

MARS

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Road to Haleakalā, Maui, Hawaii

By

Tadashi ASADA

The PPARC (Planetary Plasma and Atmosphere Research Center) of the Tohoku University, Japan, was equipped with a 60cm Reflector made by the Mitaka-Kohki co., Ltd at a village called Iidatē in the Fukushima Prefecture. However on 11 March 2011, a devastating great earthquake took place at the East Japan area, and, as is well known, it made a huge damage to the F1 nuclear power plant of Fukushima, and the Iidatē village was heavily polluted. Hence, the telescope of the PPARC was forced last summer to be moved to the summit of Haleakala in the island of Maui, Hawaii, the US. Near the summit of Haleakala, there are located several astronomical facilities belonging to the US Department of Defense, the University of Hawaii (Institute for Astronomy), the Smithsonian Institution, and so on. Especially the first Pan-STARRS telescope (PS1) was set at the summit of Haleakala (Pan-STARR: Panoramic Survey Telescope and Rapid Response System) which does full-time observations since 2010.

This time, I tried to apply to use the telescope belonging to the Tohoku University at Haleakala on Maui in imaging the planet Jupiter and was accepted. So I went to Maui this March.

7 March 2015 (Saturday)

I took some flights; at first from Fukuoka to Narita by ANA, then from Narita to Honolulu by the United Airlines, and finally from Honolulu to Kahului by the Hawaiian Airlines. I was on board for about 9 hours.

I withdrew 500 dollars with an ATM of the Bank of Hawaii at the Honolulu Airport through the VISA card. This money was prepared for the payment for the guest house of University of Hawaii in Kula, Maui.

I arrived at Kahului around 10:20. Dr. Kagitani of the Tohoku University was kind enough to come to meet me. We went to a business office of Budget, and I rented a Ford car of hybrid engine. The insurance fee was high. I was nervous for driving in the United

States because it's been a quite while since I last drove a car inside the US continent.



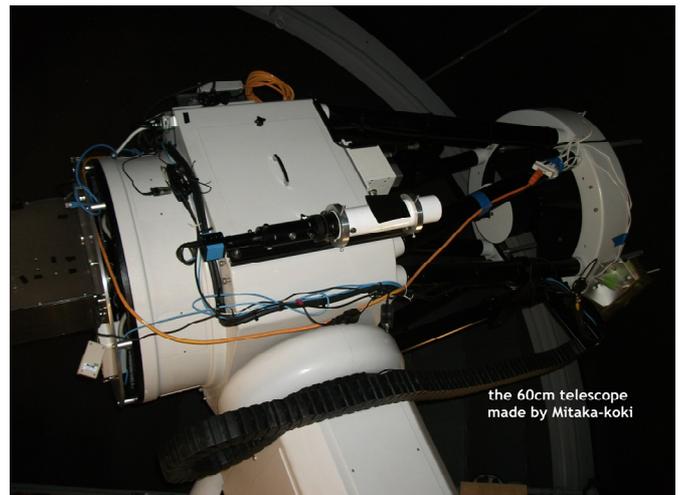
At first we went to a supermarket in Pukalani and I purchased some food and beer. Total cost was 34 dollars. There are cup noodles, rice and even Natto. I used VISA card for this payment. Then we went to the office of University of Hawaii. At this office I



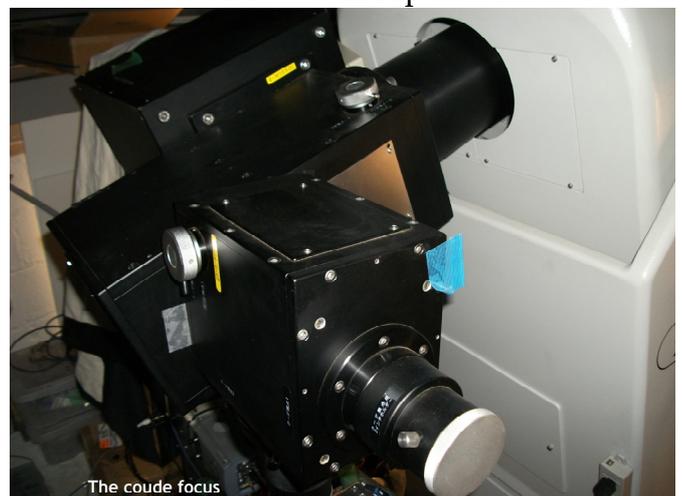
needed to pay the fee for the guest house after next Monday. Finally we went to the guest house in Kula. Because the place is around 1,000m high, it is slightly cooler than Kahului and we can enjoy the nice view of west coast of the Maui Island. The guest house is wooden and old, but it has everything necessary such as kitchen and refrigerator and so on. Because meals are not provided, I needed to make meals by myself or to go to restaurant. We planned to depart at 17:00, and I had lunch and took a nap. I got rid of my tiredness through this nap.

We departed with heavy winter clothes. Dr. Kagitani let me know the name of road

"Copp Road", which is useful to return to the guest house. Following Kagitani's car was everything I could do. It took about 1 hour to arrive at the Haleakala summit (3,055m; whereas Mauna Kea, on the island of Hawaii, is 4,205m high). On the way to the summit, it got foggy. The fog once cleared, but the summit took fog. We parked outside the gate of observatory and walked. It was very cold. During my staying, the temperature was around 2 degrees Celsius, with exception of the final night when it was around 6 degrees Celsius. Because of low atmospheric pressure, I felt short of breath when I walked a slight uphill road. At night, because Pan-STARRS project was carried out now, the light should



be just around my foot. As soon as we arrived at the 60cm telescope of the Tohoku



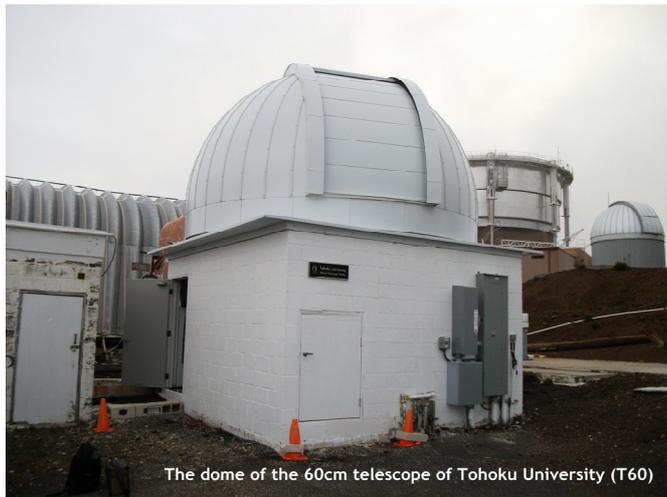
University, we connected the Takahashi cam-

era adapter and a web cam to the coude focus. The sleeve size is 2 inches. Dr. Kagitani explained me how to operate the telescope. After choosing a target star, pressing GOTO button to let the telescope move to the target. The dome also links with the telescope



motion. This telescope is completely computer controlled. If we change to the electronic filter

wheel and computer controlled imaging system, we can look forward to a remote control imaging system. The dome which accommodates the 60cm telescope is small and there



The dome of the 60cm telescope of Tohoku University (T60)

are so many kinds of equipment inside.

I waited until 19:30, but humidity stayed 90%, and so I turned back to the guest house.

8 March 2015 (Sunday)

In the morning, it was foggy around the guest house. After breakfast, I went shopping to the supermarket. On the way to come back, I confirmed the place of the office of University of Hawaii. At the guest house, Dan, an engineer of the Institute for Astronomy, accepted for me to use his electric rice-cooker. I took a nap.

After nap, I went to the supermarket again, and bought a pack of rice.

From 18:00, I visited Professor Okano, who was retired from Tohoku University three years ago and lives in Maui, and got dinner. Prof. and Mrs. Okano, Prof. Kasaba, Dr. Kagitani and I enjoyed grilled steak, shrimp salad and papaya. Prof. Kasaba let me know the weather forecast for the next week, and advised me not to be impatient. After coming back to the guest house, I talked to Dr. Kagitani about electronic filter wheel and the observation plan of the next year.

9 March 2015 (Monday)

I saw sunlight in the morning: The weather turned better but the summit of Haleakala was covered by cloud. After breakfast, I drove to Kahului airport as my practice. On the way to the airport, I visited the office of University of Hawaii and tried to pay for the guest house, but the person in charge was absent. I arrived at the airport, and confirmed the place of the business office of Budget. Then I went to the supermarket and bought some food.

I took a nap in the afternoon and had a dinner. At 17:00 I departed for the observatory. From 19:10 I began imaging through cloud, and then it became clear. To 26:00 I got 5 incomplete set (only RGB) and 4 complete set (RGB, IR continuum and 2 methane band). I also took some images of Saturn in RGB light.

10 March 2015 (Tuesday)

I woke up at 10:00. After brunch I paid

\$480 for the guest house at the office of University of Hawaii. The sky looked fine and clear, while the summit was covered by just low cloud. Then I took a nap.

I departed at 17:00 for the observatory. When I opened the door of the dome, there were so many people; Prof. Okano, family of Dr. Sakanoi, the Venus observing team (Dr. Nakagawa and a graduate student). After going back of many people, Dr. Kagitani began to pack for his return to Japan. Then Jupiter appeared through cloud, and I tried to make imaging. Because the field of view in the web cam is very narrow, it was difficult for me to bring Jupiter into the field of view. Dr. Kagitani was kind enough to do it. I felt nervous whether I could image Jupiter alone. I took one incomplete set, and went back because the seeing remained very poor.

11 March 2015 (Wednesday)

It was cloudy from the morning, then foggy and was raining. I processed images on Monday. Nice images were gotten in RGB. The weather forecast said that any observation was difficult tonight and tomorrow night also.

12 March 2015 (Thursday)

It stopped raining but was cloudy. In the morning, I tried to refuel. The direction of my credit card might not be correct, and I could not use it. And I didn't know that I had to up the lever of a tanker plane; the next person to me was kind to tell so.

After lunch, I drove to Kihei, a town of the west coast of Maui. There were many resort hotels, and atmosphere looked quite Ha-

waiian.

After coming back to the guest house, I became aware that it was difficult to observe tonight according to the weather forecast.

13 March 2015 (Friday)

It was clear in the morning. I tried to refuel again, and completed. I should have confirmed the direction of my credit card. I tried to withdraw cash through ATM of Bank of Hawaii near the supermarket of Pukalani. It seemed to be possible, but upper limit was the same as Honolulu. I took a nap after lunch.

I departed at 17:00, and arrived at the observatory at 18:00. I carried out imaging from 19:10 to 25:00, while the seeing condition was poor. I got eight complete sets. I expected to obtain some good images by processing.

14 March 2015 (Saturday)

It was very clear in the morning. I visited the supermarket and bought one cup ramen.

During lunch, I tried to process the 2nd set obtained during the last night. However it was not as good as I had expected.

I departed at 17:00, and arrived at the observatory at 18:00. Because Dr. Nakagawa still remained there, I asked him about the seeing condition. He replied "good". I started from 19:10, and got nine complete sets and one set of Saturn. The image of Saturn taken on Monday was not good. On the way to go back to my car, I fell in a gutter and cut my right eyelid. I drove my car with only left

eye but safely reached the guest house. I went to the supermarket again and bought a Band-Aid kit. I gave a first aid to my right eyelid.

I was worried if I could wake up timely, and so I didn't sleep and left the guest house around 6:30 for the airport. I safely returned to Fukuoka through Honolulu and Narita, after on board for about ten hours.

In total, I could meet imaging 3 nights for 8 nights. The better thing than images was that I could get close relationship with the planetary group of the Tohoku University. I would like to express my sincere thanks to all of the staff. I would like also to visit Maui next year, and after then I would like to take images of Planets through remote control from Japan if possible. □

Cloud Fronts on Mars in Northern Summer: Anatomy of Activity

By

Christophe PELLIER

ISMO 2013/14 Mars Note (#05)

This note is a sequel to the 1st and 2nd 2014 ISMO Notes (in CMO #428 & #429). After some general overview of the observed activity, we are now going to try to explain with more details the behavior of the observed features. It looks to fit well into the meteorological model of extra-tropical cyclones.

The Extra-Tropical Cyclone Model

Cyclonic or low pressure structures, belonging to the terrestrial mid-latitudes, are meteorological centers of action that allow polar cold air to mix with warmer tropical air. They form at the boundary of such air masses at different temperatures and their main manifestation is the formation of "fronts", that mark the boundaries of the air masses and travel with winds. Extra-tropical cyclones are different from tropical cyclones, whose main motor is not frontal activity but strong convection. That last kind of cyclone forms above very hot sea water and carry various names following its location on Earth ("hurricane" in the Atlantic Ocean or "Typhoon" in the Pacific).

The cyclonic structures observed north of Mare Acidalium during mid-northern summer on Mars belong to the first class of cyclone, and despite the resemblance of the strongest form (annular clouds)

to the tropical cyclones on the Earth, do not fit into this model.

The extra-tropical cyclone model can be described in its simple form as follows. The point at the boundary of two air masses (one cold, one warm) where the wind circulation starts to undulate

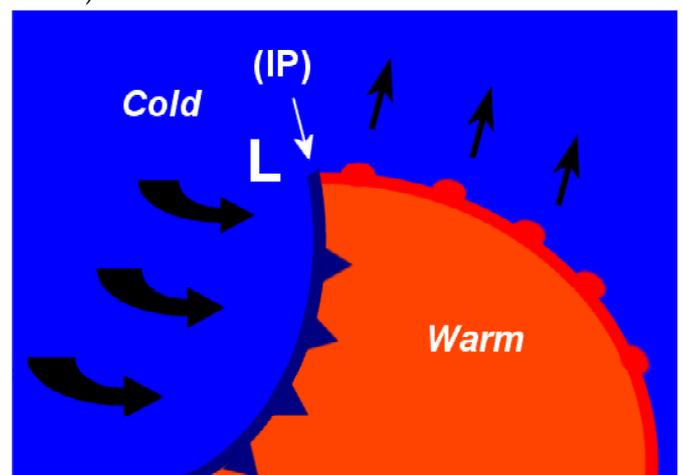


Fig. 1: Main features of an extra-tropical terrestrial cyclone, showing the position of the inflexion point (IP), the location of the centre of the low pressure (L), cold front (in deep blue), warm front (deep orange).

is called the "inflexion point". At the following side, the cold air is advancing toward the tropics, lifting warmer air and allowing water vapor to condensate into clouds behind the front at a given altitude: This is the "cold front". On the preceding side of the inflexion point, the warmer tropical air travels toward polar latitude, progressively lifting itself over colder air, also allowing clouds to form but before the front this time, in a more diffuse form: this is the warm front. This description is more simple than is the full contemporary scientific model, but it works finely to identify clouds in Mars images. Figure 1 briefly illustrates the explanation above.

Anatomy Observed on the HST and MGS Images

Spatial orbiters such as Mars Global Surveyor have photographed in detail and at several occasions clouds fronts over the enlarged north polar region of the planet, and if we look closely at

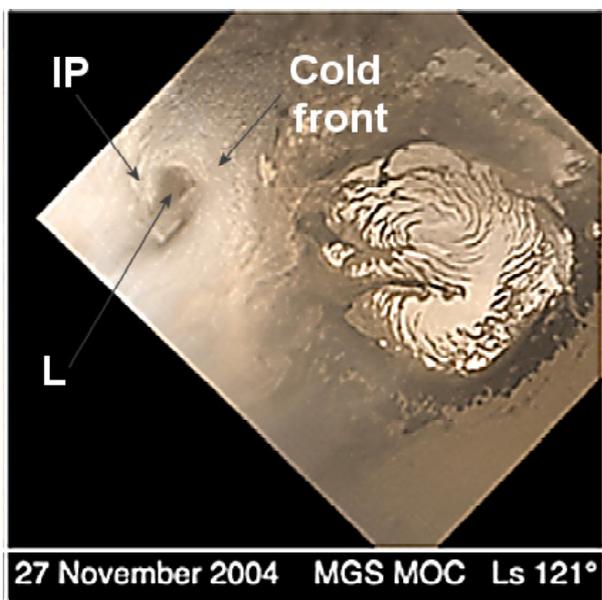


Fig. 2: Northern summer cyclone observed by MGS at $\lambda=121^\circ\text{Ls}$ (from the set of four Originally published on "Repeated weather events". On this pseudo "spiral", the pointed end of the inflexion point is particularly visible.

*1 Celebrating 8 years at Mars: repeated weather events

http://www.msss.com/mars_images/moc/2005/09/12/

such images, we are able to identify at least part of the extra-tropical cyclone model. In particular, the inflexion point, the cold front, and the position of the lowest pressure area (center of the cyclone), can be easy to spot on. But on the other hand, the warm front is much harder to identify, maybe because of a lack of condensated clouds inside the warm sector of the cyclone. Sometimes clouds are unavoidable to identify meteorological activities, and if they don't form, we may fail to see what's going on. This is a problem on Mars as clouds are scarce in comparison with the Earth. Figure 2 illustrates a front photographed by the MGS with identified structures.

The celeb "spiral" cloud imaged by the HST in 1999 has been found on several occasions later by MGS as a repeated weather phenomenon^{*1}. Here again we are identifying the inflexion point, the main cold front, and the center of the low pressure. But something more is becoming apparent on the images of annular clouds. The whole spiral is not symmetrical, and shows a clear difference between its (roughly) northern half, where we find the main cold front, and the southern half, where the mass is larger, less contrasted, and made of more diffuse clouds than the northern part. What's more, the daily evolution of the spirals as photographed by probes show that the "thin" half is always the first one to dissipate, while the "thick" half with the main front can maintain itself for several hours thereafter. The southern part looks to be more a diffuse tail of the cold front than a front by itself. This proves that the spiral form of the northern summer frontal activity is a mere rolled-up cold front. So there would not be any difference of nature between the spiral form and the simple front form, but only a difference of wind pattern and strength at the moment of their formation.

See Figs 3 and 4 below.

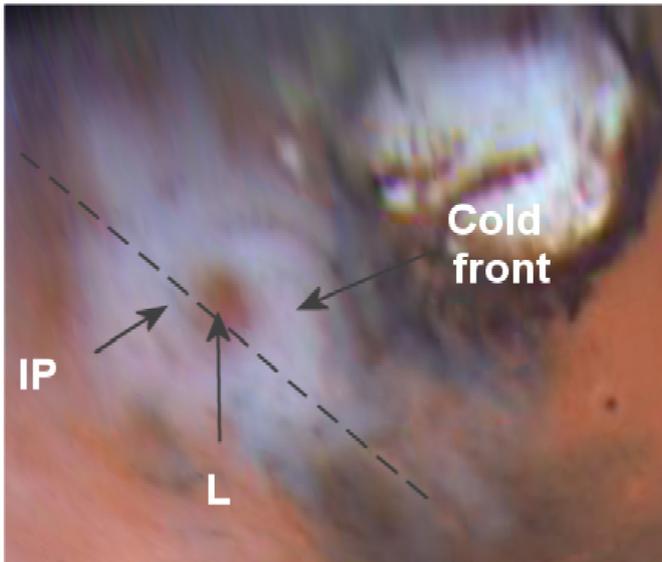


Fig. 3: Identified features on the cyclone imaged by the HST in 1999. The dashed line separates the upper right half of the structure, where the active features are found, and the bottom left that is the simple tail of the frontal activity with more diffuse and thin clouds.

Anatomy Observed on Amateur Images

The level of resolution now reached by amateurs often allow us to reveal a relatively detailed anatomy of the clouds fronts. The

"inflexion point" is sometimes resolved permitting to point the exact location of the low pressure centre. Some examples are presented on Fig. 5.

The Rear Side of the Front: A High Transparency Area

Another interesting thing must be described here about the martian summer polar fronts. Images often show a highly contrasted area just next to the cloud front. This is a region where the atmosphere must be very transparent, and this help us to see the surface of Mars with an unusual level of contrast. The phenomenon is not unknown to CMO readers because it has also been observed during dust storms (they were called wine-coloured areas by Masatsugu MINAMI). In the case of white cloud fronts the phenomenon is easily explained if we say that most of the local water vapor has been raised in altitude to form the visible clouds. Then the area at the rear of the front is more transparent to the eye; this should be the same on the Earth, we know that the sky is crystal clear after a cold front (even if turbulent). Many examples can be seen on the figures presented.

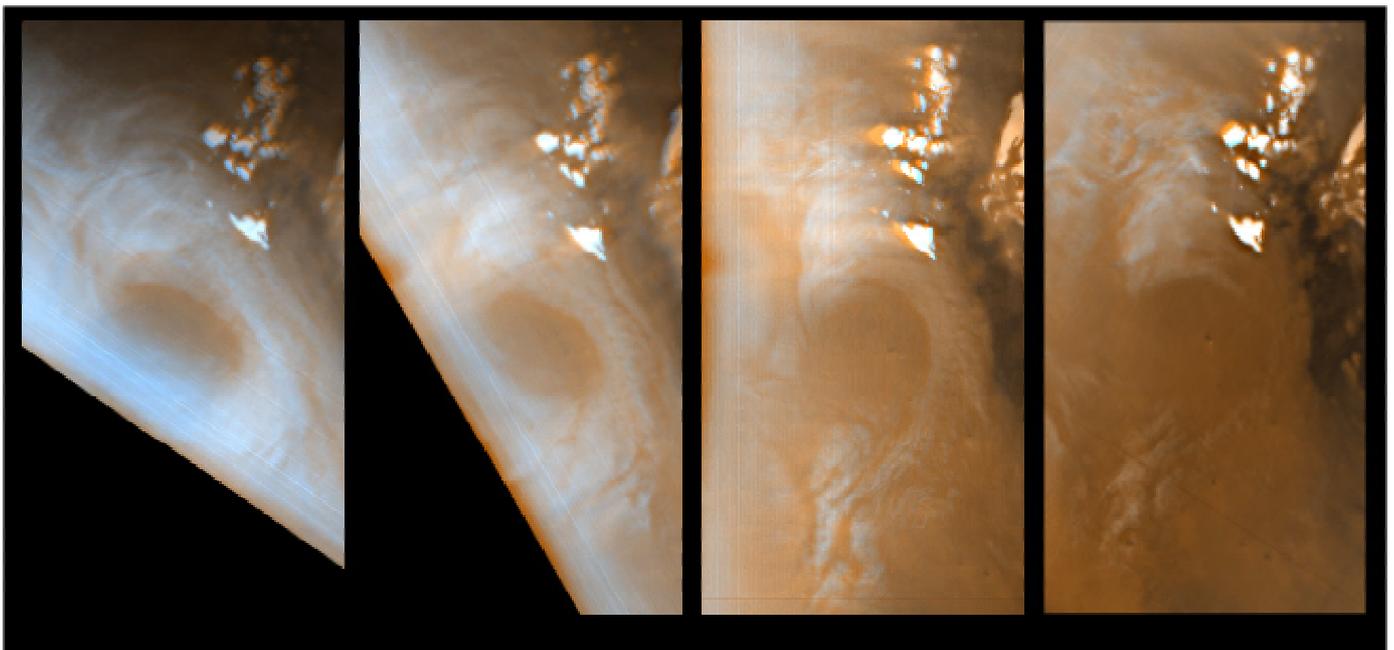


Fig. 4: Evolution of a cyclone through the first half of the martian day (MGS, $\lambda=125^\circ\text{Ls}$ on March 2nd - 3rd 2001, local hour from 7 AM to 12). The clouds dissipate as the Sun heats the atmosphere but the dissipation is not uniform: the left part (the tail) disappears first.

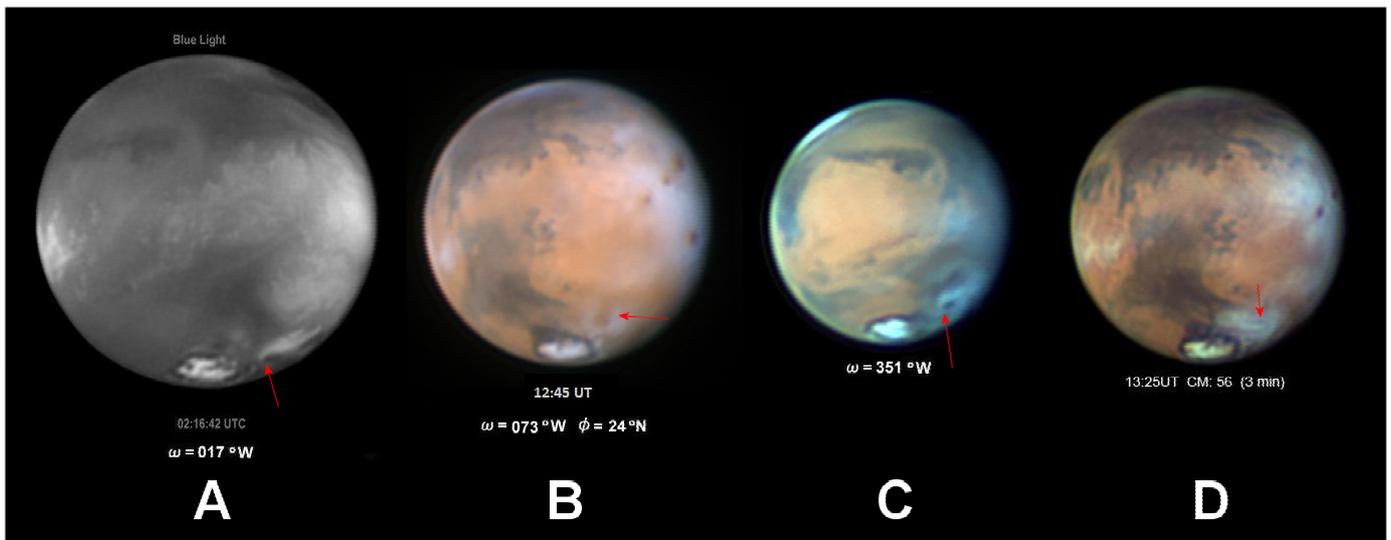


Fig. 5: Amateur images of cyclonic activity. A: $\lambda=118^\circ\text{Ls}$ (April 25th) Damian PEACH at Barbados, blue light: this image clearly shows the inflexion point (red arrow), and center of low pressure. B: $\lambda=124^\circ\text{Ls}$ (April 30th) by Stefan BUDA: on this one we can see the "two parts" of the cyclonic structure, one thick on the following (west) side (position of IP and low pressure), one thin on the preceding (east) side; the circle is almost complete but the eastern part is dissipating. C: another clear pointed IP end on $\lambda=129^\circ\text{Ls}$ (May 11th), Mark JUSTICE, with a dark center, almost completely rolled up. D: Sometimes frontal activity takes on a more complex pattern. On this image by Christopher GO taken on $\lambda=125^\circ\text{Ls}$ (May 3rd), we can actually see two fronts with a Y or T shape, one being clearly identified at left. MGS has imaged such a pattern as well.

CMO/ISMO 2013/14 Mars Report #18

2013/2014 Mars Observations in January & February 2015

♂.....As the New Year came in, the planet Mars moved from the Cap constellation to the Aqr constellation, and in February to the Psc constellation. On 22 February 2015, the apparent declination went back to the northern sky passing across the celestial equator. The angular diameter of Mars was $\delta=4.8''$ on the first day of January, but at the end of February it recorded $\delta=4.2''$. The Martian season proceeded from $\lambda=263^\circ\text{Ls}$ and reached $\lambda=300^\circ\text{Ls}$ during the period. The southern summer solstice ($\lambda=270^\circ\text{Ls}$) was reached on 11 January 2015. The tilt started from $\phi=21^\circ\text{S}$, while attained a maximum $\phi=26.3^\circ\text{S}$ in mid-February and then back but kept $\phi=26^\circ\text{S}$ at the end of February. The phase angle changed from $\iota=28^\circ$ to $\iota=18^\circ$. On 22 February, Mars was seen near the shining Venus at the western sky: Mars's elongation (the angle between the Sun and Mars) decreased thus to 27° .

♂.....During the period, Mars was still chased by Yukio MORITA (*Mo*) and Clyde FOSTER (*CFs*). *Mo* was on the watch for opportunities but just succeeded one evening. *CFs* was successful to catch Mars nine times every month. In February, it became difficult to employ the RGB separation, and only used R and/or IR monochromatic. The following is a details concerning the observational situation of *Mo* and *CFs*.

FOSTER, Clyde (*CFs*) Centurion, SOUTH AFRICA

5 Sets of RGB + 10 R + 12 IR Images

(7, 8, 12, 13, 16, 18, 20, 28, 30 January; 1, 3, 13, 17, 18, 20, 22, 23, 26 February 2015)
36cm SCT @f/33 with an ASI 120MM

MORITA, Yukio (*Mo*) Hatsuka-ichi, Hiroshima, JAPAN

1 Set of RGB + 1 LRGB Colour + 1 L Image (3 January 2015) 36cm SCT with a Flea 3

♂.....Already the planet was far away to such an extent that the angular diameter seen from the Earth decreased less than 5 arc-seconds. The observations (mainly made by one observer: Clyde FOSTER without help of the chasing from the other angles of other observers) so were forced to be made desultorily, and hence the picture of this report is just to be quite limited, and so we shall not be able to provide no more than a brief outline. We omit also the description of URLs of the images (refer however to the CMO/ISMO Mars Gallery of the 2013/2014 Mars).

http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2013/f_image.html

In January 2015, the observations were sent to us as follows:

3 January 2015 ($\lambda=265^\circ\text{Ls}$, $\delta=4.7''$): Yukio MORITA (*Mo*) communicated a set of images at $\omega=153^\circ\text{W}$, $\phi=22^\circ\text{S}$ where M Sirenum looks downward near the centre. The western part of M Sirenum appears darker and its northern neighbour looks filled with a lighter dust matter. This is evident on R and IR images. However we cannot say more about it without further observations. (The MRO-MARCI images look to show a dust spread at the very area if it is not quite free from a broken-lantern effect.) The south polar cap (spc) has now shrunk as expected, and is apparent on G and R.

7 January 2015 ($\lambda=268^\circ\text{Ls}$, $\delta=4.7''$): Clyde FOSTER (*CFs*) obtained a set of images including the one with IR742 at $\omega=234^\circ\text{W}$. However the area around M Cimberium is merely darker. The angle may allow the presence of Syrtis Mj near the morning terminator, but unknown. The spc is shot obscure.

8 January 2015 ($\lambda=268^\circ\text{Ls}$, $\delta=4.7''$): *CFs* obtained a set of images at $\omega=217^\circ\text{W}$. R and IR images look better, and grasp grossly the shape of M Cimberium. Since the *head of ant* is shown rather cut off, and so these images should be said of better quality. The spc is distinct in G.

12 January 2015 ($\lambda=271^\circ\text{Ls}$, $\delta=4.6''$): *CFs's* file is made of R and IR742 images at $\omega=184^\circ\text{W}$. On the IR image there is seen a light broad streak from Hesperia to Electris.

13 January 2015 ($\lambda=272^\circ\text{Ls}$, $\delta=4.6''$): *CFs* submitted a set of images at $\omega=171^\circ\text{W}$. The tilt ϕ went up to 24°S . M Sirenum is imaged. To the south of Phæthontis there exists a faded light area adjacent to the dark fringe of the spc. The spc itself is obvious in R together with a faint rim area preceding the spc. As we remember the same phenomenon was seen in 2003 at this season, but it might not have been so contrast.

16 January 2015 ($\lambda=273^\circ\text{Ls}$, $\delta=4.6''$): *CFs* produced a set of images at $\omega=141^\circ\text{W}$. Solis L must be near the preceding limb, but indiscernible. Maybe slightly seen in IR?

18 January 2015 ($\lambda=275^\circ\text{Ls}$, $\delta=4.6''$): *CFs* obtained a set of images at $\omega=117^\circ\text{W}$. In IR, Solis L is quite inside and looks dark roundish. Phasis and Araxes are recognised. As well, Tharsis Montes are seen as a set of dark spots.

N.B. In this apparition, neither the Noachis dust cloud *à la* 1956 ($\lambda=250^\circ\text{Ls}$) nor the cloud *à la* 1971 ($\lambda=260^\circ\text{Ls}$) were detected. The season $\lambda=276^\circ\text{Ls}$ is the one connected with the Deucalionis cloud in 1956, but at present the region is blind at the opposite side from Clyde's angle. The global dust in 1973 was entrained at $\lambda=300^\circ\text{Ls}$ (this year around 1~2 March), and in 2003 Don PARKER detected quite a dust disturbance at $\lambda=315^\circ\text{Ls}$ (on 13 December 2003) when $\delta=9.9''$. And so still the season of the great dust storms continues, but it may be quite difficult for Clyde's fighting alone to happen to encounter the cases.

20 January 2015 ($\lambda=276^\circ\text{Ls}$, $\delta=4.5''$): *CFs* produced a nice R image at $\omega=098^\circ\text{W}$ where Solis L is quite evident together with Tithonius L. The dark marking preceding Thaumasia is quite strong. The spc is bright obvious, and the dark fringe is definite. At the centre Tithonius L is evident. The Chrysokeras

streak looks faint, a detail for this angular diameter. The eastern half of M Sirenum is inside the disk, and the rest is about to come in. Tharsis Montes are shown as shadowy spots (see the reply by KONNAĪ to VENABLE at page Ser3-0896 in the preceding CMO #431). We just notice here *CFs's* image file shows an inevitable deficiency: That is, he does not pay any attention to the motion of the planet when the motor is stopped. If there is no data of $p \leftarrow \rightarrow f$, it becomes very tedious and hard to determine the positions of minor markings by the grid-matching.

28 January 2015 ($\lambda=281^\circ\text{Ls}$, $\delta=4.5''$): *CFs's* single R image is given at $\omega=019^\circ\text{W}$, $\phi=26^\circ\text{S}$. Because of the tilt, S Sabæus looks quite drooping to the extent that the southern hemisphere is seen quite largely. The hemisphere looks thus full of dark markings, though a part of Noachis is fainter as well as Deucalionis R. Margaritifer S and M Erythræum are rival in density. The area of Auroræ S is quite dark (in R) near the morning terminator. The spc is small roundish. The preceding limb of the northern hemisphere is bright.

30 January 2015 ($\lambda=282^\circ\text{Ls}$, $\delta=4.5''$): *CFs* gave a set of R and IR images at $\omega=356^\circ\text{W}$. The R image is similar to the previous one on 28 January, while the markings on the IR image are more shade. Pandoræ Fr looks broader. However Meridiani S is not well mapped. Aram is clearly cut. Syrtis Mj is dark near the preceding limb. The spc is definite in IR.

Now we are to treat the images in February 2015 which were all given by *CFs*.

1 February 2015 ($\lambda=283^\circ\text{Ls}$, $\delta=4.4''$): An R image at $\omega=337^\circ\text{W}$ is given. Syrtis Mj is drooping near the preceding limb and the area of M Serpentis is broad and dark. Hellespontus and S Sabæus are dark but not sharp. For an image of $\delta=4.4''$, this is not bad, but the reliability should be said too low to say something. Deucalionis R is mapped faintly, but should be said of no abnormality.

3 February 2015 ($\lambda=285^\circ\text{Ls}$, $\delta=4.4''$): An R image at $\omega=318^\circ\text{W}$. Syrtis Mj is a large in the shape of inverted triangle, while the following S Sabæus does not make any shape. M Serpentis may be well dark. Hellas may show the ground. The spc shows a bit up.

13 February 2015 ($\lambda=291^\circ\text{Ls}$, $\delta=4.3''$): R and IR images at $\omega=218^\circ\text{W}$. The IR image looks more moderate: This must show the area of M Cimberium, but it is totally unidentifiable. One may say the area of Ausonia is a bit light, but this remark does not belong to the observation items, because of the deterioration of the image.

17 February 2015 ($\lambda=293^\circ\text{Ls}$, $\delta=4.3''$): R & IR images. If we choose, the IR image at $\omega=175^\circ\text{W}$, but no implication.

18 February 2015 ($\lambda=294^\circ\text{Ls}$, $\delta=4.3''$): R & IR set at $\omega=165^\circ\text{Ls}$ where a part of M Sirenum must be darker with some faintness of the continents, but unreliable in general to the extent that the spc looks quite blurred.

20 February 2015 ($\lambda=295^\circ\text{Ls}$, $\delta=4.3''$): An R image at $\omega=148^\circ\text{W}$. This image cannot be regarded as meaningful.

N.B. We can understand that the angular diameter now should be said too small to reveal something meaningful in general. However one should remember, as a best pattern, the set of images produced by Damian PEACH (*DPc*) on 20 September 2013 at $\omega=251^\circ\text{W}$ when $\delta=4.3''$ (see the CMO/ISMO Gallery of the present apparition).

22 February 2015 ($\lambda=296^\circ\text{Ls}$, $\delta=4.2''$): An IR image at $\omega=125^\circ\text{W}$ whose constitution must be such that Solis L is on the preceding side and M Sirenum must be near the morning terminator. The latter may be suggested, but other darkish areas are more than half-concealed.

23 February 2015 ($\lambda=297^\circ\text{Ls}$, $\delta=4.2''$): Two IR images: One is at $\omega=116^\circ\text{W}$ and the other is at $\omega=117^\circ\text{W}$: However it is even hard to discriminate how they are alike or not. Any density of Solis Lacus is not concentrated, receiving some diffusion due to the poor seeing. The spc is unknown.

26 February 2015 ($\lambda=299^\circ\text{Ls}$, $\delta=4.2''$): An IR image at $\omega=084^\circ\text{W}$. Solis L must be near the centre of the disk, but the density is too diffused. We need the spc or/and Ophir-Candor to be imaged to say anything.

(To be concluded)

Masatsugu MINAMI & Masami MURAKAMI

Letters to the Editor

●...*Subject: Mars 30 January 2015*
Received: 2 February 2015 at 00:53 JST

Hi all, I did manage to get a few R and IR avi's on the 30 January, but was not happy with any processed results on the evening. I had another go at processing today and although the results are still not good, am submitting "for the record". A little bit of detail visible, more so in IR. Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2013/150130/CFs30Jan15.jpg>

○...*Subject: Mars 1 February 2015*
Received: 2 February 2015 at 03:15 JST

Good evening all, Red image from this evening. Sinus Sabaeus central. Syrtis Major coming into view and Hellas is clearly shown. SPC again compact but visible. Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2013/150213/CFs13Feb15.jpg>

○...*Subject: Mars 3 February 2015*
Received: 4 February 2015 at 04:50 JST

Good evening all, Red image from this evening. Syrtis Major prominent. Hellas also prominent and indicating possible detail/extension towards SPC? Hesperontus and Iapygia regions also visible. Aeria/Arabia region is bright (2 possible dark spots in Deltoton area?). SPC visible although dim. Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2013/150203/CFs03Feb15.jpg>

○...*Subject: Mars 13 February 2015*
Received: 14 February 2015 at 03:06 JST

Good evening all, As you would have gathered, I have been having poor weather and exceptionally

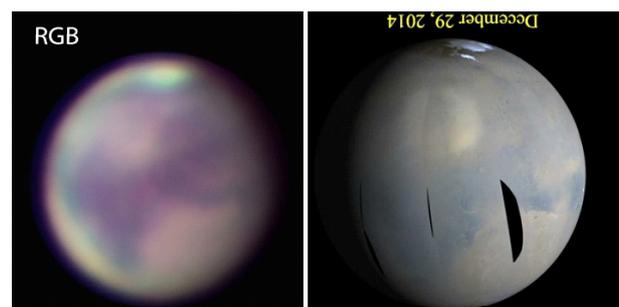
poor seeing conditions which prevented any worthwhile imaging. On top of that I did a bit of tweeking on my collimation and got it horribly wrong(!) and just did not have any conditions that were good enough to rectify it until a night or two back. This evening conditions were a bit better and I managed to capture Mars at an altitude of 17 deg and a diameter of 4.3". Attached are both R and IR images. Mare Cimmerium is central and prominent. Mare Sirenum is towards the eastern limb and Mare Tyrrhenum on the west. In the R image, I suspect that Xanthus may be visible between Eridania and Ausonia? A bit more detail showing in the IR image with possibly a bright patch in the region of Ausonia. I cannot claim that the SPC is visible, although there is maybe just a suspicion of it in the IR image. Any comments are welcome. Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmons/2013/150213/CFs13Feb15.jpg>

○...*Subject: Mars images compared with MARCI/MRO*
Received: 15 February 2015 at 20:18 JST

Hi all, I had a quick review of the MARCI weather reports, comparing with my images since I restarted imaging after my operation on 29 Dec. I only noted two possible interesting points:

a) 29 Dec 2014: On the MARCI images of this date,

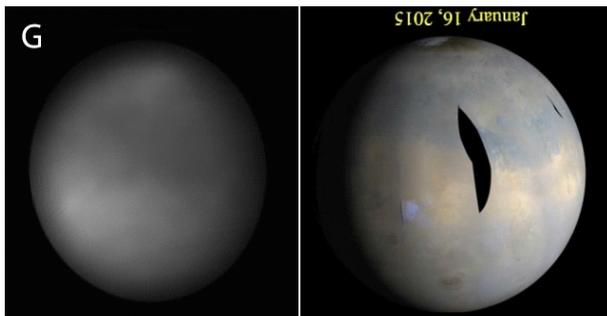


it looks like there is a bright patch in the NW corner of Hellas. My RGB, IR and R (to a lesser extent)

images possibly hint that this may have been captured? However, with size and conditions, I would not claim a confirmed capture.

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2013/141229/CFs29Dec14.jpg>

b) 16 January 2015: The MARCI comments indicate that Arsia Mons was covered by a bright water/ice cloud for the whole week. I note that there was a bright spot approximately in this area in the G image of the 16 Jan. Having said that, there is also a bright spot in the IR image in the same (but not apparently exactly the same) area. I just need to check the time of the images, as there may have been some rotation between them (I try and capture my R,G and B's as close as possible together. I sometimes have a gap between these and my IR images). Seeing conditions also were poor. I have not tried to check with Winjupos as yet, and again, I would not claim that this is a confirmed capture.



<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2013/150116/CFs16Jan15.jpg>

Best regards

○...**Subject: Subject: Mars 17 February 2015**
Received: 18 February 2015 at 04:30 JST

Good evening all, Earlier sunsets starting to work a little in my favour at this stage. R and IR images. Mare Sirenum and Mare Cimmerium visible. No significant further comment. Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2013/150217/CFs17Feb15.jpg>

○...**Subject: RE: Mars 17 February 2015**
Received: 18 February 2015 at 04:51 JST

Hi all, A heavily over sharpened R image from this evening that appears to capture the SPC?

Best regards

○...**Subject: Mars 18 February 2015**
Received: 19 February 2015 at 03:14 JST

Good evening all, Similar to yesterday evening. No significant comment. Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2013/150218/CFs18Feb15.jpg>

○...**Subject: Mars 20 February 2015**
Received: 21 February 2015 at 03:39 JST

Good evening all, Only managed to capture an R image this evening. Could the bright spot in Amazonis be Olympus Mons? Nothing further that I can note of significance.

As a slight diversion, I also captured a wide field view of Mars and Venus low in the West with my 71mm Williams Optics and Canon 60Da. I hope to capture the two of them with the moon tomorrow evening. Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2013/150220/CFs20Feb15.jpg>



○...**Subject: Mars 22 February 2015**
Received: 23 February 2015 at 02:58 JST

Good evening all, Only managed to capture an IR image this evening under very poor conditions. Mare Sirenum on the west (right) and it looks like Solis Lacus coming into view on the east?

Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2013/150222/CFs22Feb15.jpg>

○...**Subject: Mars 23 February 2015**
Received: 24 February 2015 at 03:12 JST

Good evening all, I captured two IR images taken at 16.50 and 16.53UT this evening. Solis Lacus and Mare Sirenum are fairly clearly seen, despite the conditions. It also appears that the SPC is captured in both images. I am not sure if this is "normal", but I have highlighted a brightish area extending from the SPC down the eastern limb of Mars. This is evident in both images, and on checking, was also visible in yesterday's image. This is likely in the Argyre region? Any comments would be welcome. Best regards,

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2013/150223/CFs23Feb15.jpg>

○...*Subject: Mars 26 February 2015*
Received: 27 February 2015 at 02:53 JST

Good evening all, IR image from this evening.

<http://www.kwasan.kyoto-u.ac.jp/~cmo/cmoms/2013/150226/CFs26Feb15.jpg>

Best regards,

Clyde FOSTER (Centurion, SOUTH AFRICA)

●...*Subject: Pluto history*
Received: 18 February 2015 at 08:28 JST

Dear Bill, I just wonder if you have recently encountered with the following article and pictures:

<http://www.nature.com/news/pluto-s-long-strange-history-in-pictures-1.16910>

With best wishes,

Masatsugu MINAMI (Fukui, JAPAN)

●...*Subject: RE: Pluto history*
Received: 18 February 2015 at 23:40 JST

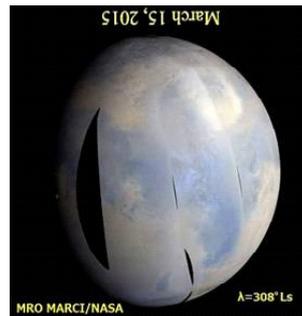
Dear Masatsugu, I hadn't seen that - thanks for sending it. Happy anniversary of the discovery of Pluto (85 years ago today!). I should publish in the CMO the letter Clyde TOMBAUGH wrote to me about observing Mars. Best,

Bill SHEEHAN (Willmar, MN)

●...*Subject: Dust over Ausonia*
Received: 19 March 2015 at 10:56 JST

Dear Clyde, Please find attached a "Great Broken

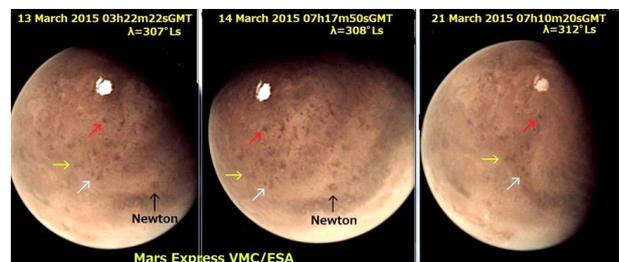
Revolving Paper Lantern"-like MRO-MARCI image dated 15 March 2015 which clearly shows a modestly large scale dust activity over the Ausonia region. This seems to be in accordance with what your recent nice IR distant views have



suggested. Best Regards,

○...*Subject: Dust Storm in the S hemisphere?*
Received: 23 March 2015 at 02:15 JST

Dear Dr. Minami, all, Please find attached a montage with some recent Mars Express images:



The 21 March image suggests that a wide area over Phäthontis to Electris is covered with dust, and the spc residual seems to be thinly veiled with the dust as well. (Colored arrows show the reference craters for orientation.) Best Regards,

Reiichi KONNAI (Fukushima, JAPAN)



International Society of the Mars Observers (ISMO)

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CMO #432/ ISMO #58 (25 March 2015)

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