

Solar Cycle 25 Started on Remarkable Times

(2020-02-02 .. 26 by P.A.Semi - $\pi\alpha\frac{1}{2}$)

Abstract:

First sunspots of solar cycle 25 appeared already in year 2019, according to their polarity. This work lists their dates, with some introduction about sunspot cycle and magnetic "color" (polarity) of sunspots.

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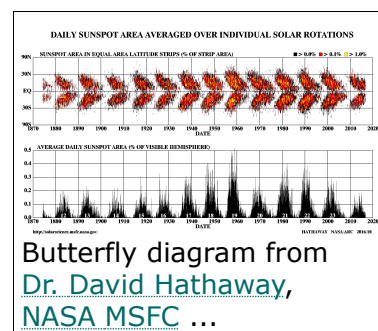
Sunspot Cycle

Solar magnetic activity has a cycle of approximately 11 years. But since the polar field of the Sun changes around time of [solar maximum](#), and direction of sunspots is different in each cycle, it can be better understood as **22 year cycle** ([Hale cycle](#)).

First sunspots of the cycle start appearing at high latitudes, and then the sunspot belt shifts continually toward the solar equator, which produces the well-known **butterfly diagram**, which is linked to the faster-moving belt of [torsional oscillation](#).

First sunspots of new cycle often appear, while there are still some sunspots of the old cycle.

Since 1874, sunspot positions were recorded at Greenwich observatory and then since 1977 continued by USAF by Solar Optical Observing Network.



I determined [solar cycle starts](#) by first appearance of high-latitude sunspots in that dataset, and since magnetic observations are available, from SOHO/MDI and SDO/HMI instruments:

| Cycle | Starting time | Possibly other starting time |
|-------|-----------------------|------------------------------|
| SC 12 | 1879-04-15 | |
| SC 13 | 1890-03-04 | |
| SC 14 | 1902-03-06 | |
| SC 15 | 1913-10-08 | 1913-02-22 |
| SC 16 | 1923-09-04 | |
| SC 17 | 1934-02-01 | |
| SC 18 | 1943-05-20 | |
| SC 19 | 1954-10-05 | 1954-07-16 |
| SC 20 | 1963-10-11 | |
| SC 21 | 1975-10-02 | 1975-08-21 |
| SC 22 | 1986-07-07 | 1984-11-21 |
| SC 23 | 1996-05-07 (SOHO/MDI) | 1997-03-29 |
| SC 24 | 2008-09-23 (SOHO/MDI) | |
| SC 25 | 2016-12-11 (SDO/HMI) | 2019-02-12 (SDO/HMI) |

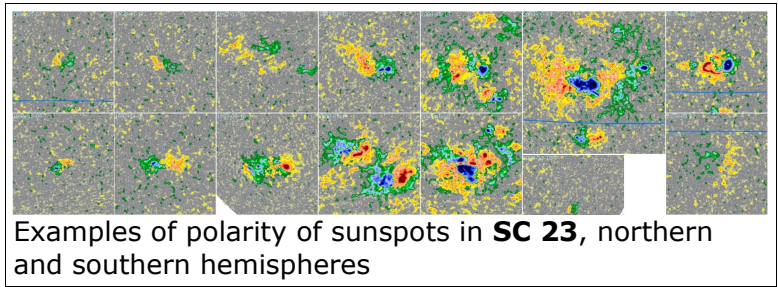
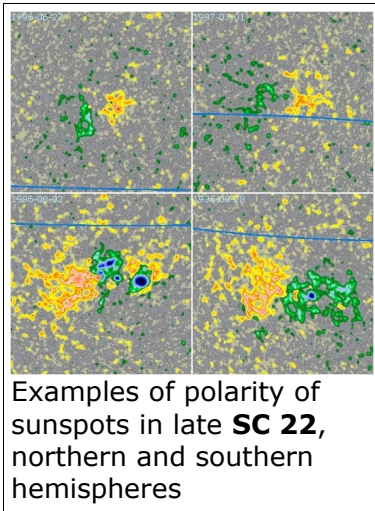
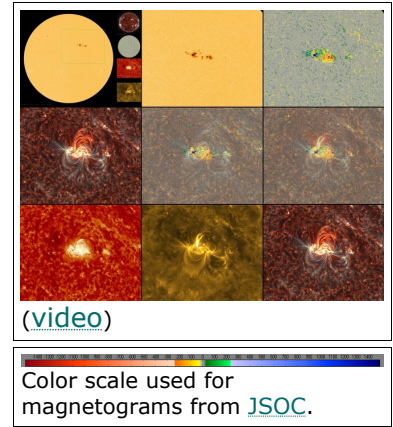
Table 1 - probable starts of sunspot cycles, as determined by first high-latitude sunspots, since SC 23 determined by sunspot polarity on magnetograms on SOHO and SDO observatories.

Most people (who know about sunspots) think, that sunspots are dark and color-less, but actually they are very colorful, but in different part of light spectrum, in extreme ultra-violet and X-ray part of spectrum.

Normal solar surface has black-body radiation around 6,000°K, but magnetic loops above sunspots are almost 1,000,000°K hot.

Sunspot Polarity

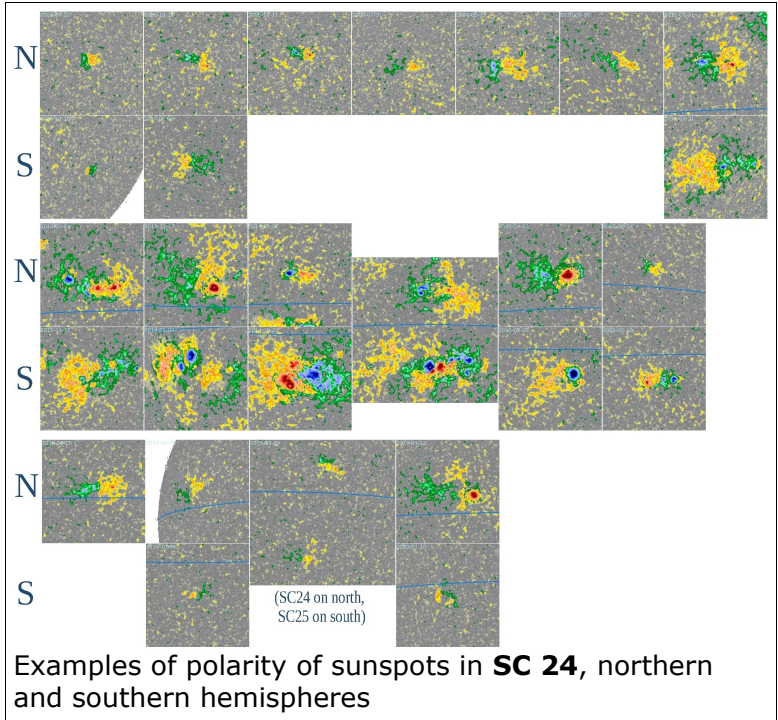
But sunspots also have a "magnetic color", or rather a polarity of their strong magnetic field. Sunspots of each new cycle have oppositely oriented their positive and negative ends, and sunspots on northern hemisphere are oppositely oriented than sunspots on southern one:



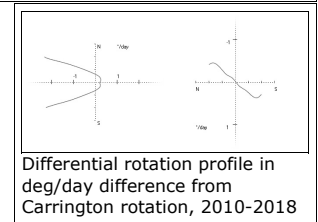
These magnetograms are filtered with low-frequency filter (FFT-2D) to remove noise in SOHO/MDI magnetograms, and same is applied on SDO/HMI magnetograms for visual unification. Equator is drawn as a blue line.

In SC 22 and SC 24, northern sunspots have negative field on leading (right) side (yellow color), positive field on trailing (left) side (green color), and southern sunspots are opposite.

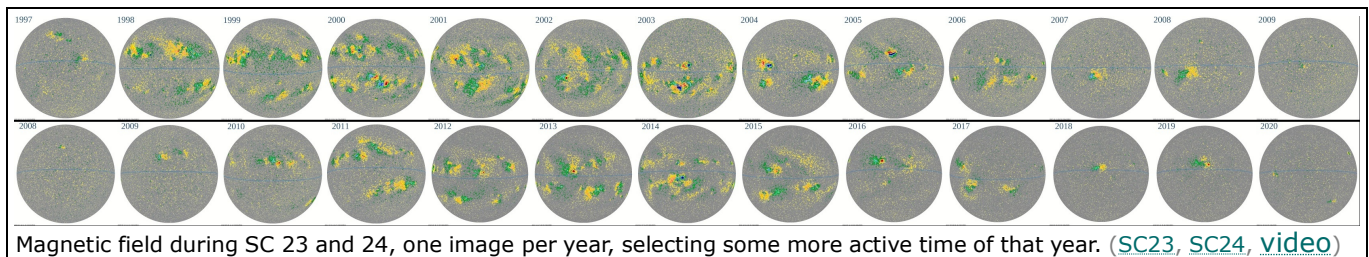
In SC 23 and SC 25, northern sunspots have positive field on leading (right) side (green color), negative field on trailing (left) side (yellow color), and southern sunspots are opposite.



(Animated [Magnetic Map of Sun](#) videos are available for SC 24 and SC 23 in rectangular projection, front side of Sun is as observed, far side of Sun is interpolated, flow profile of differential rotation is as [measured](#) by feature-tracking on SDO/HMI magnetograms...)



Notice, that SC24 (2008-2020) has been notably weaker than SC23 (1996-2009).



Some Active Regions evolve stronger and there appears a sunspot in visible spectrum, some do not.

Sunspot Cycle 25

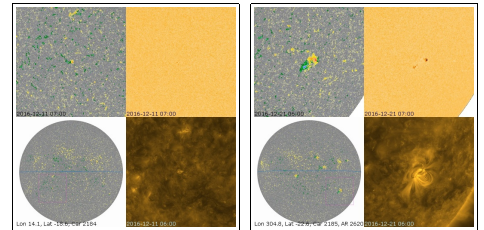
Sunspot minimum after SC 24 has been unusually deep, calm and long, similarly as sunspot minimum between SC 23 and SC 24, both being deepest minimums in at least a century...

First sunspots or active regions of SC 25, as determined by their polarity, different from SC 24 sunspots, appeared occasionally since December 2016, but then since February 2019 started to appear more frequently. Sunspots of old cycle SC 24 still occur in early 2020...

First tiny sunspot of SC 25 appeared on morning of [Third Advent Sunday](#), on 2016-12-11.

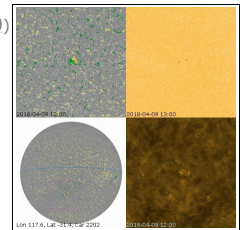
Next active region of SC 25 appeared on evening of [Fourth Advent Sunday](#), on 2016-12-18, with a sunspot appearing the next day and intensifying on 2016-12-20. (Ref 8, Ref 9)

The cycle SC 24 was still underway and these were unexpected...



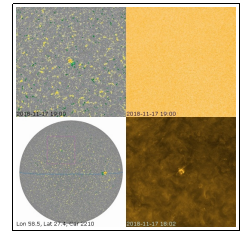
Possible remnant of another active region of SC 25 rolled into view on eastern limb on 2017-07-01 with no more sunspots, on a relatively low latitude of 14° South. It originated some time between 2017-06-17 and 2017-06-22 on far side of the Sun. (As it rolled into view of Stereo A, while the originating place could have been seen by Stereo B, if it was still operating.)

Next sunspot of SC 25 appeared on [Orthodox Easter Monday](#), on 2018-04-09. (Ref 10)



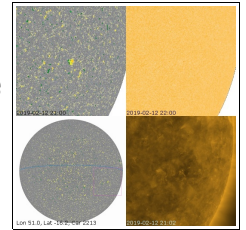
A very tiny and short-duration sunspot appeared on [International Students Day](#), on 2018-11-17, which is also a "Struggle for Freedom and Democracy Day" in Czech and Slovak republics.

It was a first sunspot on northern hemisphere. (Ref 9)



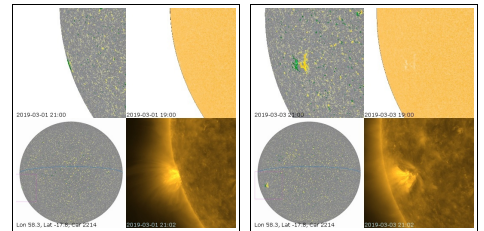
First sunspot of SC 25 in year 2019 appeared on [Darwin Day](#), on 2019-02-12 near western limb. It's polarity was not well recognizable, since a sunspot viewed on magnetograms from right side sometimes appears to have an opposite polarity due to some effect of Doppler measurement of magnetic field.

(Also notable on this day 3 years ago in 2016 Pope Francis and Patriarch Kirill signed an [Ecumenical Declaration](#) in the first such meeting between leaders of the Catholic and Russian Orthodox Churches since their split in 1054..)

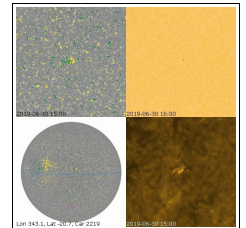


The same Active Region (without a sunspot) rolled into view on eastern limb at start of [Roman New Year](#), on 2019-03-01 from East side, on same place as moved by a differential rotation, with obviously the new SC 25 polarity.

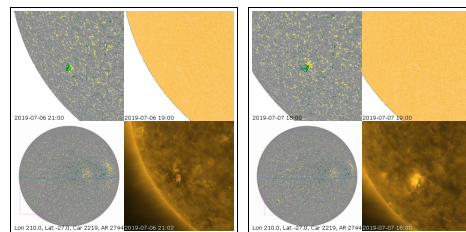
(At Roman antiquity times, year started in March, as is still evidenced by month names September to December being named by latin numerals 7 to 10, while the first months are named by Roman Emperors - Marcus Aurilius Maius Iunius Julius Augustus?)



Next Active Region of SC 25 appeared on Feast of [Saints Peter and Paul](#), on 2019-06-29, with a sunspot appearing the next day. (Ref 12)

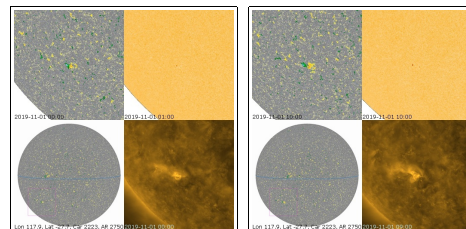


Next sunspot of SC 25 (AR 2744) appeared on anniversary of Martyrdom of Master [Jan Hus](#) (Johannes Hus), on 2019-07-06, which is a national holiday in Czech Republic...



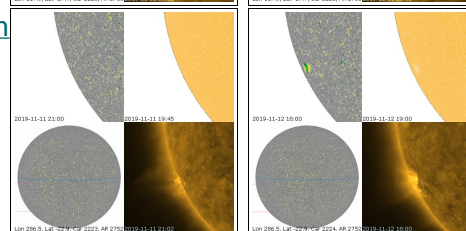
As Jan Hus appealed his condemnation by a rogue council, which was quarreling for a political might at the time of three popes, to the Jesus Christ himself, no-one on Earth could arbitrate his case or holiness before, even when pope Jan Paul II. apologized for his execution at year 2000. But this time the arbitration in favour of sanctity of Jan Hus came undeniably from the Sun from God and 24 "old ones"...

Next sunspot of SC 25 (AR 2750) appeared on [All Saints Day](#), on 2019-11-01. Active region started at late Halloween night, and sunspot appeared on early All Saints Day.



Next Active Region rolled into view on eastern limb at [Saint Martin holiday](#) on 2019-11-11, evolving into tiny sunspot the day after...

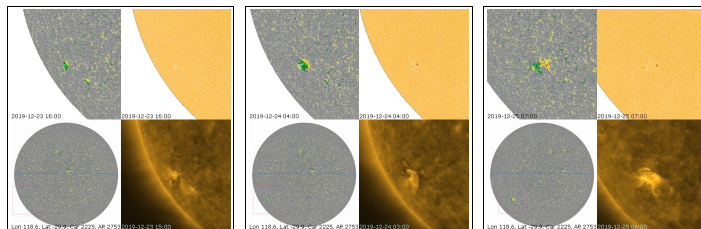
(Earlier on this day 2019-11-11, between 12:40 UTC and 18:07 UTC occurred transit of Mercury in front of Sun with center at 15:25:14 UTC, minus light-travel time...)



It is also an [Armistice Day](#), celebrating the end of World War...

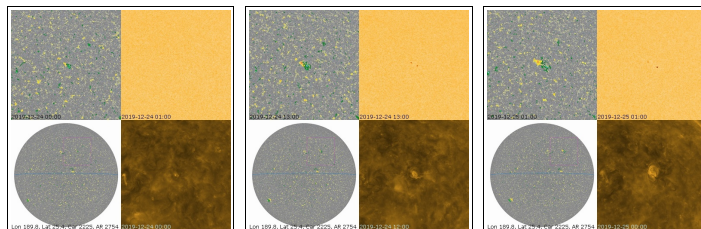
(A short-duration sunspot also appeared in this Active Region later around midnight between 2019-11-17 and 2019-11-18 ...)

Next Active Region appeared on evening of 2019-12-22 on [Fourth Advent Sunday](#), which coincided with [Chanukkah](#) on that year, and sunspot appeared there on [Christmas Eve](#) on 2019-12-24 (or a little sooner on 2019-12-23 and then intensified on Christmas Eve).



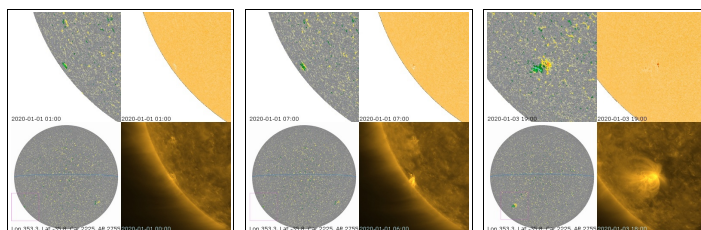
(Proper dating of [Bethlehem star](#) is on 23rd December 3 BC in proleptic gregorian calendar.)

Simultaneously, another Active Region of SC 25 appeared on northern hemisphere probably on 2019-12-23 late evening and sunspots appeared there on [Christmas Eve](#) on 2019-12-24 around noon. (Ref 11)

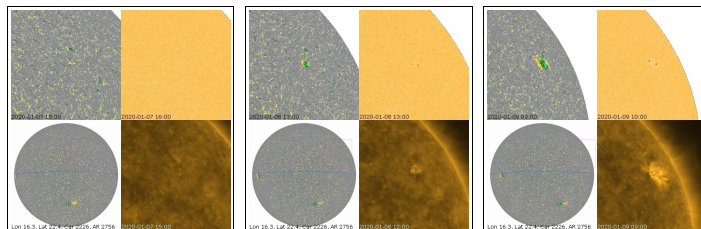


(Other reported Active Regions (Ref 12) were not sufficiently resolved or clearly oriented in new way and were rather part of a normal noise.)

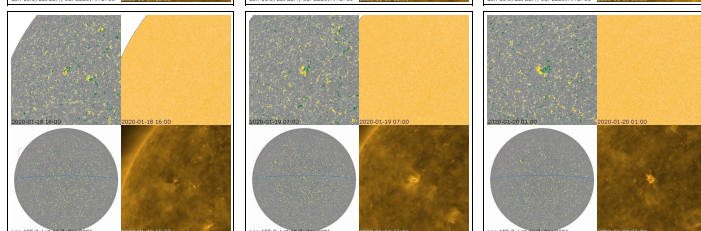
Next Active Region of SC 25 appeared on late 2019-12-31 and sunspot appeared after midnight 2020-01-01 on [New Year Day](#).



Next Active Region of SC 25 on northern hemisphere appeared on [Orthodox Christmas Day](#) on 2020-01-07, with a sunspot appearing there on the next day...

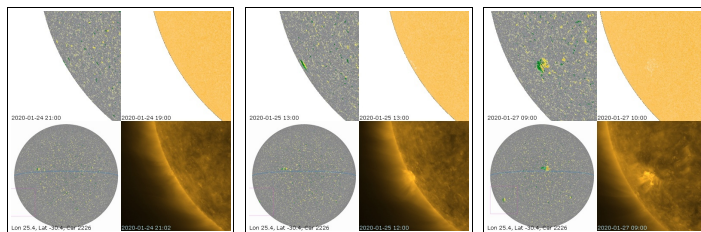


Next northern active region with sunspot of SC 25 polarity appeared on 2020-01-18 and then again on midnight between 2020-01-19 and 2020-01-20 ...



(January 19 is date of [Epiphany](#) in Eastern Orthodox church...
January 20 has multiple meanings...)

Next active region rolled into view on eastern limb almost exactly on [Chinese New Year](#) on New Moon, 2020-01-24 around 21:00 UTC...
(This year is a Year of the Mouse...)



| Time of Active Region appearance on Magnetogram | Time of Sunspot on Intensitygram | Remarks |
|-------------------------------------------------|--------------------------------------|----------------------------------|
| 2016-12-11 00:00 (new, tiny) | 2016-12-11 07:00 | Third Advent Sunday |
| 2016-12-18 09:00 (new) | 2016-12-19 16:00 | Fourth Advent Sunday (AR 2620) |
| 2018-04-09 02:00 (new) | 2018-04-09 11:00 | Orthodox Easter Monday |
| 2018-11-17 09:00 (new, northern) | 2018-11-17 16:00 | International Students' Day |
| 2019-02-12 16:00 (new) | 2019-02-12 22:00 | Darwin Day |
| 2019-03-01 18:00 (rolling on limb) | | Roman New Year |
| 2019-06-29 21:00 (new) | 2019-06-30 16:00 | Saints Peter and Paul |
| 2019-07-06 12:00 (new) | 2019-07-06 16:00 | martyrdom of Jan Hus (AR 2744) |
| 2019-10-31 06:00 (new) | 2019-11-01 01:00 | All Saints Day (AR 2750) |
| 2019-11-11 21:00 (rolling on limb) | 2019-11-12 13:00 | Saint Martin (AR 2752) |
| 2019-12-22 16:00 (new) | 2019-12-23 10:00 | Fourth Advent Sunday (AR 2753) |
| 2019-12-23 21:00 (new, northern) | 2019-12-24 13:00 | Christmas Eve (AR 2754) |
| 2019-12-31 23:00 (new) | 2020-01-01 04:00 | New Year Day (AR 2755) |
| 2020-01-07 12:00 (new, northern) | 2020-01-08 13:00 | Orthodox Christmas Day (AR 2756) |
| 2020-01-18 06:00 (new, northern) | 2020-01-18 13:00 2020-01-19 19:00 | Orthodox Epiphany |
| 2020-01-24 21:00 (rolling on limb) | 2020-01-25 13:00 | Chinese New Year |

Table2 - Times of first Active Regions and Sunspots in SC 25. Other numbered Active Regions belonged to the SC 24 according to their polarity... (Magnetogram times are with 1-hour granularity, Intensitygram times are with 3-hour granularity. AR numbers were retrieved from [SWPC archive](#) from [SRS](#) files.)

Conclusion

While on former years, sunspots seemed to appear in relation with planetary positions (Apparent Relations between Solar Activity and Solar Tides, Ching-Cheh Hung 2007 [\[archived\]](#)), or at random, this time their correspondence with times of Christian holidays and starts of Calendary does not appear random at all and is hardly deniable...

At first in early 2019 I noticed the sunspot on Easter Monday 2018, as I didn't have a calendar and thought it's friday after first spring fullmoon. (After all, it's Orthodox Easter Monday 2018 a week later...) Then I noticed the Jan Hus sunspot, a nice coincidence. But when I noticed sunspot on Christmas Eve, it was clearly a message. (I was not specifically hunting for new sunspots, but doing routine quality control of input data for a scientific project...) Then investigating other sunspots in 2019, I noticed other dates of calendar starts and various saints and it confirmed the message. Only when trying to publish this, I noted other works listing other sunspots, some unexpectedly early in 2016, and needed to fill the table more completely, which somehow diluted the boldness of the message about Darwin and Jan Hus, but not completely, as the position of sunspots on feasts remained consistent. You may argue, that there are many christian feasts around the year. But these first sunspots of SC 25 are on major christian feasts and holidays, calendary starts, and just two exceptions so far with International Students' Day (November 17) and Darwin Day (February 12).

I understand, that atheistic community would not be pleased by this revelation, and neither the churches, both with their Pride about fictitious infallibility and their superstitions. Also the scientists just *believed* incorrect [blunders](#), while scorning at believers for backwardness.

[Video](#) is available with the Sunspots... (SDO/HMI Magnetogram, cropped and full-disk, SDO/HMIIF Intensitygram, SDO/AIA 171A EUV) (Updated 2020-02-26, $\pi\alpha\frac{1}{2}$)

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