



## Mars Section

## Mars in 2016–17: Third interim report

## Section observations

Since the second report on the 2016 opposition in the 2016 August *Journal* (126(4), 205–206 (2016)), Mars was kept under continuous observation by over 80 observers. This third and final report was prepared just before the solar conjunction on 2017 Jul 27. The apparition had begun with an observation on 2015 Aug 29 at  $L_s = 034^\circ$ . The final image was submitted on 2017 Apr 7 by Martin Lewis (UK) and the final drawing by Gianluigi Adamoli (Italy) on May 16 at  $L_s = 006^\circ$ . The data covered fully 92% of a martian year.

We received many superb images, including some by Damian Peach during another of his trips to Barbados, and we reproduce one near-opposition view (Figure 1). The Director made 106 drawings with his 410mm Dall–Kirkham, and examples are given in Figure 2 to show seasonal change in the polar regions, and other features. North polar frontal systems were seen on some occasions in the form of thin E–W bands of white cloud. For example, the writer saw one on Jun 27, and another was imaged on Jul 3 by Clyde Foster.

We were able to see the S. polar cap well as soon as the sub-Earth latitude ( $D_s$ ) fell to the south of the equator in September, and to watch the bright patch *Argenteus Mons* at the edge of the decaying cap, as well as the seasonal separation of *Novus Mons*. But the disk diameter was shrinking, and after mid-December had dipped below 6 arcsec. On the other hand, by the end of the year the planet's altitude at sunset had become more favourable for UK observers, and 70 observing days were logged in 2017.

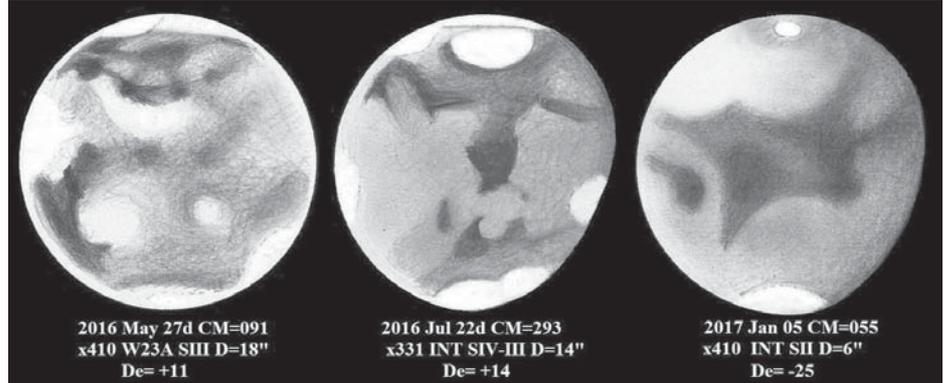


Figure 2. Drawings by the Director (Northants., UK) with 410mm DK Cass. On 2016 May 27 complex details were evident around *Solis Lacus*, while orographic cloud lay over *Olympus Mons* (approaching the CM). The NPH was well developed on Jul 22, with *Hellas* and the S. limb bright. On Jan 5 the tiny SPC summer remnant was visible.

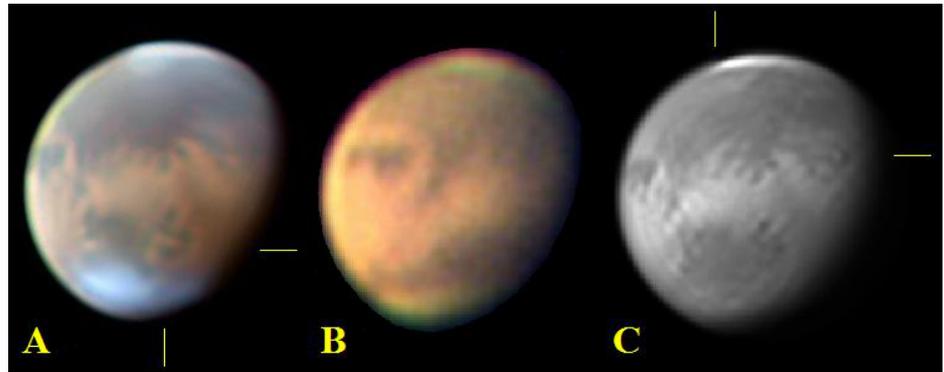


Figure 3. The 2016 August regional dust storm.

(A) RGB image by E. Morales (S.America) with 305mm SCT and PGR Flea3 on Aug 20, 23:51UT,  $CM = 060^\circ$ . Small dust clouds over *Nilokeras* (indicated).

(B) RGB image by R. Tatum (USA) with 178mm OG and ZWO ASI224MC on Aug 23, 23:56UT,  $CM = 032^\circ$ . By Aug 23 the focus of activity has moved south, with a finger of dust protruding from southern *Chryse/Xanthe* into *Valles Marineris* (indicated on (C)).

(C) Red image by W. Flanagan (USA) with 355mm SCT and PGR GS3-U3-32S4M-C on Aug 25, 02:23UT,  $CM = 058^\circ$ .

Several dust storms have been followed since the previous report. We list some of them here:

a) On 2016 Aug 20 Efrain Morales caught some small yellow dust clouds at the *Chryse Planitia–Nilokeras* border. These rapidly dispersed over a few days, as the focus of the event moved to the south. The Director issued an email alert to Section members in the USA on Aug 22, which drew a good response: see Figure 3. Frank Melillo obtained a series of images and produced an animation. On Aug 30, a chance observation by Paul Abel from the Griffith Observatory (Los Angeles, USA) revealed no residual dust activity in the region.

b) About 2016 Sep 3, a regional dust storm began in *Hellas*. It spread over N. *Hellespontus* to the west, and excavated dust from eastern *Noachis*: within days this desert area had turned dark, implying a broadening of *Hellespontus–Mare Serpentis*, while nearby there was a darkening and reappearance of

*Pandorae Fretum*, as has often been observed in the past. Figure 4 shows the first few days of the event, which lasted no longer than a week. On Sep 5 the Director visually confirmed the veiling and bright dust present east of *Hellas*. Dust fallout from this event was evident in *Argyre*.

c) According to spacecraft images, a local storm developed in SW *Arcadia* on 2016 Sep 24. This was confirmed in amateur images from Japan during Sep 25–28, and represents a rare location for a telescopic event.

d) The seasonally latest-known encircling storm arose at  $L_s = 311^\circ$  (corresponding to 2017 February). As it seemed that enough patrol images might not be secured, the Director issued BAA *e-Bulletin* No. 956 on Jan 16.

Again, there was a good response. From 2017 mid-February and then again from Mar 6, spacecraft images showed the presence of two successive cross-equatorial regional storms which began in the northern hemisphere but propagated to (and expanded in) the south.

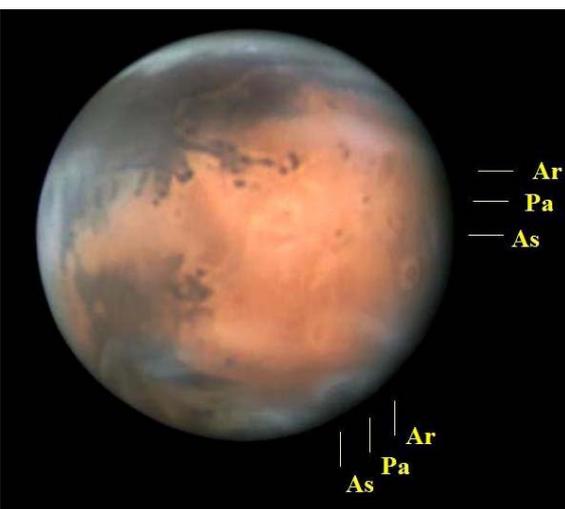


Figure 1. RGB image by Damian Peach (Barbados) with 355mm SCT and ASI120MM-S camera, 2016 Jun 5, 01:49UT,  $CM = 081^\circ$ . In addition to impressive details in the SPH and around *Valles Marineris*, the summit calderas of the *Tharsis Montes* are seen as three tiny dark spots following the CM (denoted As (*Ascraeus*), Pa (*Pavonis*) and Ar (*Arsia Mons*)). [All drawings and images have south uppermost.]

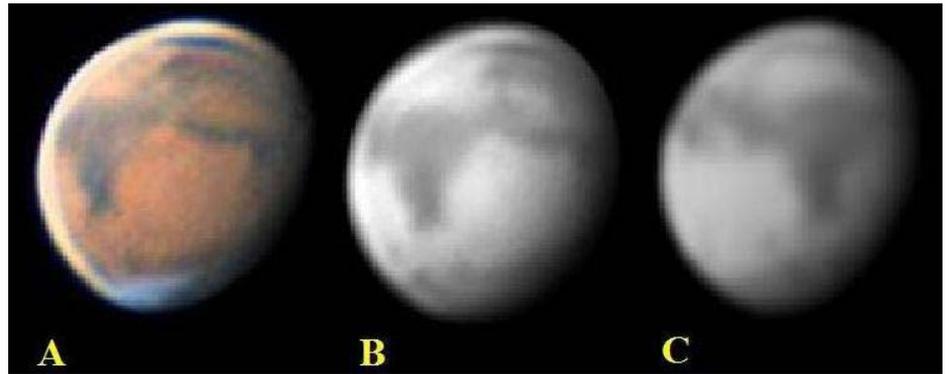


## Notes and News

The combined event (not illustrated here) failed to become encircling. Useful images were also obtained by members: for instance, Efrain Morales on Feb 22 captured the initial phase of the first event over the longitudes of *Margaritifer Sinus–Valles Marineris*, while images from Japan showed dust S. and SE of *Solis Lacus* on Feb 28–Mar 4 with the complete obliteration of *Margaritifer Sinus* (due to the second event) on Mar 9. The latter feature was again visible, though faint, in an image by Martin Lewis on Mar 24.

### 'Recurring Slope Lineae' revisited

Discoveries continue to be made upon the martian surface. *Sky & Telescope* (132(6), 14 (2016)) notes that M. Chojnacki and others have suggested that the 'Recurring Slope Lineae' or RSL (see my note in the *Journal*, 126(1), 4 (2016)) darken due to their absorption of water vapour from the atmosphere, so that the presence of a subsurface liquid reservoir is no longer considered necessary or even likely. As a chemist, this idea of hygroscopic minerals absorbing atmospheric moisture seems to me the better one, for many RSL have now been



**Figure 4.** The 2016 September regional dust storm.

(A) RGB image by P. W. Maxson (USA) with 254mm SCT and ASI290MM on Sep 3, 02:12UT, CM= 329°. Dust is breaking through N. *Hellespontus* from *Hellas* into *Noachis*. S. *Hellespontus* has darkened. Notice also the SPC.

(B) Red image by P. W. Maxson (as (A)) on Sep 4, 02:24UT, CM= 322°. *Hellas* is dusty and its N. edge now ill-defined, while dust has penetrated far west into *Noachis*.

(C) Red image by M. Hood (USA) with 200mm OG and ZWO ASI290MM on Sep 5, 00:39UT, CM= 287°. The *Hellas* dust is slightly expanding to the E. and NE.

found on very steep slopes, which effectively rules out subsurface water as a cause.

Meanwhile, it is always satisfying to be able to obtain good telescopic records of the

martian white clouds from our humble vantage point on Earth.

**Richard McKim, Director**

## Solar Section

### 2017 August

Sunspot activity increased slightly in both hemispheres during August with the recorded Relative Sunspot Number (R) being marginally higher than 2017 April and the highest since 2016 October. The quality (Q) of sunspot groups also increased during August returning to levels seen at the start of the year and also being the highest recorded since 2016 October.

**AR2670** S06°/118° was seen close to the solar SE limb on Aug 1 consisting of a small sunspot followed by a larger penumbral sunspot showing a pronounced Wilson effect. The group was fully on the disk the next day with the penumbral sunspot still showing the Wilson effect. By Aug 4 the group was type Dao with the largest sunspot having a pronounced 'bite' out of the SW edge of its umbra. On Aug 7, the group was showing signs of decay with the main sunspot having a pronounced oval appearance. The group continued to decay and by Aug 10/11 was of type Hkx with an area of 260 millionths on Aug 11. By Aug 13 the group was a smaller Hsx sunspot seen close to the SW limb and was flanked by faculae on both Aug 12 and 13.

**AR2671** N11°/303° was reported as a Dai group near the NE limb on Aug 15 surrounded by complex faculae. By the following day, the complex nature of this group could be fully seen. The group was type Esc with an area of 230 millionths on Aug 15 but by Aug 17 had increased in longitude to type Fsc; the larger penumbral sunspots being in the following part of the group. AR2671 remained type Fac for the next few days with the group having an

area of 400 millionths on Aug 19. The group straddled the central meridian on Aug 20 when three main penumbral sunspots were noted at the leading, middle and following positions with the group extending almost 20° in longitude. By Aug 23 the following end and central portion had declined substantially. The preceding sunspot displayed an asymmetric penumbra and two curious dusky patches were seen just north and east of the middle component. Due to the decline of the central portion of the group, the group was counted as two active areas by Aug 24. On Aug 27 only a single Hsx sunspot remained close to the limb.

**AR2672** N07°/226° was first recorded on Aug 20 over the NE limb as a single Hsx sunspot. The group developed rapidly becoming type Eac on Aug 22 with an area of 360 millionths and displaying a quite pronounced axial tilt. The group continued to display changes during the following days and crossed the CM on Aug 26, showing signs of decay the following day. By Aug 28 the group was recorded as type Dao with an area of 90 millionths and was last reported on Aug 31 as type Dso close to the NW limb.

**AR2673** S07°/119° rounded the SE limb on Aug 29 as a single Hsx sunspot. The group displayed little change to the end of the month being recorded as type Hax on Aug 31 with an area of 80 millionths.

**AR2674** N16°/104° rounded the NE limb on Aug 30 as a substantial bi-polar group with the potential for much activity. The group appeared highly inclined to the solar equator and by the

following day was an impressive Fko group with an area of 550 millionths. The following sunspot exhibited complex umbral structures criss-crossed by light bridges; few pores were recorded between the main components.

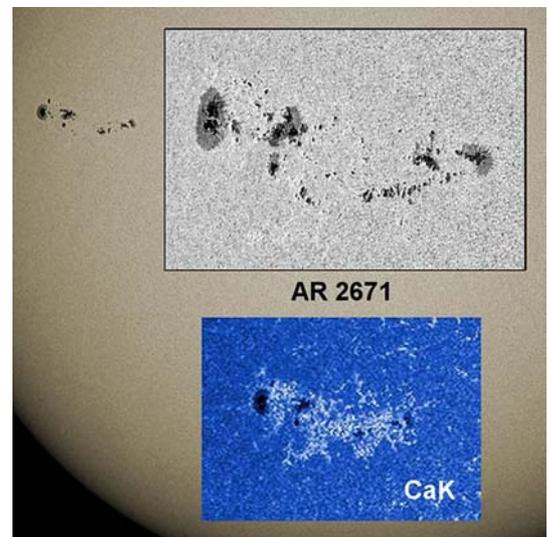
**AR2675** S08°/177° formed on the disk in the SW quadrant on Aug 31 type Cao with an area of approximately 60 millionths.

19 observers reported a Quality number of 5.25 for August.

### H-alpha

#### Prominences

21 observers reported a prominence MDF of 2.54 for August.



**AR2671** in white light and CaK imaged by Peter Paice, 2017 Aug 17.