost before they finally escape. So, if the Sun went out tomorrow - as in all reactions stopped - we'd still have a million years of the light locked inside.



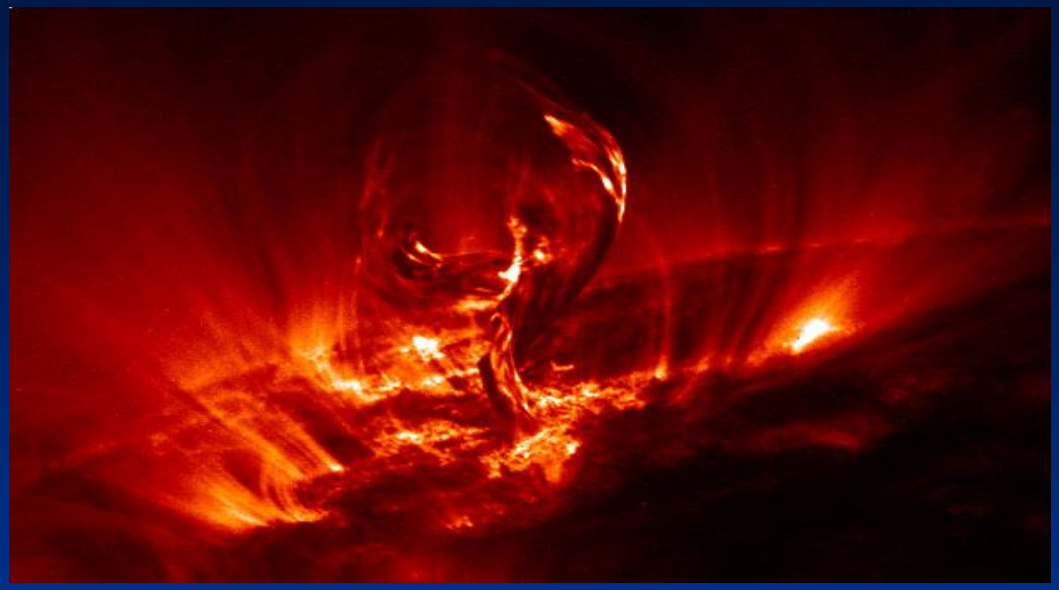
The photosphere is the surface of the Sun and is the only part we can see from Earth.

Chromosphere: temperatures can reach 100,000 Kelvins.

Corona: the volume is larger than the sun itself. Temperatures can reach 1 million Kelvins. Because the outer layers are ionized, they are influenced by the Sun's magnetic fields (sunspots and other areas). The particles are accelerated by these magnetic fields.



The Solar and Heliospheric Observatory (SOHO) was launched in 1995 by NASA and ESA to observe the sun.
This image simulates an eclipse in order to study the corona.

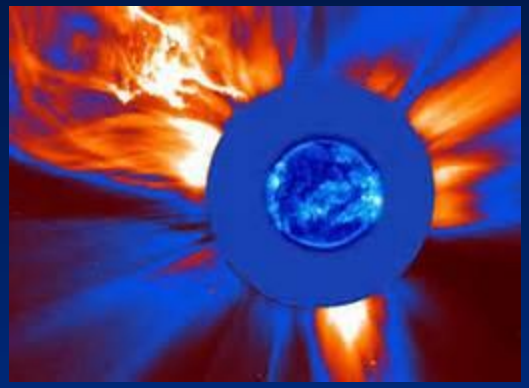


A solar filament on the Sun.
The Earth could fit in its outstretched arms.
Most of the gas involved in the filament will eventually fall back into the Sun.

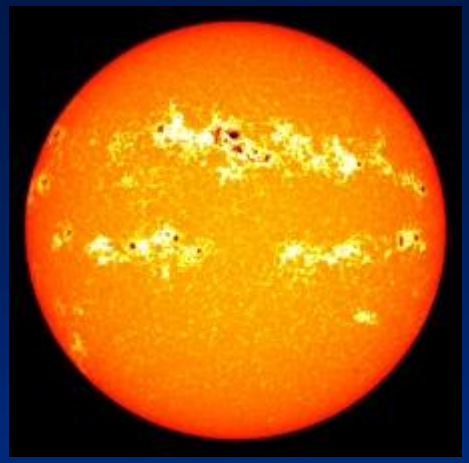
Largest solar flare ever recorded (2003) by SOHO satellite.
Rated x-28, a measure of its x-ray intensity, but considered to possibly be beyond the sensor's ability to measure.
Later upgraded to x-45.

Using a hydrogen alpha filter to view solar prominences. White light filters are good for sunspots but can detect only larger solar flares.

Solar flare.
Difficult to predict.
Can interfere with communications, satellites, radio transmissions, power grids, navigation systems, etc.
Cause auroras.



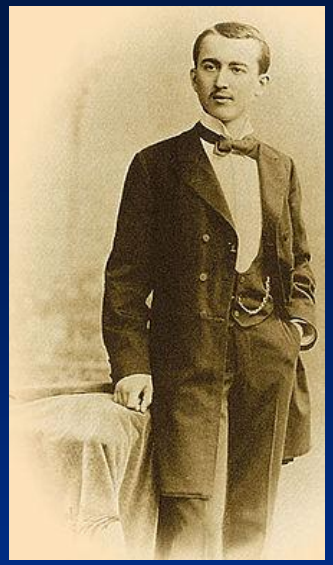
Coronal mass ejection. Most of the mass actually originates from the lower atmosphere but the ejection appears in the corona. Not known until photographed with a coronagraph aboard a satellite in 1971. Could be powerful enough to reverse the Earth's magnetic field polarity.



During the peak of the sunspot cycle, bright areas called faculae increase along with the dark spots, increasing overall solar irradiance. Solar irradiance is the amount of sunlight that strikes the top of the Earth's atmosphere.

It is measured by radiometers aboard satellites.

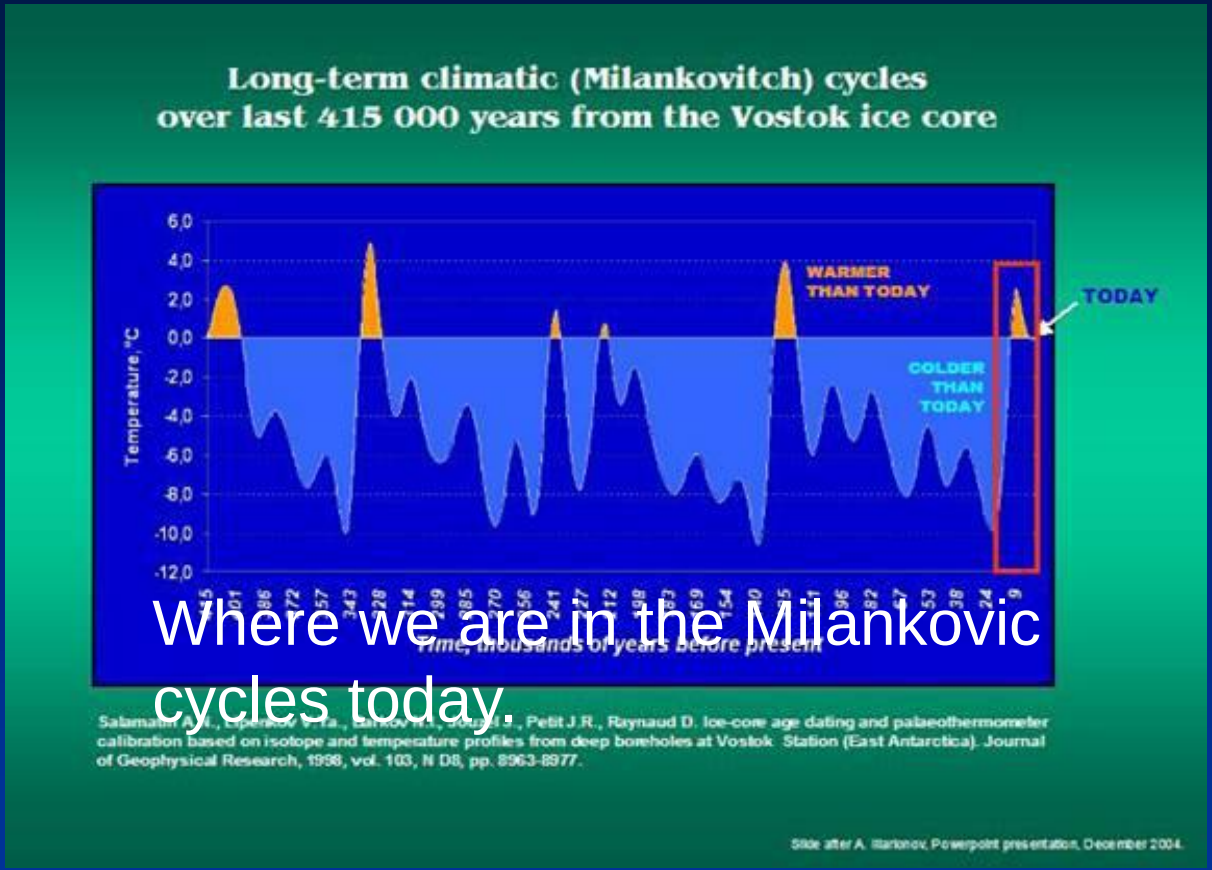
Numerous radiometric readings have been taken since 1978, but are inconsistent. The satellite Glory should start to get better data about solar irradiance this month because of improved accuracy and stability.



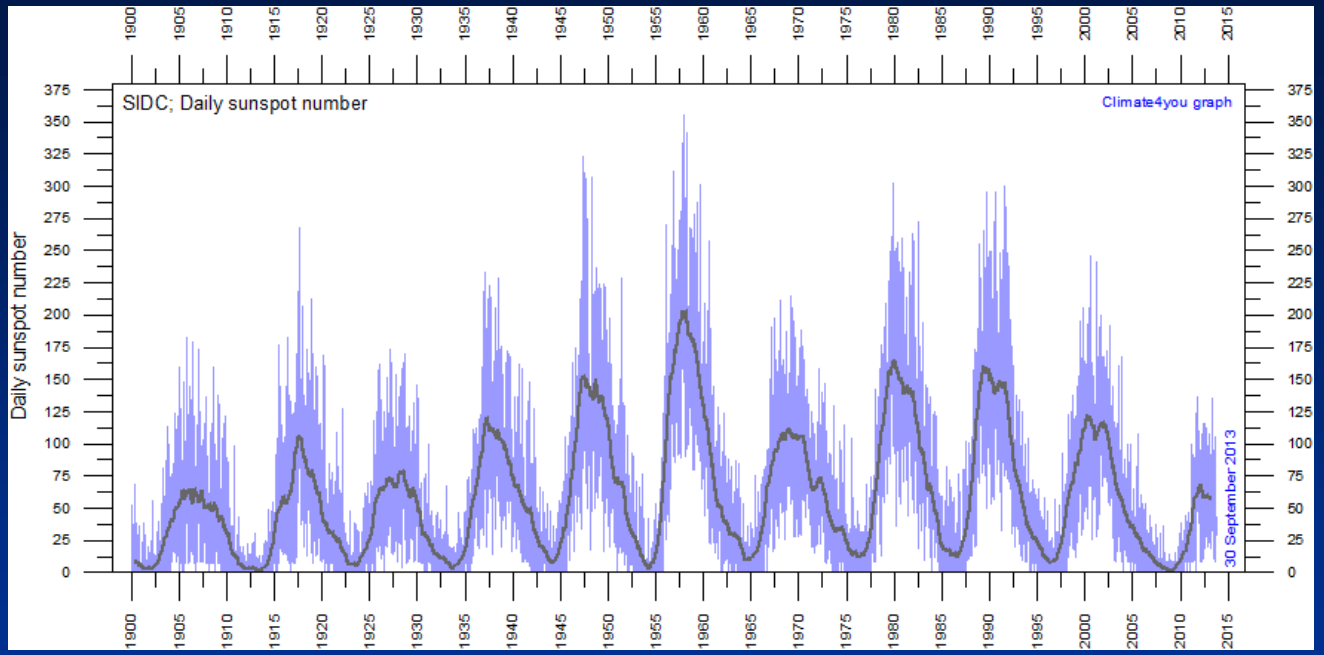
Milutin Milankovic, mathematician, physicist, and astronomer, 1879 – 1958. Identified three cycles which lead to glacial and interglacial periods that occur in roughly 100,000 year cycles:
An elliptical cycle where the Earth's orbit flattens from a circle to an ellipse and then returns to the circle, taking about 100,000 years. Sun is not in exact center of Earth's orbit, so time from spring to fall equinox is a week longer than fall to spring. N. winters are shorter than S. winters, but this will flip in about 13,000 years.

22.1 degrees to 24.5 degrees is the range of the axial tilt and takes 41,000 years to complete a cycle. The larger the tilt, the more extreme the winters and summers in the n. and s. hemispheres. Precession is the wobbling of the poles caused by gravitational forces from the Sun and Moon. One cycle takes 26,000 years to complete. In 13,000 years, our north star will be Vega, which is 47 degrees away from Polaris.

Huronian Ice Age:	2.4 to 2.1 billion years ago
Cryogenian Ice Age:	850-630 million years ago
Andean-Saharan Ice Age:	460-420 million years ago
Karoo Ice Age:	360-260 million years ago
Pliocene-Quaternary:	2.6 million years ago to the present



Where we are in the Milankovic cycles today.



Recent cycle peaked at a hundred year low for sunspot activity. Historical records show similarly weak cycles at the turn of the 19th and 20th centuries (Gleissberg cycle), so there may be an 80-100 year cycle in addition.

THE CHANGING ARCTIC.

By GEORGE NICOLAS IFFT.

[Under date of October 10, 1922, the American consul at Bergen, Norway, submitted the following report to the State Department, Washington, D. C.]

The Arctic seems to be warming up. Reports from fishermen, seal hunters, and explorers who sail the seas about Spitzbergen and the eastern Arctic, all point to a radical change in climatic conditions, and hitherto unheard-of high temperatures in that part of the earth's surface.

In August, 1922, the Norwegian Department of Commerce sent an expedition to Spitzbergen and Bear Island under the leadership of Dr. Adolf Hoel, lecturer on geology at the University of Christiania. Its purpose was to survey and chart the lands adjacent to the Norwegian mines on those islands, take soundings of the adjacent waters, and make other oceanographic investigations.

Dr. Hoel, who has just returned, reports the location of hitherto unknown coal deposits on the eastern shores of Advent Bay—deposits of vast extent and superior quality. This is regarded as of first importance, as so far most of the coal mined by the Norwegian companies on those islands has not been of the best quality.

---

[1] R. L. Holmes: Quart. Journ, Royal Meteorol. Soc., January, 1905.

The oceanographic observations have, however, been even more interesting. Ice conditions were exceptional. In fact, so little ice has never before been noted. The expedition all but established a record, sailing as far north as 81° 29′ in ice-free water. This is the farthest north ever reached with modern oceanographic apparatus.

The character of the waters of the great polar basin has heretofore been practically unknown. Dr. Hoel reports that he made a section of the Gulf Stream at 81° north latitude and took soundings to a depth of 3,100 meters. These show the Gulf Stream very warm, and it could be traced as a surface current till beyond the 81st parallel. The warmth of the waters makes it probable that the favorable ice conditions will continue for some time.

Sunspots are caused by intense magnetic activity which inhibits convection and lowers the temperature of areas on the surface to 3,000 to 4,500 Kelvins.

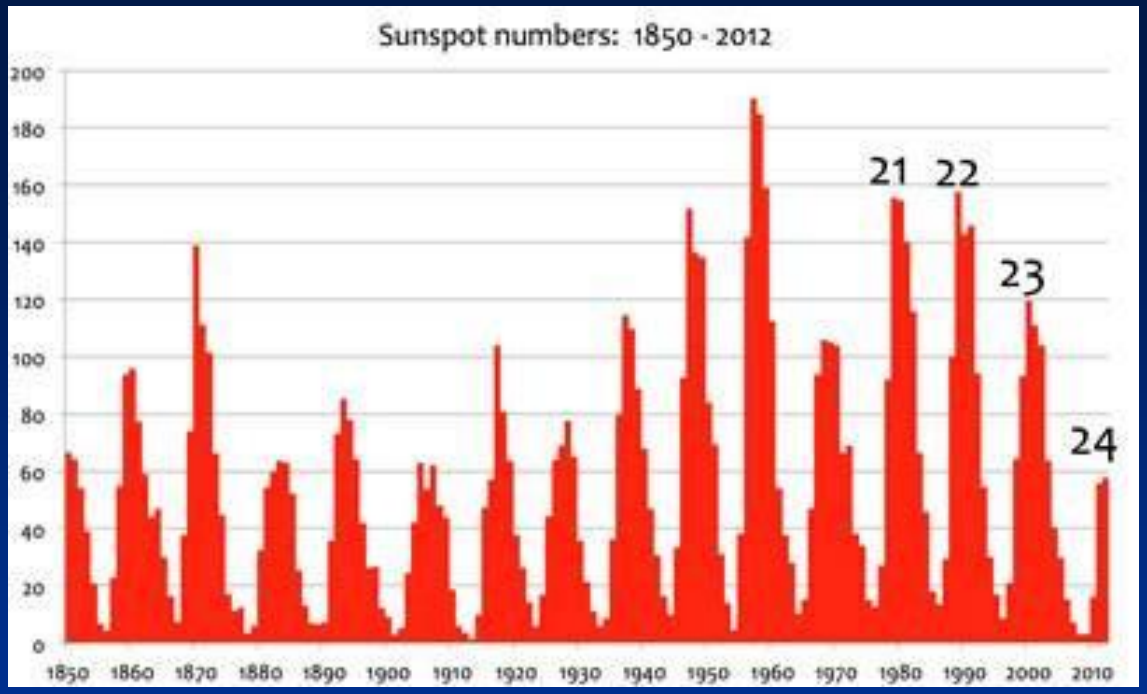
This contrast with the rest of the sun makes them appear dark. It is the magnetic activity that causes the plasma above the spot to rise in temperature. But it also inhibits the transport of heat in the sunspot itself.

They often come in pairs with opposite polarities.

They would appear brighter than the moon if isolated from the rest of the sun.

Can measure from ten miles across to 100,000 miles across.

The Sun's magnetosphere extends well beyond Pluto.

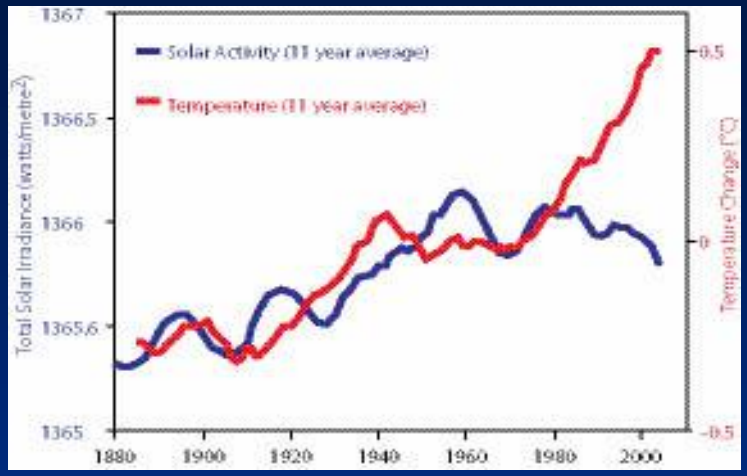


Number of sunspots occurs in 11 year cycles.

Sun flips its north and south magnetic poles every 11 years because Sun's rotation is faster at its equator (25 days) than at its poles (35 days) because Sun is a gaseous plasma.

As the field gets closer to flipping, this results in magnetic tangles that lead to sunspots.

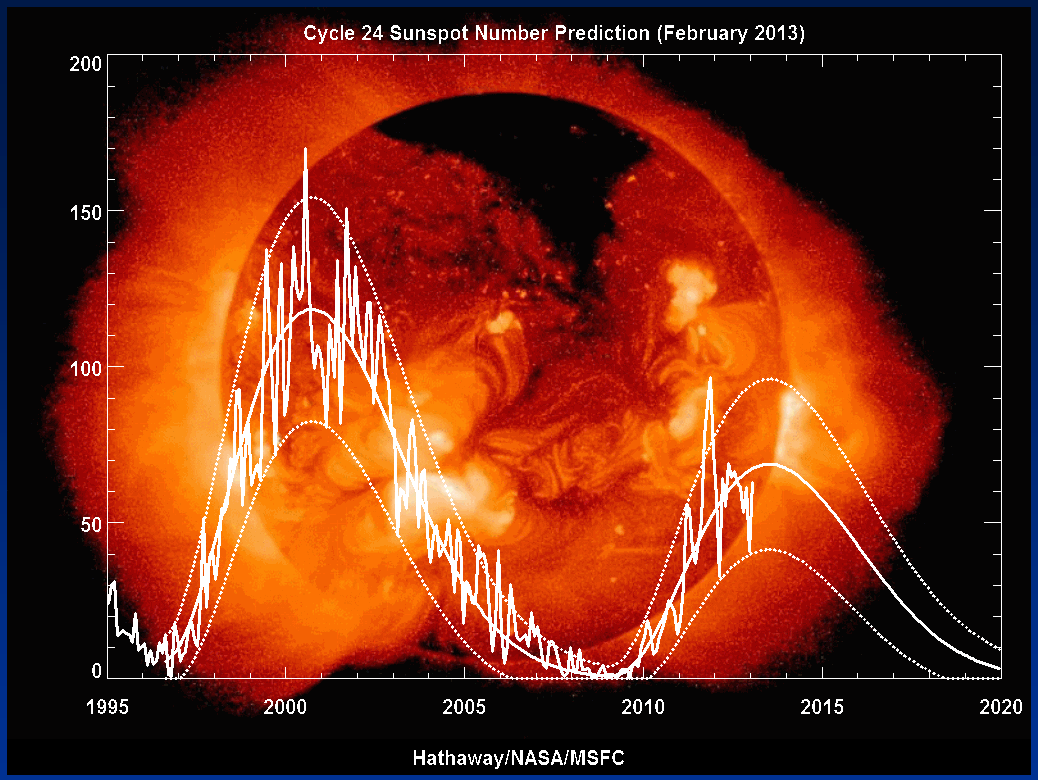
As equilibrium is reestablished, the sunspots decrease in number.



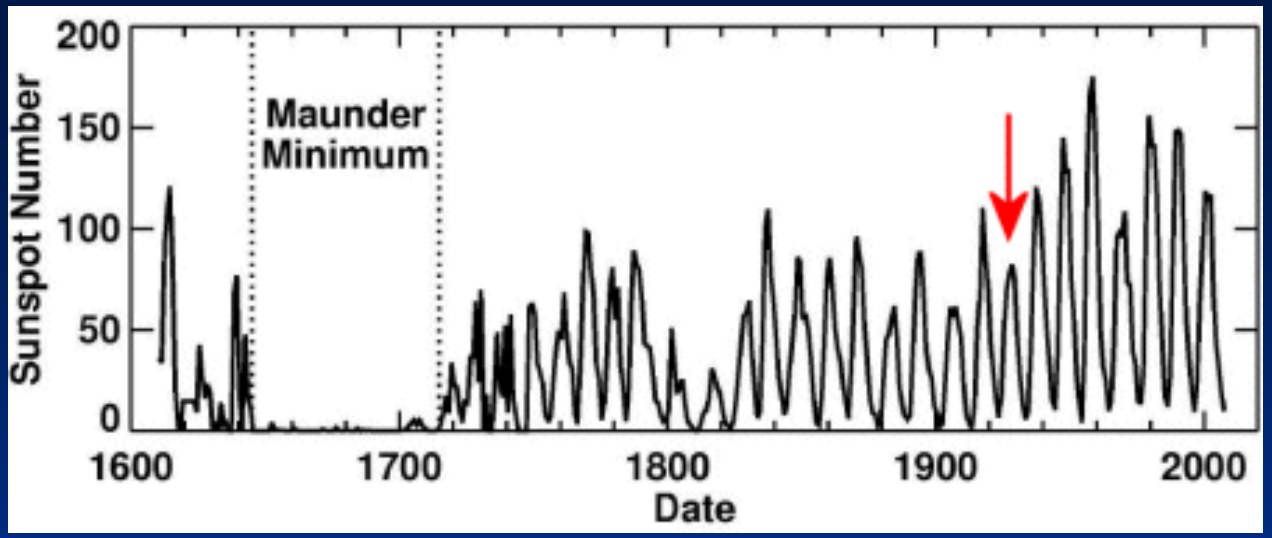
The blue line is solar irradiance, and the red line is Earth's average temperature.

The jump in temperature from 1970 is considered to be too steep to be correlated with solar activity.

The solar constant of 0.1 % (solar irradiance varies by no more than 0.1 % over the last three 11 year sunspot cycles) is considered too low to make the sun's variability a factor in climate change.



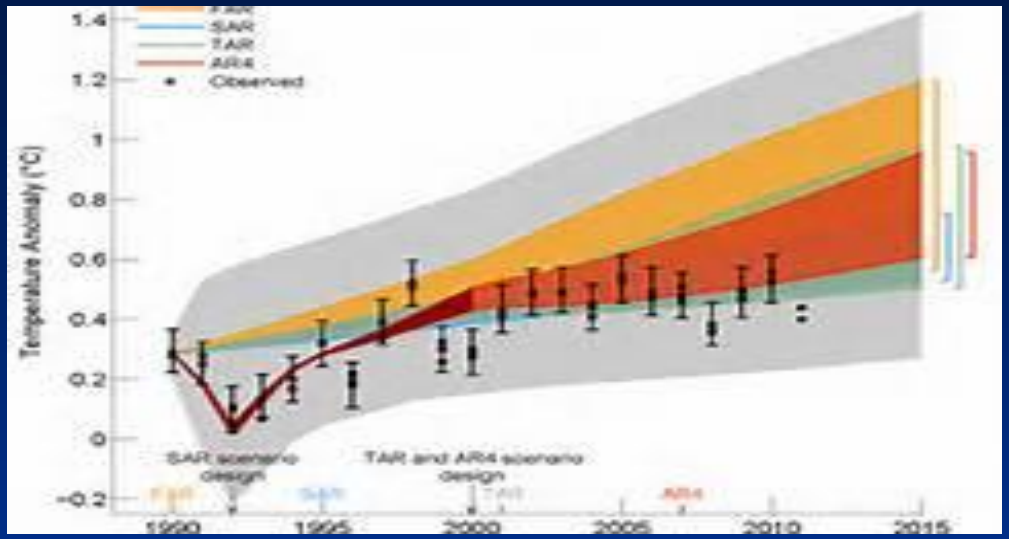
NASA prediction of number of sunspots over next seven years.
Sunspots increase irradiance by the Sun.
They also amplify the solar wind which acts as protection for the Earth against cosmic rays.
A decrease in cosmic rays leads to less cloud cover, amplifying the effect of the solar irradiance.



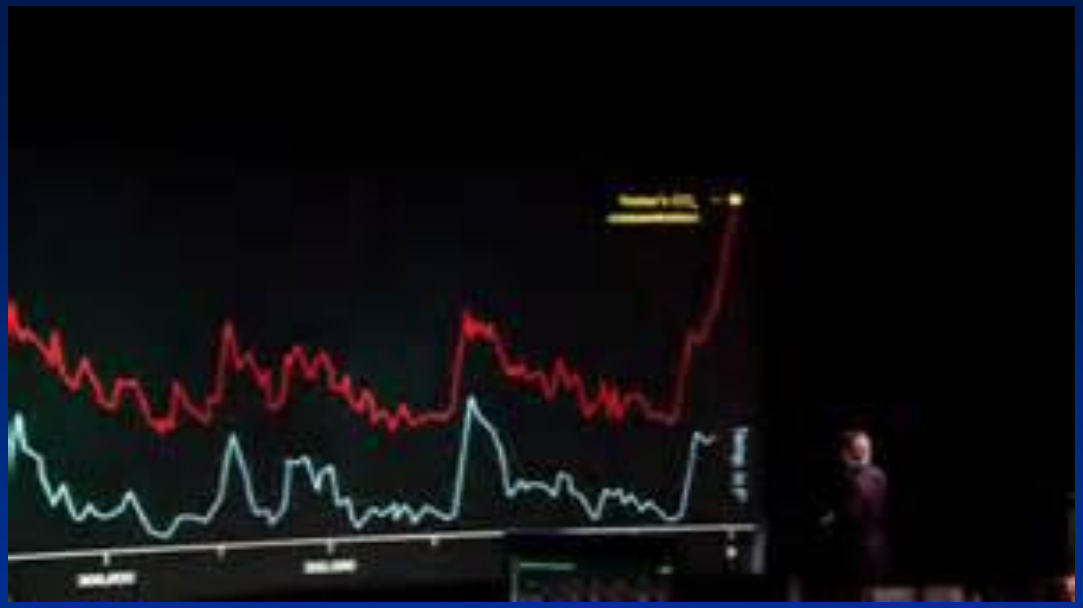
Maunder Minimum (Little Ice Age) of 1645 to 1715 corresponded to very low sunspot activity.

“Little Ice Age” occurred in Europe and Americas from 1300 to 1870.

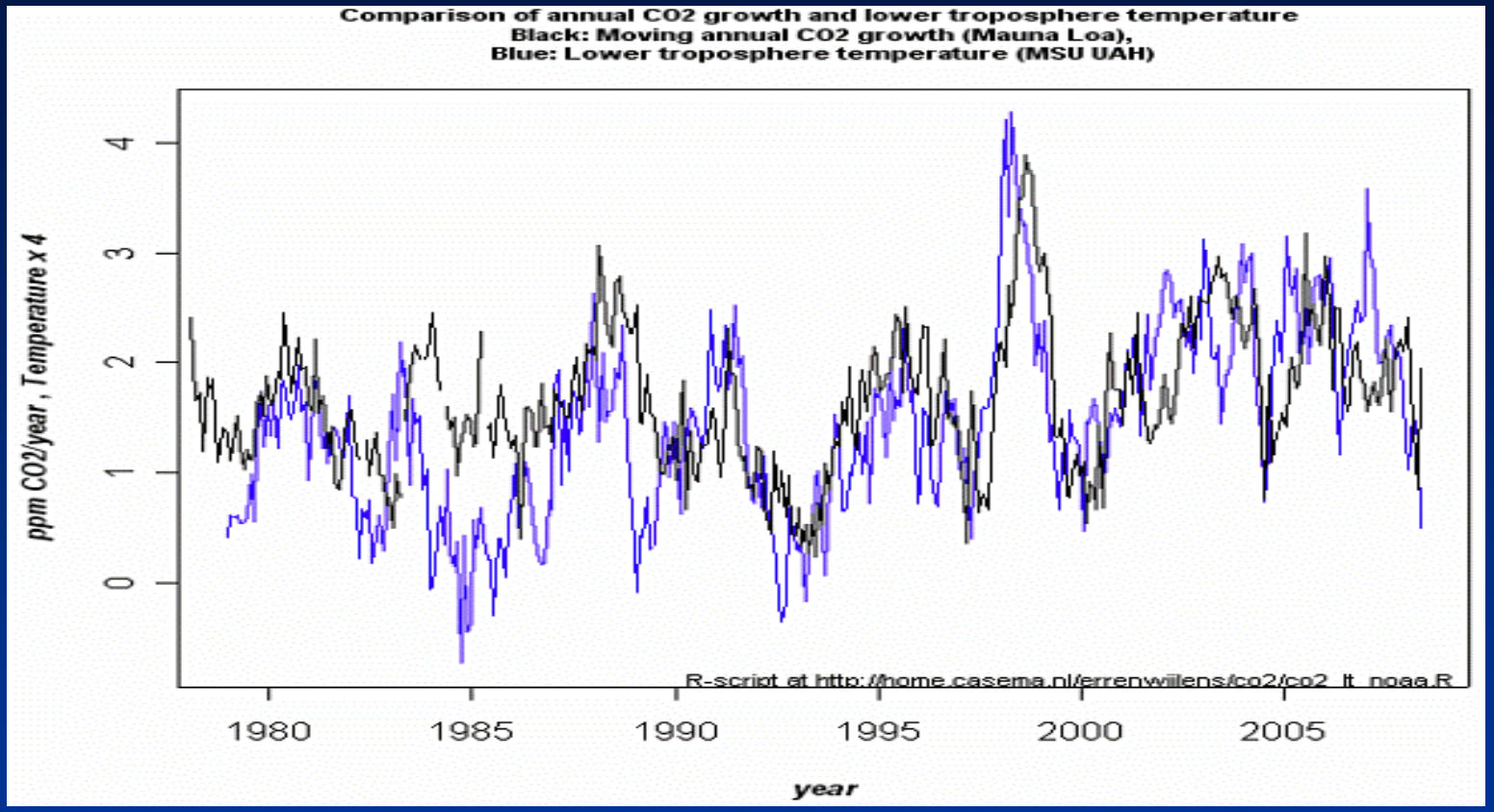
Sun may have expanded during this period and its rotation slowed.



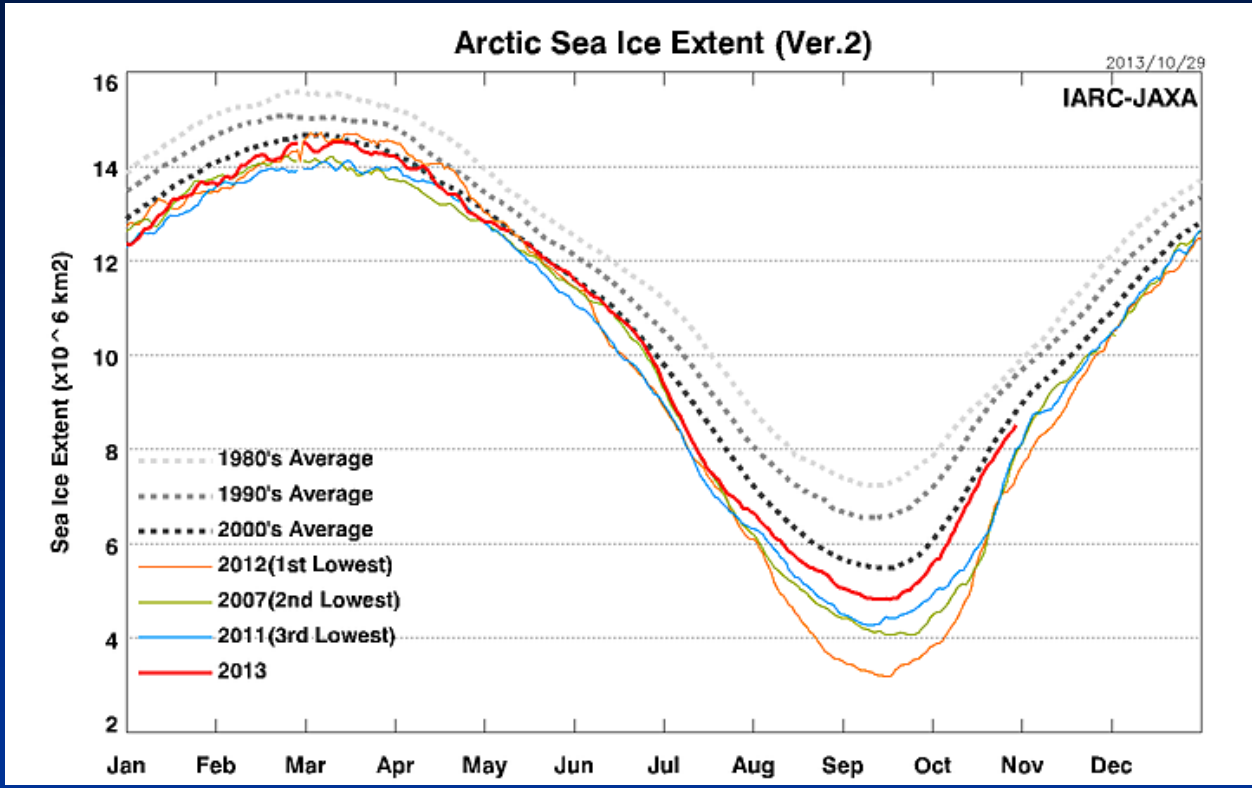
Most recent graph from IPCC.



CO2 lags temperature, not the other way around.



A shorter period showing the actual cause and effect.



Where we are now with arctic sea ice.

Total solar eclipse on August 21, 2013 in United States.

Upcoming Speakers

December

The Inaugural Heidi Winter Lecture

Dr. Ed Murphy

Meeting at NRAO

Upcoming Speakers

January

- MESSENGER Mission to Mercury update
- Mark Kochte – MESSENGER Mission Payload Operations Specialist

Upcoming Speakers

February

- Hillside Settlement – MARS Foundation
- CAS Member Greg Brown

Looking Ahead……..

Holiday Party

and

Swap Meet

Sunday, December 8

McCormick

* CAS *
Charlottesville Astronomical Society

Astro-OP (Astronomy Outreach Program)

Status

November 6, 2013

CAS Astro-OP Activity/Status ~ *10/2/13 – 11/5/13*

- **Meetings**
  - Jamie Bourland, Blue Ridge School (9-12), Greene County : interested in CAS telescope kits, speakers, & advice/guidance re: a school observatory
  - Shanil Verani, Director, John C. Wells Planetarium, JMU to coordinate collaborative efforts (see E-News article: 2014 Space Camp)
  - Ed Preston, Scott Duresky, and Fritz Repich met with Mike Coiner & Anne-Marie Eberhardt Greene County School Principals to coordinate CAS support of their Science Fair
- **Published/Distributed 2nd Issue of CAS Astro-OP E-News – (Seeking Editor/Co-Editors)**
- **Astro-OP County School System Coordinator Appointments** (a/o 11/05/13):
  - Albemarle/Charlottesville: Steve Layman
  - Orange: Ed Preston
  - PVCC: Arman Mottaghi
- **Fluvanna, Greene, Madison, and Nelson counties are still available**
- **CAS Speakers Bureau Schedule/Needs**
  - 11/11/13: Ed Preston – "Navigating the Night Sky" Fluvanna Middle School Astronomy Club
  - 11/15.13: Ed Preston – "The Moon" Greene Primary & Nathaniel Greene Elementary Science Fair (K-5)
  - 11/20/13: Steve Layman – "Observing the Night Sky" at Locust Grove Middle School Astronomy Club
  - 11/25/13: Steve Layman – "Observing the Night Sky" Fluvanna Middle School Astronomy Club
- **CAS Speakers Needed for: 1) Orange HS ,2) The Blue Ridge School (Private 9-12), 3) Fluvanna HS (9-12), and 4) Madison HS (9-12)**

FREE ASTRONOMY CLASS

ONLINE

http://www.planetary.org/blogs/bruce-betts/full-astronomy-course-online.html

Planetary Society

What's Up This Month

In the Solar System

http://www.planetary.org/multimedia/space-images/charts/whats-up-in-the-solar-system-frohn.html

In the Night Sky

http://www.jpl.nasa.gov/video/

Partial Solar Eclipse Images

John Avellone

Rich Drumm

Mikle Webster

Door Prize Drawing