

MARS

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OBSERVATIONS

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APOLOGY: We are truly sorry for any inconvenience caused by the fact that the CMO/ISMO has been silent from June to October because of the reason the Editor was in poor physical condition. We sincerely hope to continue the issuance of CMO/ISMO at least once a month from November 2007 onwards. Incidentally we would like to inform that the CMO/ISMO 2018 Mars Gallery was already uploaded first on 12 October 2017. With best wishes.

CMO/ISMO Mars in 2018 (#01)

Forthcoming Mars in 2018. I

by

Masatsugu MINAMI and Masami MURAKAMI

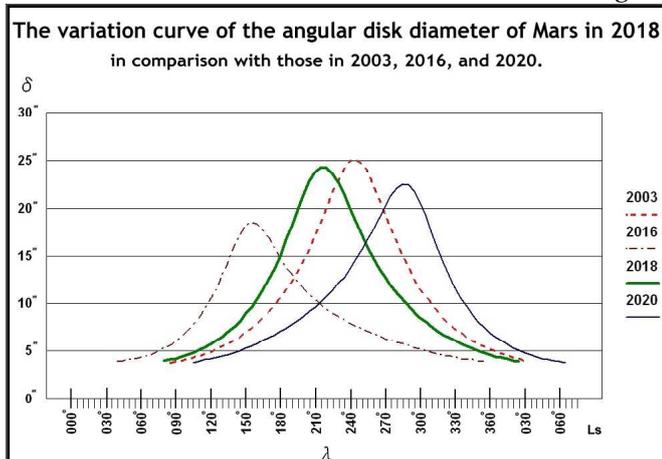
This is a first part of the CMO/ISMO guidance for the observations of the upcoming apparition of the planet Mars in 2018. This deals with the general situation until the end of March 2018, although some general items are to be shown for the full term. The second and third parts will treat the situation after 1st April 2018.

1° Introductory Note

The preceding closest apparition of the planet Mars which occurred in 2003 was literally unprecedented. It led us to an unexperienced world and fascinated us for a considerable time (during several months). In 2003 Mars was closest to the Earth on 27 August 2003 with the maximal diameter $\delta_{\text{Max}} = 25.11''$. This time in 2018, according to

Jean MEEUS [Ref. 1], the planet will be closest to the Earth in 2018 on 31 July with the maximal diameter $\delta_{\text{Max}} = 24.31''$. The apparent diameter $\delta = 24.3''$ may roughly be kept only for a few days, while in 2003 the apparent diameter which might have been kept larger to the eye than $\delta = 24.3''$ lasted from 14 August 2003 to 10 September, roughly for about two months. Until the end of August 2003, it was really marvellous to watch every night the Martian disk which appeared certainly a bit larger to the eye than the disk on the preceding night.

Incidentally, we note that the apparent angular diameter in 2020 on 6 October will still reach $\delta_{\text{Max}} = 22.56''$ and so the 2018 and 2020 apparitions are a pair in which the apparent diameter is larger than $20''$ (See Fig.1). Figure 1 also shows that the observable time span for the observation of Mars whose angular diameter is larger than $\delta = 15''$ in 2018



and 2020 taken together the range (from about the season $\lambda=180^\circ\text{Ls}$ to $\lambda=320^\circ\text{Ls}$) is wider than the period in 2003. Thus the apparitions in 2018 and 2020 are complementary pairs to give much more effective observations concerning the Martian seasons in Ls. This pair reminds us of the pair made of the apparitions in 2001 and 2003.

NB: We here use the Greek character λ to denote the Martian season: The season is described by employing the areocentric longitude of the Sun: Ls, measured in the plane of the orbit from its ascending node on the Martian equator and given as an indicator of the Martian season: The southern spring equinox occurs when $\lambda=180^\circ\text{Ls}$.

2° Recurrences of the great apparitions:

It is well known that the great apparitions are recursive every 15 or 17 years, but not definite. This is caused because the ratio of the orbital period of Mars and that of the Earth is irrational: It may be somewhat annoying, but we would like to show by referring to a list in [Ref. 1] how the 15 or 17 years recurrences are distributed for over the past two hundred decades and over the future few decades.

The 2050 apparition gives a great chance where the maximal apparent diameter will record $\delta_{\text{Max}}=25.02''$ while the preceding great apparition will occur in 2035, so that we will write this situation as 2050¹⁵2035. Then we can produce a chain of the great apparitions as follows:

2082¹⁵ 2067¹⁷ 2050¹⁵ 2035¹⁷ 2018¹⁵ 2003¹⁵
¹⁵1988¹⁷ ¹⁵1971¹⁵ ¹⁷1956¹⁵ ¹⁵1939¹⁵ 1924¹⁵ ¹⁷1909¹⁷ ¹⁷1892¹⁷
¹⁵1877¹⁷ ¹⁵1860¹⁵ 1845¹⁵ ¹⁷1830¹⁷ ¹⁵1813¹⁵ ¹⁷1798¹⁷
1781¹⁵ 1766¹⁵ ¹⁷1751¹⁷ 1734¹⁵ 1719¹⁵ 1704¹⁷,

where the year *doubly* underlined implies the great year in which the δ_{Max} was or will be larger than $25''$ while the year underlined simply is the apparition where δ_{Max} did not or will not exceed $24''$. The years double underlined in the 21st century look more in number than those in the 20th century as well as in the 19th century. Note that besides the 15

and 17 recurrences the 79 year recurrence is also well-known as a more accurate recursion. For example the 2050 apparition is a 79 year recurrence of the year of the apparition in 1971: However in the former apparition $\delta_{\text{Max}}=25.02''$ while the 1971 apparition was not double underlined, that is, did not give the δ_{Max} which is larger than $25''$. Thus the 79 year recurrence is also a bit incomplete. The famous 2024 great apparition which is unique doubly underlined apparition in the 20th century corresponds to doubly in 2003 and 2082 in the 21st century.

As to a mathematical origin of the 79 year recurrence, we recommend the readers to refer to [Ref. 2]. In this reference, you will find a magic number $M=Q/(P - 2Q) = 7.390\dots$ (irrational). If you pick out $M=7$ or 8 instead of the odd number $7.390\dots$, you will have 15 year recurrence or 17 year recurrence respectively. If we pick out a central value $M=7.5$ instead of 7.0 or 8.0 , the recurrence period becomes 32 years, corresponding to $32=15+17$. This implies that in the abovementioned chain of the great apparitions, if we pick out any of three successive elements of years, there will be found one ¹⁷ or one ¹⁵ in the three successive elements of years. If M is simply 7.4 , the 79 years recurrence comes out which may be the first plausible approximation. The Table in [Ref. 2] also suggests that the 284 year recurrence may be the best ($M=7.388$), and the 205 year recurrence also good ($M=7.384$). It also suggests the 126 year recurrence ($M=7.375$) is a better one (this value also given in the 252 recurrence).-Similarly, $M=7.400$ which gives the 79 recurrence is also repeated in the 158, 237, 316 year recurrences.

Incidentally if we employ the 79 year recurrence, the present 2018 case is quite similar to the one in 1939. The 1939 apparition gave $\delta_{\text{Max}}=24.13''$ on 27 July 1939. The preceding great apparition in 1937 gave $\delta_{\text{Max}}=18.41''$ on 28 May 1937, while the succeeding apparition in 1941 gave $\delta_{\text{Max}}=22.80''$ on 3 October. These triplets are quite similar to the present triplets since $\delta_{\text{Max}}=18.60''$ in 2016, $\delta_{\text{Max}}=24.31''$ in

2018, and $\delta_{\text{Max}}=22.56''$ in 2020. It should be first noted that the 1937 apparition brought Tsuneo SAHEKI by the use of a 31cm Cook Refractor at the Kwasan Observatory at Kyoto to find the small isolated spot near Syrtis Mj which was later named Antigones Fons by Shiro EBISAWA, and secondly in the case of the 1939 apparition it is known that Earl C SLIPHER led an expedition to the Lamont-Hussey Observatory at Bloemfontein, South Africa to secure some 8500 numbers of images of Mars by the use of a 69cm refractor, and thirdly in the 1941 apparition, it is widely known that by the use of a 38cm refractor at Pic du Midi Observatory, Bernard LYOT produced an excellent set of images covering whole of the Martian longitudes.

We also note that the 79 year recurrence of the 2003 great apparition gives the 2082 great apparition, and the 126 year recurrence of the 1924 is the 2050 great apparition. If we pick out the 1845

($\delta_{\text{Max}}=25.09''$), its 79 year recurrence gives the great apparition in 1924, and the 126 year recurrence gives the year 1971, and the 205 recurrence gives the 1971 great apparition. And the present 2018 year apparition corresponds to the 284 year recurrence of the 1734 great apparition (when $\delta_{\text{Max}}=24.52''$ on 29 July 1734). Finally we point out that the SCHIPARELLI year 1877 was 79 year recursive in 1956, 126 year recursive in 2003, and will be 205 year recursive in 2082.

3° Martian celestial phenomena in 2018:

First we shall show the orbit of Mars by collating with the orbit of the Earth in 2018 (Fig. 2). This time the planet Mars will be closest to the Earth before passing perihelion. Contrarily in 2020, the planet will be closest to the Earth after passing the perihelion on 6 October 2020 ($\lambda=291^\circ\text{Ls}$).

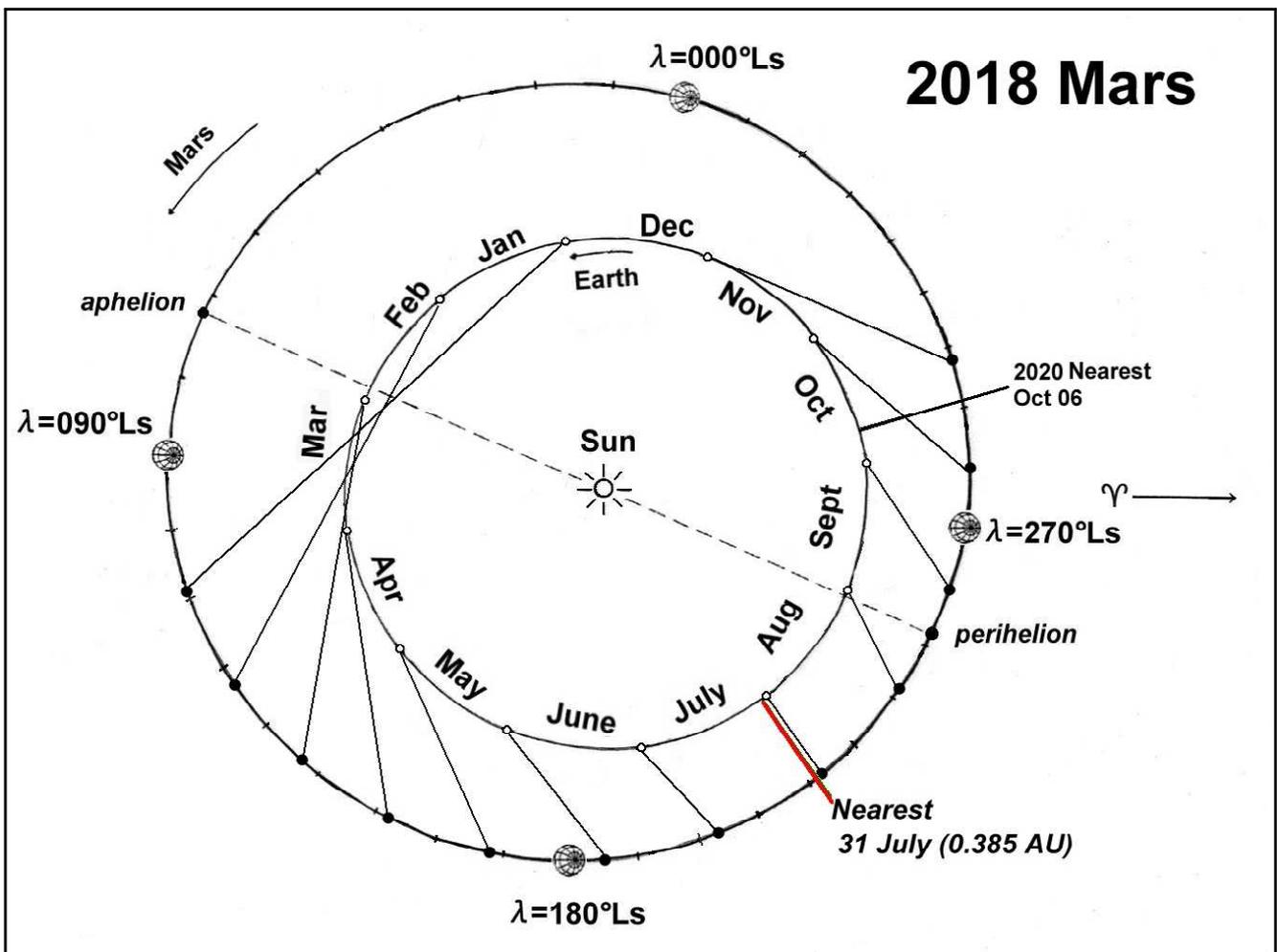


Figure 2

Some phenomena of the celestial Mars in 2018 are timed as follows:

- Western Quadrature: 24 March ($\lambda=149^\circ\text{Ls}$, $\delta= 8.0''$)
- Stationary: 28 June at 14h ($\lambda=202^\circ\text{Ls}$, $\delta=20.4''$)
- Opposition: 27 July at 5h ($\lambda=219^\circ\text{Ls}$, $\delta=24.2''$)
- Closest: 31 July at 8h ($\lambda=222^\circ\text{Ls}$, $\delta=24.3''$)
- Stationary: 28 August at 10h ($\lambda=239^\circ\text{Ls}$, $\delta=21.4''$)
- Eastern Quadrature: 3 December ($\lambda=300^\circ\text{Ls}$, $\delta= 9.1''$)

ter δ and the tilt ϕ vary as the functions of the Martian season λ

It will be a reasonable observation period if the angular diameter δ is larger than $10''$. The season will correspond to the period from just before the southern vernal equinox ($\lambda=180^\circ\text{Ls}$) until a bit after the southern summer equinox ($\lambda=270^\circ\text{Ls}$) during the observation period the tilt ϕ will provide us a chance we can observe the southern hemisphere (that is, minus ϕ). We should say we can fully observe the southern summer in this apparition.

Next we shall show how the apparent diame-

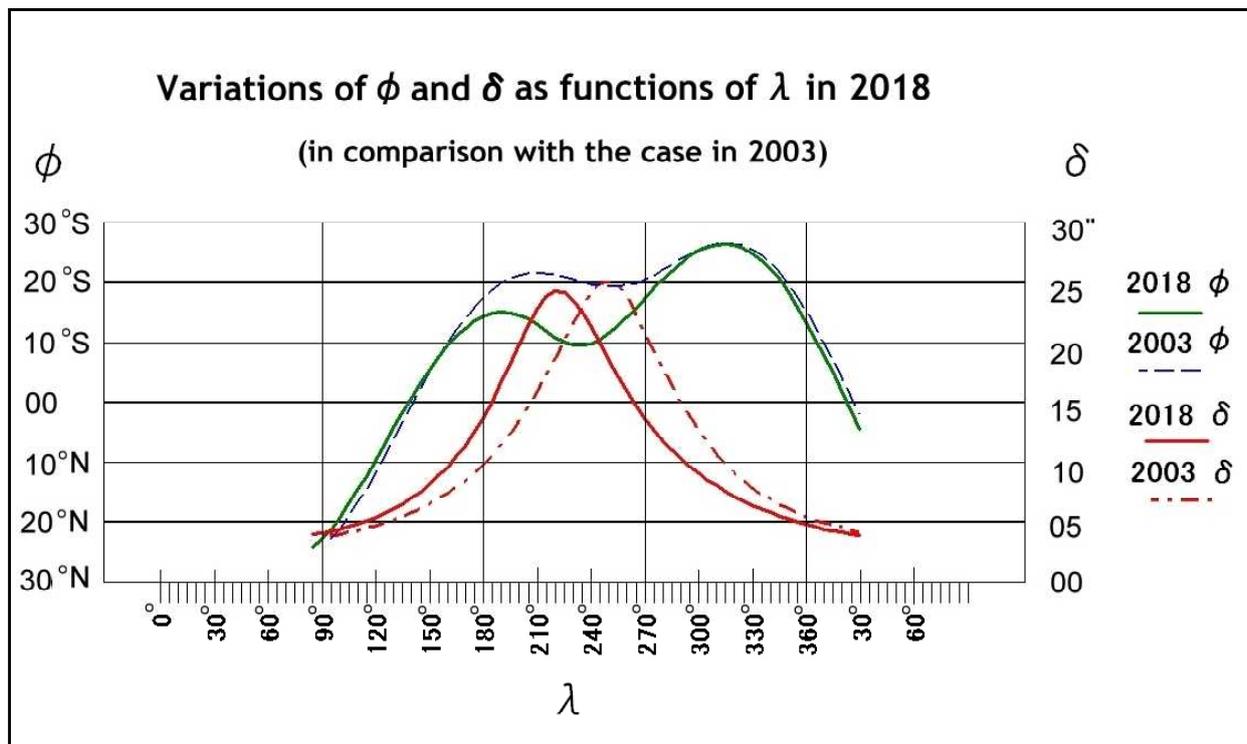


Figure 3

4° Seasonal Conditions of the Martian Hemispheres and the Rise and Fall of δ

Practically, we should know how the Martian Equinoxes-Solstices of the 2018 Mars are distributed. This is as follows:

- $\lambda=090^\circ\text{Ls}$ Southern Winter Solstice
on 18 Nov 2017 ($\delta=4.1''$, $\phi=23^\circ\text{N}$)
- $\lambda=180^\circ\text{Ls}$ Southern Vernal Equinox
on 22 May 2018 ($\delta=13.7''$, $\phi=14^\circ\text{S}$)
- $\lambda=270^\circ\text{Ls}$ Southern Summer Solstice
on 16 Oct 2018 ($\delta=13.7''$, $\phi=17^\circ\text{S}$)
- $\lambda=360^\circ\text{Ls}$ Southern Fall Equinox
on 22 Mar 2019 ($\delta= 4.8''$, $\phi=13^\circ\text{S}$)

In practice we should also take account of the variations of the angular diameter δ :

- 1) The period when δ is larger than $8''$ of arc: is about 9 months: from 24 March 2018 ($\lambda=148^\circ\text{Ls}$) to 21 December 2018 ($\lambda=310^\circ\text{Ls}$);
- 2) The period when δ is larger than $15''$ of arc is about 4 months: from 30 May 2018 ($\lambda=184^\circ\text{Ls}$) to 6 October 2018 ($\lambda=263^\circ\text{Ls}$);
- 3) The period when δ is larger than $20''$ of arc is about 72 days from 26 June 2018 ($\lambda=200^\circ\text{Ls}$) to 5 September 2018 ($\lambda=244^\circ\text{Ls}$);

5° For the Practical Observations (Part I) from November 2017 ($\lambda=082^\circ\text{Ls}$) to March 2018 ($\lambda=152^\circ\text{Ls}$)

Because of the recent improvement of the performance of the CMOS camera, the Martian minor

markings are to be detected even when the angular diameter δ is mere 4 seconds of arc if the conditions are nicely met. This apparition, we will be forced to work severely in winter for the observers in the northern hemisphere, it is recommended even for them to start the observations from November 2017. On 18 November, the northern summer solstice $\lambda=090^\circ\text{Ls}$ visits.

In **November 2017** (on the first day, $\lambda=082^\circ\text{Ls}$, $\delta=3.9''$, $\varphi=25^\circ\text{N}$, while the phase angle $\iota=19^\circ$), the planet stays in the morning Vir constellation, and the angular separation between the Sun and Mars (elongation) is about 33° . From Japan Mars may still shine to the height of 30° from the eastern horizon at around 4h JST. The planet Venus will shine below just before its superior conjunction. The Martian northern hemisphere (near the northern summer solstice) largely faces to us. On 28 November, Mars (when $\delta=4.2''$, 1.7 magnitude) passes through the north of Spica separated by 3° .

In **December 2017** (on the first day, $\lambda=095^\circ\text{Ls}$, $\delta=4.2''$, $\varphi=22^\circ\text{N}$, and $\iota=24^\circ$), the elongation will increase to 44° . The altitude of Mars is also augmented to 40° at the sunrise time. The celestial Mars will be approaching to the planet Jupiter which lies inside the Lib constellation. The tilt of the north pole is still largely towards the Earth and hence it will not be easy to check the south polar hood/cap, while Hellas may be active and whitish bright. The equatorial zone mist must be weaker, while near the afternoon terminator side some orographic clouds may be checked over the evening Montes since δ will be larger than $4''$. Since the north polar region faces towards us, the small residual north polar cap (npc) may be still caught as well as some phenomena around the npc.

In **January 2018** (on the first day, $\lambda=109^\circ\text{Ls}$, $\delta=4.8''$, $\varphi=16^\circ\text{N}$, and $\iota=30^\circ$), Mars is inside the Lib constellation, and the prolongation will exceed 60° in mid-January. As suggested from the lower position of the Libra, Mars' apparent declination D points to the south, and hence on the northern

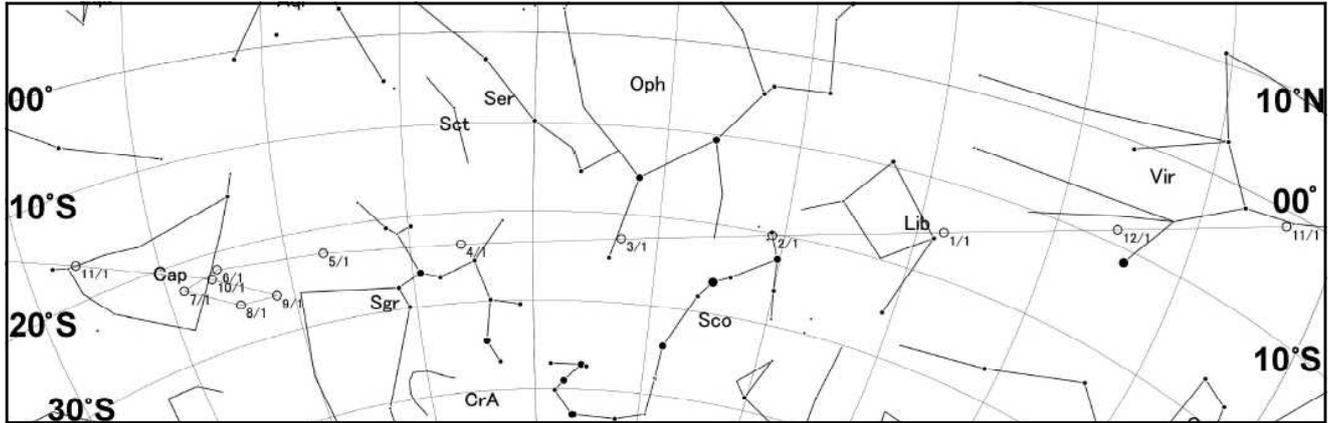
hemisphere, the time of the Mars rise does not get quicker (at around 3h JST), but there is a margin of 4 hours before the rise of the Sun so that we may be able to get a good span of the observation time though the altitude of Mars is still low. On 7 January, the celestial Mars will closely approach the south of the planet Jupiter by $10'$. This may be a good view (Mars: $\delta=4.9''$, magnitude 1.4). The phase angle ι will be augmented to 30° or so, and so the defect of illumination of the evening side stands out. Hellas still looks whitish bright. The afternoon orographic cloud activities are also checked.

In **February 2018** (on the first day: $\lambda=123^\circ\text{Ls}$, $\delta=5.6''$, $\varphi=08^\circ\text{N}$, $\iota=35^\circ$), Mars shines in the Sco constellation, and will rise from the morning horizon at about 2 o'clock JST. On 9 February Mars ($\delta=5.9''$, magnitude 1.1) passes through the 5° north of Antares. The tilt is still facing towards south, while the npc is visible and the season of the arctic Cyclone is coming; observable near the area of M Acidalium or Utopia (around $\lambda=120^\circ\text{Ls} \sim 145^\circ\text{Ls}$). The orography of the Tharsis region is still active. In the southern hemisphere, Hellas will look still light. The maximal south polar cap (spc) or the south polar hood must have been seen, but because of the small of the angular disk diameter, it may be not easy to check it at the southern limb.

In **March 2018** (on the first day: $\lambda=137^\circ\text{Ls}$, $\delta=6.7''$, $\varphi=01^\circ\text{N}$, $\iota=38^\circ$), the celestial planet will move from the southern area of the Oph constellation to the Sgr constellation. If observed from the terrestrial northern hemisphere, the celestial Mars goes down southwards and shines lower near the southern horizon. The planet will become to rise soon after midnight, but it will not reach the meridian before the sunrise. As aforementioned the Western Quadrature will occur on 24 March ($\lambda=149^\circ\text{Ls}$, $\delta=8.0''$). On 19 March the celestial planet Mars ($\delta=7.6''$, magnitude +0.5) will pass through between M8 (*Lagoon Nebula*) and M20 (*Trifid Nebula*).

The following Figure (Fig. 4, next page) denotes Mars' movements through the zodiac constellations

from Vir until Cap in the first period (November 2017 to November 2018 during the apparition.



References

[Ref. 1] Jean MEEUS, *Astronomical Tables of the Sun, Moon and Planets*, 2nd Edition, 1995 Willmann-Bell Inc.
 [Ref. 2] Masatsugu MINAMI, 1990 - 331=1659 (Cahier #03) CMO No.106 (25 June 1991 issue) p.910
<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomn2/Cahier03.htm>

(to be continued)

CMO/ISMO Mars in 2018 (#02)

Ephemeris for the Observations of the 2018 Mars. I

November & December 2017

by

Masami MURAKAMI

WE now start a serial running of the Ephemeris for the surface observations of the planet Mars in 2018. We here list up the necessary elements of the Ephemeris for the period from 01 November 2017 till 31 December 2017: The data are listed for every day at 00:00 GMT (not TDT). The symbols ω and ϕ denote the longitude and latitude of the sub-Earth point respectively. The symbols λ , δ and ι stand for the areocentric longitude of

the Sun, the apparent diameter and the phase angle respectively. We also add the column of the Position Angle Π of the axis rotation, measured eastwards from the north point: This is useful to determine the north pole direction from the $p \leftarrow \rightarrow f$. The apparent declination of the planet is also given at the final column (denoted D).

The data here are basically based on *The Astronomical Almanac for the Year 2017*.

Date (00:00GMT)	ω	ϕ	λ	δ	ι	Π	D
31 October 2017	111.87°W	25.20°N	081.18°Ls	3.88"	18.8°	29.3°	-01°07'
01 November 2017	102.09°W	25.14°N	081.62°Ls	3.89"	19.0°	29.6°	-01°16'
02 November 2017	092.30°W	25.07°N	082.05°Ls	3.90"	19.1°	29.8°	-01°31'
03 November 2017	082.51°W	25.00°N	082.49°Ls	3.91"	19.3°	30.1°	-01°46'
04 November 2017	072.73°W	24.92°N	082.93°Ls	3.92"	19.5°	30.4°	-02°01'
05 November 2017	062.94°W	24.84°N	083.37°Ls	3.93"	19.7°	30.7°	-02°16'
06 November 2017	053.16°W	24.76°N	083.81°Ls	3.94"	19.9°	30.9°	-02°31'
07 November 2017	043.38°W	24.68°N	084.25°Ls	3.95"	20.1°	31.2°	-02°46'
08 November 2017	033.59°W	24.59°N	084.69°Ls	3.96"	20.3°	31.4°	-03°01'
09 November 2017	023.81°W	24.50°N	085.13°Ls	3.97"	20.5°	31.7°	-03°16'
10 November 2017	014.04°W	24.40°N	085.56°Ls	3.98"	20.7°	31.9°	-03°31'
11 November 2017	004.26°W	24.31°N	086.00°Ls	3.99"	20.9°	32.2°	-03°46'

Date (00:00GMT)	ω	ϕ	λ	δ	ι	Π	D
12 November 2017	354.48°W	24.20°N	086.44°Ls	4.00"	21.1°	32.4°	-04°01'
13 November 2017	344.71°W	24.10°N	086.88°Ls	4.02"	21.3°	32.6°	-04°16'
14 November 2017	334.93°W	23.99°N	087.32°Ls	4.03"	21.4°	32.9°	-04°31'
15 November 2017	325.16°W	23.88°N	087.76°Ls	4.04"	21.6°	33.1°	-04°45'
16 November 2017	315.39°W	23.76°N	088.20°Ls	4.05"	21.8°	33.3°	-05°00'
17 November 2017	305.62°W	23.65°N	088.65°Ls	4.06"	22.0°	33.5°	-05°15'
18 November 2017	295.85°W	23.53°N	089.09°Ls	4.07"	22.2°	33.7°	-05°30'
19 November 2017	286.08°W	23.41°N	089.53°Ls	4.08"	22.4°	34.0°	-05°44'
20 November 2017	276.32°W	23.28°N	089.97°Ls	4.09"	22.6°	34.1°	-05°59'
21 November 2017	266.55°W	23.15°N	090.41°Ls	4.11"	22.8°	34.3°	-06°13'
22 November 2017	256.79°W	23.02°N	090.85°Ls	4.12"	22.9°	34.5°	-06°28'
23 November 2017	247.03°W	22.89°N	091.29°Ls	4.13"	23.1°	34.7°	-06°42'
24 November 2017	237.27°W	22.75°N	091.73°Ls	4.15"	23.3°	34.9°	-06°57'
25 November 2017	227.51°W	22.61°N	092.18°Ls	4.16"	23.5°	35.1°	-07°11'
26 November 2017	217.75°W	22.47°N	092.62°Ls	4.18"	23.7°	35.3°	-07°25'
27 November 2017	208.00°W	22.33°N	093.06°Ls	4.19"	23.9°	35.5°	-07°40'
28 November 2017	198.24°W	22.18°N	093.50°Ls	4.20"	24.1°	35.6°	-07°54'
29 November 2017	188.49°W	22.03°N	093.95°Ls	4.22"	24.3°	35.8°	-08°08'
30 November 2017	178.74°W	21.87°N	094.39°Ls	4.23"	24.4°	35.9°	-08°22'
01 December 2017	168.99°W	21.72°N	094.83°Ls	4.24"	24.6°	36.1°	-08°36'
02 December 2017	159.25°W	21.56°N	095.28°Ls	4.26"	24.8°	36.2°	-08°50'
03 December 2017	149.50°W	21.40°N	095.72°Ls	4.27"	25.0°	36.4°	-09°04'
04 December 2017	139.76°W	21.23°N	096.17°Ls	4.29"	25.2°	36.5°	-09°18'
05 December 2017	130.02°W	21.07°N	096.61°Ls	4.30"	25.4°	36.7°	-09°31'
06 December 2017	120.28°W	20.90°N	097.06°Ls	4.32"	25.6°	36.8°	-09°45'
07 December 2017	110.54°W	20.73°N	097.51°Ls	4.33"	25.8°	36.9°	-09°59'
08 December 2017	100.80°W	20.56°N	097.95°Ls	4.35"	25.9°	37.0°	-10°12'
09 December 2017	091.07°W	20.39°N	098.40°Ls	4.36"	26.1°	37.2°	-10°26'
10 December 2017	081.33°W	20.21°N	098.85°Ls	4.38"	26.3°	37.3°	-10°39'
11 December 2017	071.60°W	20.03°N	099.30°Ls	4.40"	26.5°	37.4°	-10°53'
12 December 2017	061.87°W	19.84°N	099.74°Ls	4.41"	26.6°	37.5°	-11°06'
13 December 2017	052.14°W	19.66°N	100.19°Ls	4.43"	26.8°	37.6°	-11°19'
14 December 2017	042.41°W	19.47°N	100.64°Ls	4.45"	27.0°	37.7°	-11°32'
15 December 2017	032.69°W	19.28°N	101.09°Ls	4.47"	27.2°	37.8°	-11°45'
16 December 2017	022.96°W	19.09°N	101.53°Ls	4.48"	27.3°	37.8°	-11°58'
17 December 2017	013.24°W	18.90°N	101.98°Ls	4.50"	27.5°	37.9°	-12°11'
18 December 2017	003.52°W	18.70°N	102.43°Ls	4.52"	27.7°	38.0°	-12°24'
19 December 2017	353.80°W	18.50°N	102.88°Ls	4.54"	27.9°	38.1°	-12°37'
20 December 2017	344.09°W	18.30°N	103.33°Ls	4.55"	28.0°	38.1°	-12°49'
21 December 2017	334.37°W	18.10°N	103.78°Ls	4.57"	28.2°	38.2°	-13°02'
22 December 2017	324.66°W	17.89°N	104.23°Ls	4.59"	28.4°	38.2°	-13°14'
23 December 2017	314.95°W	17.69°N	104.69°Ls	4.61"	28.6°	38.3°	-13°27'
24 December 2017	305.24°W	17.48°N	105.14°Ls	4.63"	28.7°	38.3°	-13°39'
25 December 2017	295.53°W	17.27°N	105.59°Ls	4.65"	28.9°	38.4°	-13°51'
26 December 2017	285.82°W	17.06°N	106.04°Ls	4.67"	29.1°	38.4°	-14°03'
27 December 2017	276.12°W	16.85°N	106.50°Ls	4.69"	29.3°	38.4°	-14°15'
28 December 2017	266.41°W	16.63°N	106.95°Ls	4.71"	29.4°	38.4°	-14°27'
29 December 2017	256.71°W	16.42°N	107.40°Ls	4.73"	29.6°	38.5°	-14°39'

Date (00:00GMT)	ω	ϕ	λ	δ	ι	Π	D
30 December 2017	247.01°W	16.20°N	107.86°Ls	4.75"	29.8°	38.5°	-14°51'
31 December 2017	237.31°W	15.98°N	108.31°Ls	4.77"	30.0°	38.5°	-15°02'
01 January 2018	227.62°W	15.75°N	108.77°Ls	4.79"	30.1°	38.5°	-15°14' - - -

Letters to the Editor

●.....*Subject: from Bill Sheehan*
Received: 11 June 2017 at 06:53 JST

Dear Masatsugu, I have not heard from you for sometime, and hope you are well.

I finally resumed work, today, on a Mars book which is to revise and update my 1996 book, "*The Planet Mars*," which I am going to publish with U of Arizona Press. (I am finally getting up the motivation to do this after being utterly absorbed in finishing the *Pluto* book, with Dale Cruikshank--also with U of Arizona Press--and working fulltime at my clinical position here in Flagstaff.... Finally, I have energy for Mars again -- not least because my health has improved since I came here.)

The Mars book is being done with Jim Bell, at Arizona State University; among other things he is the Principal Investigator for the camera that will go to Mars on the 2020 rover, which will be the first Mars sample return mission. He has agreed to write the chapters on the recent spacecraft results, about which he is expert, but he is very busy, and will probably not have time to devote to this for a while, but meantime I am working on the earlier era, which is what I know. Today I have spent some pleasant hours been hammering away again at Percival Lowell's views of Mars, which I think I now understand quite well in the context of the time. I will send you as an attachment the first part of this (longish) chapter, and would welcome your comments.

I realize how much more I know now than I did twenty years ago. Some of it is detail. So I have been able to incorporate some new information that

fills in some of the gaps. For instance, I learned from Carol Bundy, who is the daughter of Bill Bundy (who headed the CIA during the Kennedy and Johnson era), that the Brahmin woman from whom Lowell broke off the engagement was none other than Rose Lee, Alice Roosevelt's sister (at the time, Theodore Roosevelt--who wrote Percival a scathing letter--was an ambitious Assemblyman in the New York legislature). So no wonder the break-up of that relationship made it seem that Lowell could not live comfortably in Boston. He had committed the cardinal faux-pas for the Brahmin upper-crust society in which he lived. My understanding of Lowell's *Far East* phase has also been deepened largely thanks to that marvelous trip--I shall never forget it--to *Noto* with you and Asada. It is possible I will return to Japan again; but I have come to love it, and will never experience the thrill of discovering what really was a completely strange and wonderful place that I did with you in May of 2004.

***We had a small event at Lowell to commemorate the 100th anniversary of Lowell's death last November, and I also spoke on Lowell's last year at a meeting of the Antique Telescope Society that same month. I published an article in *Sky & Tel* on Lowell's last observations (of the fifth satellite of Jupiter), and on Lowell's last year in the *Journal of the Royal Astronomical Society of Canada*. (Lowell's most important paper from 1916, "The Genesis of Planets," was published there; he had given his lecture on this topic in Toronto in April.) Overall, though, this important anniversary was little marked in Flagstaff; I think because the observatory is still a bit embarrassed about the founder's reputation for flights of fancy -- and I would be the first to admit that there is a good deal of the kind of pseudoscience that Martin Gardner describes in

Fads and Fallacies in the Name of Science in Percival's work. Douglass was right that it would be impossible to turn him into a real scientist.

Nevertheless, he did create the iconic view of Mars as a desert world which has continued to frame our thoughts ever since--and now that I am in Flagstaff, I have been systematically immersing myself in the landscape hereabout, and appreciating how much Lowell "saw Arizona, and imagined Mars."

We are getting excited about the Great North American eclipse this summer. I am going to venture out from Lander, Wyoming, to the eclipse path, with some friends in Flagstaff and some visitors, David and Jane Sellers, from England. David and Jane are from Leeds; David is a retired hydraulic engineer, and his special interest has been in William Gascoigne and the pioneering micrometer he devised before his untimely death in the English Civil War (he was on the losing side to Cromwell and perished at Marston Moor in 1645). David and Jane are both enthusiastic supporters of Labour, and are "over the Moon" about Jeremy Corbyn's success in the recent election. I pay attention to European politics in part because there is room for optimism there -- whereas here, things could hardly be more depressing.

See attachment, *Lowell*. I will send more as soon as I can. With warm regards, my old and dear friend,

○...**Subject: FW: Roman Tkachenko Pluto flyover**
Received: 27 July 2017 at 07:03 JST

Dear friends, May be of interest...
Roman Tkachenko has produced a stunning "Pluto Flyover" movie at:
https://www.youtube.com/watch?v=XeAjh_26Znk&feature=youtu.be
Enjoy!

Bill SHEEHAN (Flagstaff, AZ)

●...**Subject: RE: CMO Message**
Received: 29 June 2017 at 18:47 JST

Dear Masami and Masatsugu. I am very sorry to hear about the poor health of Dr MINAMI. I sin-

cerely hope that he feels better soon and undergoes a full recovery. I am indeed looking forward to the coming Mars apparition! I am also pleased to say that I was invited to the *European Planetary Science Congress 2017*(EPSC 2017) in Latvia in September, and I will be doing a short presentation on my work covering the Mars 2015-2017 apparition. My very best wishes to the both of you. Best regards,

○...**Subject: Mars 12 October 2017 0335UT IR**
Received: 12 October 2017 at 14:49 JST

Hi all, I had to cut back a few bushes to get this capture low in the east. I had tried a few days earlier but with Mars so low and with turbulent morning conditions, I could not get any surface detail.



Very difficult conditions again this morning but at least a few features becoming visible: The bright Arabia region is at centre left, with Acidaliu at lower right. Maybe just a hint of the NPC. Winjupos simulation at lower right. Mars is at Ls 73 and 3.7" in size. I am hoping that this "embryo" image is the start of a memorable apparition for the Mars community. I am certainly looking forward to having Mars at 24" directly overhead from my location next July! Best regards, Clyde

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2018/171012/CFs12Oct17.png>

○...**Subject: RE:Mars 12 October 2017 0335UT IR**
Received: 13 October 2017 at 04:13 JST

Hi Roger, I have seen another image (reported in CMO/ISMO) a few days earlier. Irrespective, the Mars hunting season is now open! Regards, Clyde

○...**Subject: Mars 1 November 2017 0338UT IR**
Received: 1 November 2017 at 16:25 JST

Hi all, Mars this morning under slightly more settled conditions. The rather bland side of Mars, but at least the north polar cap was detectable. Mars is

at 3.9" and it is mid-summer in the northern hemisphere. There is also a hint of the albedo markings in Arcadia. Checking in Winjupos, I am wondering whether the small bright spot central on the proceeding(left) limb is not Ascræus Mons. However, at this resolution, I would not make any claims.... I have included the winjupos simulation at lower right. This was 3x60s captures derotated. Best regards, Clyde

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2018/171101/CFs01Nov17.png>

○.....**Subject: Mars 3 November 2017 0335UT IR**
Received: 3 November 2017 at 18:26 JST

Hi all, IR Mars capture from this morning. There appears to be some structure to the NPC. The dark markings in Arcadia/Propontis region are again visible. Best regards, Clyde

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2018/171103/CFs03Nov17.png>

○.....**Subject: Mars 5 November 2017 0325UT IR**
Received: 5 November 2017 at 16:16 JST

Hi all, Mars IR this morning, under rather poor conditions. In spite of this, the structure in the NPC that was seen on 3 Nov is well seen today. I suspect the dark rift to be Olympia Planitia, but any other comments would be welcome. Best regards, Clyde

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2018/171105/CFs05Nov17.png>

○.....**Subject: Mars 6 November 2017 0321UT IR**
Received: 6 November 2017 at 13:54 JST

Hi all, Mars IR from this morning. Poor seeing. Acidalium, Vallis Marineris and Solis Lacus all rotating into view. Olympia Planitia again evident in the NP region. Best regards, Clyde

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2018/171106/CFs06Nov17.png>

Clyde FOSTER (Centurion, SOUTH AFRICA)

●.....**Subject: RE: CMO Message**
Received: 30 June 2017 at 03:53 JST

Dear Masami, I send best wishes to convalescence to Masatsugu. Best regards to you all

André NIKOLAI (GERMANY)

●.....**Subject: BAA digital membership offer from R McKim**
Received: 6 September 2017 at 20:25 JST

2017 September 6th

Dear colleague: I am writing to you as an overseas

contributor (past or present) to the BAA Mars and/or Mercury & Venus Sections to let you know about a new initiative from the Association. Some of you have been past members of the BAA, but most of you have never joined. Being a member is not necessary for contributing observations, and I am only too glad that you have sent me your work, and hope you will continue to do so. Overseas BAA members have less chance to attend our courses and meetings, but they do still get many other benefits, such as being able to watch our meeting talks online, engaging with others via the BAA online Forums, and receiving bulletins and publications, so the BAA Council recently decided to offer a low cost digital membership to non-UK residents. These details I have added at the end of this message.

For those that have not been in touch for a while, I retired from a long teaching career last month, and so I will have (even) more time to devote to reporting the observational work of my two Sections. A long three-part report on the ten elongations of Venus from 2007 to 2014 will be completed soon, a two-part final report on Mars in 2010 will be appearing in *the Journal* soon, and another for 2012 is being completed now. A ten-year report on Mercury and the 2016 solar transit was recently published. These analyses do take up a vast amount of time, and I hope that I can narrow the gap between observation and publication. Shorter reports on all the Mars oppositions up to and including 2016-17 have already appeared in print, and are uploaded to our website (www.britastro.org/mars).

So here are the membership details. We have had a good take-up so far with other groups of overseas observers, and I do hope you will give BAA digital membership your consideration. Whether you decide to join or not, please do continue to send us your observations and keep in touch.

With best wishes, Richard

Dr R.J.McKim

BAA DIGITAL MEMBERSHIP:

I am writing to you to let you know about the

launch of a new membership category of the *British Astronomical Association*: digital subscriptions. This category of membership allows individuals to subscribe to digital only versions of *the BAA Journal and Handbook* at a lower rate and without paying the postage supplement.

As a digital subscriber you will be able to:

- * Receive our bi-monthly *Journal & annual Handbook*, delivered digitally
- * Receive our regular *BAA Newsletter*, delivered by email
- * Watch videos of talks by leading experts online
- * Access tutorials
- * Get help and advice to develop your skills
- * Get involved in our observing programmes organised by the BAA Observing Sections
- * Participate in our active online discussion Forum
- * Present your work on your own BAA Member Page and contribute articles to *the Journal*

If you are not familiar with *the Journal*, the 2017 August edition is available online at:

<https://britastro.org/pdf/aug2017.pdf>

We are initially making this new digital subscription available to people living outside the UK who are not yet members of the BAA.

To find out more about the benefits of a digital subscription to the BAA, please visit

<https://britastro.org/digital>.

Signing up online is easy and payments by credit card or PayPal are accepted.

The BAA has been a driving force in amateur astronomy for over 125 years and is today recognised as one of the world's leading amateur groups. Founded in 1890, the BAA is a global community of amateur astronomers with members in over 40 countries.

As a valued contributor to our work, why not formally join our international community of amateur astronomers? We would love to have you as a member!

Richard McKIM (BAA: Peterborough, the UK)

●.....*Subject: Mars 2017/10/09-Kumamori*
Received: 10 October 2017 at 21:22 JST



Dear Masatsugu MINAMI,

The planet Mars is still quite low in the eastern sky; it is therefore hard to gain any detailed image. I shall send the present image captured on 9 October 2017 just because this is the first memorial experience in this apparition.

From here (Osaka) even at the sunrise time, the planet is still low, showing just a latitude of 20 degrees. Just an R image only. Best wishes.

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2018/171009/Km09Oct17.png>

○.....*Subject: Mars 2017/10/26-Kumamori*
Received: 27 October 2017 at 15:25 JST

Dear Masastugu MINAMI,

After a while, the night sky became fine. But at the shooting time, the altitude of the planet was about 27° which is still lower we should say. Just an R image only. With best wishes.

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2018/171026/Km26Oct17.png>

○.....*Subject: Mars 2017/10/31-Kumamori*
Received: 1 November 2017 at 16:24 JST

Dear Masatsugu MINAMI,

The clear sky continues, but it has become colder (under 10°C). The seeing condition has a bit improved but it is no good on the verge of becoming bright. So no more than an R image. Best wishes

[.http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2018/171031/Km31Oct17.png](http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2018/171031/Km31Oct17.png)

○.....*Subject: Mars 2017/11/01-Kumamori*
Received: 2 November 2017 at 17:52 JST

Dear Masatsugu MINAMI,

On the morning of 2 November, a thin cloud came. Through the thin cloud the seeing looked stable but the result was worse than expected. No more than an R image. With best wishes.

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2018/171101/Km01Nov17.png>

○.....*Subject: Mars 2017/11/04-Kumamori*
Received: 6 November 2017 at 11:38 JST

Dear Masatsugu MINAMI,

Just after an cold front, temperature was mild, and Seeing was so and so under a poor transparen-

cy. Still an R image only.

With best wishes,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2018/171104/Km04Nov17.png>

Teruaki KUMAMORI (Osaka, JAPAN)

●.....*Subject: Re:Mars 3 November 2017 0335UT IR*
Received: 4 November 2017 at 04:34 JST

Hi Clyde, How have you been? What sticks out to me are "straight-line" dark markings, i.e. canals. Lowell would be thinking, "See, I told you so".

Good seeing,

Jim MELKA (Chesterfield, MO)

☆☆☆

A LA CARTE in CMO/ISMO (#01) recommended by Masami MURAKAMI

"ISMO Best Recommendation to Observe Mars" by Christophe PELLIER

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomn4/CMO420.pdf>

"Some Ruminations on Observing Mars" by Donald C. PARKER

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomn4/CMO418.pdf>

"Abandon the Patchwork of Dust Images of Different Days" by Masatsugu MINAMI

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomn4/CMO399.pdf>

"The Seasons of Dusts" by Masatsugu MINAMI

http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomn2/2007Coming_7.htm

"The SPC in fall and winter" CMO#353 p1021

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomn0/CMO353.pdf>

"Watch the Inside of the South Polar Cap" by Masatsugu MINAMI

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomk/coming2003/07.html>

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