

Something with 'W'

Leif Svalgaard

March 1, 2012

They all have a **W**

The directors of Zürich Observatory were:

1864-1893 Johann Rudolf **W**olf (1816-1893)

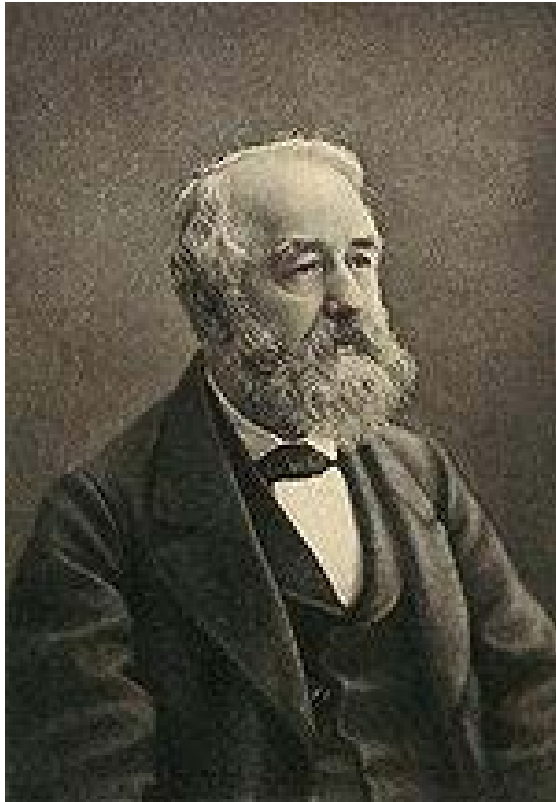
1894-1926 Alfred **W**olfer (1854-1931)

1926-1945 **W**illiam Otto Brunner (1878-1958)

1945-1979 Max **W**aldmeier (1912-2000)

So, I shall talk about them.
And tomorrow you'll hear a lot
more, so be there...

Johann Rudolf Wolf



Rudolf Wolf (1816-1893)

Observed 1849-1893

1849: begins regular observations of sunspots

1852: publishes first list of historical sunspot observations back to 1610 in 'Mittheilungen' and establishes that the length of the sunspot cycle is 11.11 years

1856: discovers the relationship between sunspots and variations of 'the magnetic needle'

1857: compiles catalog of northern lights

1858: devises the Wolf Number $R = 10G + S$

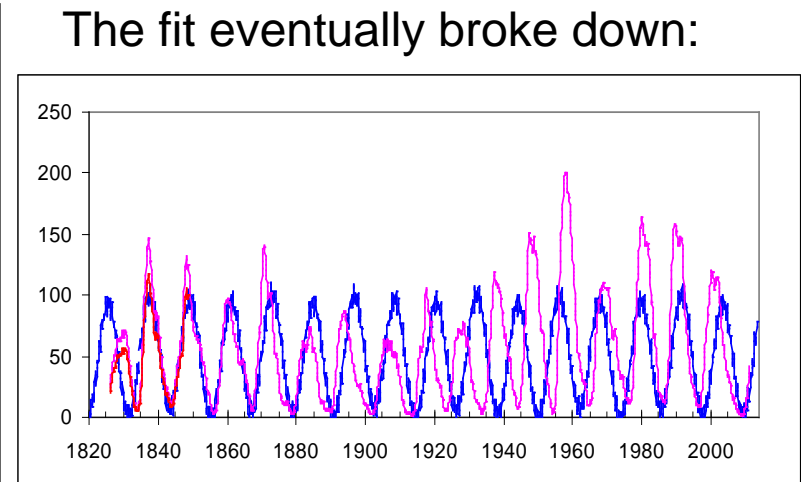
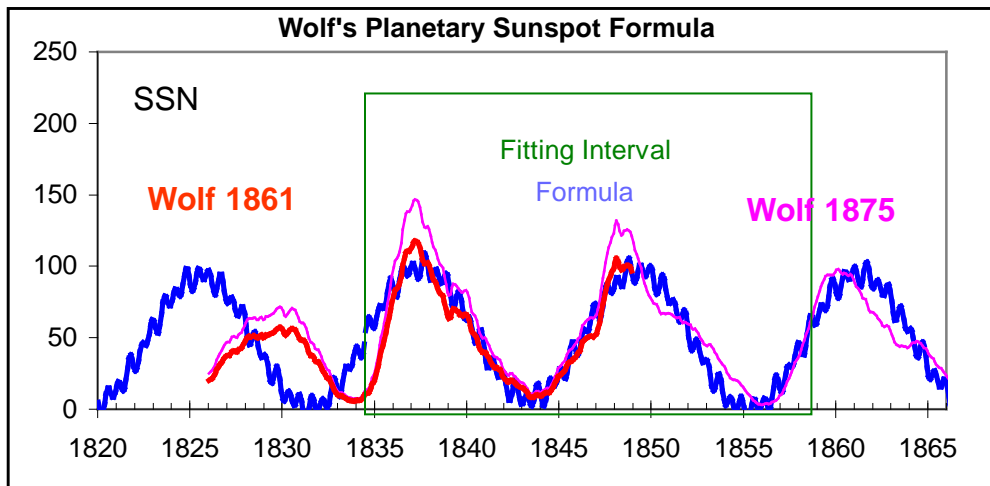
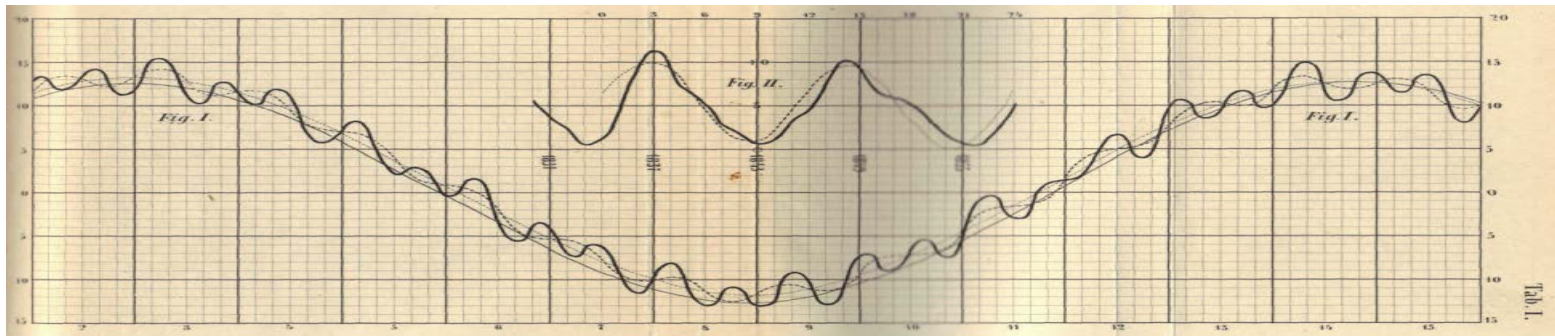
1859: puts forth the Planetary Hypothesis (that planets cause of modulate solar activity)

‘External’ Control of Solar Activity?

- Rudolf Wolf noted that the length of the cycle was close to the orbital period of Jupiter.
- From time to time since then [even today], the idea has been put forward that the planets create/control/modulate the solar cycle
- Even galactic ‘influence’ is sometimes called for (not discussed here)

Rudolf Wolf's Attempt in 1859

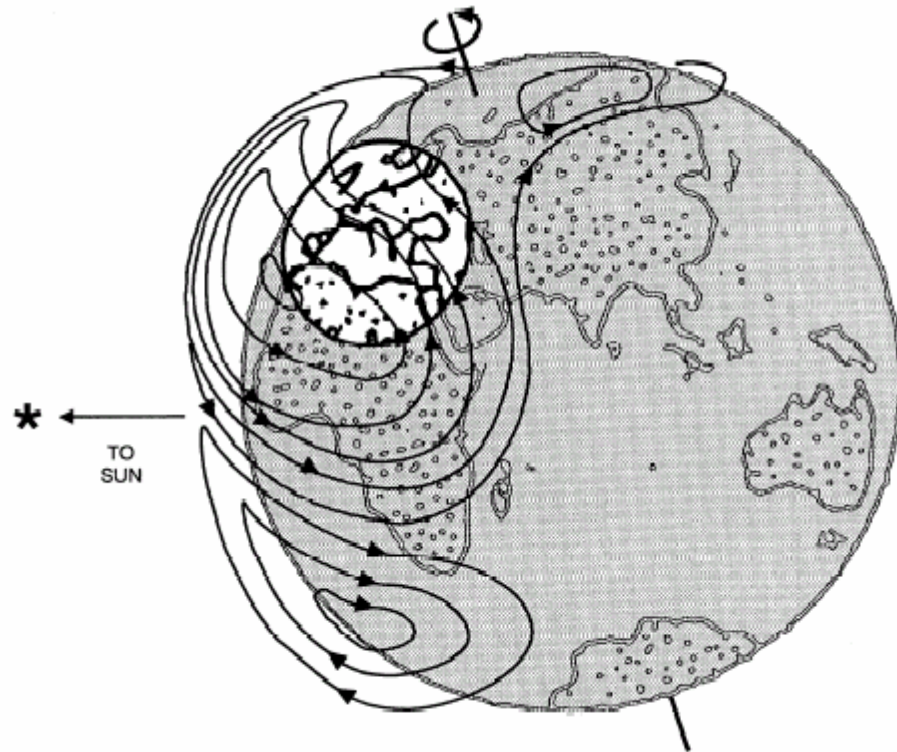
$R = 50.31 + 3.73 [1.68 \sin(586.26^\circ t)\{\text{Venus}\} + 1.00 \sin(360.00^\circ t)\{\text{Earth}\} + 12.53 \sin(30.35^\circ t)\{\text{Jupiter}\} + 1.12 \sin(12.22^\circ t)\{\text{Saturn}\}]$, where t is years from 1834.50. The angles are degrees per Earth-year. The coefficients are *mass/distance-squared*. [Tidal effects are *mass/distance-cubed*]



At the end of his life [1893] Wolf remarked that this research (by him and others) never produced any really satisfactory results

Wolf's Important Discovery

$$rD = a + b R_W$$



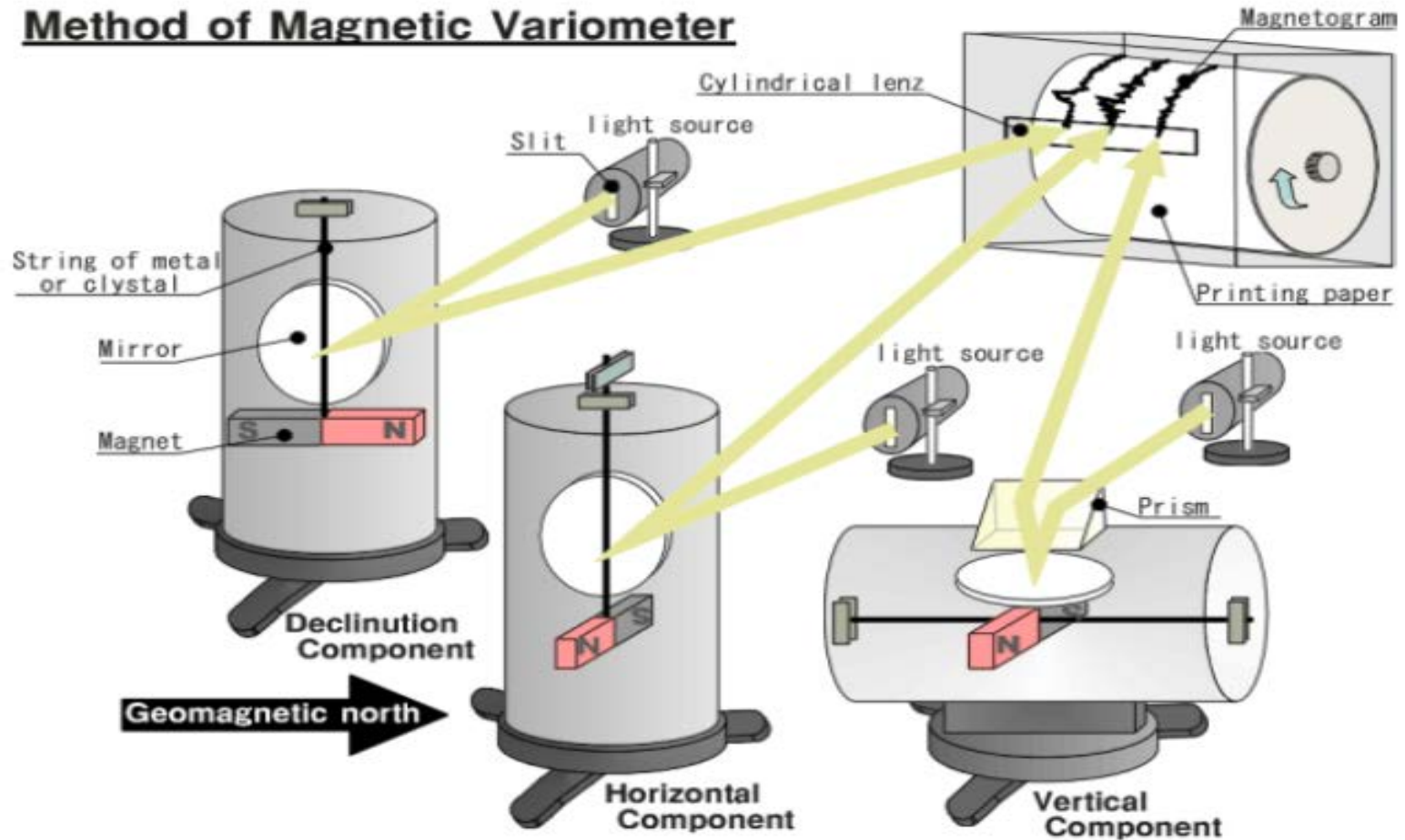
A current system in the ionosphere is created and maintained by solar FUV radiation.

The current has a magnetic field of its own which is readily observed on the ground even with 18th Century technology.

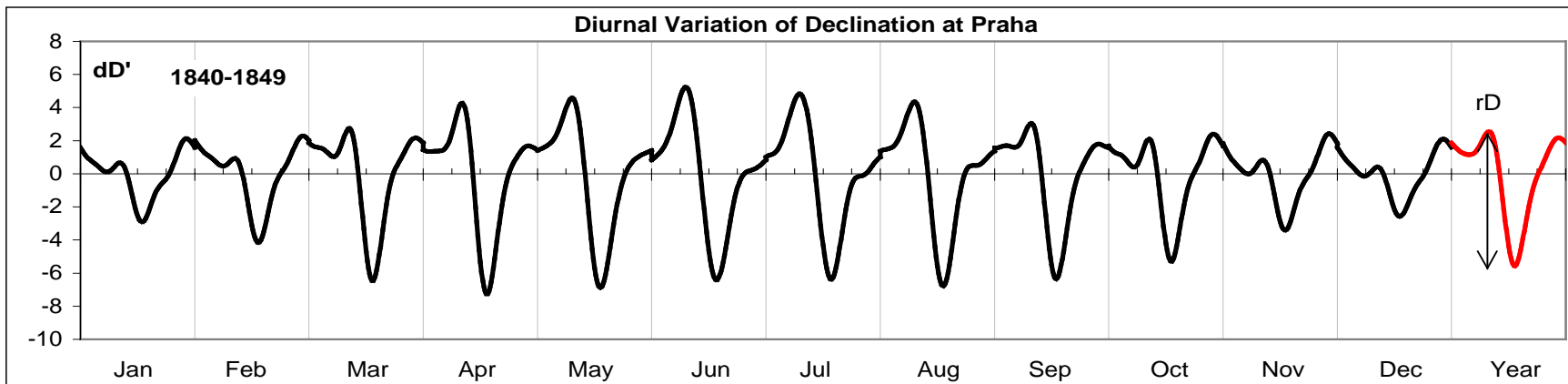
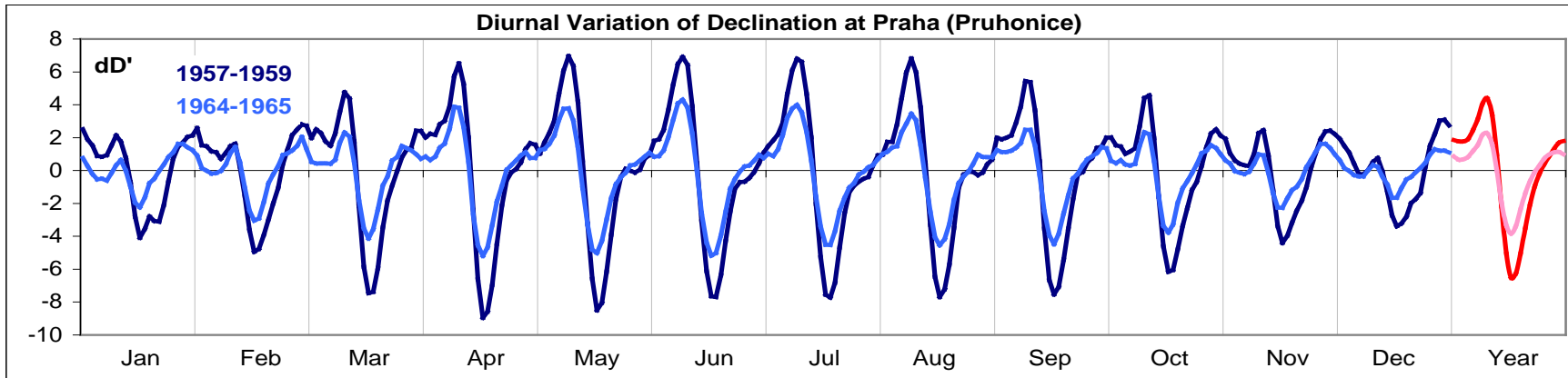
The amplitude [rD] of this variation is a proxy for FUV.

Recording Variations of the Geomagnetic Field

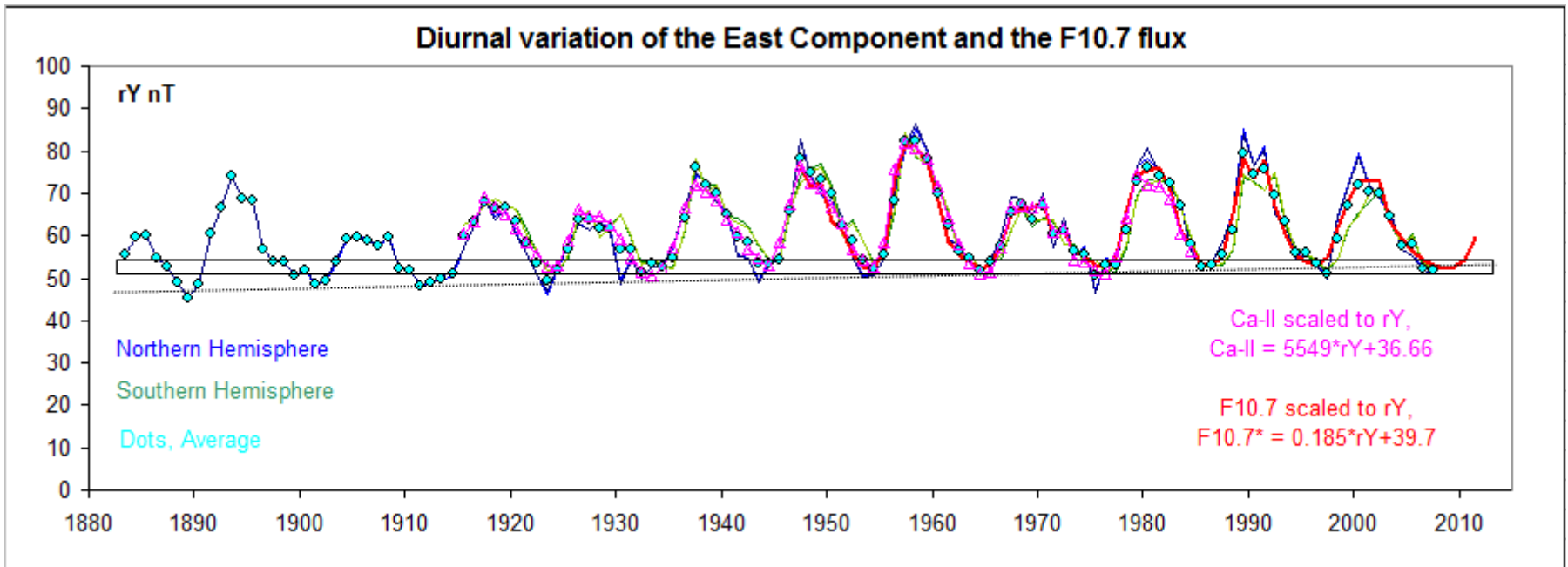
Method of Magnetic Variometer



Amplitude Varies with Solar Zenith Angle and Solar Activity



Putting the discovery to work



Variations of F10.7 microwave flux and Ca II K-line index (and thus solar activity) track the Diurnal Variation of the Geomagnetic Field.

Johann Rudolf Wolf



Rudolf Wolf (1816-1893)

1861: publishes list Relative Sunspot Numbers for 1749-1860

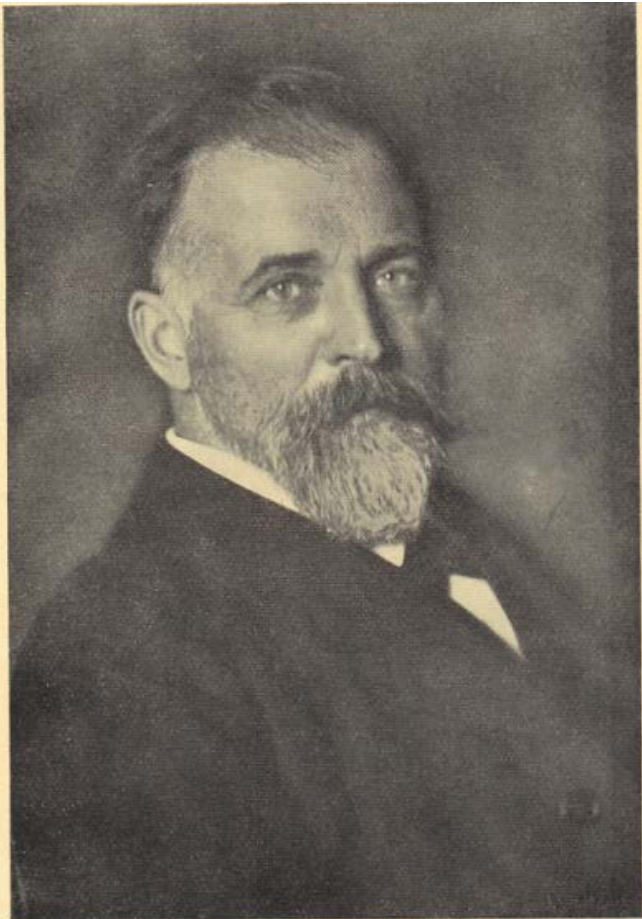
1876: hires assistants Billwiller and Wolfer

1878: corrects the 1861 list, increasing all pre-1849 Relative Number by 25% based on the 'magnetic needle' data

1884: publishes a list of Magnetic Needle Variation for 1781-1880

1893: makes his last observation on 31 October, 37 days before his death, completing 47 years of observing

Alfred Wolfer



Prof. Dr. Alfred Wolfer †
1854–1931

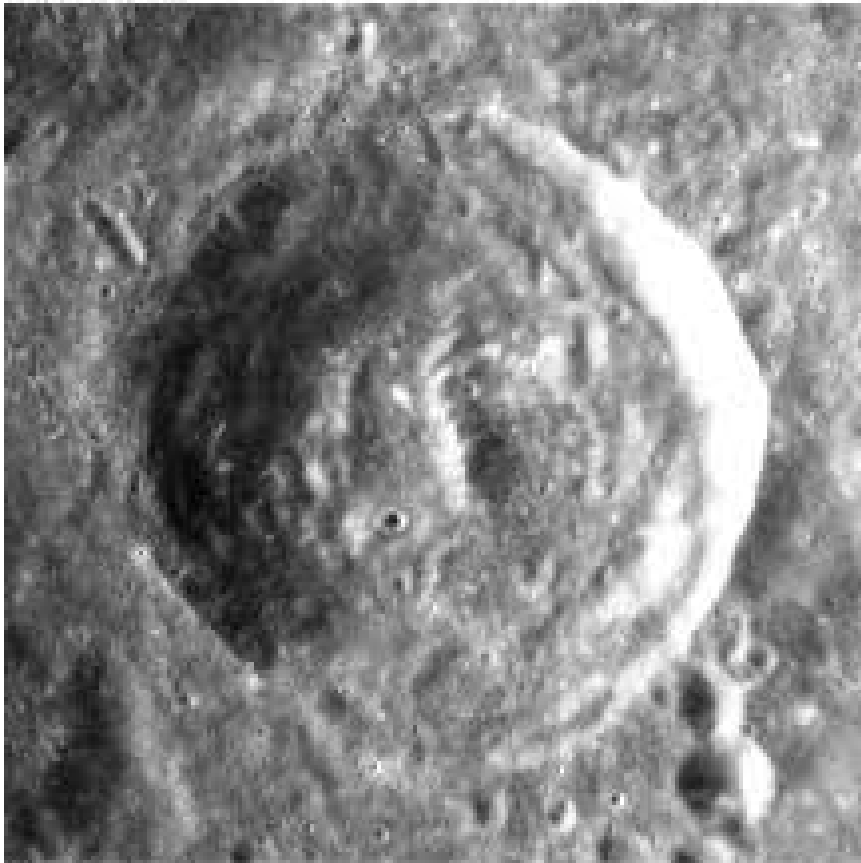
1876: disagrees [rightly] with Wolf and insists on counting *all* spots he can see, not omitting the smallest spots. This makes it necessary to apply a correction factor of 0.6 to match Wolf's scale

1902: lowers Wolf's Relative Sunspot Numbers for solar cycle 5 (1798-1810); in effect, creating the Dalton Minimum

1923: stops publication [and use] of geomagnetic variations [they didn't fit anymore --- the Earth's magnetic field is changing]

1926: continued the publication of 'foreign' observations, begun by Wolf in 1852

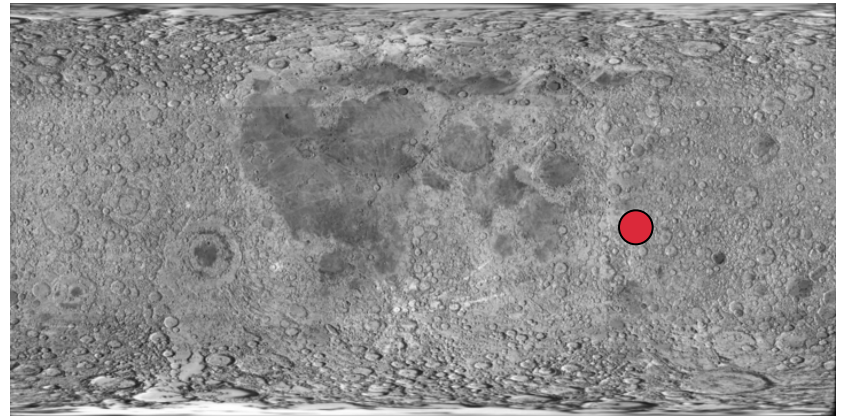
William Otto Brunner



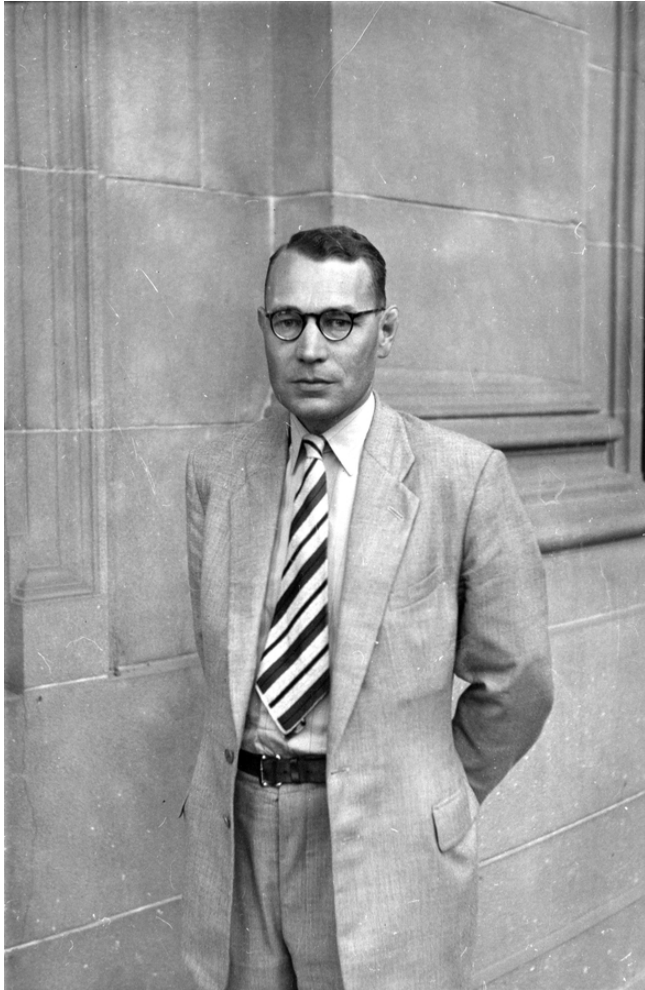
© NASA/JPL/ASU/ESA/2007/003

I couldn't find a photo of Brunner, but here is one of the crater on the moon named after him

Brunner stopped publication of 'foreign' observations, making it harder to get at the raw data



Max Waldmeier



1940: begins synoptic observations of the Green Corona (530.3 nm)

1945: stops publication of raw data altogether making it VERY hard (impossible?) to verify the construction of the sunspot number

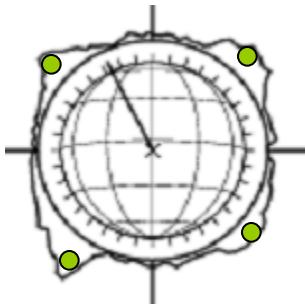
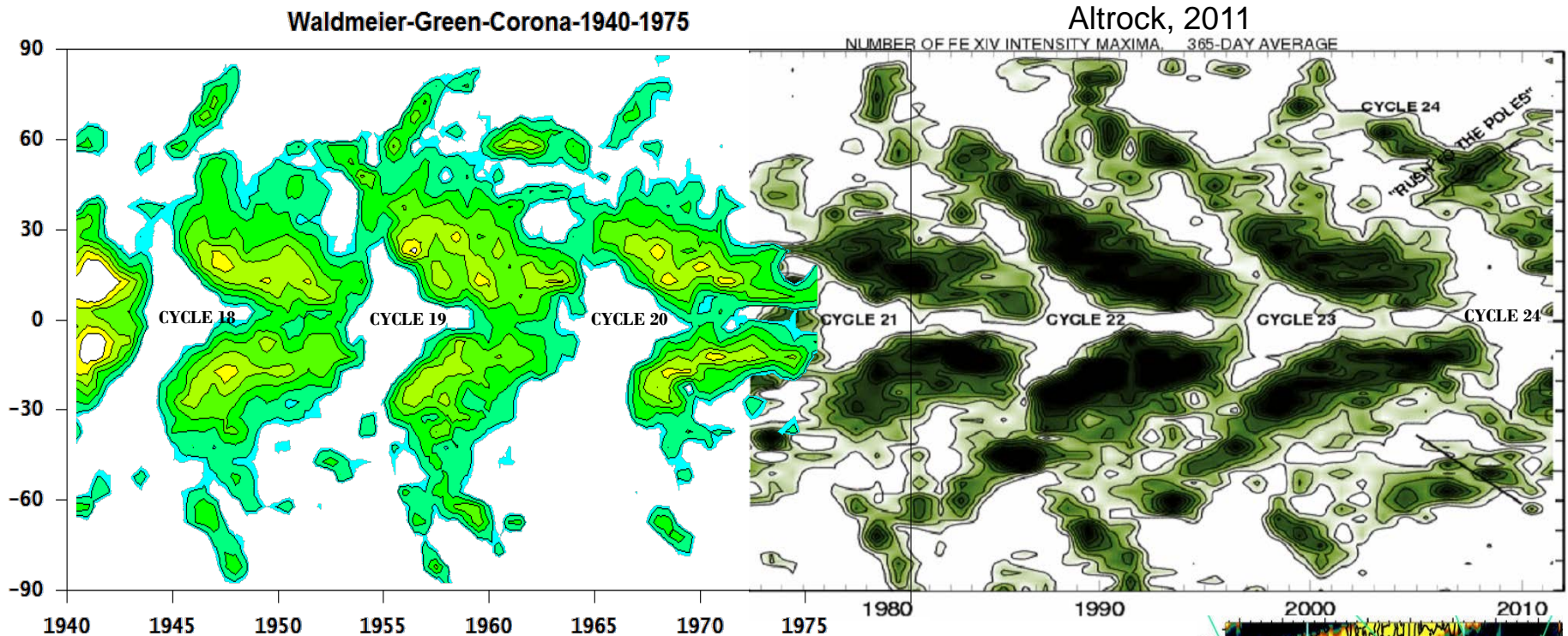
1947: begins to weight large spots more than small spots in the count, thus inflating the Zurich number by 20% [continues to this day]

1957: recognizes [and coins the term] Coronal Holes

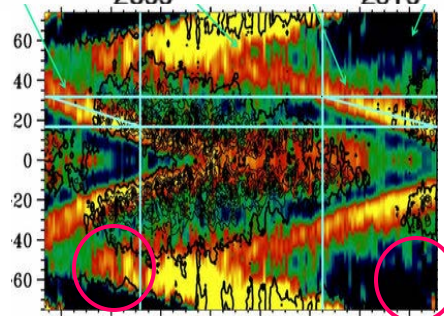
1971: finds a very tight relationship between the F10.7 solar radio flux and the sunspot number and realize that this can be used to calibrate the Sunspot Number

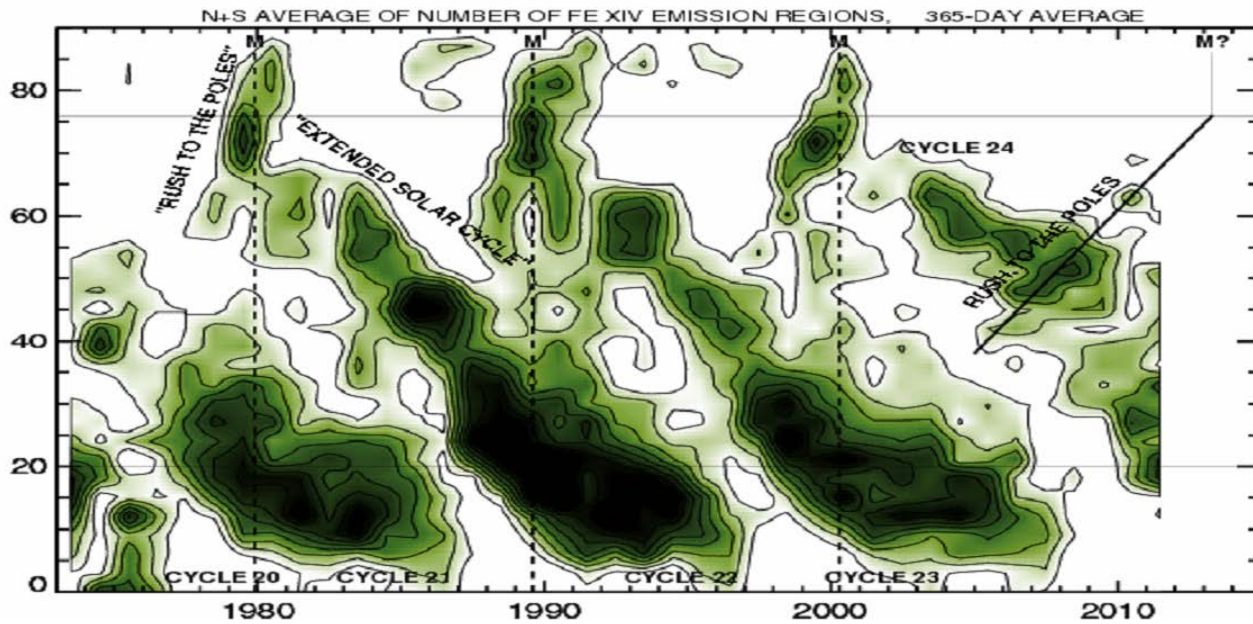
1996: continues observations long after the official hand-over to SIDC in Brussels in 1980

The 'Rush' to the poles

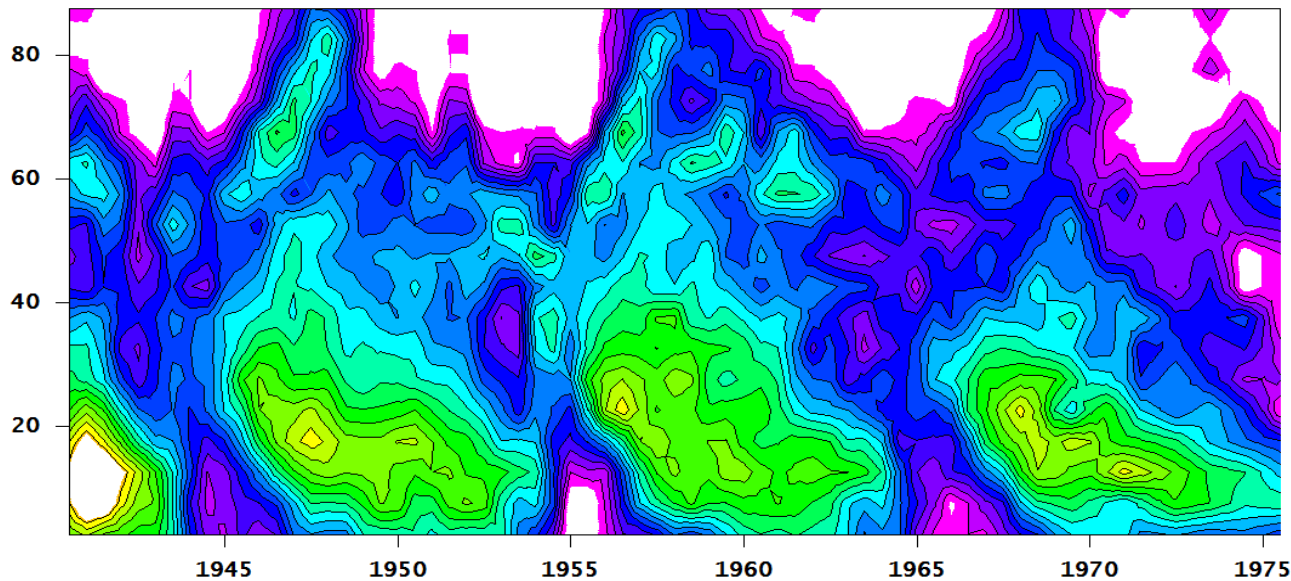


Measurements of the location of 'peaks' of Fe XIV coronal emission at 503 nm (the 'Green Line Corona') over 7 solar cycles. The plots show the probability of observing a 'peak' at a given latitude as a function of time.

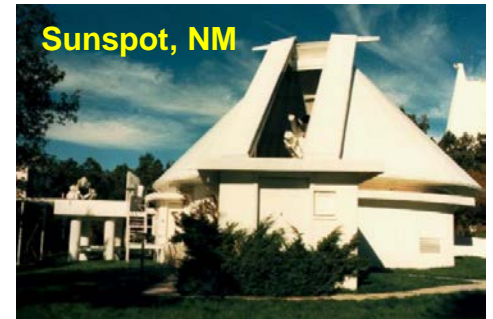




Waldmeier-Green-Corona-1940-1975



Fold South
unto North



The Extended
Cycle [if any] is
not very clear



“It’s The Sun, Stupid”

DANGER ROOM

WHAT'S NEXT IN NATIONAL SECURITY

PREVIOUS POST

NEXT POST

Army: Sun, Not Man, Is Causing Climate Change (Updated)

By Noah Shachtman June 3, 2008 | 11:46 am | Categories: Science

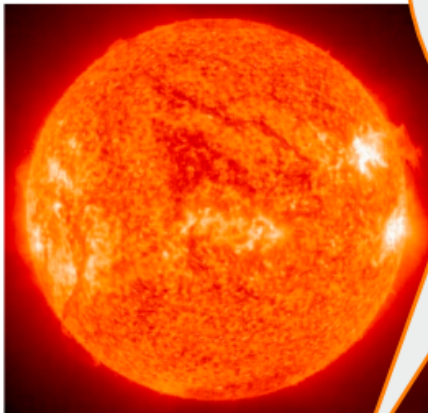
The Army is weighing in on the global warming debate, claiming that climate change is not entirely man-made. Instead, Dr. Bruce West, with the Army Research Office, argues that “changes in the earth’s average surface temperature are directly linked to ... the short-term statistical fluctuations in the Sun’s irradiance and the longer-term solar cycles.”

In an advisory to bloggers entitled “Global Warming: Fact of Fiction [sic],” an Army public affairs official promoted a conference call with West about “the causes of global warming, and how it may not be caused by the common indicators [sic] some scientists and the media are indicating.”

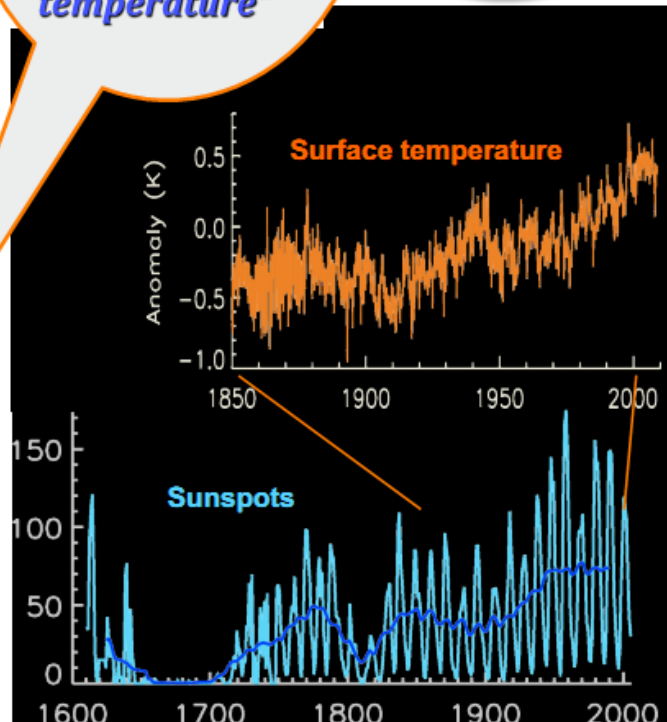
In the March, 2008 issue of *Physics Today*, West, the chief scientist of the Army Research Office’s [mathematical and information science directorate](#), wrote that “the Sun’s turbulent dynamics” are linked with the Earth’s complex ecosystem. These connections are what is heating up the planet. “[The Sun could account for as much as 69 percent of the increase in Earth’s average temperature.](#)” West noted.

It’s a position that puts West at odds with nearly every major scientific organization on the planet. “The American Meteorological Society, the American Geophysical Union, and the American Association for the Advancement of Science all have issued statements in recent years concluding that [the evidence for human modification of climate is compelling.](#)” *Science* magazine observes. So has the United Nations’ Intergovernmental Panel on Climate Change (IPCC), which shared the 2007 Nobel Peace Prize with Al Gore, for their work on global warming. [UPDATE: [West himself said during a Thursday conference call that global warming is at least partially man-made -- and maybe as much as “70 percent” due to human intervention.](#)]

West faults the IPCC and other scientific groups have “conclude[d] that the contribution of solar variability to global warming is negligible.” He argues that these groups have done a poor job modeling the Sun’s impact, however, and that’s why they have “significantly over-estimated” the “anthropogenic contribution to global warming.”



“The Sun could account for as much as 69% of the increase in Earth’s average temperature”



J. Lean,
Nagoya,
2012

She was
mocking
the idea,
though

Bruce
West

The Climate Debate has reached absurd heights



ADELAIDE NOW 14 HOURS AGO

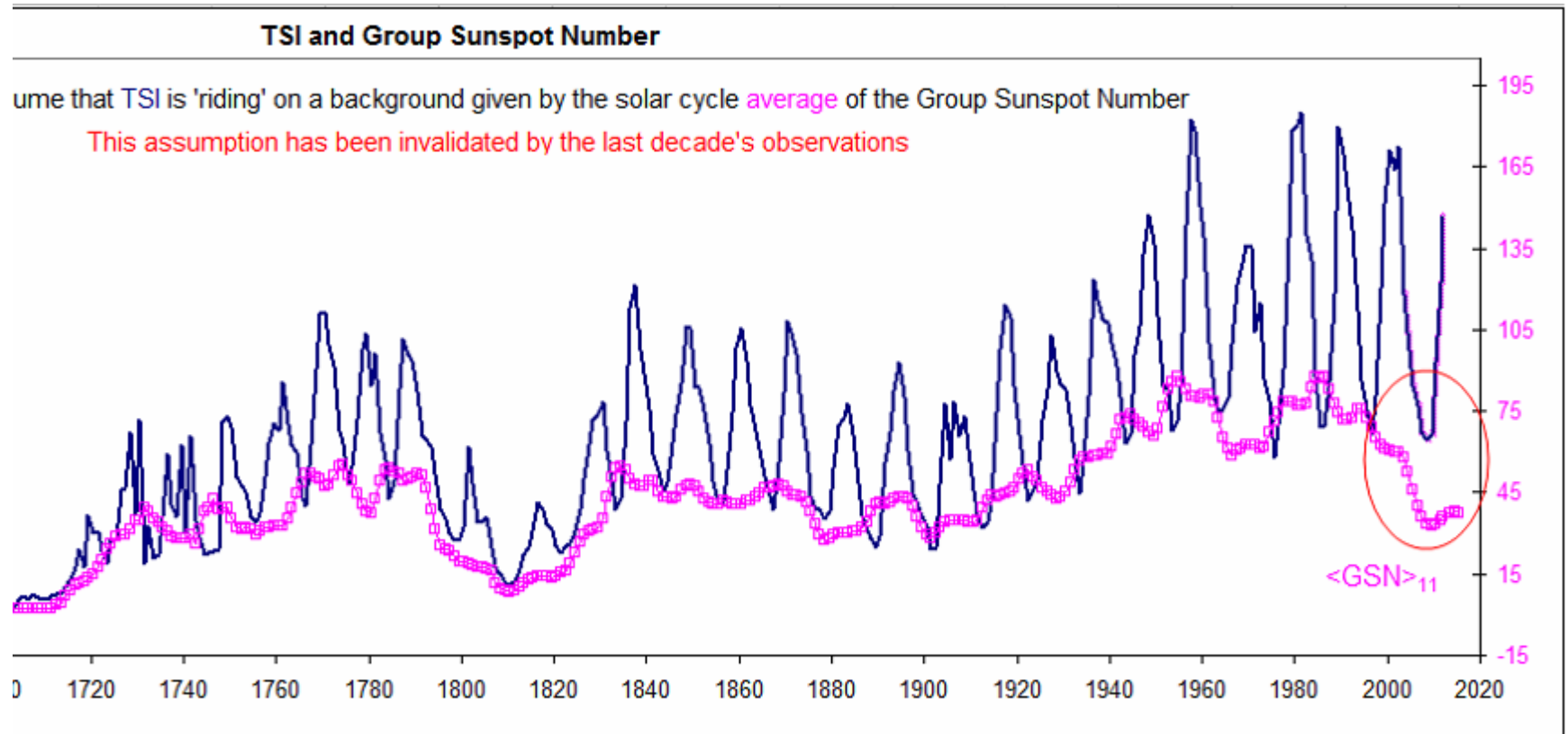
Global warming is making the world colder



Researchers believe the disappearing Arctic ice is sending more water vapour into the air, and is interfering with atmospheric currents and westerly winds that would typically have swept snowy weather northward. An iceberg off Ammassalik Island in... [FULL ARTICLE AT ADELAIDE NOW](#)

Two **W**s in the above

Important to get the Sunspot Number correct



More tomorrow...