ISSN 0917-7388

COMMUNICATIONS IN

CMO Since 1986

MARS

No.437

25 August 2015

OBSERVATIONS

No.63

Published by the International Society of the Mars Observers

Mid-Summer Clouds over Utopia

By

Christophe PELLIER

ISMO 2013 | 14 Mars Note (#10)

As repeatedly said, the cloud activity observed over Mare Acidalium was one of the highlight of the 2014 apparition on Mars. The 10th CMO Note will deal with another mid-latitude cloud activity, similar but less prominent, but that we should consider as another milestone of the Martian seasonal advance: mid-summer clouds over Utopia.*

Overview of Activity

In the notes describing the frontal clouds over Acidalium (CMO 428, 429 and 432) we concluded that the activity in 2014 peaked between λ=124°Ls and 129°Ls, and severely declined from 135°Ls. This timing is interesting because λ=135°Ls is the season when another Martian region starts to produce thick clouds at the same latitude: Utopia. Science litterature has noted this before. In an article published in Research Online in 2009, Huiqun Wang (Center for Astrophysics) and Jenny Fisher (Harvard University) wrote "Arc shaped clouds north of Tharsis (in the 045°-135°W sector) first appear after the early summer (i.e. solstitial) hiatus in the frontal event distribution (...). Clouds in the 45°-180°E sector [180° to 315°] occur about a month later than arc clouds north of Tharsis"**. This looks to be the case in 2014 where the Acidalium region was active in the second half of April to early May, and the Utopia region from mid/late May to early July.

The first sign of activity is noticed on images taken in Japan on 17/18th May (λ=132°Ls) by Teruaki Kumamori and Yukio Morita. It has been especially well imaged on the last days of May and the first ones of June precisely at mid-summer (λ=135/140°Ls). On the images, the activity often appears as an uniform white patch covering most of the Utopia dark marking. No image is able to reach a resolution good enough to show the fine structure of the cloud; the planet was already getting away from the Earth during the period.

The MGS imagery resolves the "patch" is made of fine puffy clouds, revealing their convective nature; they can be compared to terrestrial cumulus.

---

* This had already been noticed by the CMO team in 1999: *Morning cloud at Utopia evident in early May 1999*. Minami M., CMO 229, 1998 Note 5.

http://www.kwasan.kyoto-u.ac.jp/~cmo/cmo/note/9905/05.html

** Wang, H. & Fisher, J. A. (2009). North polar frontal clouds and dust storms on Mars during spring and summer. *Icarus*, 204 (1), 103-113.

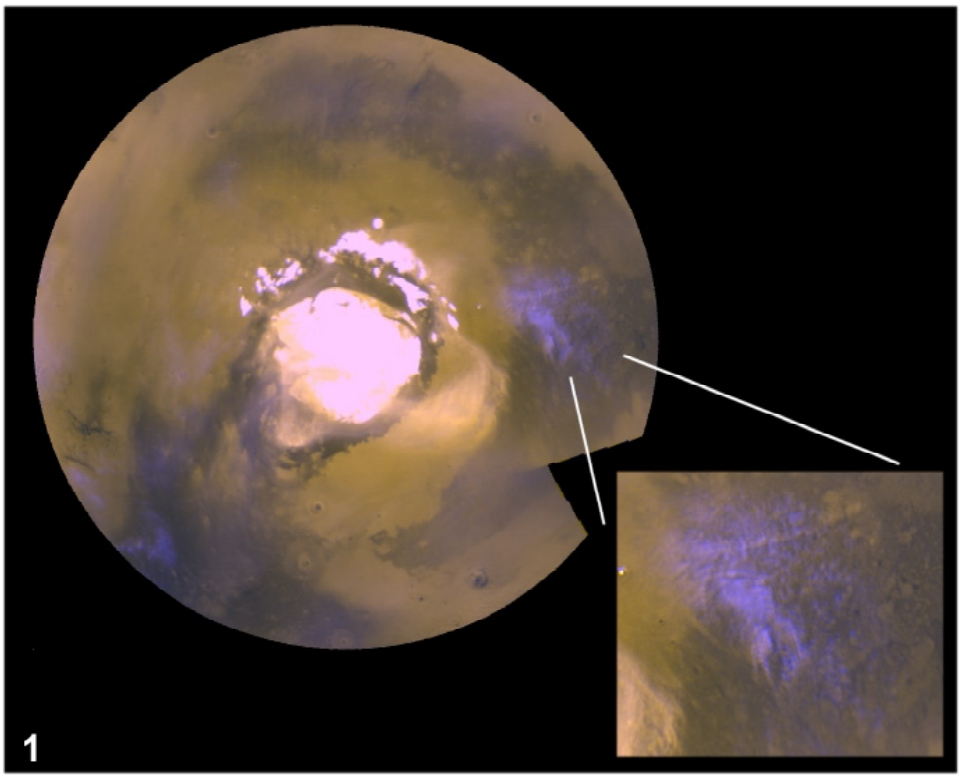


Fig. 1: Utopia clouds observed on λ= 146°Ls by Mars Global Surveyor (20 Feb. 2003). The zoom clearly revealed a fine aspect of multiple convective cells (note as well a dust storm at north, unrelated). Image @ Ashima Research.

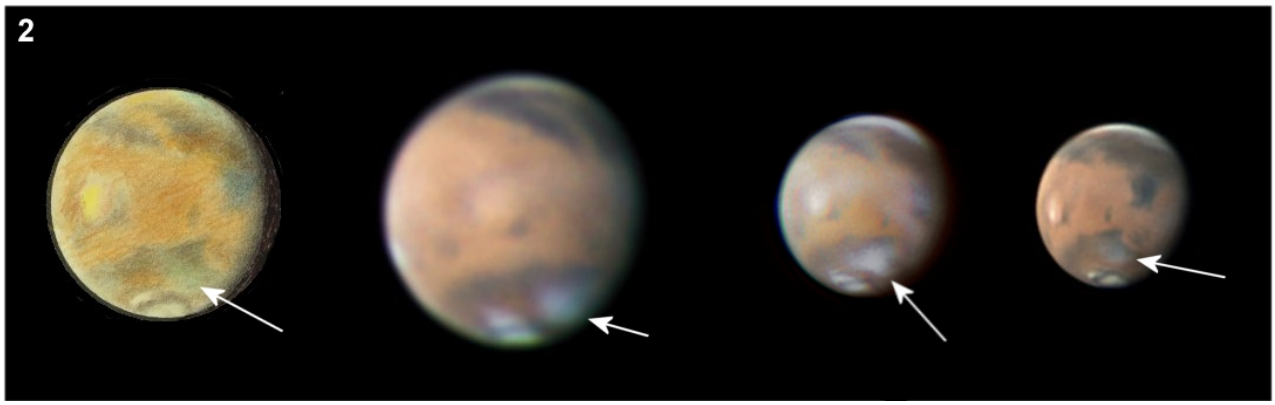


Fig. 2 : First amateur observations of the cloud in 2014. From left to right: λ=133°Ls (drawing by Reiichi KONNAÏ on 19th May), λ=134°Ls (Yukio MORITA on 22nd May), λ= 139°Ls (Leo AERTS, 1st June), λ=143°Ls (John BOUDREAU, 8th June).

Daytime Evolution

Thanks to the observing method of regular time-spacing of imagery, we can deduce the daily evolution of the activity. On 31th May 2014 (λ= 139°Ls) Xavier Dupont in France took a series of six images from 7H30 LMT (local Martian time at the south point of Utopia triangle) to 11H00 LMT. The series clearly shows the regular fading of the cloud patch.

This behavior is puzzling in a sense. On the Earth, convection preferentialy starts during afternoon, when the Sun has brought enough heat to the lower atmosphere. This is well observed for example during post-cold front situations when clouds (and rain) reactivates after midday. But on Mars, the activity looks to be more intense in the morning and dissipate during afternoon. It could be the re sult of a stronger convection existing at dawn,

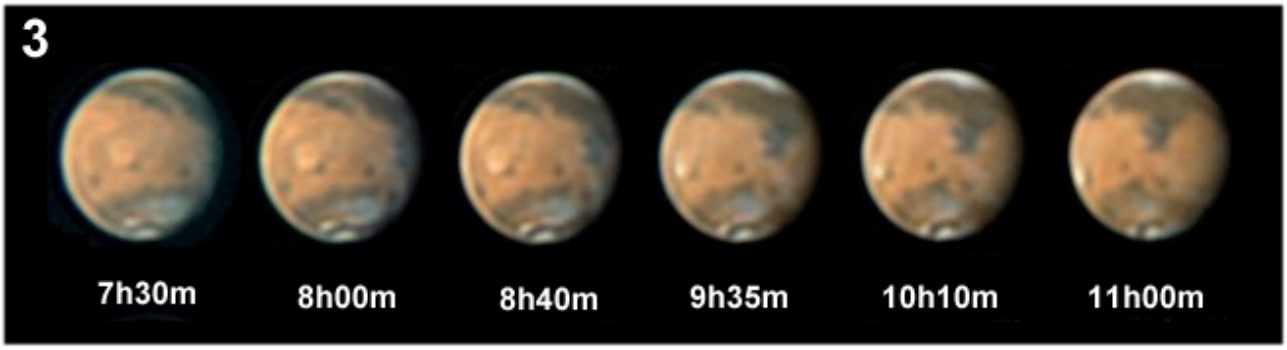


Fig. 3: Progressive fading of the cloud on λ=139°Ls (31th May) during the Martian morning. Time in local Martian hour. Images taken by Xavier DUPONT (to be seen as well his animation on SAF Galerie).

when the Sun abruptly warms the lower atmosphere on Mars. But the fading phase may happen just because warmer temperatures after midday stops the condensation of water into clouds.

Frontal Activity inside the Clouds

Wang and Fisher wrote again "Clouds north of Utopia usually appear first as patches (with fluffy structure suggestive of shallow convection). They are sometimes transformed by the ambient flow to adopt a front -like morphology".

As we said the resolution of amateur images at first look not good enough to resolve such fronts inside the white patch, to the contrary of what has been realized during the active phase of the Acidalium cyclonic clouds (earlier in the season). However, at the end of 2014 June (just before λ= 150°Ls), some images might show a clear change in the morphology of the patch. Observed before that season, the activity looks fairly uniform and structurless (at the low level of resolution). But from that period of Ls 150, we can clearly observe sometimes a large arc-shaped feature, and on one image at least, we can spot on a more transparent area, just like the ones we saw inside the Acidalium "spirals". This would be a clear indication of the presence of a stronger low pressure and a truly constituted storm. See Fig. 4 with fine images taken by Paul Maxson.

Fade of Activity after λ=155°Ls

After mid-July, the area looks to show no sign of clouds anymore. So the activity fades just like the Acidalium zone did some twenty Ls degrees earlier. At that point, we still see no connexion nor regular gradient of storm activity inside the northern polar region on its way to fall equinox (λ=180°Ls). The 2014 data must not be good enough to observe the formation of the north polar hood but this will be a job for us during the 2016 apparition. □

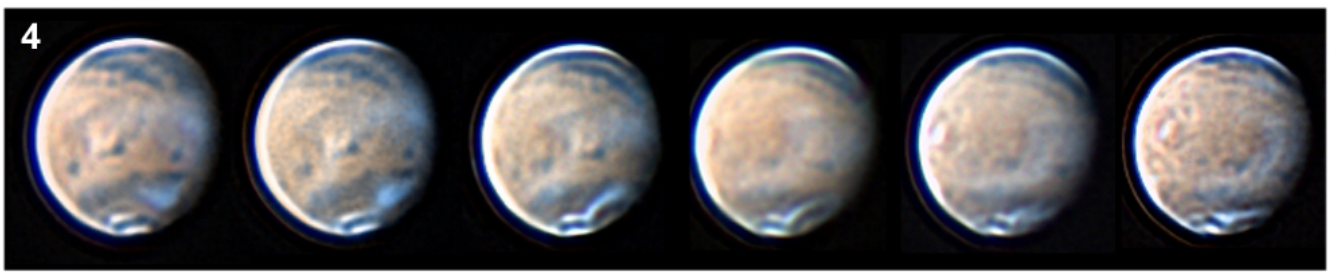


Fig. 4: Images from λ=146° Ls to λ=149° Ls (on 14, 15, 17, 18, 19, 20 June) by Paul MAXSON. Some of them clearly show an arc shape.

Personal/Nostalgic Reminiscences of the Mars Apparitions in 1954, 1969, 1986 and 2001. Part I (1954 and 1969 Cases)

By
Masatsugu MINAMI

Introduction

The next apparition in 2016 of the planet Mars is the apparition just before the great apparition in 2018 where the planet will be at opposition on 27 July 2018, closest to the Earth on 31 July 2018 with the maximal angular diameter 24.3".

The preceding apparition in 2016 has the following elements:

22 May 2016: the day Mars at opposition,
21.5°S: apparent declination,
30 May 2016: the day closest to the Earth
δ=18.6": maximal angular diameter
λ=161°Ls: Martian season counted in Ls

(These almanac data were completed by Akinori NISHITA, based on Jean MEEUS's data)

This 2016 apparition is analogous to the 1937 apparition, if we employ the 79 years recurrence hypothesis.

http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomn2/Cahier03.htm

In fact, in 1937, we have

19 May 1937: the day Mars at opposition,
20.6°S: apparent declination,
28 May 1937: the day closest to the Earth
δ=18.4": maximal angular diameter
λ=158°Ls: Martian season counted in Ls

We everybody knows that on 2 June 1937 (λ= 161°Ls) Tsuneo SAHEKI met with an excellent seeing at Kwasan, Kyoto, with the 31cm Cooke Refractor of the Kwasan Observatory. If we employ the more favourable 287 year recurrence formula, the 2016 apparition is quite akin to the apparition which occurred in 1732:

Namely the elements in 1732 are given by

20 May 1732: the day Mars at opposition,
21.1°S: apparent declination,
28 May 1732: the day closest to the Earth,
δ=18.9" : maximal angular diameter,
λ=161°Ls: Martian season counted in Ls.

In fact, with respect to the apparent declination, the set (1732, 1734) proves to be near the set (2016, 2018).

Incidentally, the elements in 2018 are as follows:

27 July 2018: the day Mars at opposition,
25.5°S: apparent declination,
31 July 2018: the day closest to the Earth,
δ=24.3": maximal angular diameter,
λ=221°Ls: Martian season counted in Ls,

while those in 1734 were given as

26 July 1734: the day Mars at opposition,
25.9°S: apparent declination,
29 July 1734: the day closest to the Earth,
δ=24.5": maximal angular diameter,
λ=222°Ls: Martian season counted in Ls.

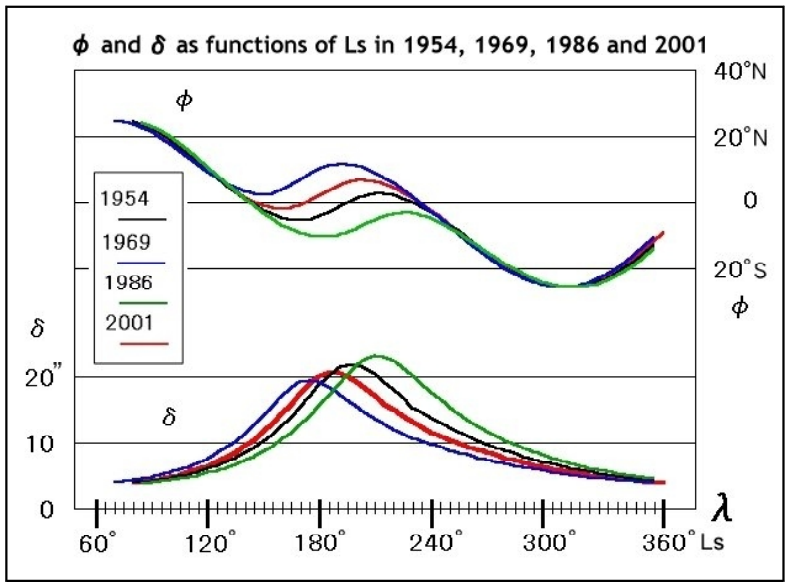
Now, as far as the present writer experienced, such apparitions as the 2016 one occurred in 1954 (when he was 15 years old), in 1969 (30 years old), in 1986 (47 years old) and in 2001 (62 years old), and hence he would like to follow the memories of these four apparitions (though we divide into a few Parts: This Part treats the cases in 1954 and 1969).

These apparitions are however not necessarily identical each other, but there exists some differences as soon as the some elements are compared as follows:

In 1954

24 June: the day Mars at opposition,
27.5°S: apparent declination,
2 July: the day closest to the Earth,
δ=21.9": maximal angular diameter,
λ=189°Ls: Martian season counted in Ls.

In 1969,



31 May: the day Mars at opposition,
24.0°S: apparent declination,
9 June: the day closest to the Earth,
δ=19.5″: maximal angular diameter,
λ=170°Ls: Martian season counted in Ls.

In 1986

10 July: the day Mars at opposition,
27.7°S: apparent declination,
16 July: the day closest to the Earth,
δ=23.2″: maximal angular diameter,
λ=206°Ls: Martian season counted in Ls.

In 2001,

13 June: the day Mars at opposition,
26.5°S: apparent declination,
21 June: the day closest to the Earth,
δ=20.8″ : maximal angular diameter,
λ=182°Ls: Martian season counted in Ls.

The Figure here shows well the differences of the four cases: This was produced by Masami MURAKAMI at the occasion in an article in CMO #327, and also in

http://www.nature.museum.city.fukui.fukui.jp/shuppan/kenpou/54/54-01-16.pdf

The Case of the 1954 Apparition

For our Mars Observations we have been using long the Observatory installed on the rooftop of a Museum which is now called the Fukui City Museum of Natural History. The Museum and the Observatory were established in 1952. The Observatory was equipped first with a 15 cm Refractor, though it was replaced by a 20cm Refractor in 1985. In 1952 the planet Mars was closest to the Earth on 8 May with the maximal angular diameter 16.8″, but unfortunately, though the present writer was able to sometimes gaze Mars by using the Refractor, he did not make any observation. Around 1952, when we were students in a junior high school in Fukui, we were already familiar with several articles on Mars and drawings of Mars made by Tsuneo SAHEKI and Sadao MURAYAMA.

So when the apparition of Mars in 1954 started we were ready to make visual observations of the planet Mars. The observation group was made at least of Takeshi HANAYAMA, Takashi NAKAJIMA and the present writer who were all the graduates of the same junior high school. The school master was at the same time was the first Director of the Museum and the Observatory.

In 1954, the present writer was 15 years old, and in April became a freshman of a senior high school in Fukui, and HANAYAMA was a second year student in another senior high school, while NAKAJIMA was still a final year student of the junior high school. We had another member called Toshiji KURODA who was from a different junior

high, but became a classmate of the present writer in the senior high school. He has been chosen later as the Chancellor of the Kanazawa Institute of Technology (KIT) at Kanazawa City, and quite helped us later in 2004 when we had a Lowell Conference at Anamidzu: He kindly provided us a good conference room and accommodation as well as a ship to trace the sea root of Percival LOWELL in 1889: These facilities were all owned by the KIT at a good milieu of Anamidzu, the farthest place where Percival reached. We remember we had a happy presence of William SHEEHAN at the Conference.

The Mars observation series at the 1954 apparition of the present writer was the first trial and was not so satisfactory, but he secured a total of 170 drawings by the visual observations.

The first observation (No.1) was made on **4 April 1954 (λ=140°Ls)** which started at 05:11JST and ended at 05:30JST (Japan Standard Time JST is ahead by 9 hours of Greenwich Mean Time). In the following description, we use no more than the Local time JST as far as the observations in 1954 are concerned. The present writer used to record at first the observation time interval, but was advised by SAHEKI who was at that time Director of the Mars Section of the Oriental Astronomical Association (OAA) to use the mean time of the concentrating observation time, and hence we changed the time system from No.15. To record the observation items the present writer used a B5 blank Notebook whose one-side page each was mimeographed with such items as Day, Time, Telescope, Magnifications, Seeing, Weather/Degree of cloudiness, together with such data as ω (longitude of the central meridian (CM)), φ (Tilt), δ (apparent diameter), λ (Martian season by Ls), and several others like Colour, Depth (or Intensity), Remarks and a blank corner. Each sketch was made by pencils on a drawing paper. Every drawing was copied by pencils even if it was made under very poor seeing and sent to Director SAHEKI (so ordered by SAHEKI).

The central point of the image of No.1 was at (ω=157°W, φ=0.3°S), δ was 10.1″, and the Martian season was at λ=140°Ls. Considering the value of the apparent diameter, we should say from the present-day standard that the start looks too slow. Seeing was poor. Eyepieces used were HM 9mm and HM 6mm (HM: Huygens-Mittenzway) to produce a set of magnification 250×, 375×. We were staying in the dome until the twilight dawn. The sky was fine with the degree of cloudiness 3 and the degree 0~1 of wind. We do not remember we went to the Observatory after midnight, and hence we must have arrived at the Museum on the eve of the morning observations and stayed inside the preparation room on the top floor until the rise of the planet.

As Depth or Intensity, the first page describes that the southern limb is 4.5 and the *f* (following) limb is light with degree 3.5. As to the bright southern limb, it was suspected to be the spc (south polar cap), but not definite. As to this, there was a hesitation to identify it to be the spc until **11 April (φ=1.4°S, λ=144°Ls).** The spc must have passed the maximal time by then and already began to shrink, while at these kinds of apparitions the equatorial zone faces to us, and so it is not so easy to take contour definitely (if not hazed).

On **5 Apr,** we observed twice: the first was made between 4h and 5h AM JST, and between 5h and 6h AM JST. The Martian nomenclatures which first appeared were Mare Acidalium and Sinus Auroræ on the No.7 drawing made on **16 Apr** (δ=11.4″). On this day the observations were made twice, and from the second the diameter of the sketch circle was augmented to 4cm (from 3cm previously). On **17 Apr** at ω=010°W, the west of M Acidalium is described light, so it must have been Tempe. On **24 Apr**, the area of Syrtis Major came into sight: It was described at ω=321°W (No.12) in Remark corner that there was seen a small white spot to the west of Syrtis Mj and it also appeared on the drawing of NAKAJIMA. Oculars were used HM 12.5mm and HM 9mm to produce 180× and

250×. By the use of magnification of 180×, the region from the northern Syrtis Mj to S Sabæus was quite thick and the colour contrast between the dark markings and the reddish desert was beautiful. At dawn the inside of the dome was said quite light. At the beginning of May there was no observation, and on **12 May (No.15, ω=133°W)**, as noted before, as the observation time we began to use the mean time. It is however too minute as 03:23 JST. At present, we may fix more loosely like 03:20 or 03:30. We did not use GMT yet. The Martian season proceeded to λ=160°Ls. The angular diameter was already over 15″ so that our altitude at that time was quite leisurely. On **18 May** the diameter became bigger than δ=16″, and the observation started before midnight: The observation times were carved as 0:03, 02:14, and 5:16 JST (Nos.17, 18, and 19). This choice looks like to have wasted time from the present day philosophy. At the first observation, we paid much attention to colours of the markings, and as to the second drawing at ω=062°W SAHEKI wrote to the present writer on 6 July that the drawing proved again the darkening of Ambrosia Lacus. The third observation was made after sunrise to check the spc (ϕ=3.7°S): The southern limb part was really bright so that we were again convinced of the existence of the spc. The reddish colour of the planet Mars was really beautiful against the background of the blue sky, and this has been a good memory. On **27 May** the angular diameter reached δ=17.7″ so that we employed the drawing disk of 5cm diameter. We observed successively on **28 May** and **29 May**. June was the month of opposition, but we were inactive (maybe mostly because of the rainy season): Just we obtained three drawings on **4 June:** On the day, the observations were made two folds (but three times) at 00:09 JST (ω=241°W), 02:02 (ω=264°W), and in the next evening at 23:45 JST (ω=221°W): The first two show that the curve of Thoth-Nepenthes looked rather linear and quite unexpectedly Mœris Lacus looked quite faint. On **13 June**, the sky was clear without wind, but unfortunately we could not reach the usual observatory by an accident and so NAKAJIMA and the present writer went to the Junior High School and watched the big planet of δ=20.4″ by the use of a small 5.8cm refractor which we used when we were boys of the Junior High.

During July 1954, this writer secured 18 drawings from No.29 through No.46. On **1 July (δ=21.9″, λ=188°Ls)**, the Fukui City Observatory was opened to the public for watching the planet Mars, and hence a lot of people stayed inside the dome until past 22h JST: On 2 July and 3 July they also planned to have Mars watching parties. It was rainy on 2 July, while it was fine on the evening of 3 July and a total of 273 numbers of people gathered to watch Mars by making a long queue from the rooftop to downstairs. The situation on 1 July was the same as the third day. The Seeing condition was best on 1 July (poor or moderate, sometimes good). Since it was such circumstances, on 1 July the first observation of the present writer was not able to be got started until 22:35 JST. The observation was made at 22:50 (ω=329°W) and ended around at 23:20 JST. It was on 1 July that Tsuneo SAHEKI observed a glint phenomenon at Edom Promontrium at 22h15m JST±5 seconds. Near 2001 the following interesting oracle was issued by Tom DOBBINS and Bill SHEEHAN: Based on SAHEKI's observation, this same kind of the glint phenomena could occur in June 2001, and miraculously the occurrence was truly proved by the expedition to the Florida Keys led by Don PARKER and his Colleagues. In our case in 1954 we apparently missed the opportunity by a difference of 10 minutes＋α. At that time however, since this writer was quite a mere beginner, any of such delicate phenomenon might have never been recognised, or, if we happen to recognise the event, we would be apt to regard it as an illusion or something like that, and furthermore we often divert our eye from the ocular to draw and then it is quite possible for us to concentrate on the pencil strokes for more than 10 or 20

seconds. So in such cases, we would like to say that it is better to miss the chance than to be entangled in the "trouble". So the present writer was just happy on 1 July at ω=329°W just by the observations of Helles- pontus, the arced tail at the east end of Sabæus Sinus as well as Ismenius Lacus and its associated canals to the south of the northen canopy cloud.

The Martian season on 1 July was λ=188°Ls, and hence it was after the season of the entrainment of the 2001 global dust storm. In 1954, that there was no indication of such event was felt true even for this writer when he was a mere beginner. The planet was closest to the Earth on 2 July (though rainy at Fukui, as said before). On each of **3 July and 4 July, a** single sketch was obtained each. On **11 July,** though there were held the semester examinations at the Senior High, we went up to the Observatory. The Note on **15 July** describes how troubled NAKAJIMA and his colleague in the Junior High when they tried to open the slit of the dome. The wires were already troublesome. On **16 July (δ=21.2", λ=197°Ls)**, we noticed as on the day before that Cerberus I was darkened and became wider (the remark corner in the Note say that if it's Trivium Charontis, it must have moved southward, but this might be seemingly impossible, and hence we must conclude that Cerberus I was darkened and made wider). Cerberus looked darker than Trivium Chrontis. On the day this writer observed three times at 21:30 JST (ω=176°W), 23:08, 25:38 (ω=236°W). On **18 July** twice observed at 21:00 and at 23:45 (ω=191°W). On **21 July (λ=200°Ls),** at 20:25, 22:25, 24:49: The first observation at ω=115°W and the next at ω=144°W alluded to a presence of Phasis, faint but broad. The evening the Observatory was opened to the public and 26 persons joined. From this day on the seeing conditions were recorded on a digital ten step evaluation (though later this writer preferred to use a five step evaluation again). Ambrosia L is visible again though slightly fainter. Description of the northern polar cloud was put. On **22 July,** observations were made at 21:22, and at 23:40 JST: There are several writings in Note, but the outlines of M Sirenum (dark brownish) and Solis Lacus are not well produced. There is a statement about the usefulness of HM4mm ocular which gave us a magnification of 564×. On **24 July (δ=20.3", λ=202°Ls)**, the sky was clear without clouds while we could not use the Observatory, and HANAYAMA brought us to his Senior High School, and observed at the School by using a 10cm Refractor owned by the School. Seeing was 5~6, and it gave us nicer images than expected. Observed twice at 20:15 JST (ω=095°W), 21:39 (ω=106°W): The spc is beautiful. Auroræ S was dark as if it was independent, and it looked that Lunæ Lacus had been darkened. The dark fringe of the spc appeared dark. "Remark" says it was regrettable without a 4mm eyepiece.

The last observation in July was made on **26 July** once at 23:10 JST (ω=115°W). The spc was bright and looked clear though the seeing was poor.

In August, already one month passing from the day of δ=21.9", the angular diameter on **1 Aug** (observed once at ω=053°W) went down to δ=19.2". In Aug, the weather was blessed so that this writer secured 57 pieces of drawings (though just 18 in July). The season proceeded from λ=207°Ls to λ=223°Ls. This implies the season of the dust disturbance set in, but the present writer was unconscious even about the local dust. On **2 Aug (λ=207°Ls)** the seeing condition improved (4 or 5), and the observations were made four times at 19:40 JST (ω=355°W), 20:15 (ω=003°W), 21:53 (ω=013°W), and at 23:08 (ω=046°W). The third one was numbered No.50. S Sabæus was dark and brownish, Margaritifer was greenish, and Syrtis Mj was greenish or bluish. Hellas was light at the east. The northern polar cloud was large and bright. Nilokeras and Oxus were thick. On **3 Aug (λ=208°Ls),** the seeing being sometimes 5 (moderate), just one observation was made at 22:57 JST (ω=033°W). This must have been because of the firework festival of Fukui City on the day. Nilokeras was broard and looked "doubled". Lunæ L

was not so dense. On **4 Aug (λ=209°Ls, δ=18.9″, fine sky)** sketches were made four times at 20:20 JST (ω=346°W), 20:51 (ω=354°W), 22:32 (ω=018°W), 24:08 (ω=042°W). The seeing was 6 first and then a bit deteriorated. At midnight it went down to 2. Hellespontus looked thinner. Syrtis Mj, first big and became slimmer near the eastern limb. Deltoton S looked to protrude. S Sabæus was dark with Sinus Meridiani. The south of S Sabæus looked blank and Pandoræ Fr looked missing. Oxus was clear. Oxia Palus is a bit shown. Ismenius L was large and adjacent the northern canopy together with Deuteronilus. At ω=018°W, Argyre appeared. The border of M Acidalium and northern canopy is clear, and so on. On **5 Aug**: Cloudless→a bit cloudy; and the observations were made four times at 20:30 JST (ω=340°W), 21:34 (ω=355°W), 22:39 (ω=011°W), and at 23:42 (ω=026°W); nearly every one hour. We knew that the surface rotated 14.6°W for one hour, but we had no idea at that time that 40 minute rotation gave 10 degrees. On **6 Aug**: three observations were given at 20:40 JST (ω=333°W), 21:35, and at 23:29 (ω=014°W). Pandoræ Fr might be a bit visible, and the third wrote "it surely exists." The dark fringe of the spc is thick but quite narrower. The northern part of Syrtis Mj was very dark. There is a light area near Argyre, and outside the area there was seen a light patch. Edom light. On the night,

we used a classical camera with a cabinet sized glass dry plate at the focus. The images of Mars were enlarged by equipping a HM 18mm eyepiece. Even then the diameter of the images was around 2mm. We focused several images successively on a Sakura SG plate. Exposure time was about 10 seconds (too long). Takeshi HANAYAMA and the present writer manipulated to shoot at 22:22 JST and 22:56 JST respectively. The plates must have been preserved at the Museum. As far as this writer remembers, S Sabæus was seen shadowy at the eastern side. The spc was shot. The Museum had a photo dark room. The development of the plates was easier than the film case. The photographic observations at that time must have been more precious if we could try to take the area of Nodus Alcyonius since this area was to show a drastic change in the 1970's.

On 7 Aug (δ=18.4″, λ=210°Ls): (opened to the public. 18 persons joined). The personal observations were made twice at 19:54 JST (ω=312°W) and at 21:08 JST (ω=330°W): Syrtis Mj showed a dark blue-greenish tint. S Sabæus was dark brownish, the south part of Syrtis Mj was blue-greenish, and the northern end of Nilosyrtis was dark blue-greenish, the density was equal to Syrtis Mj. Hellas showed a bit reddish tint. The north polar canopy showed a dark band inside as if it was divided, but the brightness is equal. Phison looked to be made of small specks. The western border of Deltoton Sinus appeared to be zigzagged. On **8 Aug (λ=211°Ls, ϕ=4.1°N)**: This writer observed at 20:13 JST (ω=308°W), 21:55 JST, and at 22:52 JST (ω=346°W); the seeing was not so favourable. The n p canopy was thick on the eastern side, while the western side suggested a bit desert-ish tint. Later a whiter cloud appeared from the morning terminator. Maybe a mist existed near at Ausonia. The area pinched by Syrtis Mj and Thoth-Casius line attracted attention. Pandoræ Fr might be visible. Edom was bright. On **9 Aug**: Four times observations were made at 20:55 JST (ω=309°W), 21:43 JST, 22:18 JST, and at 22:43 JST (ω=335°W): Around Nepenthes was faint. Mist? The deserts were different in colour at the both sides of Syrtis Mj. The roundish border of Hellas looked blurred. Hellespontus was definitely clear. At ω=321°W (21:43 JST) we use Y and R filters. Thru Y, the n p canopy became brighter. On **11 Aug (δ=17.8″)**: we observed four times at 19:56 JST (ω=276°W), 20:38 JST, 22:08 JST and at 23:28 JST (ω=327°W). The sky was clear but the seeing remains as 2~3. Hellas' southern part was lighter than the opposite main area. The n p canopy was brighter at the eastern side. Lighter was the area between Nepenthes and Nilosyrtis. Cerberus I remained inside the disk as a dark spot. On **12 Aug**:

Four times observations were given as follows; at 20:22 JST (ω=273°W), 21:03 JST, 22:06 JST (No.80) and at 23:21 JST (ω=316°W): Cerberus I was weaker than expected; the western neighbour looked reddish. Colœ P was darker. Libya and Isidis R were light. The n p canopy was brighter at the following side. The dark fringe of the spc was quite darker at the eastern side. Hellespontus and Sabæus S looked separated. Hellas gradually turned lighter. On **13 Aug**: We observed five times at 19:46 JST (ω=255°W), 20:36 JST, 21:11 JST, 21:44 JST and at 22:20 JST (ω=292°W): As to the configuration of N Alcyonius, spelled was a hesitation. Nilosyrtis was dark. The morning mist around the coming Syrtis Mj was not so thick. It was slightly difficult to tell Hesperia. The np canopy is of the tint of creamy-white. [Memorandum says that the writer was alone for the first time inside the Museum. It was possible to pursue the planet, while the seeing remained rather poorer, and so he wanted to sleep at the preparation room. (Perhaps returned home after dawn).]

On **14 Aug**: First took a drawing at 19:37 JST (ω=243°W), and then the refractor was used for the public. Then we observed at 22:15 JST (ω=282°W) and at 23:07 JST (ω=295°W): There was written a hesitation concerning the configuration of Utopia and N Alcyonius. Hellas looked light. Elysium was rather reddish. Cerberus was dark. Hesperia was identified. The northern Ausonia was fainter while the southern Ausonia was light. Æria was quite reddish. After then the seeing was broken. On **21 Aug (δ=16.4″, λ=219°Ls)**: The Observatory was open to the public (70~80 persons joined). So the first observation was made at 21:50 JST (ω=201°W) and the second at 22:30 JST (ω=211°W): The north polar hood was fainter/thinner. The area around Cerberus appeared dark. The evening limb was light. We had still a hesitation to state about around Nodus Alcyonius. On **23 Aug**: We observed six times at 19:35 JST (ω=159°W), 20:25 JST, 20:50 JST, 21:25 JST, 21:54 JST and finally at 22:25 JST (ω=200°W): The southern sea is of the blue-grey colour. We could easily distinguished Mare Sirenum from its southern markings. Tithonius Lacus was visible as a dark spot near the *p* limb. The n p canopy expanded flatly (beautiful/very bright by the use of 250×). Memnonia was bright. The SN limb looked to show a protrusion. Some bright spot is detected near Nix Olympica. Trivium Charontis looked rather large. Propontis I was not detected. Phæthontis and Electris were shown. [On the night, the present writer was alone again because Takeshi and Takashi went to visit Shigemaro KIBÉ (1912~1990), an executive of the OAA who was widely known as an excellent mirror maker. We should say it was not pleasant to stay alone inside the Museum at midnight surrounded by a lot of stuffed animals. In the present writer's case, the Mars Observation has remained as a matter of the top priority.] On **26 Aug (λ=222°Ls):** We observed three times at 19:25 JST (ω=128°W), 20:15 JST, 21:00 JST (ω=152°W, No.100); Nodus Gordii and Phœnicis L were clearly checked, while the present writer does not understand what was N Gordii. Also there is a comment that Gigas was checked, but nowadays we don't refer to it any more. A protrusion existed at the WS limb? Mare Sirenum was dark and checked as independent. On **27 Aug (δ=15.6″, λ=223°Ls)**: This writer observed three times at 19:40 JST (ω=122°W), 20:15 JST, 21:23 JST (ω=148°W): It seemed hard to grasp well Solis L, while Tithonius L was definitely shown up. M Sirenum was well checked. There was a small spot around at Ascræus L (the Note says that it is quite certain because we often witnessed it since 23 Aug (λ=220°Ls) at ω=171°W). To the east of Solis L there was seen a dull white spot. Ambrosia was rather faint. Eumenides was described. This was the last observation in August (No.103).

According to a record of the Museum, Takeshi HANAYAMA obtained 20 drawings in August, while he stopped observing from September onward.

The present writer obtained 28 drawings in September. On **2 Sept (δ=14.8″, λ=227°Ls)**, we observed twice at 19:30 JST (ω=063°W), 20:20 JST

(ω=076°W): Solis L was difficult to delineate as if it was hazy or faint. On the other hand, Tithonius L was quite definite. Ganges (having a blue-greenish tint) and Lunæ Lacus were quite dark. Their density could not be compared to the dullness of Solis L. There ran a dark band westward from Lunæ L, and Nilokeras was visible though slightly slim and was connected with M Acidalium. Auroræ S was dark. S Margaritifer was sharp down to northward. Candor was light. Clytæmnestræ Lucus was not detected. On **3 Sept (λ=227°Ls)**: We observed four times at 19:20 JST (ω=051°W), 20:00 JST, 20:34 JST, 21:19 JST (ω=080°W): Most of M Acidalium was under the n p canopy. S Meridiani stood out. Lunæ L and Ganges were dark conspicuous. At ω=061°W, to the north of the darkened Lunæ L there was visible a yellow-whitish patch which was roundish but slightly flat towards the EW direction. This must have been a kind of the dust cloud, not identified with any marking on the Mars Map. At the southern region Argyre was visible. The yellowish patch to the north of Lunæ L stood out even at ω=069°W. The darkness of Lunæ L was extraordinary. The detail of Solis L was still not evident, while Tithonius L was well identified. At ω=080°W, the intensity of Lunæ L was estimatedthe darkest among other dark markings inside the disk. We note that there was a sign since **24 July (No.44, λ=202°Ls)** when we used a 10cm spec. On **5 Sept (δ=14.5″, λ=230°Ls)**: We observed twice at 20:10 JST (ω=045°W), 21:35 JST (ω=065°W): The seeing was down turn. The mare near Sinus Auroræ was the darkest, and unexpectedly Lunæ L was not so dark. The markings from the southern part of M Acidalium to Lunæ L was very complicated. The north of Auroræ S showed up to be bright. On **7 Sept (δ=14.2″, λ=230°Ls):** only once at 19:57 JST (ω=022°W); Sinus Meridiani and S Sabæus were dark. The Note commented that Typhon #13 was near so that the seeing condition would remain to be worse.

On **10 Sept (δ=13.9″, λ=232°Ls)**: We observed three times at 18:40 JST (ω=335°W), 19:20 JST, 20:03 JST (ω=355°W): It became possible to observe before 19h JST though it was at dusk. Fine sky, but the seeing was unfavourable. The north of S Sabæus looked reddish. The dark fringe of the spc was dark, while Hellespontus was faint. It was noted that the "promotion wave" must have been completely weakened. Hellas was light, and S Sabæus was dark. Isidis R is lighter than Libya. The diameter of the circular disk was made down to 5cm. On **11 Sept (λ=232°Ls)** no more than the drawing at 18:46 JST (ω=328°W) was obtained. Hellas showed a reddish tint. Hellespontus was definite but not as dark as on No.70 (on 9 Aug (λ=212°Ls)). The southern region to S Sabæus shows a bit whitish tint, in contrast with northern reddish. The reddish desert and the white colour of the n p canopy made a beautiful contrast across Ismenius L and associated canals. The evening the Observatory was opened to the public because of the Autumnal Full Moon (joined about 300 persons). On **15 Sept (δ=13.3″, λ=235°Ls)**: we observed three times at 19:39 JST (ω=302°W), 20:02 JST, 21:30 JST (ω=329°W) where Nepenthes was a bit recognised. Isidis R was lighter than the surroundings. Hellas looked light with showing a reddish tint, while the southern area was slightly shadowy (including Zea L?). The west of Syrtis Mj showed a reddish tint. S Sabæus was darker on the western side. The northern part of Hellespontus was darkened and connected with the east end of S Sabæus. Sigeus Portus was evident. On **16 Sept,** we observed twice at 19:20 JST (ω=288°W) and at 19:50 JST (ω=295°W), where the *p* limb was bright. Isidis R was light. Nilosyrtis was visible. Hellas was light, but the southern part looked shadowy. Libya was reddish. We checked N Alcyonius and the dark Casius, though they were near the *p* limb. Seeing then deteriorated. On **19 Sept (δ=12.9″, λ=237°Ls)**, we observed at 19:17 JST (ω=258°W), 20:05 JST (ω=270°W) after Typhoon 14: M Cimmerium and M Tyrrhenum were seen dark. Hesperia was evident. From S Gomer down to N

Laocoontis a dark canal band ran. Cerberus showed a remnant shadow. The n p canopy was smaller? On **20 Sept;** we observed twice at 19:30 JST (ω=252°W), and at 20:25 JST (ω=265°W): Seeing 5 (moderate) after a while. The dark fringe of the spc stood out. M Cimmerium and M Tyrrhenum were dark. Xanthus was evident. The detail of S Gomer was unclear but from this ran down a shadowy canal to the direction of Nodus Alcyonius. The n p cloud looked smaller but the contrast between the canopy and the reddish tint of the central desert was beautiful. At the last stage Hellas appeared. On **22 Sept (δ=12.6″, ϕ=4°S, λ=239°Ls),** we observed three times at 19:35 JST (ω=234°W), 20:45 JST, 21:37 JST (ω=264°W); where the degree of the seeing was not high, but the images were stable, though gradually it deteriorated. The dark ring around the spc was quite fine/thin. Trivium Charontis was large though the previous darkness left away. The Note wrote that since the sketch at ω=234°W looked to show a structure similar to the structure of the drawing given by E.-M. ANTONIADI on 5 September 1924 at ω=231°W (though ϕ=16°S was different), we were aware that Sinus Læstrygonum was proved to show up, and furthermore the present writer in the previous occasions mistook it as the western end of M Sirenum. Eridania was recognised, not so light. The southern part of Ausonia was recognised as well as Xanthus. The east of Cerberus is lighter than the opposite side; That is, we did not identify Elysium. The n p canopy was bright, but did not show perimeter ring. At ω=250°W the area where Syrtis Mj must have shown up was lighter maybe by the presence of the morning mist. On **29 Sept (δ=12.0″, λ=244°Ls)**, Seeing remained poorer, but we observed three times at 19:15 JST (ω=162°W), 19:50 JST, 20:39 JST (ω=182°W): the area of M Sirenum was most dark. The spc looked to have declined to us (ϕ=5.6°S). At ω=162°W, Solis L showed a glimpse near the evening limb. At ω=170°W, the east of M Sirenum, near the *p* limb, looked to be whitish tinged. The n p canopy was smaller though bright. At ω=182°W, it was suggested that Trivium Charontis was already inside the disk. That's all about the observations in September 1954.

Next we may be concerned with the observations first one on **4 Oct (δ=11.5″, ϕ=7.1°S, λ=247°Ls)** (ω=107°W) which was numbered No. 132 through the last one numbered No.170, but we shall close the case in 1954 since the angular diameter was down to near 10″. In the case of 1954, the season λ=250°Ls when the dust storm in 1956 started was quite around the corner (on 14 October 1954 the season reached λ=253°Ls), while the area of S Sabæus was clear on 14 Oct, and no vast spread of the dust storm was witnessed. Hellas showed some reddish tinge near *p* limb, but on **16 Oct (λ=255°Ls),** the northern boundary of Hellas was definite. Also Syrtis Mj showed clearly us its shape up to the northern end.

In October 1954, the present write secured 12 drawings, in November a total of 23 drawings, and in December he obtained 2 drawings. On **8 Jan** 1955 at 18:40, one image was given, and finally on **13 Jan** 1955 at 20:10 (ω=215°W) the final drawing was performed which numbered No.170. The angular diameter was δ=6.1″, and season recorded λ=309°Ls.

The Case of the 1969 Apparition

When 15 years passed since 1954, a similar apparition was expected in 1969. The present writer was then 30 years old. As already suggested in the Introduction, this apparition was not exactly the same as before, and hence he cannot say he dealt well with the 1969 case.

In March 1957, the present writer graduated from the Senior High School in Fukui and went to Kyoto to be enrolled in the Faculty of Science of Kyoto University (est. in 1897) in April 1957. He spent 4 years as a student of the usual course, and then entered Graduate School (where he did not choose the Department of Astrophysics, but Department of Physics to learn the quantum field theory) where he spent 5 years (spent 2 years to complete master's degree, and then spent 3 years to complete

the doctoral programme). In 1966, he thus finished his student carrier and readily found employment at the RIMS (Research Institute for Mathematical Sciences, Kyoto University) as a researcher. So after a few years he thus came across with the apparition similar to the one in 1954. When it came, he felt as if he was torn into two; he wanted to observe Mars as an amateur astronomer at Fukui on one hand, but he was forced to work on the other hand for the Institute as a national public servant, provided a dormitory to live in Kyoto (at Fushimi). At that time this writer was still keeping in touch with Takashi NAKAJIMA, who already went out to society and entered the teaching profession in Fukui. So NAKAJIMA helped me much to open the way, and we formed again a tag team. He also drove a car and so this was convenient for us especially when the observations were made in the early morning. Since this writer could not stay long at Fukui, the opportunity to start observing was forced to be quite late.

We first observed Mars at Fukui on **11 Apr 1969 (δ=12.5″, λ=139°Ls)** at ω=188°W. (We earlier went up to the familiar Observatory on 8 April, but he sky soon clouded. Incidentally, on 11 April the present writer first met inside the dome with Yasunobu YOSHIZAWA who was also interested in astronomy and a student of Fukui University at that time, while he is now Director of the Museum.)

Incidentally the final observation was made on **12 October 1969 (δ=8.9″, λ=245°Ls)**, and we just secured no more than a total of 82 drawings in the 1969 season. Furthermore, in this season the observing sessions were often forced to be discontinuous, and hence the present writer has no memory of impressive session in this 1969 season. The telescope was the same, magnifications were the same as in 1954, and the failure of the slit of the dome was quite the same (these were improved in 1985 as far as the present writer remembers). Just we newly obtained a Nikon 5mm ocular which was useful throughout the later part of the 1969 season.

The second observation in 1969 was made on **28 Apr (δ=15.1″, λ=148°Ls)**. This implies that this writer was again back in Fukui after leaving Kyoto, because at the beginning of May the Japanese people used to enjoy the consecutive holidays. Thus, this writer produced four drawings on **2 May (δ=15.7″, λ=150°Ls)** at 14:50 GMT (ω=320°W), 16:20 GMT (ω=342°W), 18:00 GMT (ω=006°W) and at 19:30 GMT (ω=029°W). Note that these were obtained mostly in the early morning: We here use the GMT system, but 19:30 GMT implies 04:30 JST. We also observed four times on **3 May (δ=15.8″, λ=150°Ls)** at 15:20 GMT (ω=318°W), 16:30 GMT (ω=335°W), 18:20 GMT (ω=002°W) and at 19:30 GMT (ω=020°W). The spc was not clearly bright without a clear perimeter, but at ω=318°W the spc area looked well independent of Hellas which was duller at the evening side. The s p canopy showed a bluish white tint. The north polar hood existed variably showing a very bright (smaller) patch inside the hood. The n p bright patch looked to vary. At ω=020°W, Mare Acidalium was seen to have popped out from a thick morning mist. We were not yet aware of the every 40 minute observation system. On **4 May (δ=16.0″, λ=151°Ls)** this writer drew one sketch at 17:15 GMT (ω=338°W) where the bright spot inside the n p hood was very small. We do not well remember as to this case, but the present writer sometimes took the first morning train at the Fukui station to go back after the observations.

The observation attitude at that time was really discontinuous, and next observations were made at Fukui on **31 May (δ=19.2″, λ=165°Ls)** when the planet was at opposition. The diameter of the sketch circle was already 6cm. On the day we made three drawings at 12:35 GMT (ω=028°W), 15:30 GMT (ω=072°W) and at 17:00 GMT (ω=094°W). We chased S Meridiani→M Acidalium→Solis L. The perimeter of the spc was still duller. At 12:35 GMT, M Acidalium was near the CM and its north was the n p hood, which showed a small brightest spot

at the evening side. Tempe was largely light even if it rotated to the afternoon side. Lunæ L was dull. Solis L was rather faint. On **4 June (δ=19.4″, λ=167°Ls)**, we observed three times at 13:00 GMT (ω=359°W), 14:00 GMT (ω=014°W), 14:45 GMT (ω=025°W): The surface started from the angle where Syrtis Major was quite near the *p* limb. Hellas was also near the limb, but the southern part of Hellas looked to send a yellowish matter to the west. Noachis was blurred. The n p hood was not so conspicuous as the case of one month ago. The s p cap's perimeter was not yet clear. Oxus is definite. At 14:45 GMT, Tempe was light near the morning terminator, but the n p canopy looked smaller and brightest. The area of Pyrrhæ Regio looked fainter than Margaritifer S and Auroræ S. The last one was made before midnight. On **7 June (δ=19.4″, λ=169°Ls),** we observed three times at 11:45 GMT (ω=314°W), 14:20 GMT (ω=353°W), 16:50 GMT (ω=029°W): We do not remember the reason why the intervals were so longer. At ω=314°W, Hellas which stayed at the evening side looked strange: the area of Hellas looked larger and the roundish border was not clear but appeared blurred. At ω=353°W, the seeing was moderate to good, and we became aware how richly varied the darkness in the inside of S Sabæus (to the extent that it was impossible to draw down the changes). Syrtis Mj was about to sink, being separated from M Serpentis. Notable was a protrusion of a light matter in an inverted triangular shape which was hanging down from the perimeter of the spc. The phenomenon similar to this was also observed by the present writer 17 years later on 2 June 1986 (δ=17.3″, λ=181°Ls) at ω=016°W. About this we once discussed (it could be possibly related with Argyre). Finally, that night, the hill (called Asuwayama) on which the Museum was built was covered by thick mist. On **8 June**, we observed twice at 11:50 GMT (ω=307°W) and at 13:50 GMT (ω=345°W): On the first drawing, Hellas is drawn just like a huge hole whose roundish boundary is quite blurred. This looked really extraordinary. The desert was reddish from the following boundary of Syrtis Mj to the morning terminator. The northern circumpolar cloud looked blue-whitish. The area of the s p cap was bright though the perimeter was not definite. ϕ=9°N. The second drawing also suggests the large Hellas reaching the *p* limb. **9 June (δ=19.5″, λ=170°Ls)** was the day when the planet was closest to the Earth. The Observatory was opened to the public during 20h~22h JST. The present writer observed twice at 23:20 JST＝14:20 GMT (ω=335°W) and at 16:00 GMT (ω=359°W). The spc was more clearly visible than the day before. Almost all of Hellas, whitish, went to the rear side.

The observation was then adjourned for more than one month, and the next session was taken place in *Kyoto* on **14 July (δ=16.6″, λ=190°Ls).** There had been kept another 15 cm *F*15 Refractor of the same type as the one at Fukui on the rooftop of the building of the Department of Astrophysics on the campus of the Faculty of Science, Kyoto University. Yoichi TERASHITA (who was a university classmate of the present writer's: He already got a PhD of Astrophysics at the Iowa State University, and was Professor of the KIT at that time) kindly made all the arrangements to use the Refractor which was accommodated in a barrack with a sliding roof. This was cared by a doctorate student called Takeshi KUREIZUMI, and the present writer was much indebted to him for a long time. Nowadays, the classical building of the Department disappeared and we do not know where the Refractor had gone, but the place is nostalgic. This writer remembers it was inside the very barrack where he first met with Tadashi ASADA when ASADA was a freshman or sophomore of Kyoto University.

On **14 July**, the writer observed twice at 11:15 GMT (ω=339°W, ϕ=12°N) and at 12:30 GMT (ω=353°W) inside the barrack observatory. The Refractor readily proved excellent, maybe better than the old one at Fukui. Seeing was first moderate to good, and it was possible to use 562×. At ω=339°W, the hanging part of the spc came in. That year, the depth of the spc was shallow because of the tilt ϕ,

but on 14 July the spc was rather clear. The bright part inside the n p canopy looked large. At the southern part of Thymiamata, there was seen a thick morning mist.

We should say because of the traffic condition, we could not pursue the morning Mars. In fact it was drastic to catch a final buss near the campus. We ran several times. Dormitory was located quite southward, while the university was situated rather near the most northern part.

On **15 July (δ=16.5″, ϕ=12°N, λ=191°Ls)** it was possible to secure three drawings at 10:45 GMT (ω=319°W), 11:25 GMT (ω=328°W) and at 12:30 GMT (ω=344°W): Seeing was moderate, and we could use the magnification 562×. At ω=319°W, Depressiones Hellesponticæ was dark to the north of the spc, and it was found that Hellespontus was separated from M Serpentis. Another important thing was that we could check how the spc was connected with the white Hellas. The sketch shows a zone between the spc and the northern part of Hellas: The northern part of Hellas was slightly lighter than the main part. The spc might show seemingly a fine fringe. At this season, the icy part on the ground must be melted, and the spc must have returned to the original *symmetrical* shape. However the intensity of the brightness of the spc was weaker than usual because of equatorial tilt ϕ=12°N which made the spc to be seen quite obliquely, and furthermore Hellas itself must have had some water vapour and airborne dust, and hence the spc and Hellas appeared to show the same brightness accidentally. On the sketch after the observation the boundary was not detected. At ω=344°W the fringe seems to be a bit shown. Note also Hellas this apparition seemed extraordinary. On **16 July** the seeing was poor and so no more observation at 11:15 GMT (ω=316°W). On **17 July (δ=16.2″, λ=192°Ls)**, we observed twice at 11:30 GMT (ω=311°W), 12:40 GMT (ω=329°W): At ω=311°W, it was written "The boundary of the spc is obscure at the evening side, being disturbed by a mist at the upper side of Hellas" and drew a zone at the southern end of Hellas. There was seen a bright small patch inside Deucalionis R adjacent to the eastern part of S Sabæus. At ω=329°W, the Note says "Edom was light. There goes down a broad canal from Sigeus Portus. Hellas is light still broadly".

Returning home at Fukui, on **20 July (δ=15.9″, λ=193°Ls)**, we observed three times, first at 12:00 GMT (ω=291°W), then at 13:05 GMT (ω=306°W), and finally at 14:05 GMT (ω=321°W): The writer owed to NAKAJIMA for the observations near at midnight. This was the first time to watch Syrtis Mj and Hellas near at the CM. At ω=306°W, Hellas' inside was depicted slightly shadowy. The boundary of the n p canopy was zigzagged. On **22 July (δ=15.6″, λ=194°Ls)**, just one observation was made at 13:15 GMT (ω=290°W): Crocea was seen to be a bit fainter than the surroundings. On **24 July (λ=196°Ls)** we observed three times; first at 11:00 GMT (ω=239°W), 12:05 GMT (ω=255°W), and finally at 13:00 GMT (ω=269°W). Trivium Charontis and Cerberus came into the disk. Ordinary look. However the connection from M Cimmerium with the area of Nodus Laocoontis was very complicated. This aspect should be said precious, since this configuration changed completely after 1975. The n p hood looked complex, and active from the morning. Especially the configuration seen at ω=268°W of M Cimmerium to N Laocoontis is now quite classical. However, already Nepenthes and similar markings were detected no thicker than the brightness differences. Hellas was at the morning side, somewhat shadowy. We judged that the southern end of Hellas and the perimeter of the spc were covered by a misty matter. On **25 July**, we observed twice at 11:00 GMT (ω=230°W) and at 12:35 GMT (ω=253°W): Cerberus and Phlegra were visible, while the west side of Elysium looked gradually blurred. The spc was seen thinner (ϕ=11°N). On the second drawing, Syrtis Mj and Hellas entered (already the defect of illumination was quite effective since the

phase angle ι was about 37°). On **26 July**, we obtained no more than the drawing at 11:00 GMT (ω=220°W) since it became then cloudy. On **3 August (δ=14.3″, λ=202°Ls)**, we observed twice at 11:45 GMT (ω=156°W), 12:30 GMT (ω=167°W): From this angle the spc looked independently clear. The nph appeared wavy. Elysium was under the morning mist? On **9 Aug (δ=13.6″, λ=205°Ls)**, the angular diameter being decreased, and no more than "a short observation after extraordinary rainy days which swept the middle districts of Japan." Still clouds floated, and so the surface image at 11:00 GMT (ω=088°W) looked not clear but it was very certain at a glance there existed a dark spot on the evening northern side which could be identified with Lunæ Lacus. Ganges however appeared duller. This phenomenon must have been important in this Martian season, but on the day the conditions did not improve. The diameter of the sketch circle was decreased to 5cm. From this day we began to use Nikon's Or-5mm ocular to produce a clear images by 450×. On **12 Aug (δ=13.3″, λ=207°Ls)**, we observed twice at 10:20 GMT (ω=050°W), and 11:45 GMT (ω=071°W): The first image showed Lunæ L "but it was not yet conspicuous, but its WS edge is sharply contrasted with the lightened area of Candor". On the image made at 11:45 GMT (ω=071°W), the dark Lunæ L was near the CM, and Ganges was broad and dark extraordinariry. To the north, the shadowy area expanded, and accentuated the n p canopy. On **13 Aug**, we observed 4 times at 10:10 GMT (ω=036°W), 11:10 GMT (ω=053°W), 12:10 GMT (ω=068°W) and at 13:30 GMT (ω=087°W): The spc appeared more clearly. At ω=068°W, Lunæ L showed us consisted of a few smaller dark spots. Its north was similar to the case on the preceding day. At ω=087°W, though the seeing was deteriorated, Xanthe was yellowish light near the evening limb. On **14 Aug**, we recorded twice at 12:15 GMT (ω=060°W) and at 13:10 GMT (ω=073°W): At ω=073°W, general aspect was the same as the day before, but there was seen a cloud patch adjacent to Lunæ L at the WS side. The darkening of Lunæ L looked similar to the one on 3 Sept 1954 (δ=14.7″, λ=227°Ls), while the mutual seasons were not identical. However, in 1954, the sign appeared earlier on 24 July 1954 (λ=202°Ls). So the season around should be attentive. In 1969, it was a pity we were not yet to adopt the every 40 minute observation system. It was unfortunate for us that the angular diameter already shrank. Furthermore we were still outside the scope of the world-wide information. We observed successively on 15 Aug, 16 Aug, 17 Aug, and on 18 Aug, but the area of Lunæ Lacus did not face to us. Finally S Sabæus was completely on the disk, with M Acidalium quite concealed beneath the northern cloud.

On **21 Aug (δ=12.5″, λ=213°Ls)**, the present writer went back to Kyoto, and observed the area of Syrtis Mj at 10:10 GMT (ω=323°W) and at 11:00 GMT (ω=335°W). Hellas behaved interestingly near the p limb.

It was recorded he visited Dr Shotaro MIYAMOTO (1912~1992), Director of the Kwasan Observatory, Kyoto University at that time on the morning of 29 August 1969, but no comment is there (while as to the case in 1973, the present writer well remembers the conversations with MIYAMOTO at Kwasan because it was concerned with the initial status of the great dust storm in October 1973).

On **29 Aug**, we tried to use the Nikon 5mm eyepiece to produce 450× in Kyoto.

As to Lunæ L, it was caught again inside the eye field on **18 Sept (δ=10.3", λ=230°Ls)** at 11:10 GMT (ω=069°W) and wrote "The density of Lunæ L seems to remain the same as before" and obtained a similar result also at 12:00 GMT (ω=081°W). Earlier on the day, we observed at 10:10 GMT (ω=054°W) that there was quite a bright part at the left-hand-side of the spc (occupied 1/3). Referring to the data in 2003, at the season the western side of the spc was shadowy and we can judge the phenomenon was due to the internal light and shade, quite seasonal. 30 minutes later Ganges and Lunæ L came on the stage.

We thus conclude the case in 1969 based on the original Notebook. Next we shall deal with cases in 1986 and 2001, but both years we secured more than 800 numbers of drawings, so that I wonder how should we do? □

Letters to the Editor

●……***Subject: Stereo image of Pluto***
Received: 3 August 2015 at 22:54 JST

Dear all, NASA released a fantastic stereo image pair of the plutoed once-a planet, arranged by the great(!) legendary Rock Star/Astrophysicist Brian May:

http://www.nasa.gov/feature/rock-starastrophysicist-dr-brian-may-goes-backstage-with-new-horizons

This "officially NH approved" stereo pair consists of the "farewell look" photo from 15th July and the "two-by-two" image downloaded from NH on the 17th, must have a baseline(a virtual giant's interpupillary distance) of a few hundred thousand miles, as Dr. Brian May says.

The commentary reccomends to buy or make a stereoscopic viewer. If you can do stereoscopic parallel freeviewing, you can see on the spot to enjoy the fantastic real ball-like color 3D Plutonian globe floating in the space! And I notice by stereo freeviewing, a distinct concentric double-ringed fresh crater about 80km across, a bit due west of the great "ice cream cone", is about to be perceptible as a realistic 3D crater!

You can also access the interview in which Dr. Brian May demonstrates how he brings New Horizons Pluto photos to life in 3D :

https://www.youtube.com/watch?v=E-zurr9PHKg&index=1&list=PL5u7fD8rLzj22GAMKStDhK6nGvJ2GhEVy

For stereo viewing of the ground-based planetary images, please refer to my article "Application of Stereoscopic Inspection to Planetary Images", CMO/ISMO #403 (25 October 2012) :

http://www.kwasan.kyoto-u.ac.jp/~cmo/cmomn4/CMO403.pdf

Best Regards,

○……***Subject: Lunar Images***
Received: 11 August 2015 at 23:47 JST

Dear Clyde, Though your lunar images attached to your LtE dated 07 August all show some ghost-like S to N doubling for the clear-cut craters, peaks and ridges, I like the images very much, they are very smooth and natural. They reminded me of my incredibly energetic twenty-year-old days ; Every clear night I took drawings and photographs of Mars, Jupiter and the MOON, and every cloudy/rainy night went out drinking or chasing girls!

I also love the view around Plato, especially when the sun is low enough to enhance the delicate irregularities in the mare surface.

94-8

泰平天文趣味人気質！ 1994 Aug.

月は無慈悲な夜のテストチャート
(The MOON is a Harsh Test-Chart)

近内令一（多方面天文マニア）

回折による制限のみの像質を意味するディフラクション・リミテッド…この魅力的な表現には二面性がある。口径の限界の性能を保証するという響きと、1/4波長の波面誤差は残っているかも知れないというニュアンス。「諸収差をバランスよく抑えた、イメージサークル全面ディフラクション・リミテッドの写真用光学系」といえば前者の高性能保証に当たる。良質の星野写真を撮る目的では、これが光学的精度のゴールだ。

他方、軸上の高倍率で惑星や月面を観察する場合には事情が異なる。先月号で紹介したセラヴォロ氏らの実験では、少なくとも15cmF8のニュートン式では、1/4の波面誤差が残っている。"ようやくディフラクション・リミテッド(just diffraction limited)"の光学系と、"とびきり上等（superb）"の光学系との間には、考え方によってはわずかな差なのかも知れないが、シーイングがある程度良ければ熱心な天文ファンには充分見分けのつく像質の違いがあることが明らかになった。私にとってこの差は小さな差ではない。求める以上は最良の光学系が欲しいのが天文趣味人の人情ではないか。

さて、苦労して最高の光学系の望遠鏡を手に入れたとしても、いつも抜群に鮮明な惑星や月面の強拡大像が得られるわけではない。気流の条件もまた"ディフラクション・リミテッドのシーイング"でないと口径の性能は発揮できない。惑星の眼視観測者の使うシーイング

プラトーの底面の小クレーター群（ルナーオビター4号の写真をトレース）。数字は直径km（単位は100m）。1°角で1.9kmに当たる。

96km（50°角で、ほぼ木星の視直径）

100

のスケールで、7/10以上というところだろう。

望遠鏡の総合的光学性能を判定するのに、惑星が最もきびしいテスト用対象であることには世界的に異論はない。しかし惑星はオフシーズンには観察できないし、年々表面の様子も変化する。その点、文字どおり毎月見られる月面はまことに都合がよい。

「月ぐらいはよく見えないと話にならない…」などと望遠鏡にとって甘い対象と一般的にとらえられているがとんでもない。暗黒の夜空をバックの明るい月縁は、色収差や迷光の極めて鋭敏なチェッカーだ。また太陽光線による様々な照明条件下で、あらゆるコントラストのディテールに満ちあふれている。欠け際の闇に輝く微小ピークが干渉リングで囲まれたディスクの"回析像"を見せているのに（恒星像のように）気づいたことがあるだろうか。そして暗い海の上で先細りに次第に幅が狭くなっていく裂溝や、直径を順次減じながら放射状に並ぶ小クレーター列は、まさに低コントラスト解像力チャートそのものではないか！

そう、その気で観察をすれば、月は望遠鏡の性能を（欠点を）残酷なまでに暴き出す厳格な天然テストチャートなのだ。R.A.ハインラインの傑作長編SFのタイトルは「月は無慈悲な夜の女王」。望遠鏡をテストされる側にとっては「月は無慈悲な夜のテストチャート」だ。

月面上に興味深いテストサイトは何カ所もある。今回は最も有名なプラトー（「雨の海」の北縁に接する96km径のクレーター）の内部の小クレーター群を紹介しよう。別名"大暗黒"のプラトーの底面は非常に暗く、したがってそこに存在する小クレーターが作る陰影のコントラストは低い。気流の条件が悪いと、口径にかかわらず何も見えないかもしれない。私の経験では、月面上で明瞭に見分けられる最小のクレーターの見かけのサイズは、二重星の分解能で使われるドーズ値にほぼ一致する。角度の1"は地球から見た月面上の1.9kmに相当する。口径10cmの望遠鏡では1.9km径、口径20cmならば1km径くらいのクレーターまで見えてよいわけだ。

ちょうどシーイングもよくなってくる季節、あなたの望遠鏡ではプラトー底面の小クレーターがどこまで確認できるだろうか？

As Oli Froom's beautiful mirror-image sketch suggests... :

http://www.asod.info/?p=10759

...I believe Plato has a twin brother, slightly wider across, just south off the Greater Black Lake, almost submerged below Mare Imbrium, leaving its outline with subtle wrinkle ridges. Mons Pico, and a part of Montes Teneriffe might had been the highest portions

of the sunken twin's outer rim.

In the mid-90's I had a regular page for my essay in the monthly Tenmon-Guide (A Guide to Astronomy, the Japanese counterpart to Sky & Telescope). The page was entitled "泰平天文趣味人気質" (taihei-tenmon-shumijin-katagui, or That's The Way The Light-Hearted Astronomers Like It). Please find attached the scan of the one appeared in August 1994 titled "The MOON is a Harsh Test-Chart" giving the trace of the Lunar Orbiter 4 image of Plato with the craterlets on the floor with their sizes as the chart to test the resolution of our telescopes. I had visually observed the Plato craterlets so many times with various sizes of telescopes, often with an iris diaphragm, and have come to have the cnclusion that the minimum diameter of the crater on the Moon discernable as a shadowed relief image nearly corresponds to the Dawes' limit. It's amazing that today's excellent imagers' Plato images seem to surpass this limit ; e.g. Damian Peach's Plato images resolve the floor craterlets as small as 0.4km across!

I am always looking forward to seeing your and many skiliful observers' excellent lunar images with various lighting conditions. Best Regards,

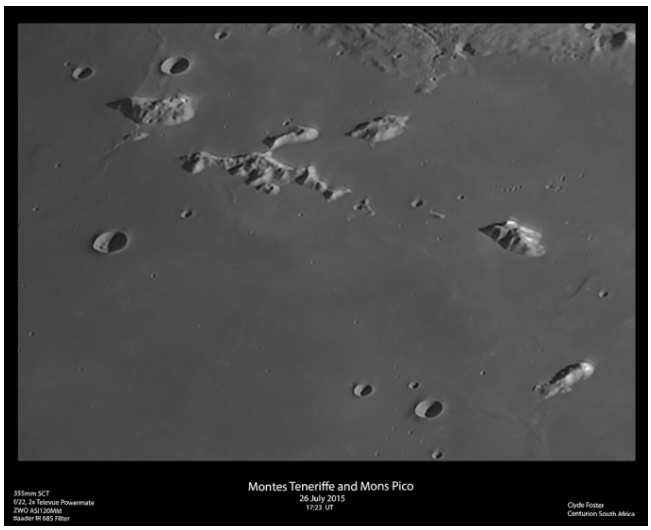
Reiichi KONNAÏ (Fukushima, JAPAN)

●·····***Subject: Good seeing on July 26 - Saturn and Moon***
Received: 7 August 2015 at 13:49 JST

Hi, all, I had some good seeing for a short while on the early evening of 26th July and managed to capture a few images of Saturn and the nearby Moon which I thought I would share with you(I have already shared seperately with BAA and ALPO Saturn sections and the BAA Lunar section, so apologies for any duplication).

I am not convinced I am getting the best out of my Saturn images as yet, but the images do show the current storm systems on the planet.

Regarding the lunar images, I could have dropped back to f11, but thought I would give it a crack staying at f22 due to the seeing. I probably rate the Copernicus image as one of my best results so far. The Plato image unfortunately has a few artifacts, but does show quite a number of the minor craterlets on the floor of the crater. (Damian, all, if anyone has any comments on the "doubling" of the main cratelets I would appreciate it. I am wondering if it is not related to the alignment box size and positions in Autostakkert2!, or is it for some other reason? This effect is also a bit evident in the Montes Tenneriffe image)



The Montes Teneriffe and Mons Pico image is probably my favourite lunar image for a number of reasons, and my commentary was as follows: "Having tackled a few of the big mountains of the world, I will always be drawn to the "Mountains of the Moon" and I was particularly struck by the scene I have captured in the attached image. If I can be excused for making the comments myself, it is a stunning vista highlighting a number of mountain massifs, with their associated gullies, ridges and summits rising to heights of up to 2400m above the surrounding plains. It is very evi-

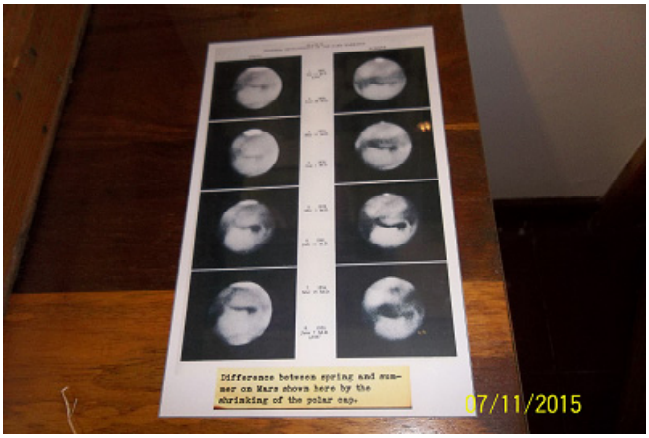
dent that these peaks are only the remaining summits of more substantial structures which are now submerged below the lava floor of Mare Imbrium. The base of Mons Pico, at centre right covers an area of 15x25km, and with an altitude of 2400m, would likely provide opportunities for both gentle treks to the summit, as well as more serious climbing! Pico Beta is the peak at lower right. I also note the interesting crater chain just above Mons Pico, and the outer regions of Plato are at upper right. Definitely one of my favourite lunar images." Best regards,

○····***Subject: RE: Lunar Images***
Received: 16 August 2015 at 15:56 JST

Dear Reiichi, It is always good to hear from you and thank you very much for your comments and also the drawing of Plato in your article. Very interesting!
There is still more that I need to learn about the image processing and do not fully understand what is causing the "doubling" (Optics, conditions, processing?).

Yes, I have read about the "brother of Plato", and as mentioned, this is definitely a favourite lunar area of mine, with the impressive mountain ranges. The craterlets on the floor of Plato are always a good test of image quality.

I am not sure if I mentioned it in previous communications, but I recently visited a number of the major observatories in South Africa. I was pleasantly surprised when I visited the Boydon Observatory in Bloemfontein, (which was historically linked with the Lowell Observatory in Flagstaff, Arizona) to see that some of the early Mars work (back in the 1920-30's?) was done with telescopes that have eventually ended article on my "roadtrip" but am trying to get some up at this observatory and they have some interesting records and photos there. I am considering doing an more information on the Mars exhibition. I have attached a few photos from the Boyden Observatory (I would like to acknowledge the warm welcome and assistance I was given by Pieter Meintjies of the University of the Freestate during my visit to Boyden. Any images used are with acknowledgement to the Boyden Observatory).



Best regards and I am definitely looking forward to

the next Mars apparition as I will be well placed down in South Africa,

○····***Subject: RE: Lunar Images***
Received: 16 August 2015 at 16:02 JST

Dear Reiichi, I also attach an image of the 1.5m reflector which is at the Boyden Observatory. It was an amazing visit! I am standing on the left.

Best regards,

Clyde FOSTER (Centurion, SOUTH AFRICA)

●····***Subject: August 9***
Received: 10 August 2015 at 08:07 JST

Dear Masatsugu, I hope you are well. I have been reflecting today on the events of 70 years ago, and cannot do so without recalling the magnificent time I had in Nagasaki, including the OAA event at which I received the medal of the society, and the grand dinner, at which I was so cordially treated, in that splendid hotel on St. Paul Avenue across the street from the International Peace Park. I still remember well attending the Nagasaki atomic bomb museum with you and Asada; we spoke not a word to one another. There was nothing to be said. I shall never forget how moving that was.

I thank you so much for introducing me to the beauty of Japan, both its geography and culture, on that pilgrimage of 2004.

It occurs to me that since you were born in 1939, the first six years of your life were spent with the country on a full war footing. I wish you would some day write your memoirs and describe those experiences, and of course the way that Mars took hold of you in 1954, the year I was born.

*** I was in Flagstaff for the New Horizons flyby? and had a chance to meet up with Ewen Whitaker, the great lunar man; his daughter and son-in-law live close to where I have a place now. Will write up something in due course for you about these experiences.

I simply wanted to express my kind regards to you on this day of days,

Bill SHEEHAN (Willmar, MN)

●····***Subject: CMO 437 Note 10***
Received: 24 August 2015 at 00:02 JST

Dear Masatsugu, Masami, Reiichi,

Here is my Note for the next CMO issue. Hope I am not too late.

Note that I will not be able to write for CMO 438; during the first week of September I will complete another nission at the Astriqueyras Observatory, so I should keep time to analise our data there!

Best wishes,

Christophe PELLIER (Nantes, FRANCE)

☆ ☆ ☆

International Society of the Mars Observers (ISMO)

Advisory Board: **Donald PARKER† , Christophe PELLIER, William SHEEHAN, and Tadashi ASADA, Reiichi KONNAÏ, Masatsugu MINAMI**

Bulletin: Kasei-Tsûshin CMO (**http://www.mars.dti.ne.jp/~cmo/ISMO.html**)

CMO #437/ ISMO #63 (25 August 2015)

Editorial Board: **Tadashi ASADA, Masatsugu MINAMI, Masami MURAKAMI, Takashi NAKAJIMA and Akinori NISHITA**

☆ *Any e-mail to CMO/ISMO including the image files is acknowledged if addressed to*

cmo@mars.dti.ne.jp (Masami MURAKAMI in Yokohama)

vzv03210@nifty.com (Masatsugu MINAMI at Mikuni-Sakai, Fukui)

☆ *Usual mails to CMO are acknowledged if addressed to*

Dr Masatsugu MINAMI, 3-6-74 Midori-ga-Oka, Mikuni, Sakai City, Fukui, 913-0048 JAPAN