

2012: The Science of the Maya Apocalypse

Dr. Bryan Mendez
UC Berkeley
Space Sciences Laboratory

The Maya

The Maya have been in Mesoamerica for thousands of years.

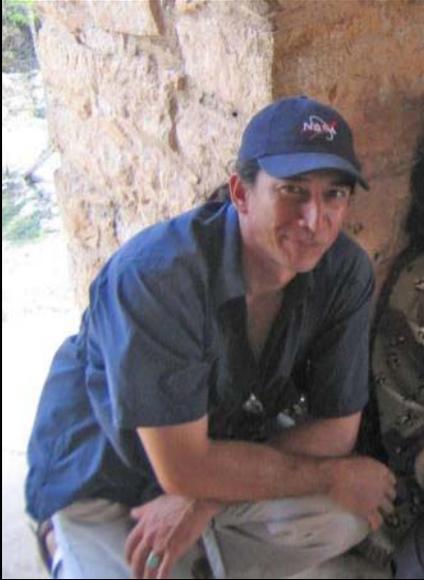
During their classic period (2,000 – 1,000 years ago), a civilization of city-states flourished around the region.

The end of this classic period was marked by a collapse of the political structure and mass exodus from the cities (~900 AD).



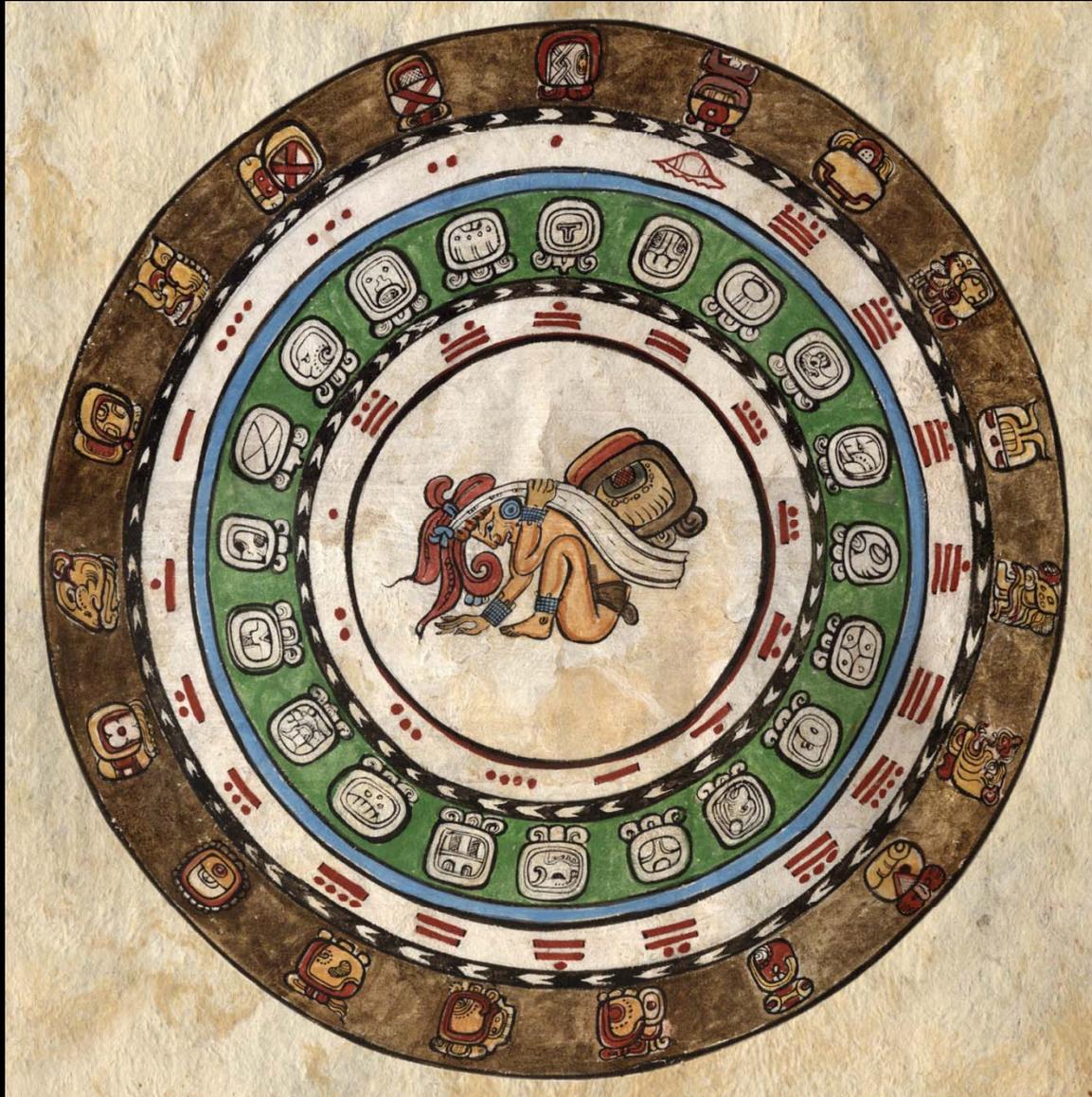
The Maya

Today, there are more than six million Maya who live in Mesoamerica, the United States, and throughout the world.



Maya Calendars

The Maya have used many different calendars over the millennia for a variety of purposes.



Not a Maya Calendar

This is *Piedra del Sol*, an Aztec altar with calendar symbols in it. The Aztec were a much later civilization than the Maya. They were distinct in region, language, and culture.



Long Count

The 2012 phenomenon begins with a misinterpretation of one of the ancient calendars of the Maya, the Long Count



	Symbolic Variant	Head Variant	Head Variant	
B'aktun				144,000 days (20 K'atuns)
K'atun				7200 days (20 Tuns)
Tun				360 days (18 Winal)
Winal				20 days (20 kins)
K'in				1 Day

Long Count

An example Long Count date written in the Dresden Codex:



9 B'ak'tun



9 K'a'tun



9 Tun



16 Winal



0 Kin



1 Ajaw

Tzolkin



18 Wo

Haab

Long Count

Modern scholars write this as:
9.9.9.16.0 1 Ajaw 18 Wo

Long Count: Beginning

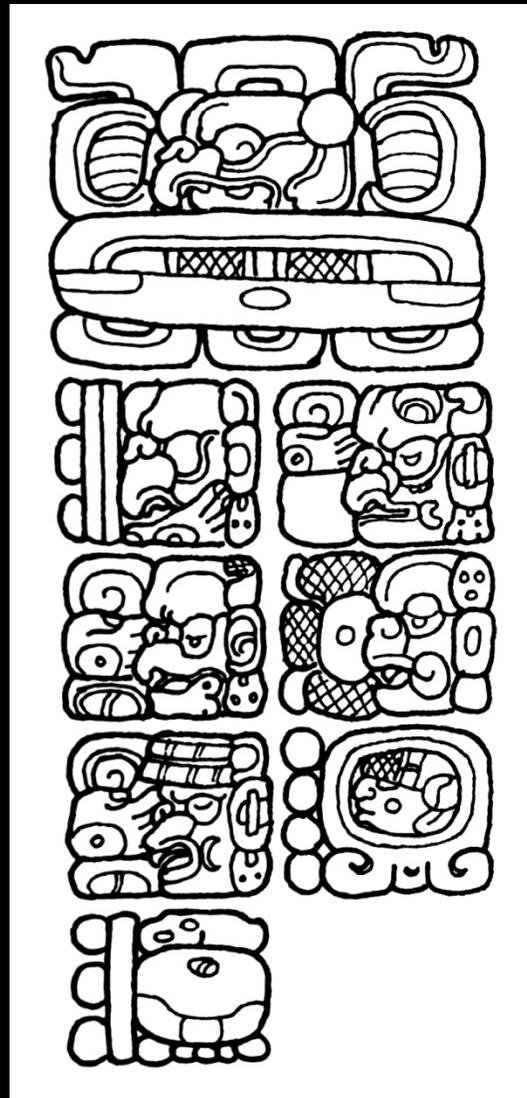
The Long Count started/reset with the legendary beginning of this creation of the world.

13 B'ak'tun

0 Tun

0 Kin

8 K'umku'



0 K'a'tun

0 Winal

4 Ajaw

Long Count: Beginning

Counts days since the creation of this age of the world:

Which involved hero twins, who bring their father back from Xi'bal'ba to become the corn god and then transform themselves into the Sun and Moon. Also, the laying down of the 3 hearth stones of creation, and the restart of time.

Analogous to the idea that the Christian calendar begins with the birth of Jesus Christ.

The date of that first day of creation is given in several places as
13.0.0.0 4 Ajaw 8 K'umku'



Long Count: Correlation

The Long Count had not been used for centuries by the time the Spanish arrived in Mesoamerica.

Correlations use Julian Calendar dates recorded by the Spanish and Calendar Round dates that the Aztec and Maya people were using at the time.

The correlation most accepted by most scholars right now (with plenty of debate) gives the creation date (13.0.0.0.0 4 Ajaw 8 K'umku') as August 11, 3114 BCE.



Long Count: 13th B'ak'tun

Using this correlation, today's Long Count Date is:

12.19.19.9.4 10 Kan 7 Zec

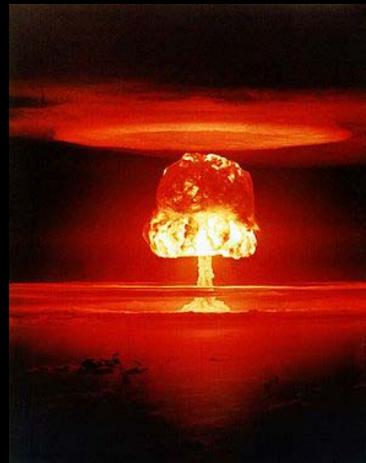
2012.06.29 Friday

176 days until

13.0.0.0.0 4 Ahaw 3 K'ank'in

2012.12.21 Friday

What does it mean!?!?!?



Nothing



This monument is the first of only two known inscriptions to reference the coming 13th B'ak'tun.

There is NO evidence that the Maya thought of this date as anything more than a significant anniversary of creation. Which would be a great celebration!

They wrote about dates later than this.

The Maya DID NOT predict the end of the world in 2012



They would probably have written the next day as
13.0.0.0.1 5 Imix 4 K'ank'in

Misinterpretations of this date lead to a misconception that it was either the end of the Long Count, or a great reset date, like the last time the world reached this date.

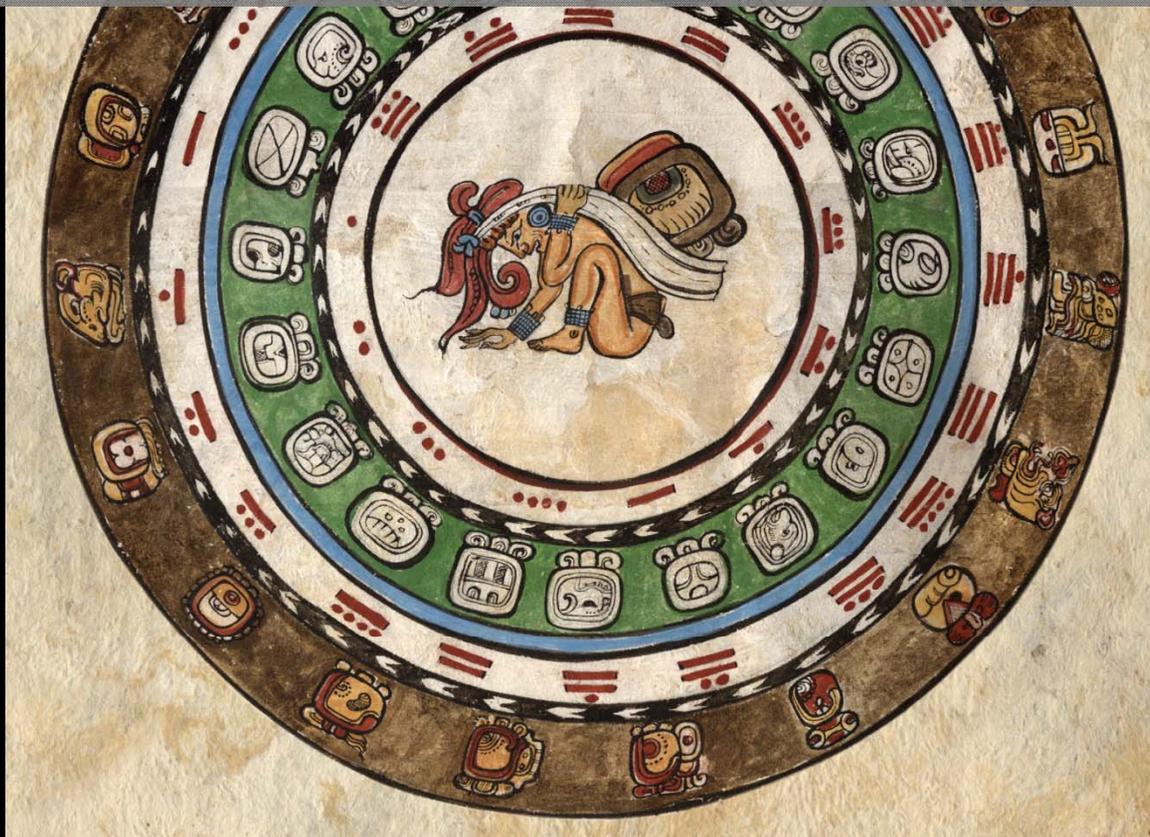
Maya Calendars

Modern Maya people don't use the Long Count. The calendars they do use (Tzolkin & Haab) do not end in 2012, nor do they ever end, they cycle.

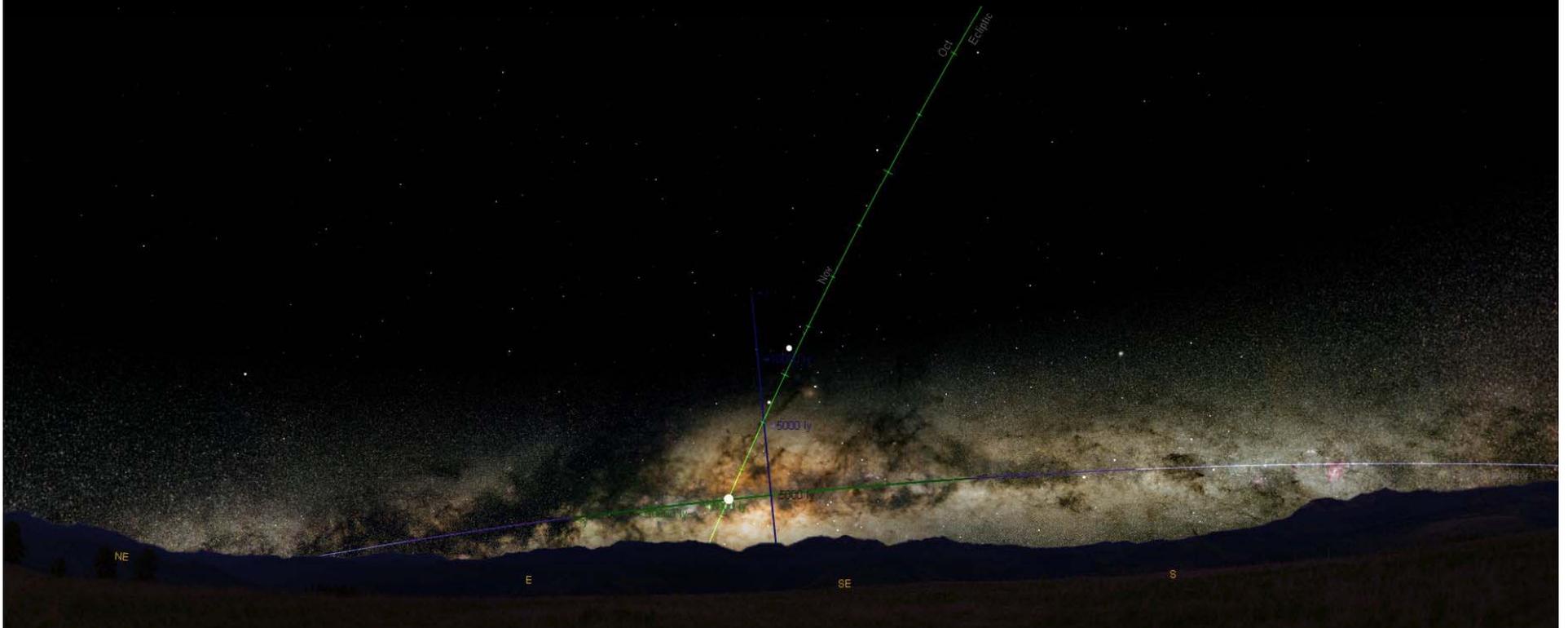
For more info visit:

http://www.mayan-calendar.com/ancient_tzolkin.html

http://www.mayan-calendar.com/ancient_haab.html

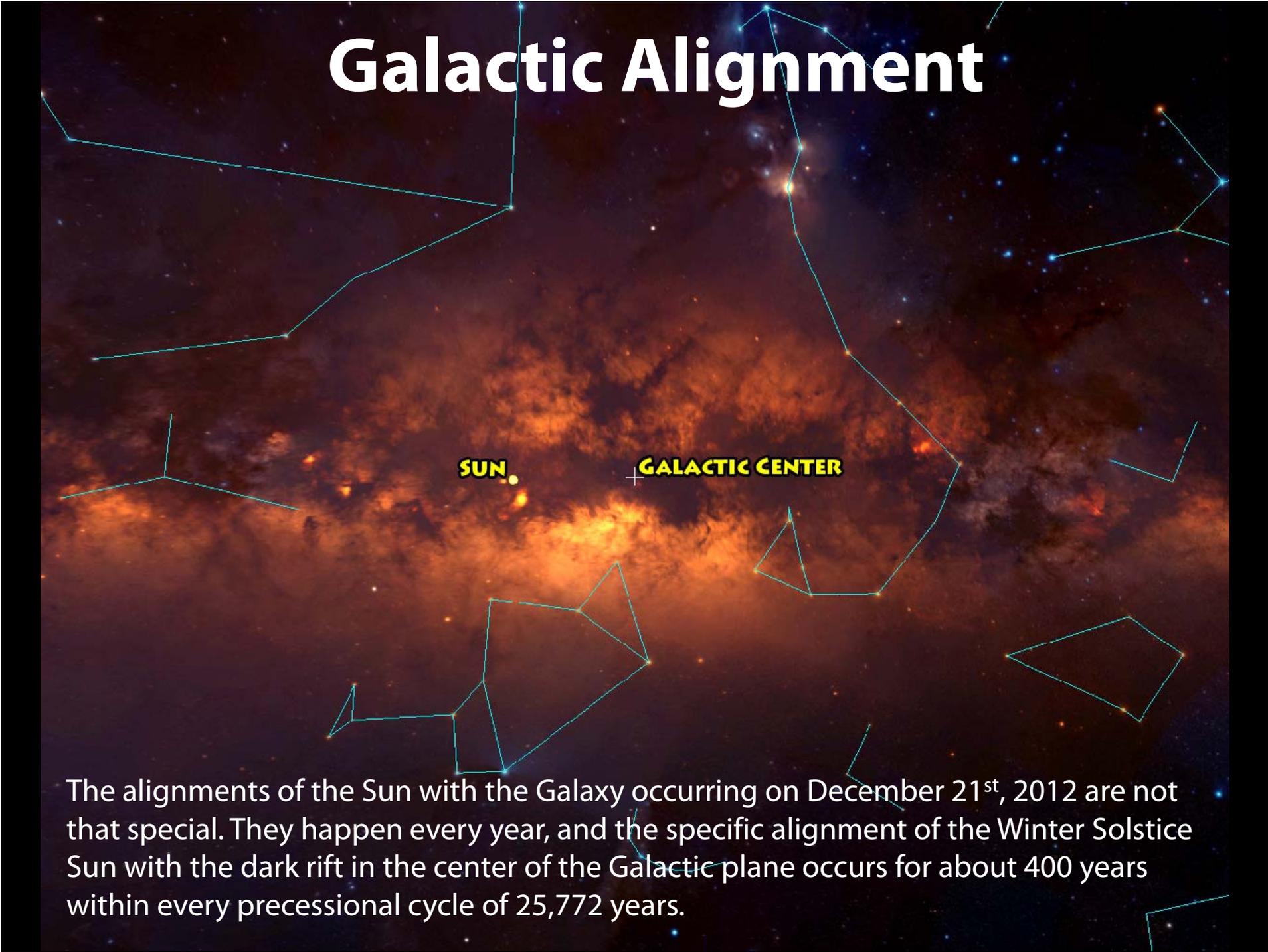


Galactic Alignment



The claim is that an alignment of the Sun with the center of the Milky Way Galaxy that only happens once every 25,772 years will happen on December 21st, 2012 and that it will cause *something* to happen.

Galactic Alignment

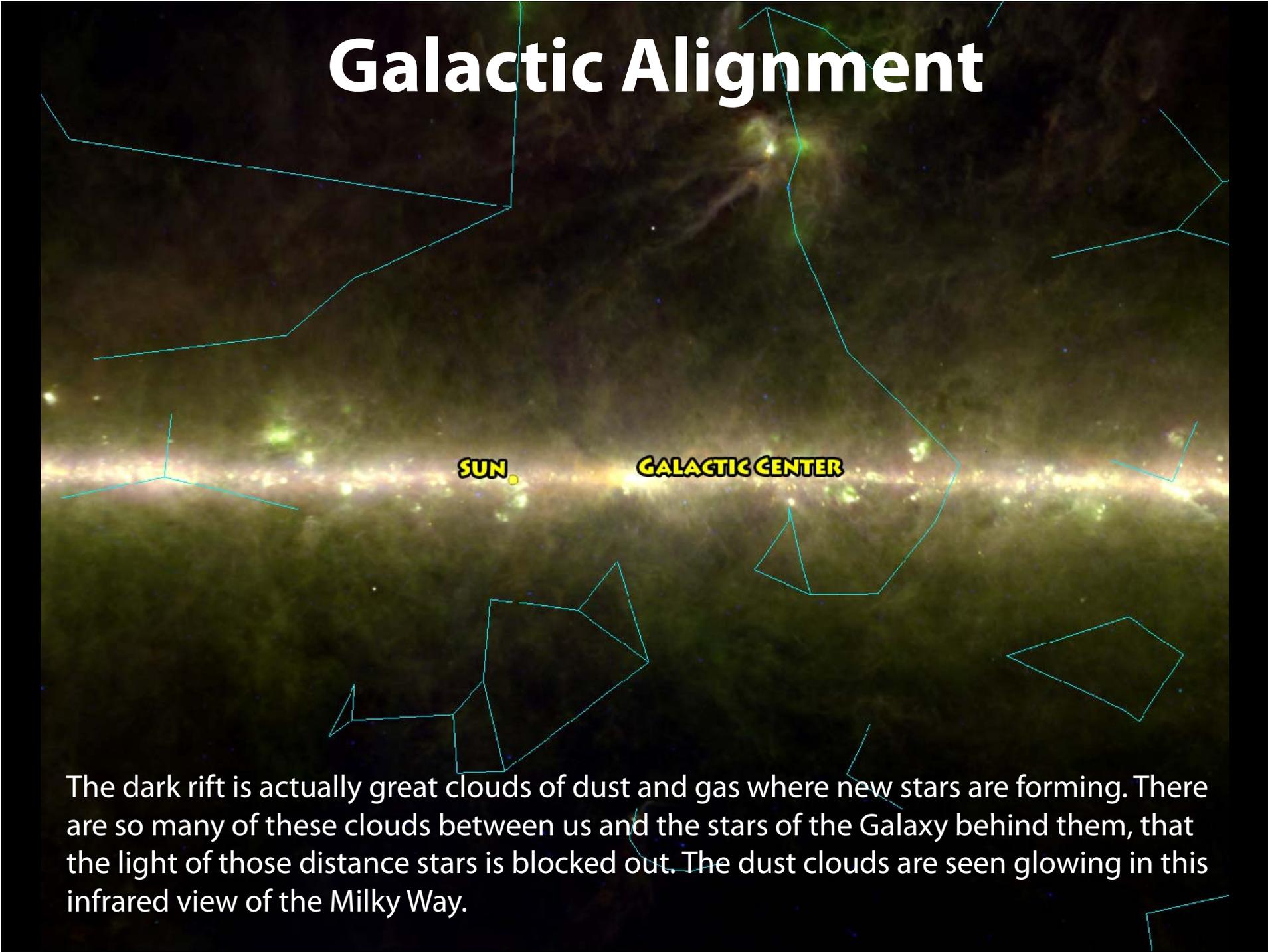


SUN

GALACTIC CENTER

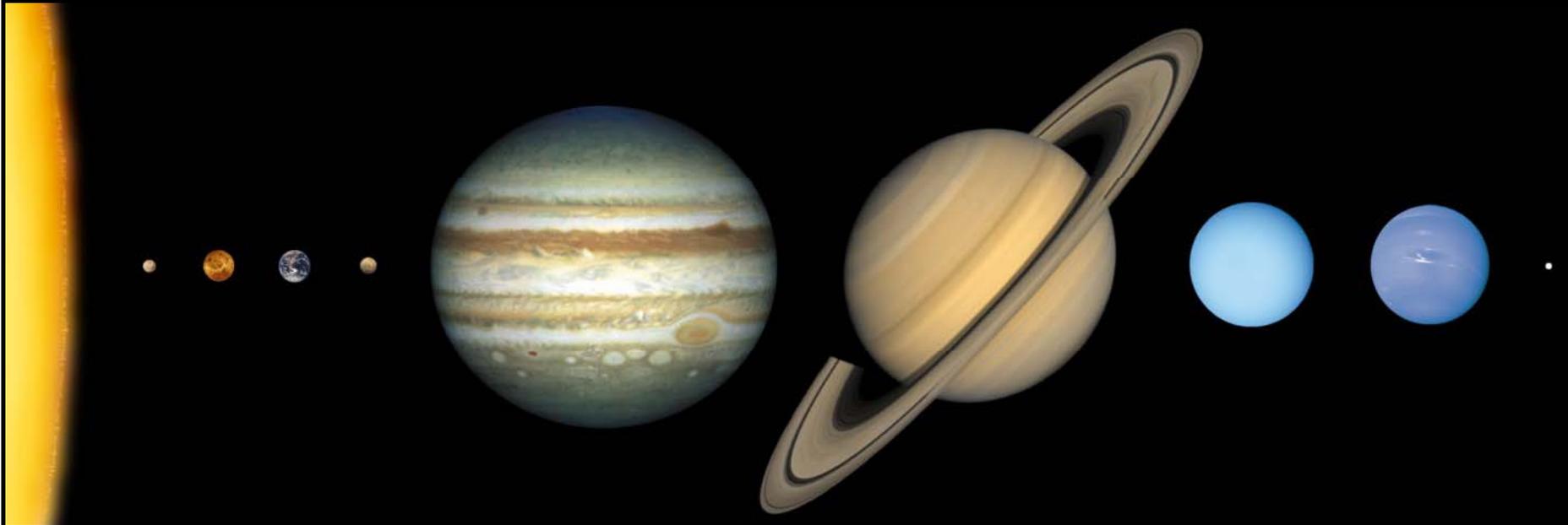
The alignments of the Sun with the Galaxy occurring on December 21st, 2012 are not that special. They happen every year, and the specific alignment of the Winter Solstice Sun with the dark rift in the center of the Galactic plane occurs for about 400 years within every precessional cycle of 25,772 years.

Galactic Alignment

An infrared view of the Milky Way galaxy, showing a dense band of stars and dust. The image is overlaid with cyan constellation outlines. Two labels in yellow text with black outlines are placed on the galactic band: 'SUN' on the left and 'GALACTIC CENTER' on the right. The background is dark with scattered stars and glowing dust clouds.

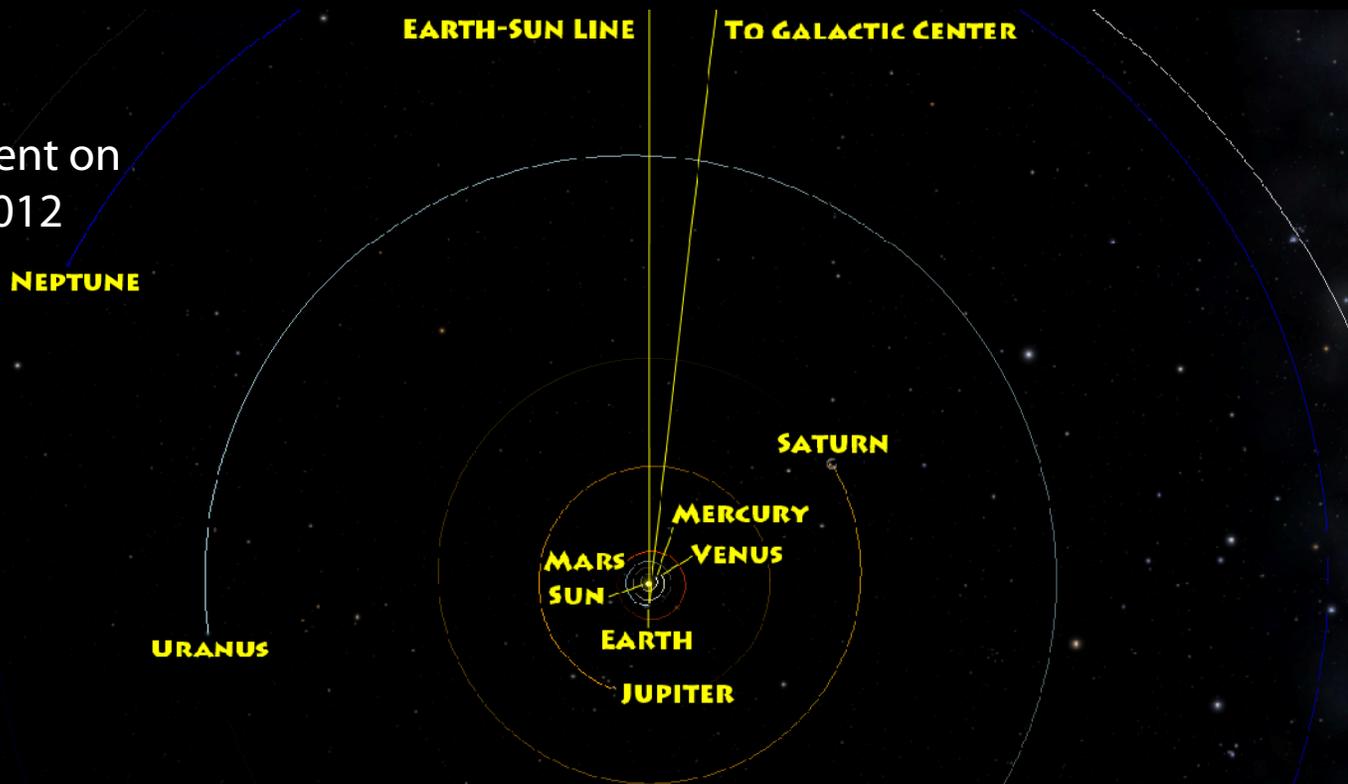
The dark rift is actually great clouds of dust and gas where new stars are forming. There are so many of these clouds between us and the stars of the Galaxy behind them, that the light of those distance stars is blocked out. The dust clouds are seen glowing in this infrared view of the Milky Way.

Planetary Alignment



Planetary Alignment

Planetary
arrangement on
Dec. 21, 2012

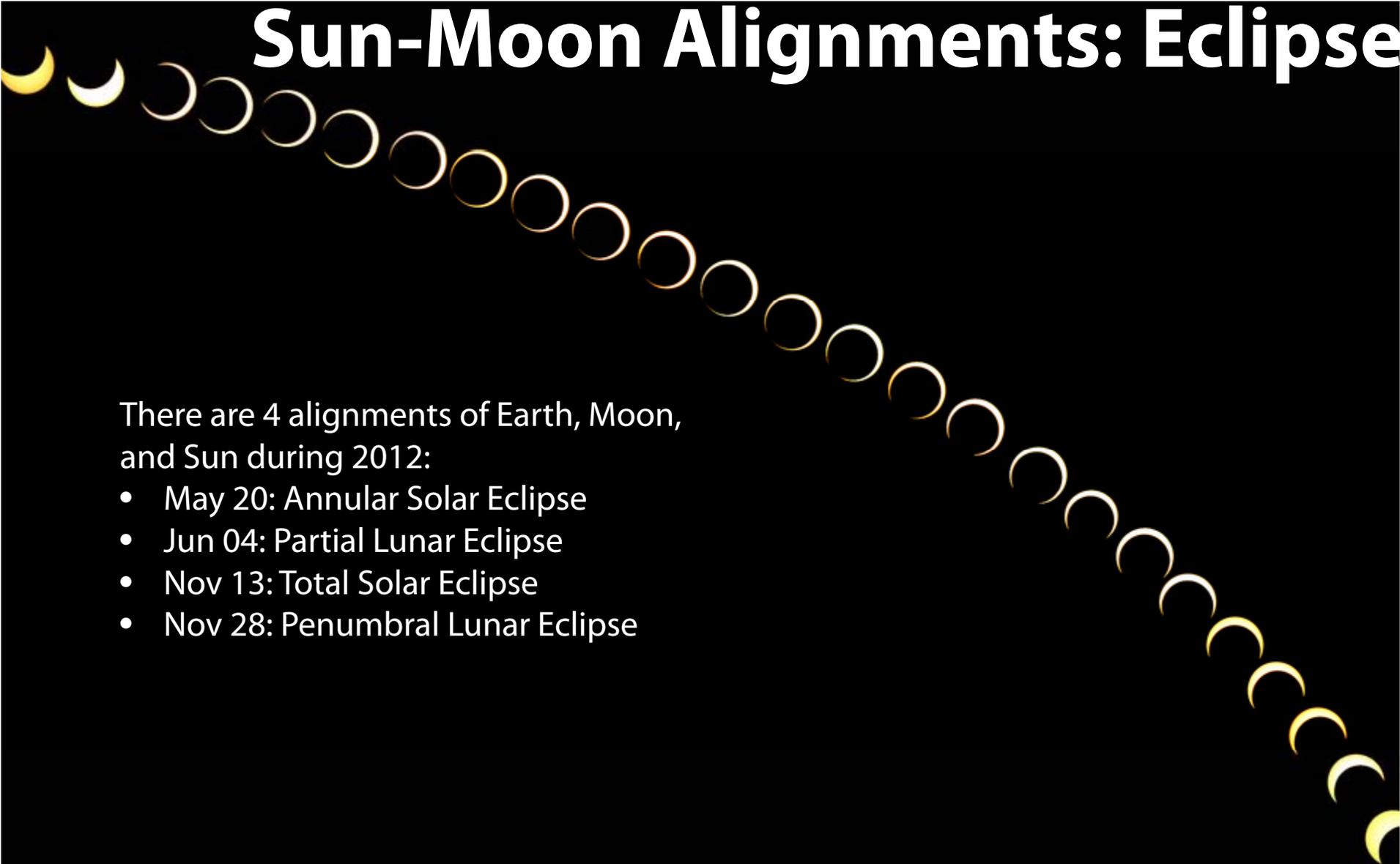


The planets *never all* line up in such an arrangement.

<http://www.etsu.edu/physics/etsuobs/starprty/22099dgl/planalign.htm>

But even if they were to do so, it would have no effect on Earth. Tidal effects from the Moon and Sun are tens of thousands to millions of times larger than the planets. The Moon-Sun tides vary by 25% every month! Earth's been just fine for billions of years.

Sun-Moon Alignments: Eclipse



There are 4 alignments of Earth, Moon, and Sun during 2012:

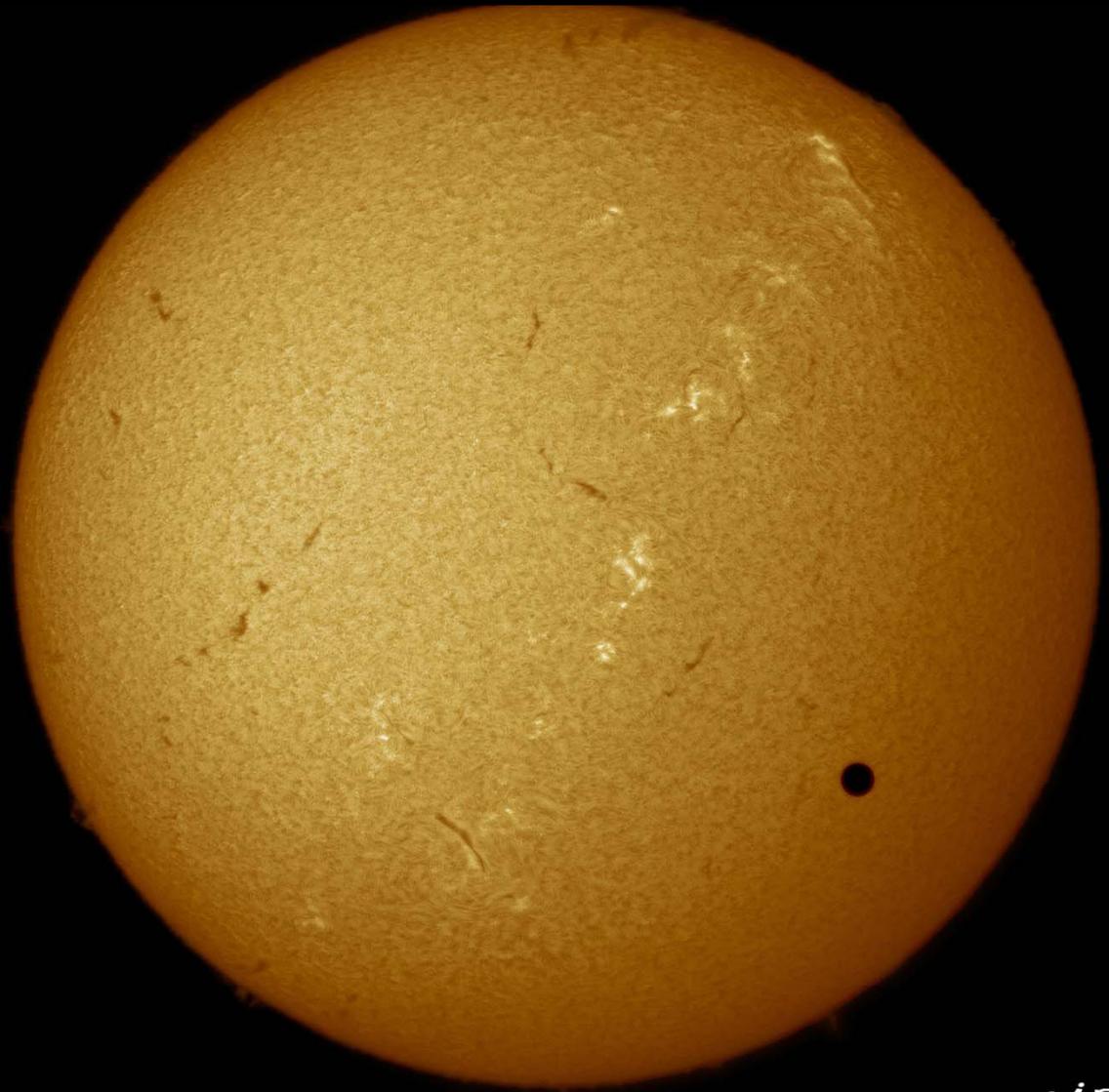
- May 20: Annular Solar Eclipse
- Jun 04: Partial Lunar Eclipse
- Nov 13: Total Solar Eclipse
- Nov 28: Penumbral Lunar Eclipse

Planetary Alignment: Venus Transit

On June 5, Venus, Earth, and Sun aligned to create a kind of eclipse, called a transit.

Venus transits typically occur in pairs 8 years apart separated by gaps of over 100 years.

The last one was in 2004, and the next won't occur until 2117.



Global Warming



Global Warming

The surface temperature of Earth has been increasing for the past century at a rate unprecedented in geologic history. The consensus of the scientific community is that this global warming is caused by human activity that increases the amount of gases in the atmosphere that trap heat (so-called greenhouse gases).

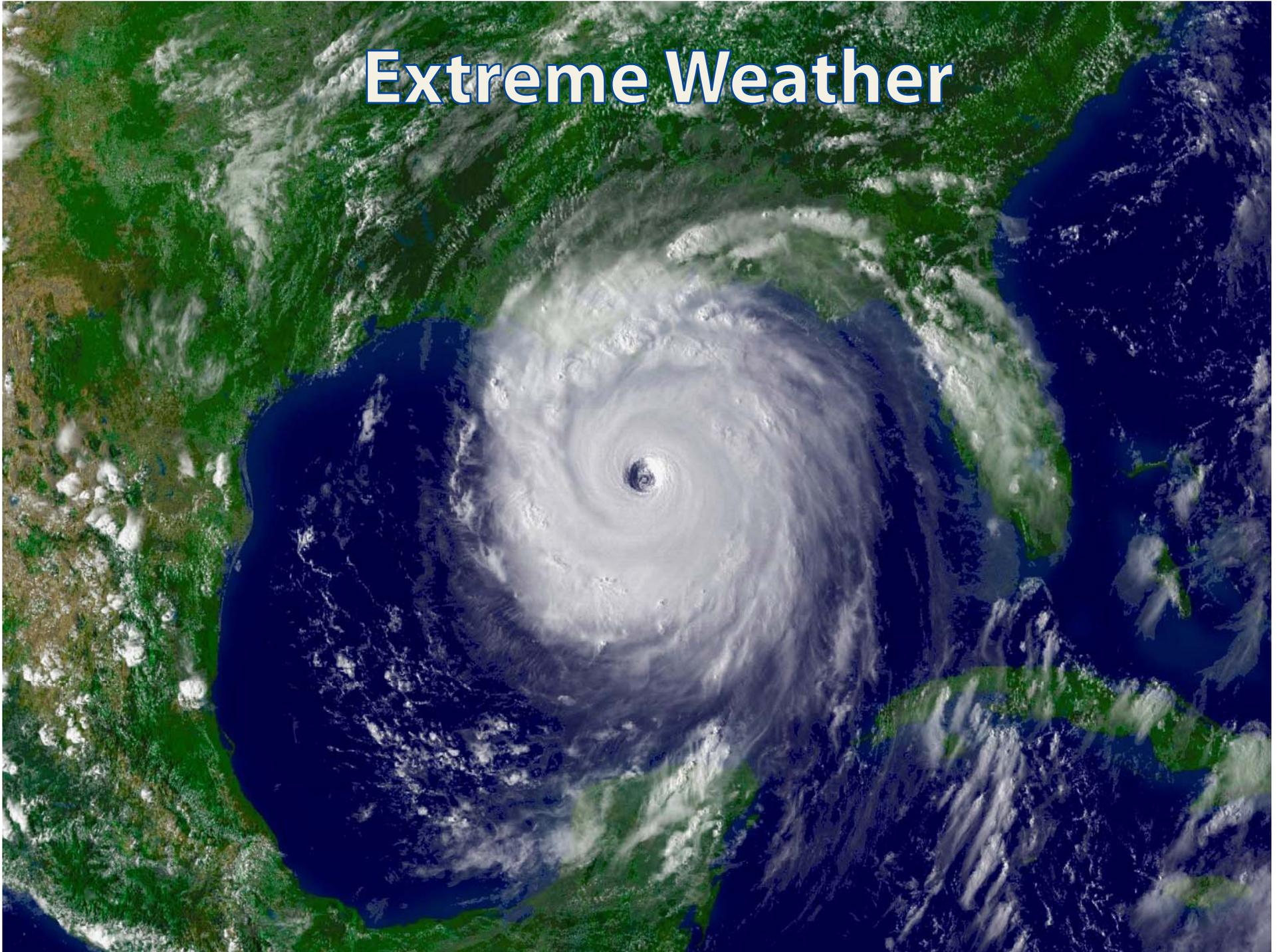
Temperature changes have been happening for decades now and will continue for possibly centuries to come.

There is nothing special about the year 2012 in regards to climate change. The climate change happens over decades and centuries, not within a single year.

For more info:

http://www.ipcc.ch/publications_and_data/ar4/syr/en/spms3.html

Extreme Weather



Extreme Weather

No reason to expect 2012 to be any different than previous years for extreme weather.

http://www.ipcc.ch/publications_and_data/ar4/wg1/en/fag-3-3.html

http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch3s3-8-5.html

Precipitation (snow and rain) – Globally there has been no significant change in precipitation over the past century.

Tornadoes – Annual average in U.S. is 1300 +/- 300. No indications of trends of increase or decrease with time.

<http://www.spc.noaa.gov/climo/online/monthly/newm.html>

Tropical Cyclones – Atlantic average (13), Worldwide average (86) – no discernable increase in storm number can yet be attributed to global warming (though there are some indications of more strong ones occurring).

<http://www.aoml.noaa.gov/hrd/tcfaq/E10.html>

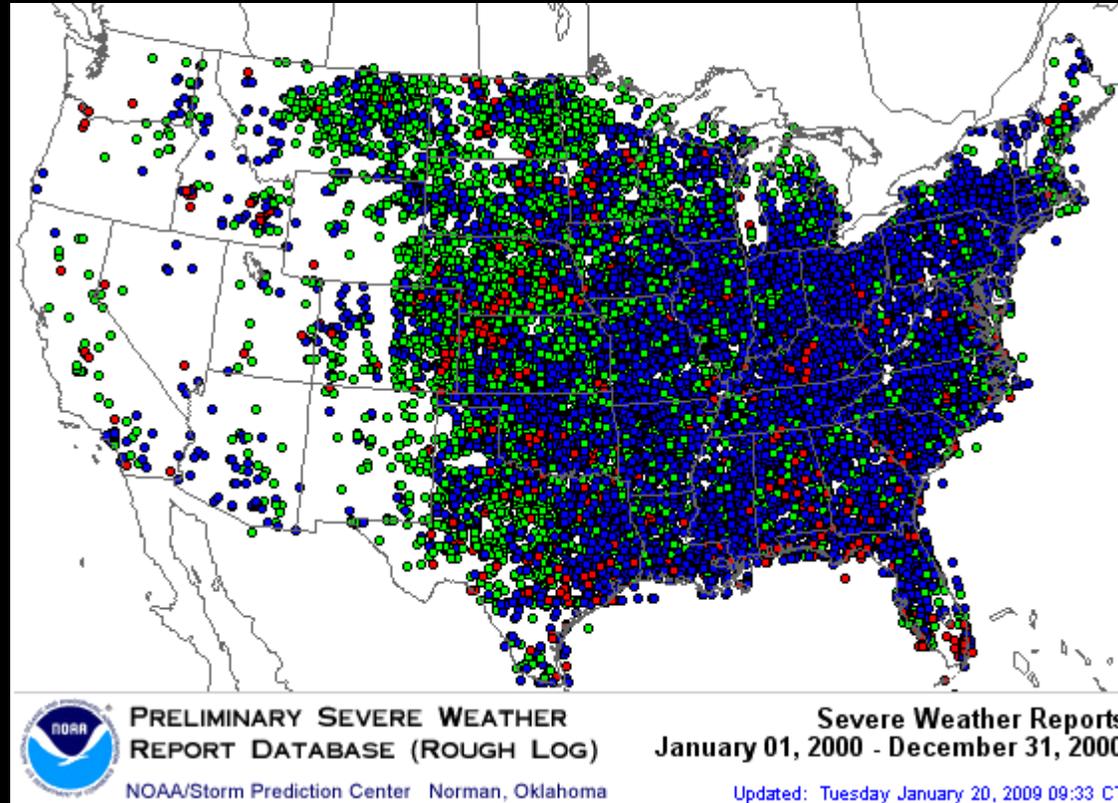
<http://www.aoml.noaa.gov/hrd/tcfaq/E11.html>

<http://www.aoml.noaa.gov/hrd/tcfaq/G3.html>

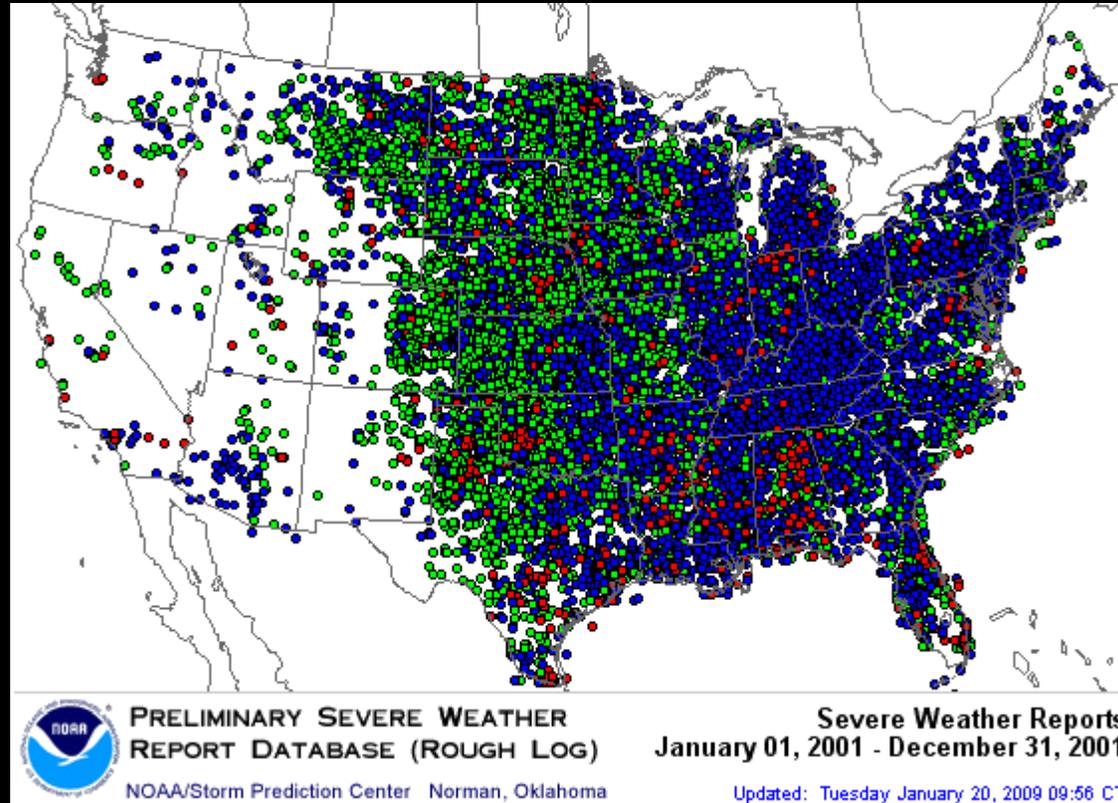
http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch3s3-8-3.html

http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch3s3-8-4.html

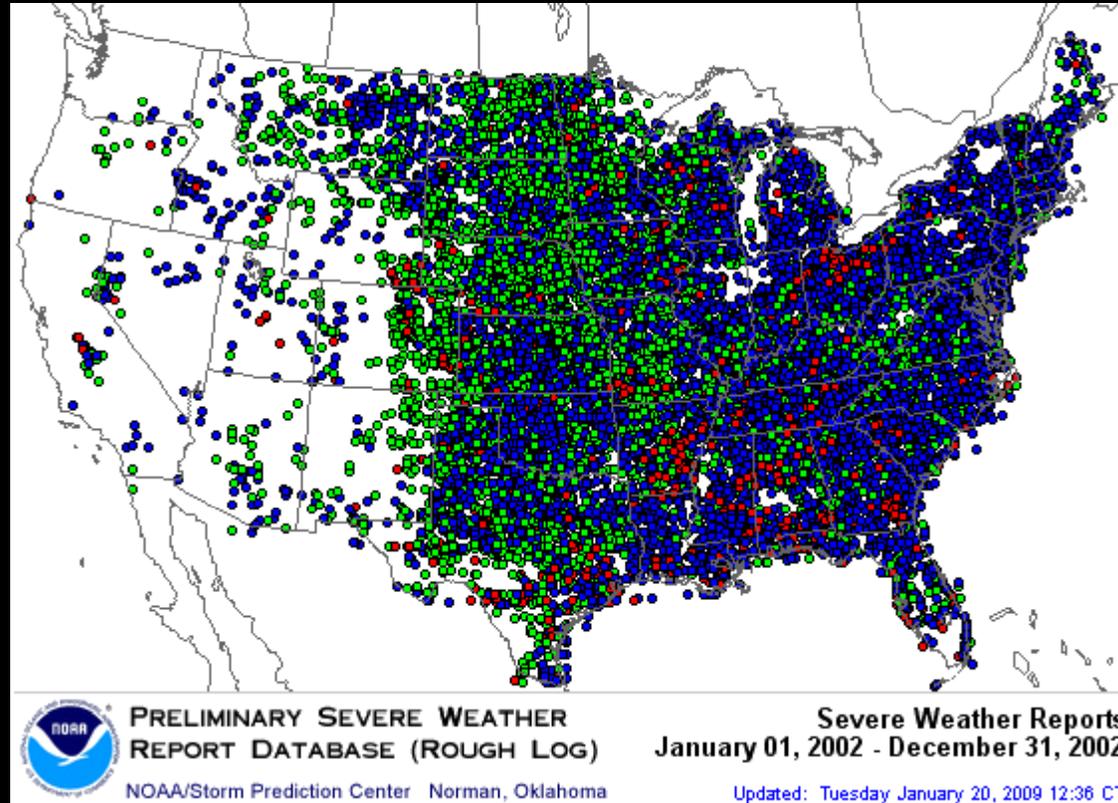
Extreme Weather



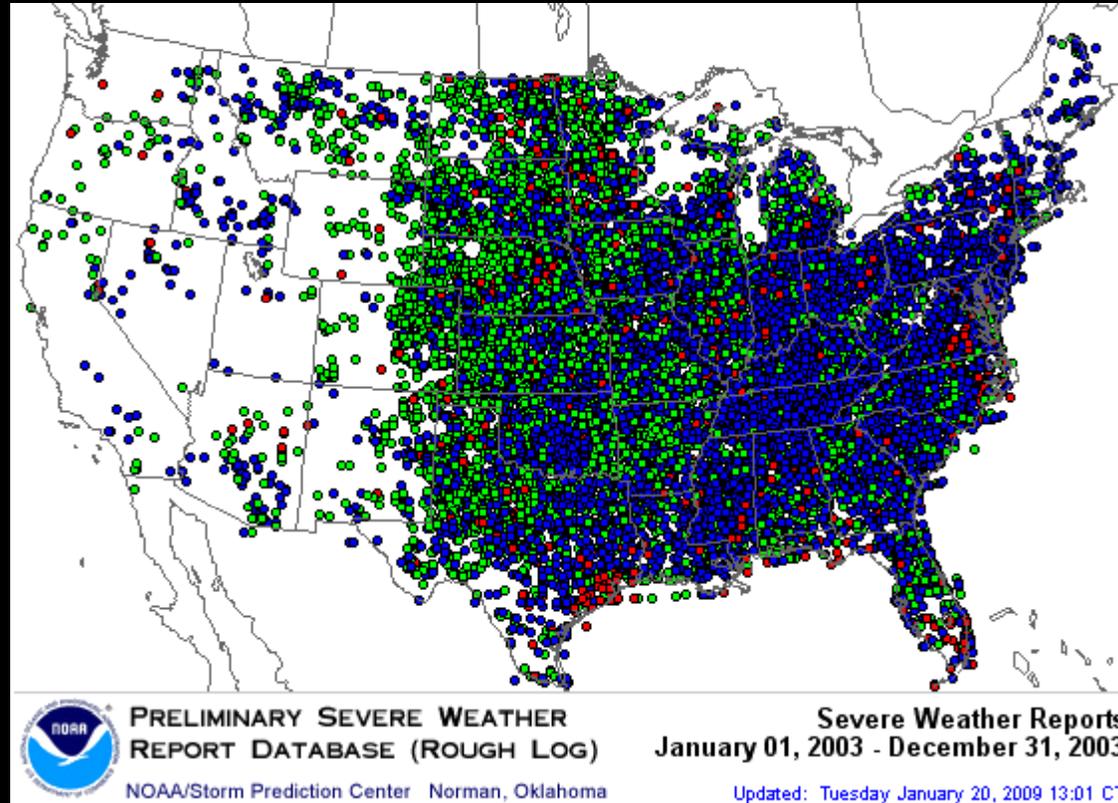
Extreme Weather



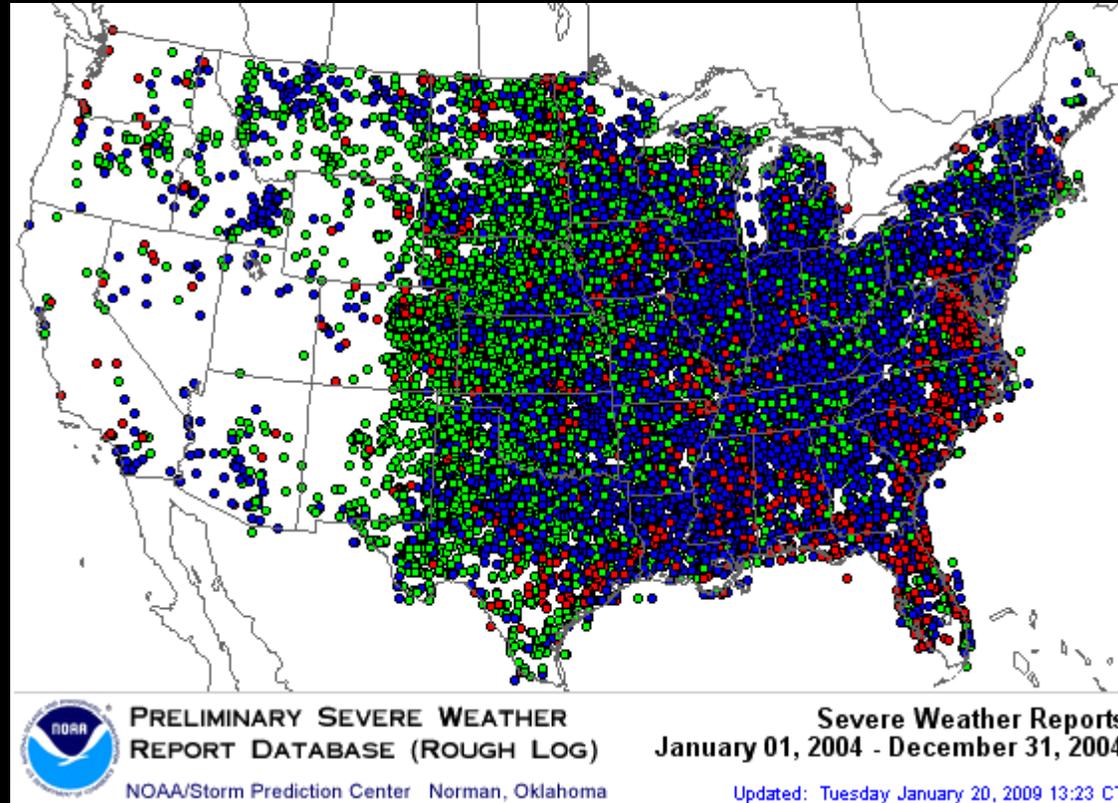
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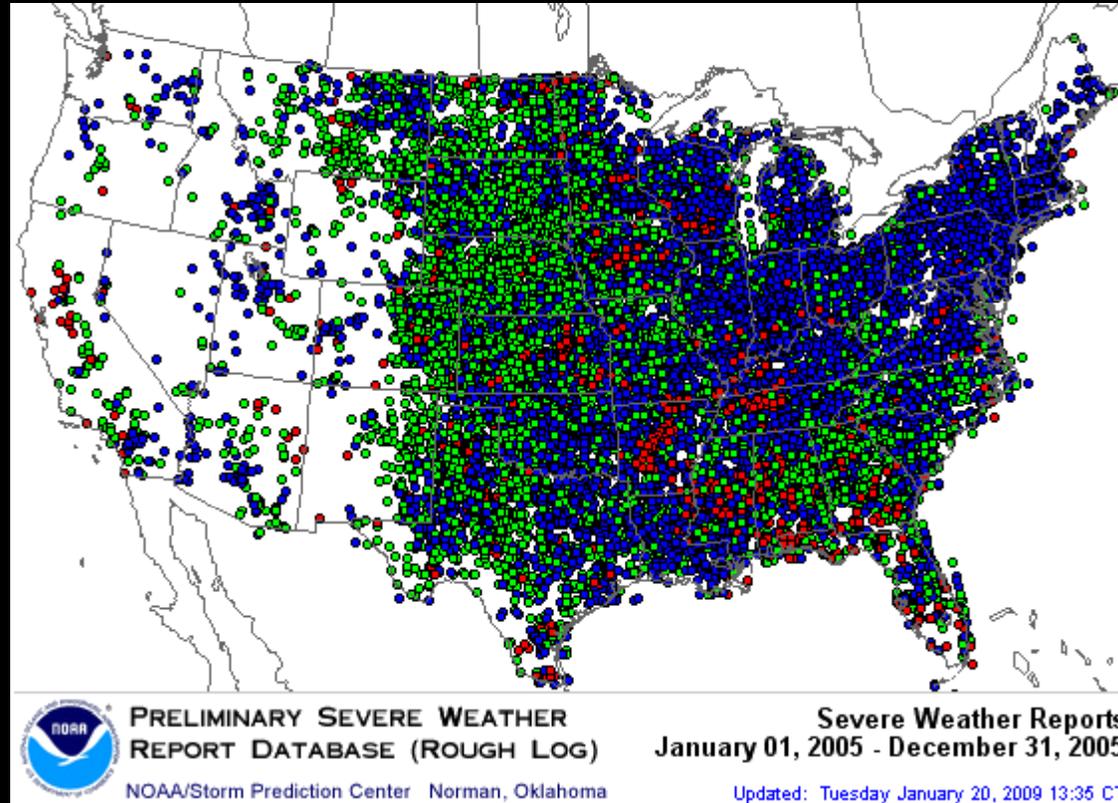
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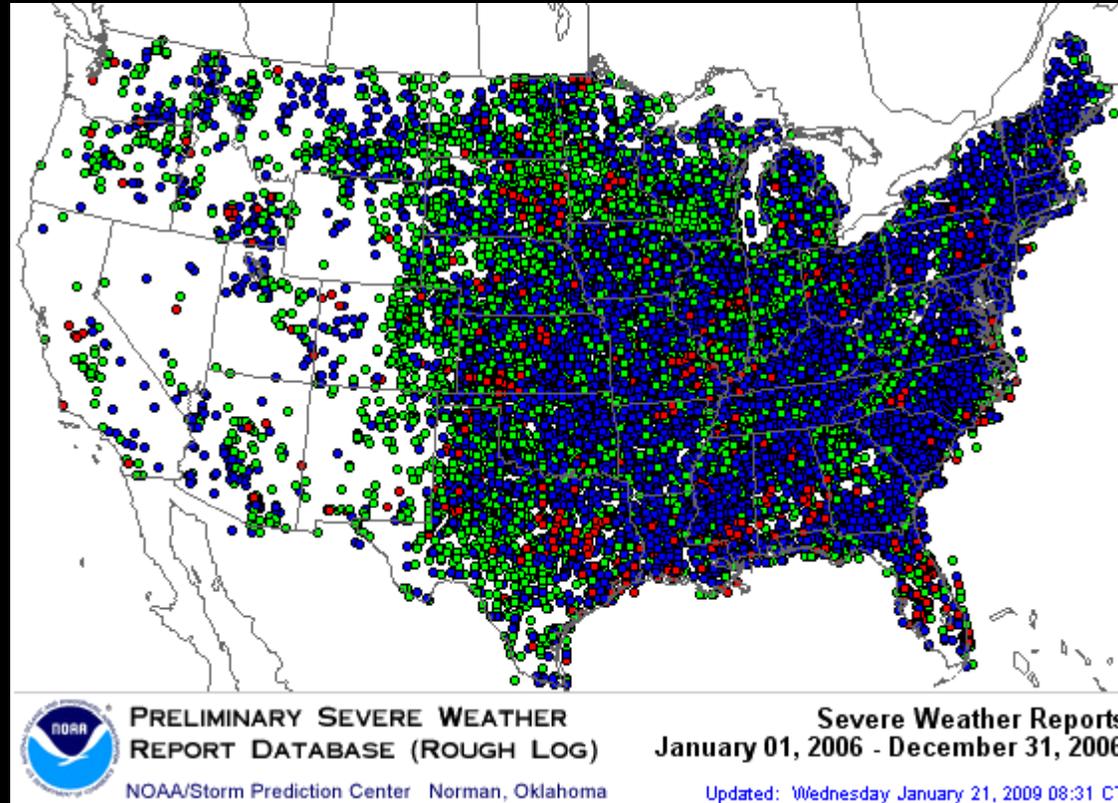
Extreme Weather



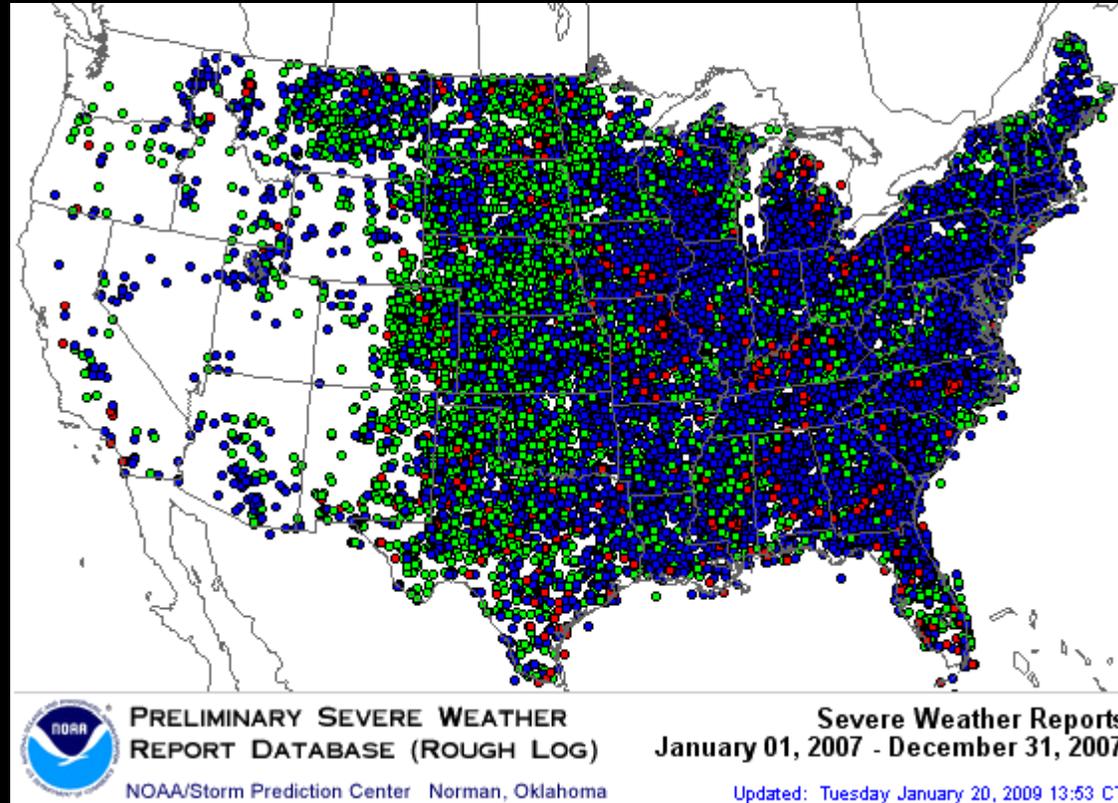
Extreme Weather



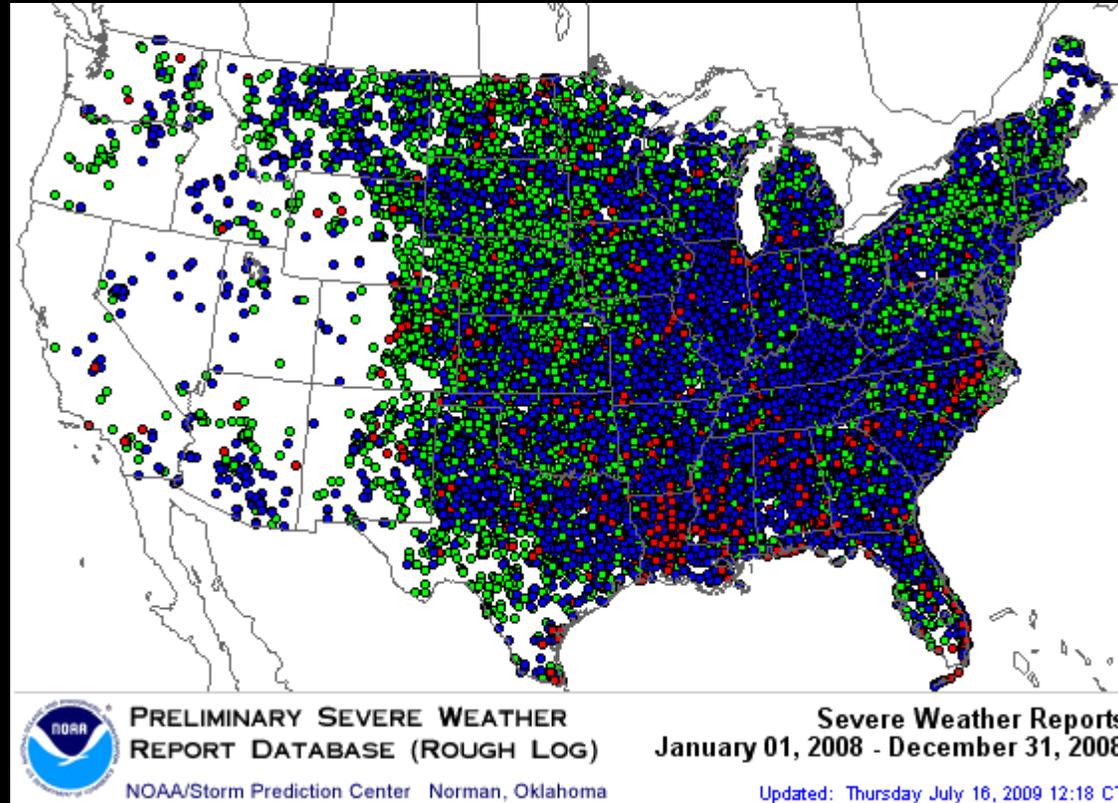
Extreme Weather



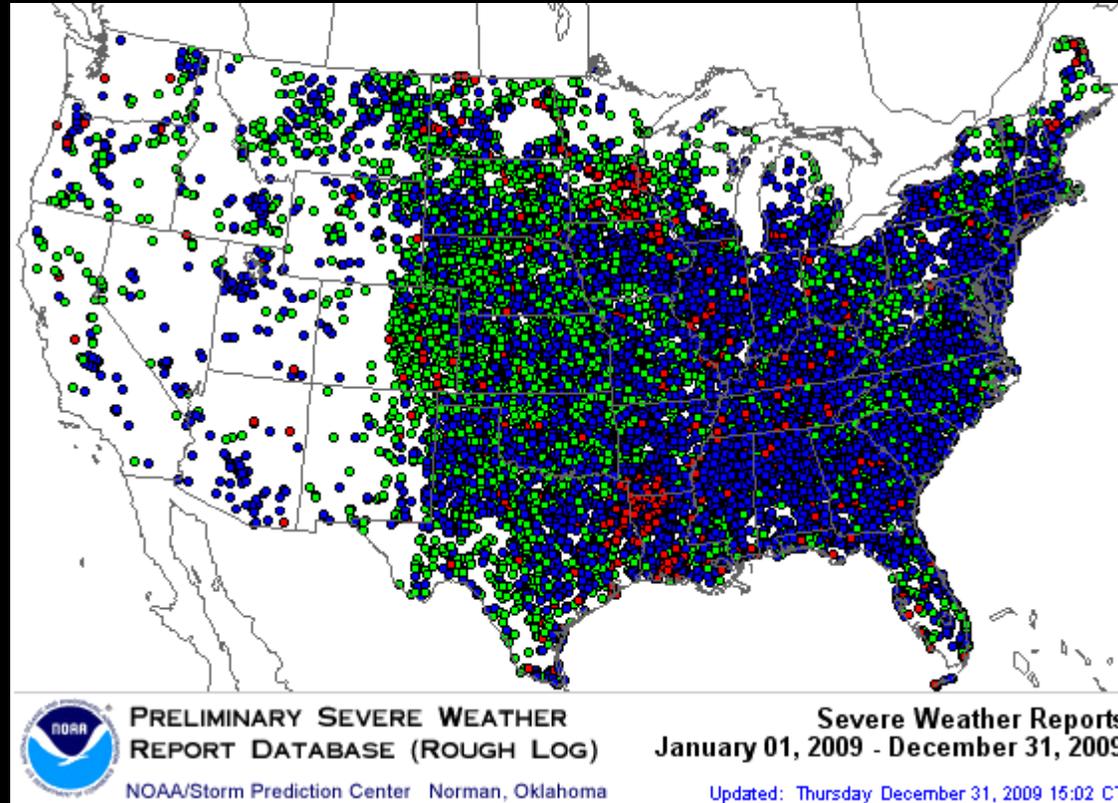
Extreme Weather



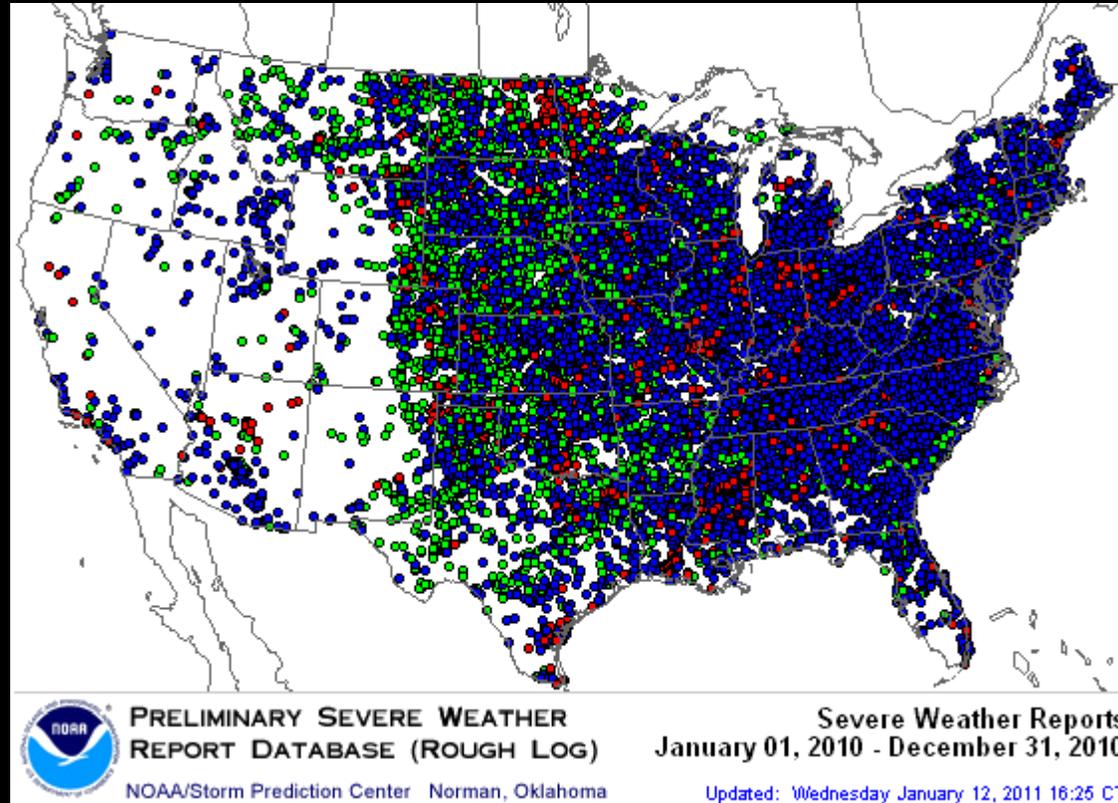
Extreme Weather



Extreme Weather



Extreme Weather



Earthquakes



Earthquakes

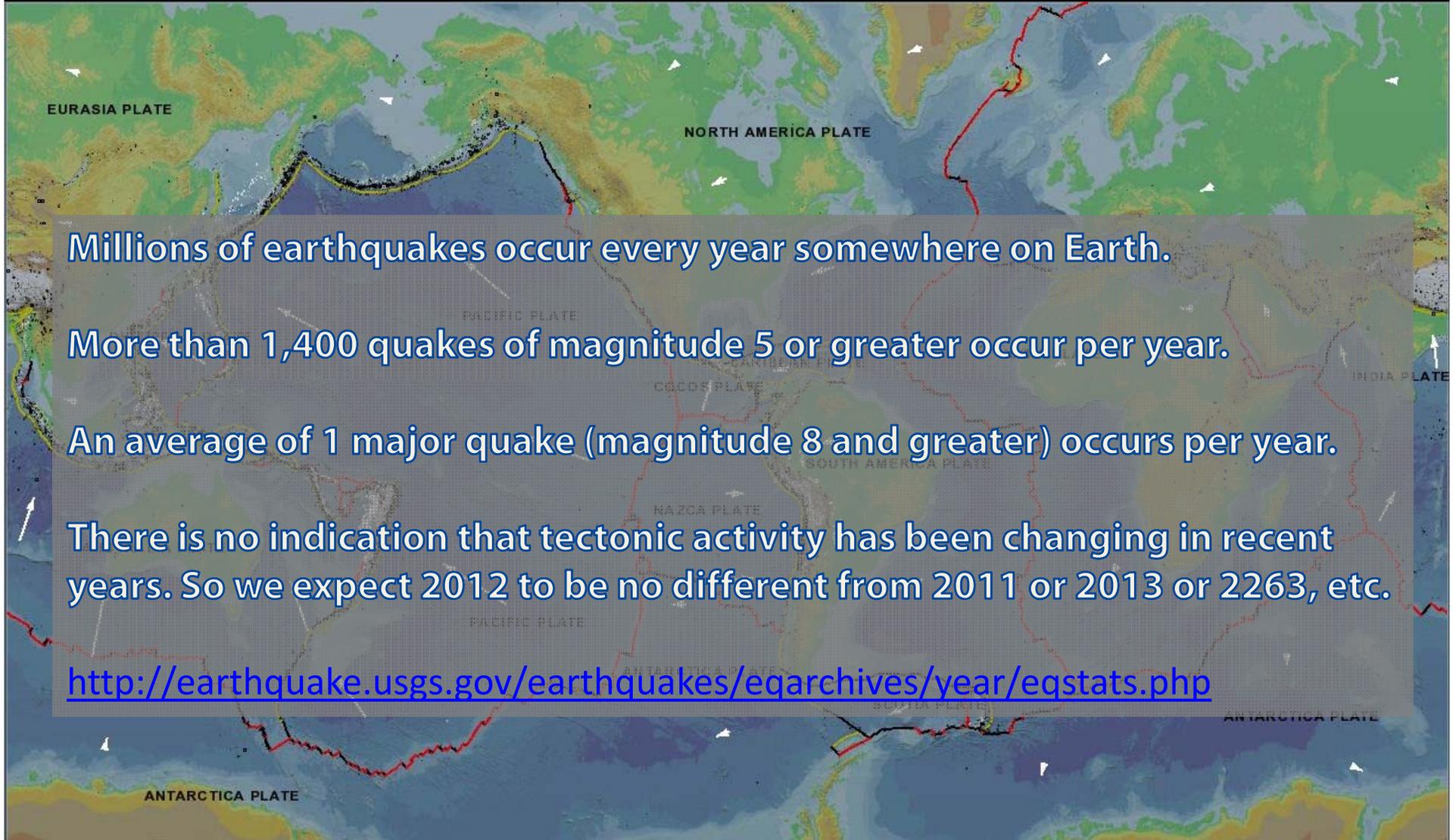
Millions of earthquakes occur every year somewhere on Earth.

More than 1,400 quakes of magnitude 5 or greater occur per year.

An average of 1 major quake (magnitude 8 and greater) occurs per year.

There is no indication that tectonic activity has been changing in recent years. So we expect 2012 to be no different from 2011 or 2013 or 2263, etc.

<http://earthquake.usgs.gov/earthquakes/eqarchives/year/eqstats.php>





Volcanoes

Most are located near tectonic plate boundaries.

In recent decades worldwide, there have been about 56 volcanic eruptions per year.

The largest events are called caldera-forming eruptions, sometimes called super volcanoes. Yellowstone National Park has been the site of two such eruptions in the past 2.1 million years.

Scientists see no evidence that another such cataclysmic eruption will occur at Yellowstone in the foreseeable future.

Recurrence of these events is neither regular nor predictable.

<http://www.volcano.si.edu/education/questions/index.cfm?faq=06>

Meteor Impacts



Meteor Impacts

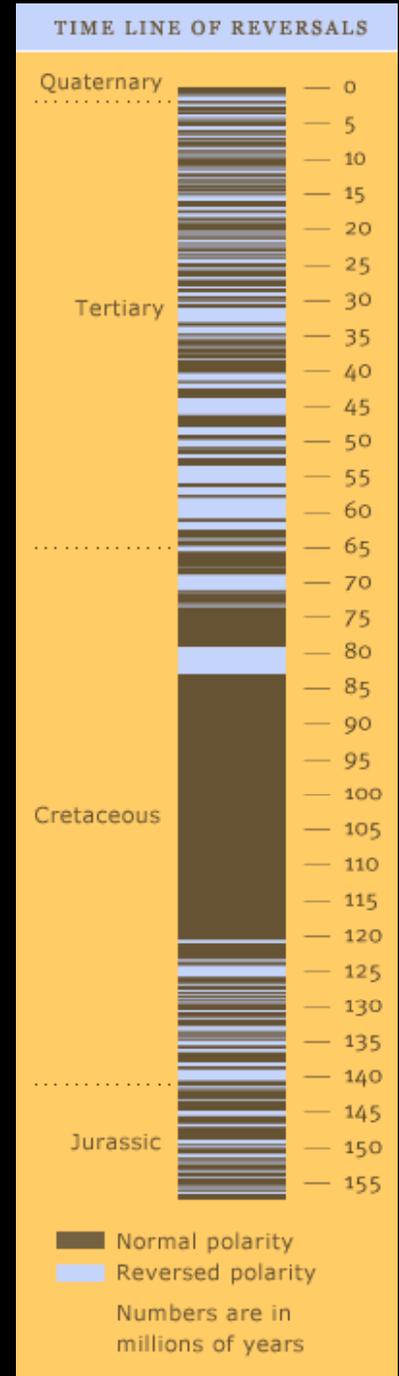
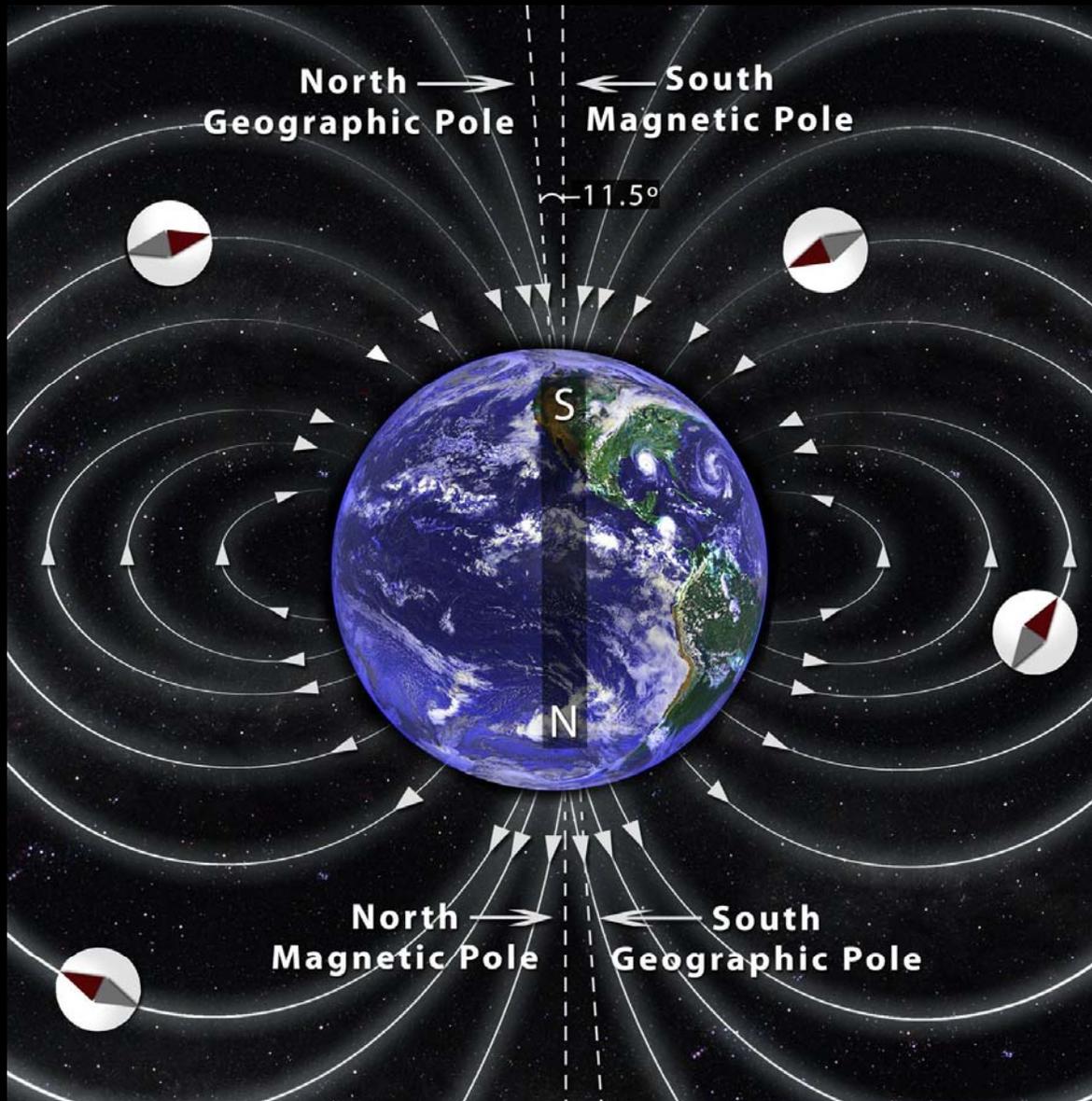
1. Event in Sudan, Africa in October 8, 2008 (3-5 m, observed in space one day prior, about 10 kg recovered)
2. Event in Tunguska, Siberia, Russia in 1908 (20-30 m, exploded in atmosphere, flattened trees for 50 km)
3. Event in Meteor Crater, AZ about 50,000 years ago (30-50 m, 1200 m crater)
4. Event in Chicxulub, MX 65 million years ago (10 km diameter, 200 km crater, global catastrophe: dinosaur killer)

JPL keeps a tally of known asteroids and their risks:

<http://neo.jpl.nasa.gov/risk/>

Nothing for the next few hundred years shows a better than 1 in 10,000 chance of impacting. And nothing in 2012 poses any risk.

Magnetic Pole Shift



Magnetic Pole Shift

Magnetic pole shifts don't happen quickly or regularly.

<http://www.pbs.org/wgbh/nova/magnetic/timeline.html>

<http://pubs.usgs.gov/gip/dynamic/stripes.html>

<http://pubs.usgs.gov/gip/dynamic/developing.html>

Shifts have happened many times in the past. Life has survived.

There has been some evidence suggesting that a magnetic reversal could be starting. But it is way too early to know with any certainty.

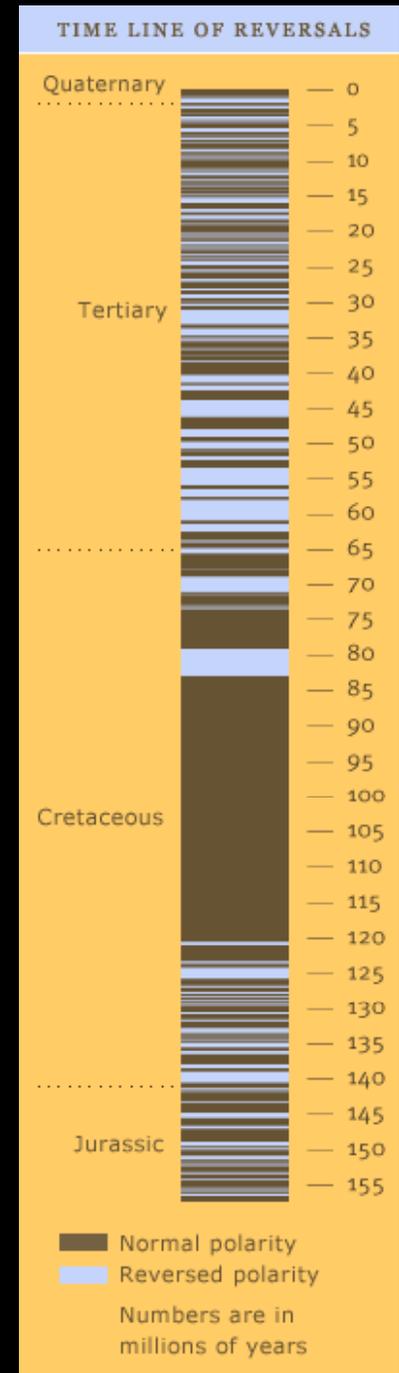
Difference between magnetic poles and geographic poles

-Earth's magnetic field is generated by electric currents in its spinning liquid iron core. The poles of that field are the magnetic poles.

-The axis of Earth's spin defines the geographic poles.

Only a catastrophic event (e.g. moon smashing into Earth) could change Earth's spin, and thereby its geographic poles as described by doomsday theorists.

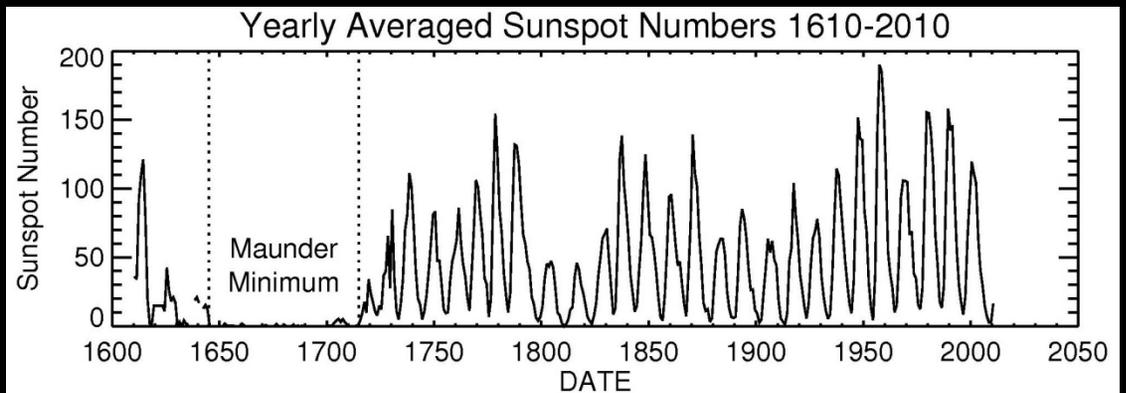
The Moon keeps Earth's spin axis stable over time,



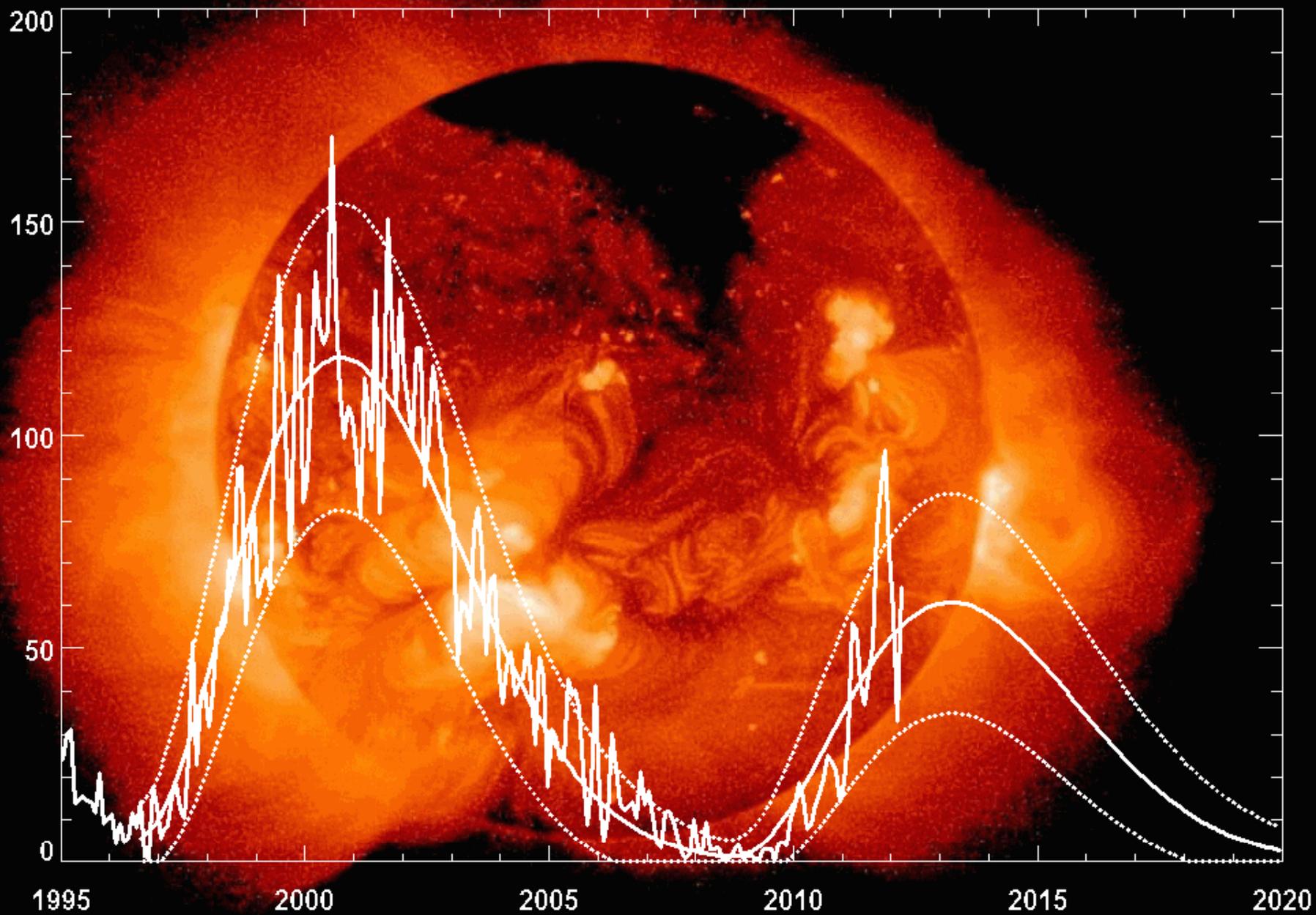
Solar Storms

The Sun produces storms that can affect Earth.

These storms occur along with sunspots in an eleven-year magnetic solar cycle.

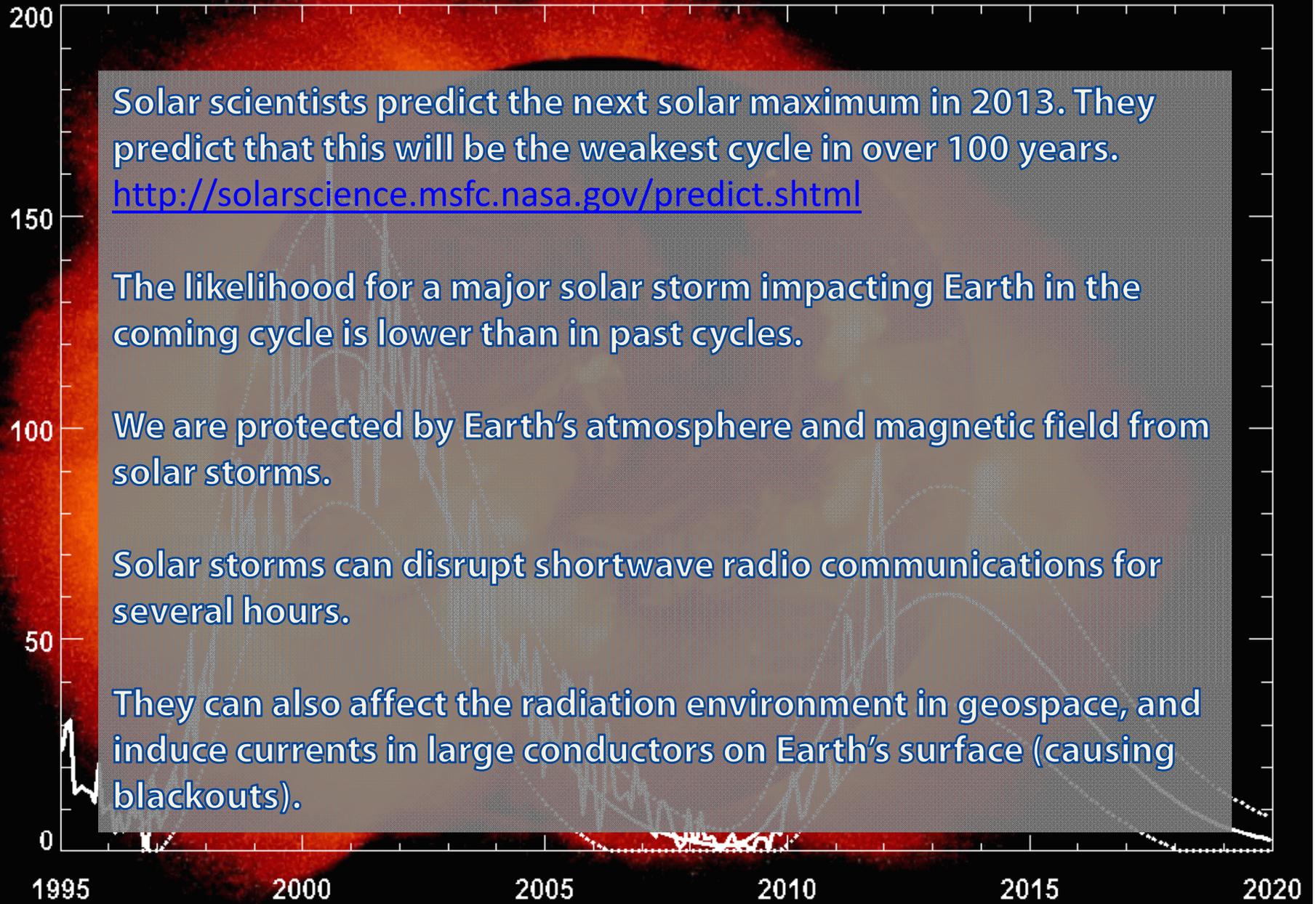


Cycle 24 Sunspot Number Prediction (April 2012)

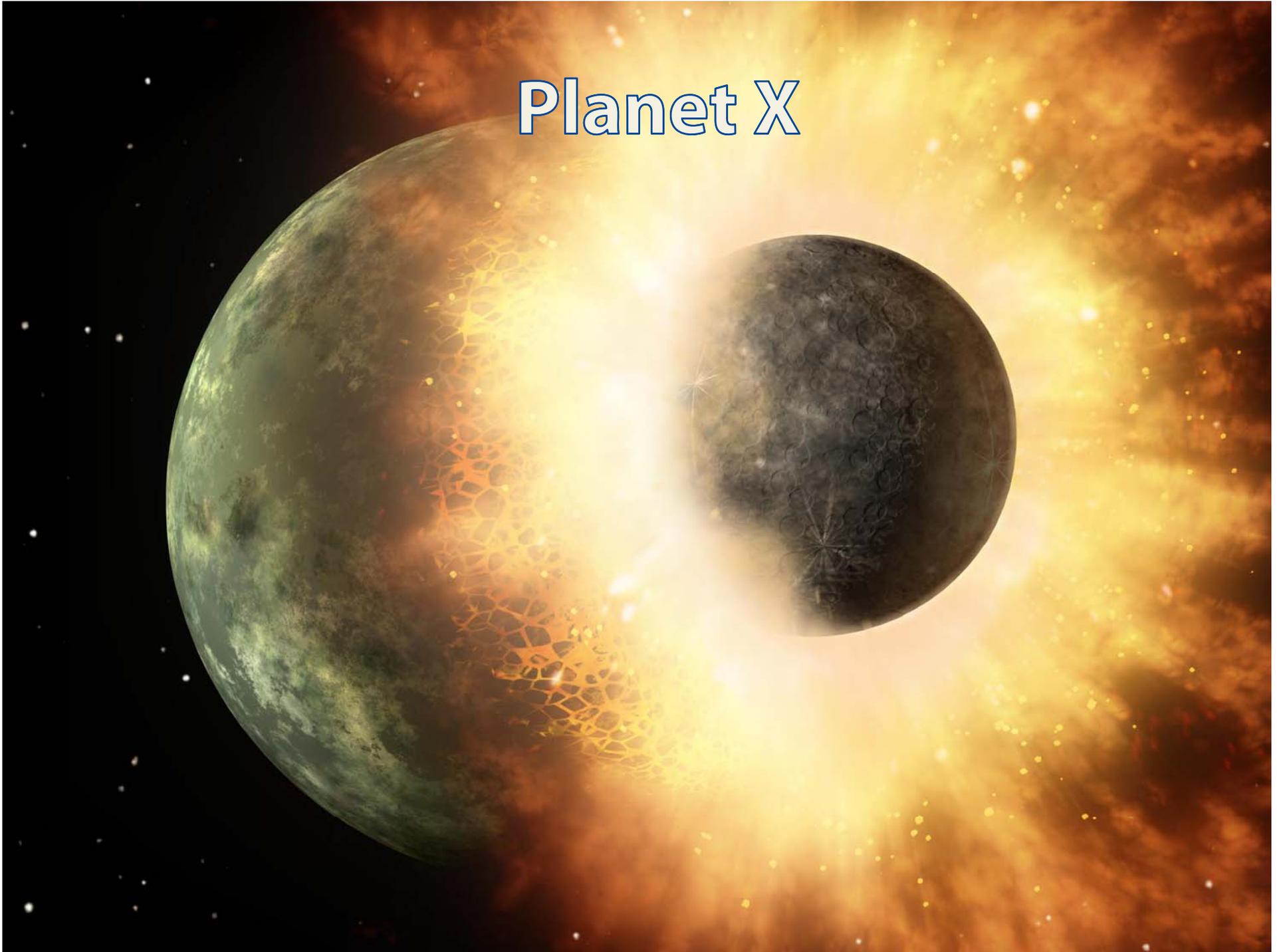


Hathaway/NASA/MSFC

Cycle 24 Sunspot Number Prediction (April 2012)



Planet X



Planet X

The idea is that there is a mysterious planet, alternatively called Nibiru, Nemesis, Tyche, or simply Planet X that lurks in the outer reaches of the Solar System.

Some theories of this planet are that it is large enough to disturb comets in the Oort Cloud surrounding the Solar System and can send them hurling into the Inner Solar System on a collision course with Earth.

Other scenarios state that this planet will itself make a trip into the inner Solar System wreaking havoc as it goes.

Planet X

We continue to discover new objects in the outer Solar System. For example, Eris is a dwarf planet discovered in the Kuiper Belt.

It is possible for the WISE all-sky survey to have observed a planet the size of Jupiter out in the Oort Cloud. It is too early in the analysis of the data to determine if such a world has been found by WISE.



Any world on a collision course with the inner Solar System by 2012 would be very close by now and visible to the naked eye in the sky. It would also be affecting orbits of bodies in the inner Solar System.

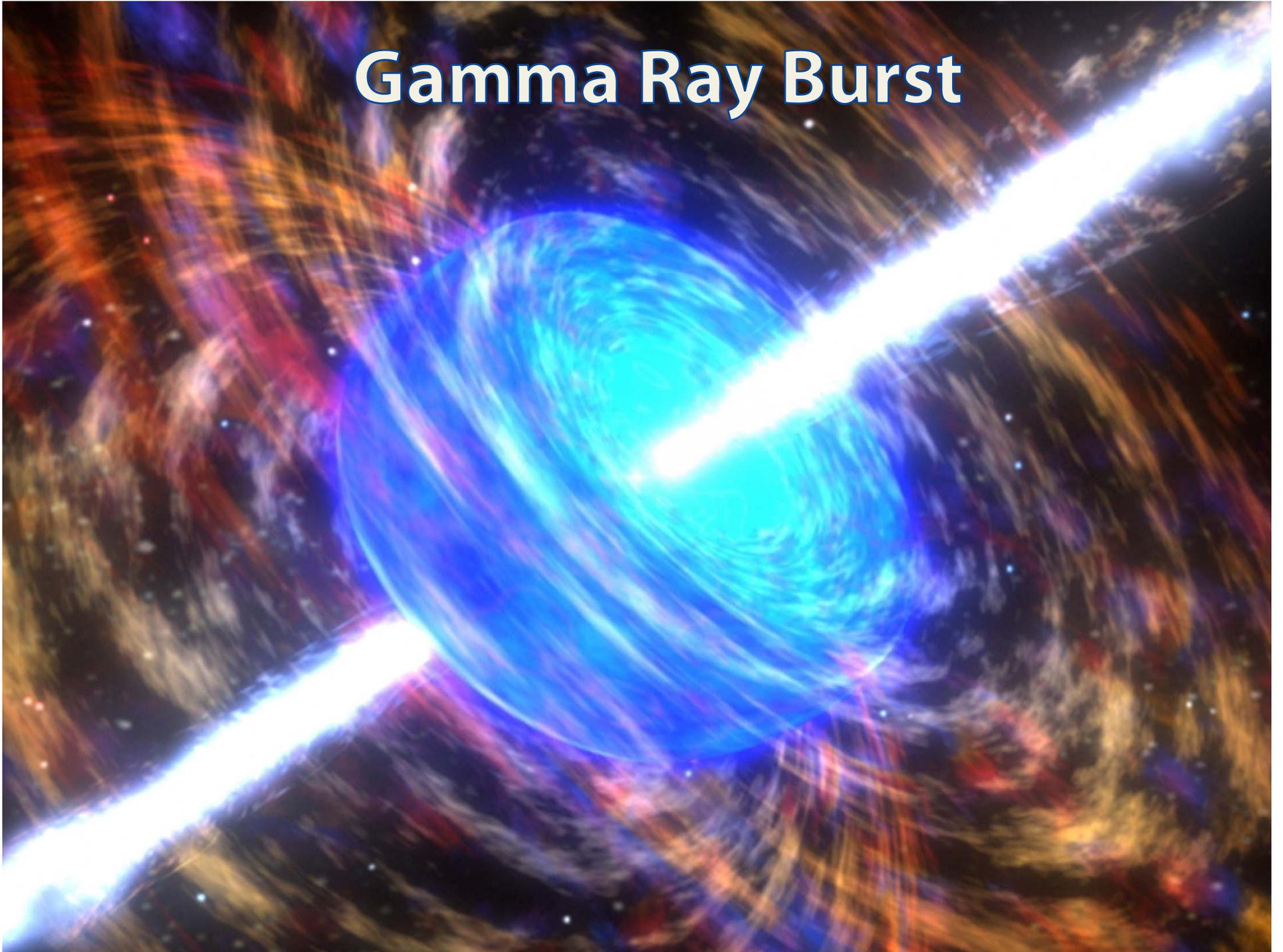
It also would have been easily seen by WISE during its 2010 survey.

It was not.

http://www.nasa.gov/mission_pages/WISE/news/wise20110218.html

<http://www.mikebrownsplanets.com/2008/03/planet-x-uncovered-again.html>

Gamma Ray Burst



Gamma Ray Burst

Violent death of a supermassive star or collision of two neutron stars.

Gamma ray flash could kill many organisms on the side of Earth facing the blast.

Could also destroy a large percentage of the ozone layer. That would cause a longer term danger letting dangerous UV from the Sun reach the surface.

Occur once per day in the observable Universe.

100 billion galaxies in the observable Universe => 1 in 270 million chance of GRB in Milky Way during 2012.

To be dangerous, a GRB beam needs to be pointed directly at Earth and located less than about 30,000 light-years away from Earth .

Probably hundreds of stars that can possibly cause a GRB in that volume, but the beam of radiation must be pointed at us. **That isn't so likely.**

http://swift.sonoma.edu/about_swift/grbs.html

<http://www.pbs.org/wgbh/nova/gamma/milkyway.html>

Summary



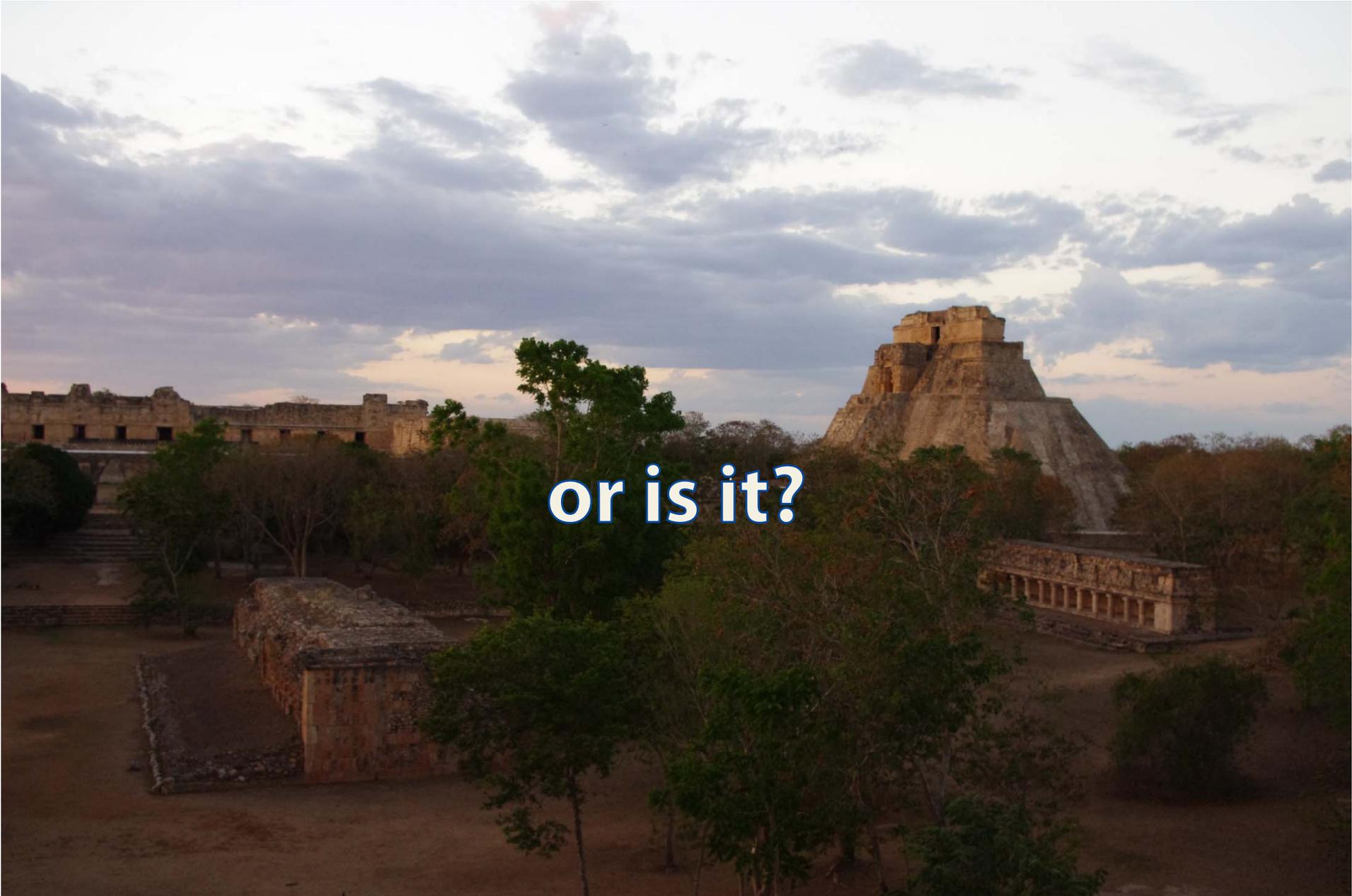
The Maya DID NOT predict the end of the world in 2012.

There are many natural disasters that threaten people all the time, and it is always wise to be prepared for emergencies.

Scientists find no evidence for natural global catastrophe in 2012 (or any time soon).

The End

or is it?

A photograph of ancient Mayan ruins, including a large pyramid and several smaller structures, surrounded by trees under a cloudy sky. The scene is captured during the "blue hour" of twilight, with soft light filtering through the clouds. The central focus is a large, stepped pyramid with a smaller structure on top. To the left, there's a long, low wall with several rectangular openings. In the foreground, there are several smaller, rectangular stone buildings, some partially obscured by trees. The ground is dry and dusty, and the overall atmosphere is one of historical mystery and decay.