End of Apparition Report: Mars 2015-2016

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Start of Observations: 2016 March 19th Finish: 2017 January 02
Opposition: 2016 May 22nd
Number of Observations: 7 (10 Disk Drawings)

Instruments:

- 203mm Newtonian Reflector (Leicester, UK)
- 508mm Planewave DK (University of Leicester, UK)
- 304.8mm OG, Griffith Park Observatory, Los Angeles

Ls= 129° to 292°

Abstract

Short report summarising the visual observations made by the author during the 2015-2016 perihelic opposition of Mars.

1 Introduction

Presented here is a short report summarising observations of Mars made by the author during the 2015-2016 apparition. This was a perihelic type opposition, thus the disk subtended a favourable 18.3" on the date of opposition**[1]**. However, since opposition occurred in the constellation of Scorpius, the planet was situated low down in the sky for UK observers. Towards the end of the apparition, Mars reached a higher altitude and the author was able to make a number of observation in January 2017, although bad weather meant that only a few observations were made before the planet's apparent diameter fell below 4".

The low altitude severely restricted observations– the planet was only visible for a short forty minute window when it passed between the houses on the author's southern horizon. As a result, only seven observations were made (the author's lowest number of Mars observations in a given apparition to date!) and a total of 10 disk drawings were obtained.

All observations were made visually, with disk drawings being made at the telescope in black and white. Notes about colour, intensity and form (along with other pertinent observing details) were recorded in the author's field log book (vol V). Neat colour drawings were made later indoors, and these drawings, along with the observing notes for each session can be found the the author's Mars book (Vol II). Unless otherwise indicated, all drawings have north situated at the bottom and the western limb is situated on the right hand side.

2 The General Appearance of the Planet

The planet presented its usual strong ruddy colouration, and the albedo features were usually a strong greyish-brown colour. A number of bright white clouds were recorded along the morning and evening terminators, these were enhanced by use of a blue filter.

Towards the end of 2016, the planet's southern hemisphere was well presented and the author had a number of fine views of the south polar cap. The author did manage to follow the planet into the Martian dust storm season, however no yellow clouds were observed during this time.

Although only a small number of observations were secured, the author did manage to view a reasonable amount of the Martian surface during this apparition. Good views were obtained of Syrtis Major, Sinus Sabaeus, Acidalium and Erythraeum. Solis Lacus was also well observed on two occasions and showed some interesting structure. Unfortunately, it was not possible to observe the regions containing Sirenum and Cimmerium – indeed longitudes $\omega = 130°$ to $\omega = 250°$ were unobserved during this time, this means it was not possible to compile a summary chart of the whole Martian surface.

3 Regions Observed

In this section we shall summarise specific observations of the regions observed in blocks of longitude of 120°. We start at 10° and then move westwards (to the right in drawings given here)

(a) Longitudes λ= 10° to 130°

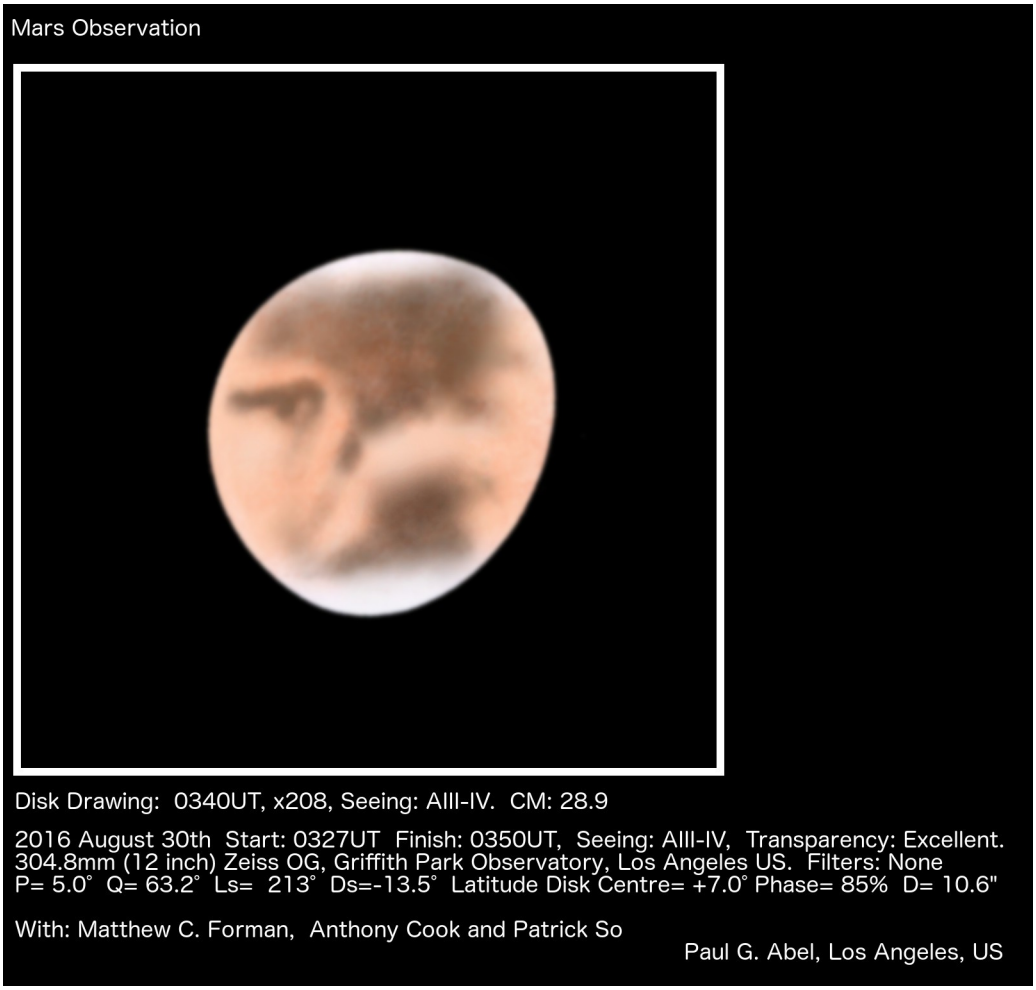

Figure 1: *Drawing of Mars made by the author on 2016 August 30th using the 12" Zeiss Refractor at the Griffith Observatory. Erythraeum and Acidalium presented some interesting details.*

This region of Mars is dominated by Acidalium in the north, and Erythraeum in the south. These two dark albedo features are separated by the Chryse region. On 2016 August 30th, the author was able to use the 304.8mm (12 inch) Zeiss refractor at the Griffith Park Observatory in Los Angeles to view the region. The telescope is of excellent optical quality and the author, along with Dr Matthew Forman, Anthony Cook and Patrick So used the telescope to study both Mars and Saturn. Both planets were notably higher in the skies of LA compared to those of the UK! Observations (and some general notes on visual observing) made by the author and were published in The Griffith Observer**[2]** (the Observatory's official publication.)

Seeing conditions were average, at at 0340UT when the drawing in figure 1 was made. In the far north, there appears to be white cloud activity over the northern polar cap (which would be sublimating due to the arrival of spring). Chryse appears to also contain a small amount of white cloud. Sinus Sabaeus can be seen on the eastern side of the disk, and although the seeing was mediocre, Erythraeum showed some subtle structure. The far south was rather bright suggesting the presence of clouds in the Argyre basin.

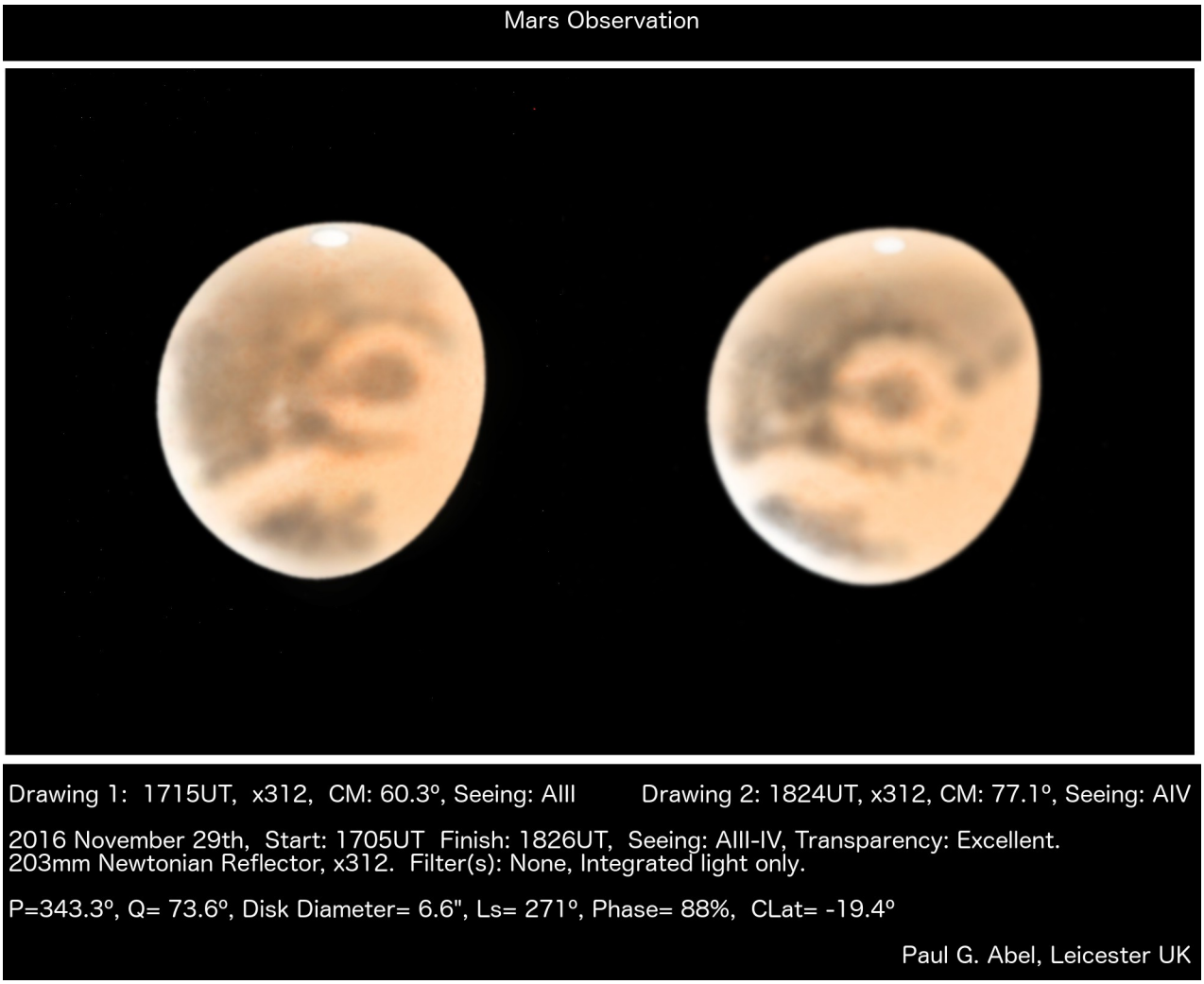

Figure 2: *Two drawings made by the author on 2016 November 29th with a 203mm newtonian Reflector, x312. The Solis Lacus region was well seen and presented some interesting fine details.*

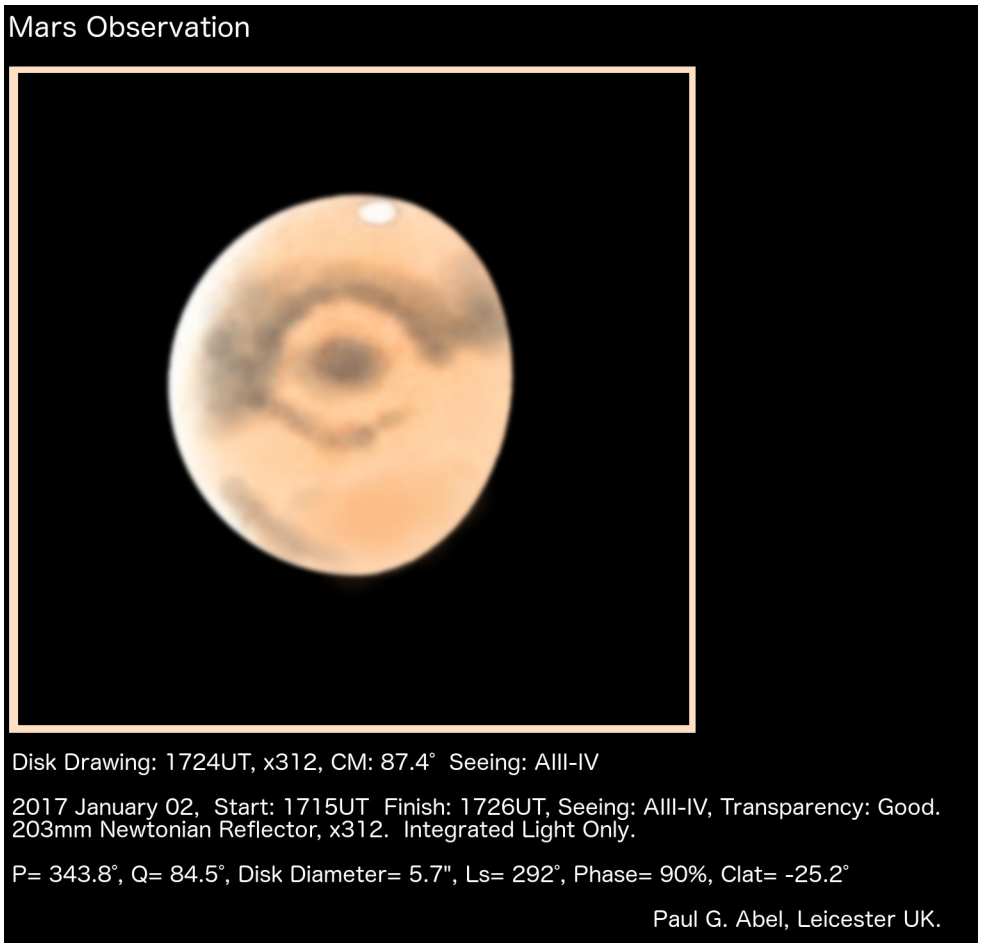

Figure 3: *Last observation of Mars made by the author of the 2015-2016 apparition. Once again the Solis Lacus region is presented but the planet had an apparent diameter of 5.7", so only the prominent albedo features were observed.*

On 2016 November 29th, the planet had reached a sufficient altitude so that the author could once again observe the planet from his observatory in Leicester (figure 2). During this time, the Solis Lacus region was well presented, at at a power of x312 a number of fine details and structure were visible. The eastern limb was rather bright due to the presence of white clouds. In the far south, a small polar cap can just be made out.

The author had a similar view of the planet on 2017 January 02 and it was hoped that the planet could be followed a little further- at least until it had reached an apparent diameter of 5.0". Unfortunately, a prolonged spell of bad weather prevented this and so this was the last observation made of Mars during the 2015-16 apparition.

One observation of the so-called 'dull side of Mars' was made on 2016 July 05 but in rather poor conditions. Solis Lacus was situated on the preceding limb, and the only thing of note was was a vague bright streak running from Aurorae Sinus into Tempe.

(b) Longitudes λ= 130° to 250°

These regions contain the dark Mare Sirenum and Mare Cimmerium albedo features-- both can show considerable structure visually in good seeing. Unfortunately these features were unobserved during this apparition and no disk drawings were made of this section of longitude.

(c) Longitudes λ = 250° to 10°

The main albedo features in this section of longitude are the dark Syrtis Major and the Sinus Sabaeus which ends at 'Dawes Bay' the point of zero longitude on Mars. The first observation of the region was made on 2016 May 05th at 2332UT (see Figure 4). Unfortunately the seeing conditions were rather poor, and all but the most obvious features visible could be discerned. During this time, there appeared to be white clouds present in the far north, and long the following limb. The Hellas basin did not appear to be particularly bright on this occasion.

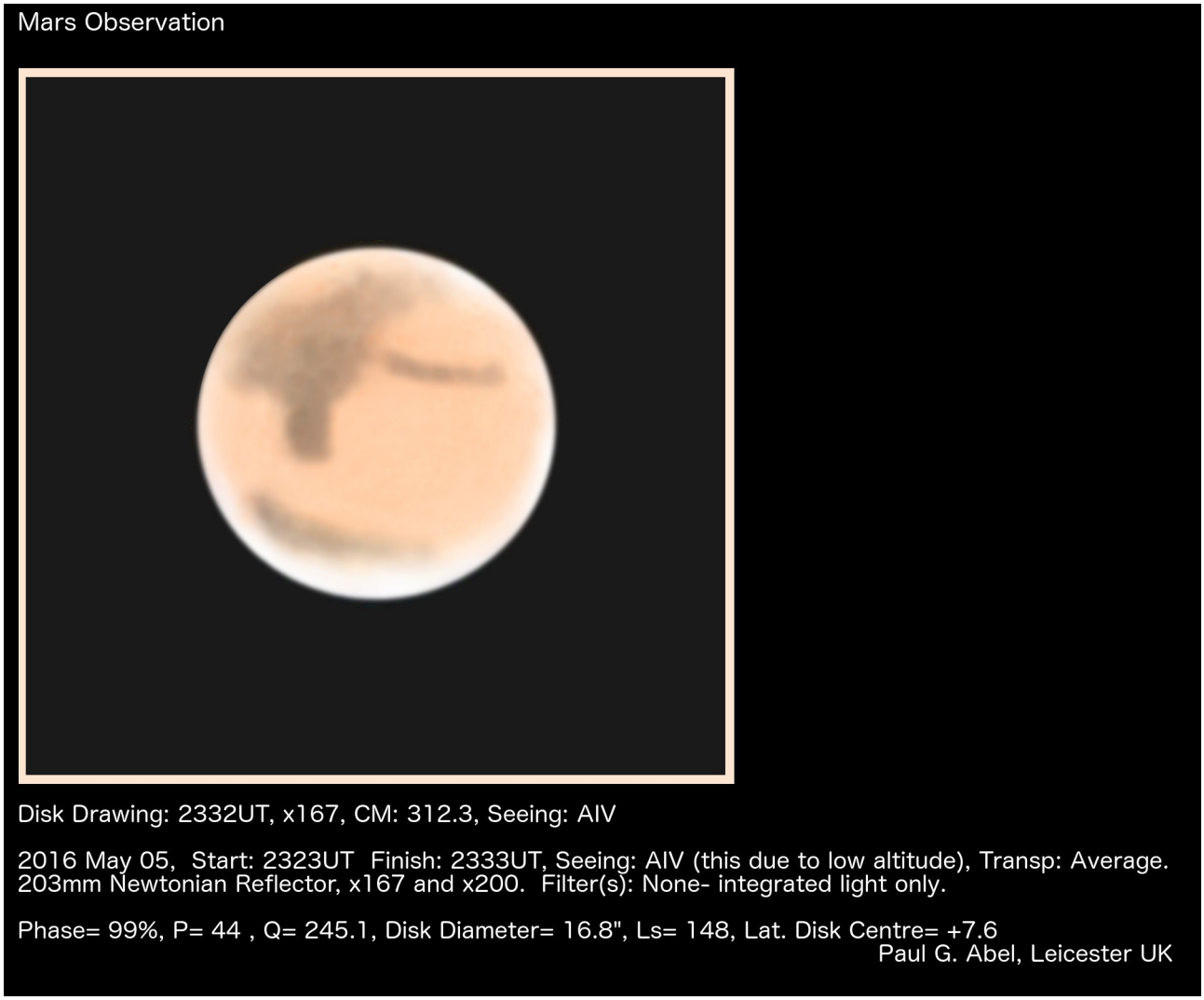

Figure 4: *Observation of Mars in poor conditions on 2016 May 05 at 2322UT, x167. Syrtis Major and Sinus Sabaeus can be seen, but there is little in the way of fine details.*

The first observation made for this apparition was of the Sinus Sabaeus feature (see Figure 5) on 2016 March 29th. Once again conditions were poor, but a number of interesting features were present on the disk. In particular, the following limb seemed to be particularly brilliant indicating the presence of many bright white clouds. The white clouds appeared to extend into the Chryse region was was located near the morning terminator. Sinus Sabaeus was visible as a thin dark streak ending in Dawes Bay.

The far north and south of the planet appeared as vague brighter regions with no structure evident. There also appeared to be a brighter region to the east of Acidalium. In the drawing, Syrtis Major is rotating out of view and is located on the preceding limb.

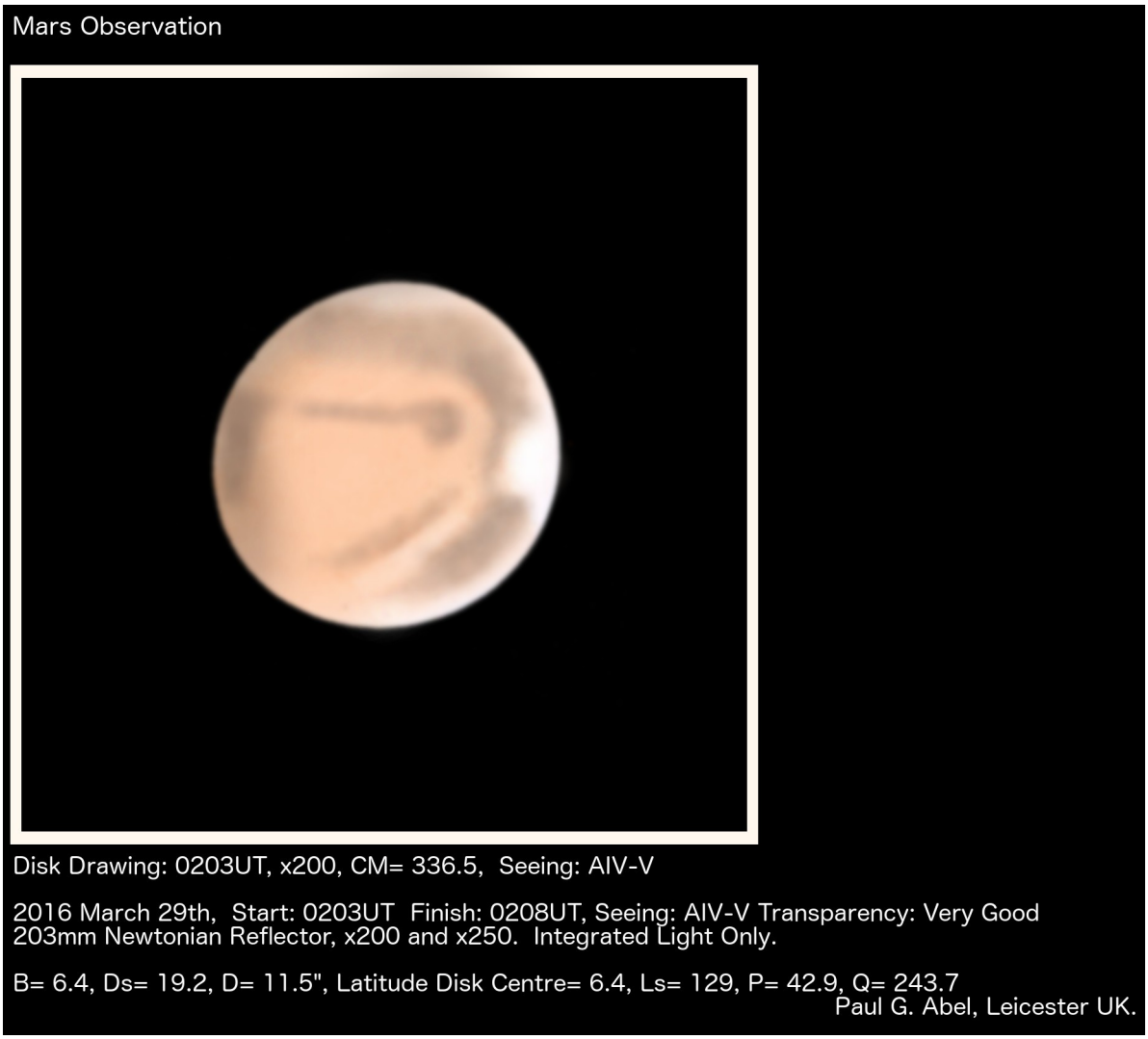

Figure 5*: First observation of the 2015-16 apparition. On 2016 March 29th the Sinus Sabaeus was nicely presented and although seeing conditions were poor a number of interesting features were observed.*

The last observation of this region was made on 2016 November 07 (see figure 6). The apparent diameter of Mars was by then just 7.2", and seeing conditions were poor. The dark albedo features were rather weak but Syrtis Major, Mare Tyrrhenum and Hellespontus were seen. Hellas appeared to contain bright clouds (white clouds were also present on the preceding limb), while Noachis was darker.

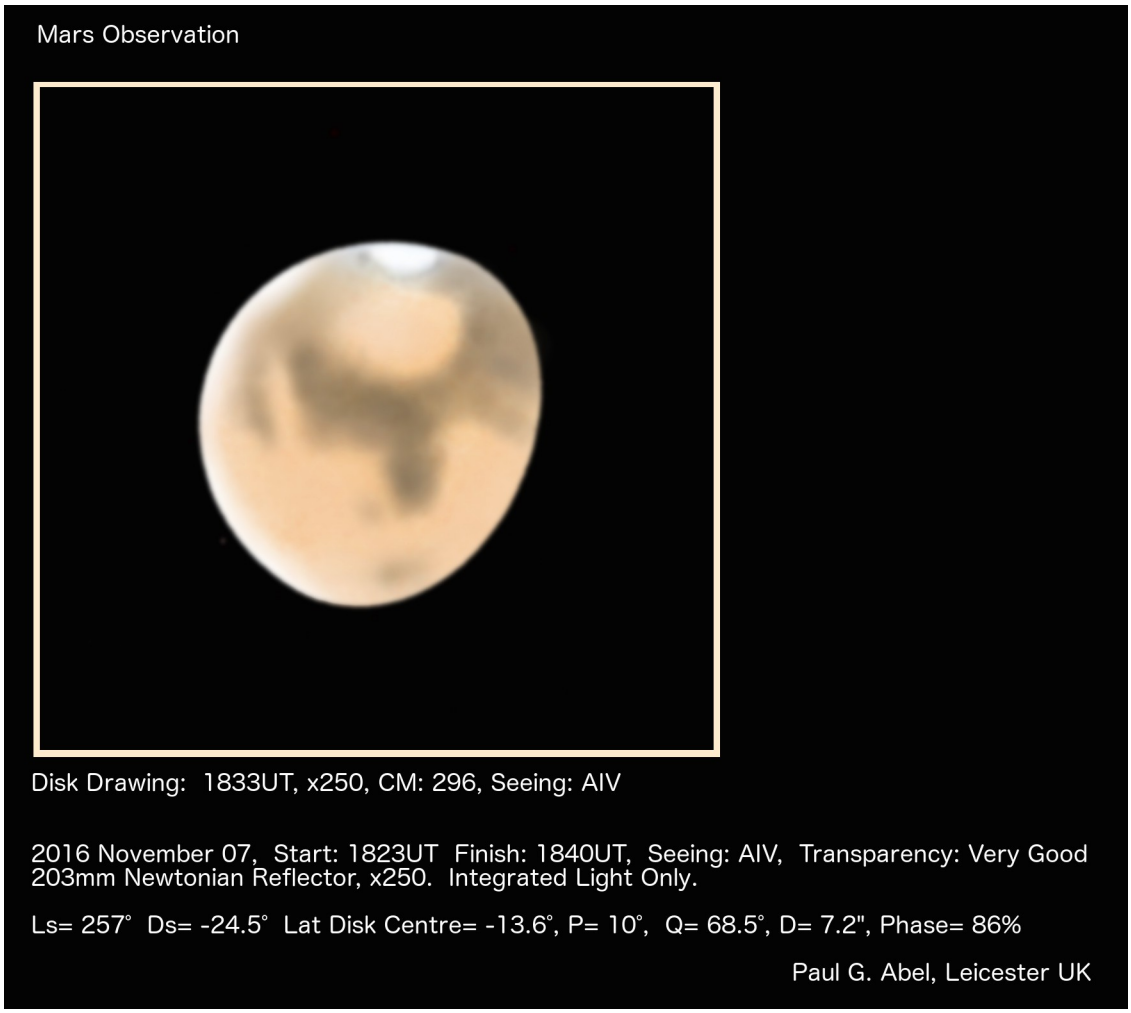

Figure 6: *Observation made on 2016 November 07 at 1833UT, x250 showing the Syrtis Major region. The Hellas basin is bright and the south polar cap can also be made out.*

4 Concluding Remarks

The 2016-2017 opposition of Mars saw the planet reach a good apparent diameter. Unfortunately for UK based observers, the planet spent much of the time far below the celestial equator. The author was able to make a number of drawings showing the outline and some fine details of many of the principle albedo features. A lot of white cloud activity seemed to be present in many of the observing sessions. The author was also able to record the decreasing size of the south polar cap as the southern hemisphere passed from spring towards summer.

The next opposition occurs on 2018 July 27th at 0507UT with an apparent diameter of 23.4". This will be another perihelic opposition and will be the most favourable opposition since the 2003 apparition[3]. Unfortunately for UK based observers, the planet will have a declination of some -25° 38' and thus, will be even lower down in the sky. Best views will be obtained by travelling as far south as possible to observe the planet during the weeks around opposition. Martian dust storm season will start in September 2018, and it will be interesting to see if another global dust storm ensues during this time.

References:

1. *"The Handbook of the British Astronomical Association 2016"*. The British Astronomical Association, Burlington House, Piccadilly, London.
2. *"The Griffith Observer."* **Vol 81**, No 2, February 2017.
3. ALPO 2018 Opposition of Mars: http://www.alpo-astronomy.org/jbeish/2018_MARS.htm