

Mars Observations in 2003, Part I

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(Abstract) This is a rough report of our observations of Mars in the 2003 great apparition: Observations made by others and any detailed description of some phenomena are not touched here as to which we shall describe in the following issues of this Journal.

Keywords: Mars in 2003, Fukui City Observatory, Expedition to Okinawa

1 Introduction

The planet Mars was closest to the Earth on 27 August 2003 at 10h GMT: Its apparent diameter was $\delta = 25.11''$ and this was said the greatest apparition in these 57,000 years.

The Fukui City Observatory of the City Museum of the Natural History has a long history of Mars Observations since 1952. This occasion the present writers (Takashi NAKAJIMA - abbreviated as *Nj*, and Masatsugu MINAMI - abbreviated as *Mn*) started to observe the planet on 25 October 2002, when the apparent diameter $\delta = 3.7''$, and the Martian season $\lambda = 086^\circ$ Ls. Observations were made every 40 minutes: During 40 minutes the planet rotates 10 degrees. *Nj* continued up until 28 March 2004, and obtained a total of 185 drawings by the use of a 20cm Refractor of the Fukui City Observatory. The last δ was 4.9", and the Martian season was $\lambda = 012^\circ$ Ls: That is, watching from the southern winter, we observed through spring equinox and summer solstice to just after the southern autumnal equinox. At the City Observatory we used $400 \times$, 480×20 cm Refractor.

On the other hand *Mn* continued to 4 June 2004 ($\lambda = 043^\circ$ Ls, $\delta = 3.9''$): *Mn* however made an expedition in 2003 summer to Okinawa from 23 June 2003 to 30 August 2003 avoiding the rainy season of Fukui, and obtained 436 drawings at Okinawa. In fact, at Fukui the sky remained dismal during summer, while in Naha, Okinawa, the sky was fine almost every night and it was just two days in August that *Mn* could not observe because of the passing of a Typhoon. As the day of 27 August nearly approached, the apparent diameter increased 0.2" every night, and it was truly amazing to watch the big images of the planet during the period. *Mn* resumed again his observations from 1 September 2003 at Fukui, and eventually obtained a total of 1158 drawings during the apparition (among them at the Fukui City Observatory *Mn* obtained 722 drawings).

This report was sectioned to three. The First Section treats the Period from the beginning to 21 June 2003. The Second Period is from 23 June to 31 August 2003. The Third Period is from 1 September to the day of the final observation. As an Appendix we include some Plates of drawings made at Okinawa. At Naha *Mn* was very indebted to Hiroshi ISHADOH and Tetsuo WAKUGAWA. The telescope was a $350 \times$, $420 \times$, 530×25 cm Newtonian whose mirror was polished by WAKUGAWA. And the place was on the rooftop of a building at Ameku, Naha where WAKUGAWA and ISHADOH kindly constructed the observation site. *Mn* also acknowledges Isao MIYAZAKI and Tetsuo WAKUGAWA who kindly invited *Mn* to use their $480 \times$, 600×40 cm Newtonians when the planet much approached. *Mn* expresses his deepest thanks heartily to them all.

2 The First Period

As abovementioned, our observations were first made on 25 Oct 2002 ($\lambda = 086^\circ$ Ls) when apparent diameter $\delta = 3.7''$. The planet was still so low that *Nj* and *Mn* observed only at $\omega = 340^\circ$ W, and $\omega = 345^\circ$ W respectively. Next, *Mn* observed on 30 Oct ($\lambda = 088^\circ$ Ls), 6 Nov ($\lambda = 091^\circ$ Ls), 16 Nov ($\lambda = 096^\circ$ Ls), 19 Nov ($\lambda = 097^\circ$ Ls), 22 Nov ($\lambda = 099^\circ$ Ls), and on 23 Nov ($\lambda = 099^\circ$ Ls): On 23 Nov, $\delta = 4.0''$ and the tilt ϕ went down from 25° N to 22° N; the Northern Hemisphere (NH) was well visible. However it was not easy to observe the north polar cap (npc). *Mn* further observed on 28 Nov ($\lambda = 101^\circ$ Ls), 14 Dec ($\lambda = 109^\circ$ Ls), 22 Dec ($\lambda = 112^\circ$ Ls). At this time it was possible to observe four times in the morning and the npc became easily caught. As the New Year came in, *Mn* observed on 2 Jan 2003 ($\lambda = 117^\circ$ Ls) at $\omega = 009^\circ$ W, 019° W when $\delta = 4.6''$. The planet was low in the south. *Mn* checked on 8 Jan ($\lambda = 120^\circ$ Ls). Next on 12 Jan ($\lambda = 122^\circ$ Ls) when $\delta = 4.8''$, *Mn* and *Nj* observed as follows at $\omega = 270^\circ$ W (*Mn*), 275° W

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(*Nj*), 280° W(*Mn*), 285° W(*Mn*), 289° W(*Mn*), 294° W(*Nj*), 299° W(*Mn*), 302° W(*Nj*). We chased Syrtis Mj: Hellas was bright. Elysium was light near the terminator. On 25 Jan ($\lambda=128^\circ$ Ls) we observed at $\omega=151^\circ$ W(*Mn*), 161° W(*Mn*), 166° W(*Nj*), 171° W(*Mn*), 176° W(*Nj*), 181° W(*Mn*) from 20:30 GMT to 22:30 GMT. Next *Mn* observed 3 times on 6 Feb ($\lambda=134^\circ$). *Mn* also did on 7 Feb ($\lambda=135^\circ$ Ls) 5 times from $\omega=013^\circ$ W to $\omega=052^\circ$ W and on 13 Feb ($\lambda=137^\circ$ Ls), *Mn* 4 times. On 17 Feb ($\lambda=139^\circ$ Ls) *Mn* observed from $\omega=269^\circ$ W to $\omega=308^\circ$ W 5 times where he checked Syrtis Mj and the bright Hellas. On 18 Feb ($\lambda=140^\circ$ Ls) *Mn* observed 7 times from $\omega=250^\circ$ W (18:30 GMT) to $\omega=308^\circ$ W (22:30 GMT): Already ϕ was down to 1° N, while $\delta=5.8''$. On 27 Feb ($\lambda=144^\circ$ Ls) *Mn* observed 3 times: Temperature was -1.5° C outside the dome. On 13 Mar ($\lambda=151^\circ$ Ls) *Mn* checked the area of M Acidalium 6 times. Around the season, the south polar hood (sph) became conspicuous. On 15 Mar ($\lambda=153^\circ$ Ls) *Mn* observed 6 times from $\omega=011^\circ$ W and *Nj* did 5 times from $\omega=016^\circ$ W. On 18 Feb ($\lambda=154^\circ$ Ls) *Mn* obtained 3 drawings, and on 20 Mar ($\lambda=155^\circ$ Ls) *Mn* and *Nj* observed 5 times each. On 22 Feb ($\lambda=156^\circ$ Ls) δ reached $7.0''$, and *Mn* and *Nj* observed 6 times and 5 times respectively. Hellas was bright near the evening terminator. *Mn* observed on 23 Mar ($\lambda=157^\circ$ Ls) 2 times and on 26 Mar ($\lambda=159^\circ$ Ls) 5 times. Already $\phi=10^\circ$ S so that the south polar hood (sph) looked large. On 29 Mar ($\lambda=159^\circ$ Ls) *Nj* and *Mn* observed 5 times each. In April, *Mn* observed on 6 Apr ($\lambda=164^\circ$ Ls), 10 Apr ($\lambda=166^\circ$ Ls), 13 Apr ($\lambda=168^\circ$ Ls), 15 Apr ($\lambda=169^\circ$ Ls), 16 Apr ($\lambda=169^\circ$ Ls), 17 Apr ($\lambda=170^\circ$ Ls), 18 Apr ($\lambda=170^\circ$ Ls), 21 Apr ($\lambda=172^\circ$ Ls), 26 Apr ($\lambda=175^\circ$ Ls), 27 Apr ($\lambda=175^\circ$ Ls), 28 Apr ($\lambda=176^\circ$ Ls), 30 Apr ($\lambda=177^\circ$ Ls) and obtained a total of 49 sketches. During the period, δ went up from $7.8''$ to $9.4''$. At the end of April the south polar cap (spc) appeared. In May *Mn* observed on 1 May ($\lambda=177^\circ$ Ls) 4 times from $\omega=283^\circ$ W, and recognised a bit of deformation of the spc. On 2 May ($\lambda=178^\circ$ Ls) we observed at $\omega=254^\circ$ W(*Nj*), 264° W(*Nj*), 274° W(*Mn*), 283° W(*Nj*), 293° W(*Mn*), 298° W(*Nj*), 303° W(*Mn*): From around $\omega=293^\circ$ W we noticed a shadowy area at the southern limb of the spc which implied the melting of the spc in the centre. Also on 3 May ($\lambda=179^\circ$ Ls) *Mn* checked the shadow from the angles $\omega=254^\circ$ W to 283° W when $\delta=9.7''$. On 9 May ($\lambda=182^\circ$ Ls) we observed at $\omega=186^\circ$ W(*Mn*), 191° W(*Nj*), 196° W(*Mn*), 201° W (*Nj*), 206° W (*Mn*), 211° W(*Nj*), 216° W(*Mn*), 220° W(*Nj*), 225° W(*Mn*), 230° W(*Nj*). At the latter half we noticed a depression of the centre of the spc. The season came to the time when there occurred a global dust storm in 2001, but no signs this time. On 13 May ($\lambda=184^\circ$ Ls) *Mn* observed from $\omega=148^\circ$ W to $\omega=187^\circ$ W every 40 minutes. On 17 May ($\lambda=186^\circ$ Ls) *Nj* chased from $\omega=114^\circ$ W to 143° W. On 20 May ($\lambda=188^\circ$ Ls)

the seeing improved and *Mn* observed that the perimeter of the spc is made of a series of small spots and the central depression was strong around at $\omega=109^\circ$ W, 119° W. On 21 May ($\lambda=189^\circ$ Ls) *Mn* observed 7 times from $\omega=053^\circ$ W to $\omega=109^\circ$ W: Phasis was evident. Especially the preceding part of the spc was shadowy around at $\omega=109^\circ$ W: On 22 May ($\lambda=189^\circ$ Ls) also *Mn* checked from $\omega=061^\circ$ W to $\omega=100^\circ$ W, and around at $\omega=080^\circ$ W he saw the shadowy half of the spc at the preceding part. On 23 May ($\lambda=190^\circ$ Ls) we observed at $\omega=041^\circ$ W(*Mn*), 051° W(*Mn*), 056° W(*Nj*), 061° W(*Mn*), 065° W(*Nj*), 071° W (*Mn*), 075° W(*Nj*), 080° W (*Mn*), 085° W(*Nj*), 090° W(*Mn*). On 27 May ($\lambda=192^\circ$ Ls) *Mn* chased from $\omega=003^\circ$ W to 051° W: The shadowy areas of the spc became more complex. On 28 May ($\lambda=193^\circ$ Ls), δ reached $12.0''$, and *Mn* observed from $\omega=013^\circ$ W to $\omega=042^\circ$ W. On 29 May ($\lambda=194^\circ$ Ls) the seeing was broken because of a Typhoon. On 1 June ($\lambda=195^\circ$ Ls) *Mn* observed from $\omega=315^\circ$ W to 003° W where the complexity of the inside of the spc looked increased. Hellas and Noachis were off-white. In June *Mn* observed, in addition to 1 June, on 2 June ($\lambda=196^\circ$ Ls), 5 June ($\lambda=198^\circ$ Ls), 6 June ($\lambda=198^\circ$ Ls), 8 June ($\lambda=200^\circ$ Ls), 20 June ($\lambda=207^\circ$ Ls), 21 June ($\lambda=207^\circ$ Ls) at the Fukui City Observatory. During the period the diameter δ went up from $12.5''$ to $15.1''$, and *Mn* observed 42 times. On 12 June the Fukui district entered the rainy season, and hence the observations were rather stuck. However minute observations became possible: The spc and Hellas were topics but the latter was not so varied. On 5 June, the shadowy area of the spc showed a tint of ochre, and the perimeter became more complex. On 20 June at $\omega=123^\circ$ W a shadow came into the spc, and on 21 June at $\omega=123^\circ$ W there was seen a segment which was seen to the direction of EW so that at $\omega=133^\circ$ W, $\omega=143^\circ$ W it looked a rift lying inside the spc. On 21 June the rainy season ended in Okinawa.

3 The Second Period

Mn fled to Okinawa on 23 June ($\lambda=209^\circ$ Ls) to observe Mars further. From the outset the spc showed its details and the perimeter was shined by a bright small spot on 23 June at $\omega=094^\circ$ W and on 24 June ($\lambda=209^\circ$ Ls) at $\omega=099^\circ$ W ($\delta=15.4''$). The apparent declination was 15° S~ 14° S and the altitude was low at Fukui while at Naha it was higher by 10 degrees. At Naha it was possible to observe Mars every night through June and July (also observable whole in August except on 6 and 7 Aug when a Typhoon passed). At Fukui it was still in the rainy season and *Nj* met first the planet merely on 16 July ($\lambda=222^\circ$ Ls) at $\omega=214^\circ$ W, 223° W, (cloudy), 267° W, 277° W: Just *Nj* observed a shadowy band inside the spc and could check Syrtis Mj. Next Mars

appeared at Fukui on 27 July ($\lambda=229^\circ$ Ls) when *Nj* observed at $\omega=134^\circ$ W, 144° W, 154° W, 164° W, 173° W: *Nj* noticed a small bright spot at the perimeter of the spc from $\omega=144^\circ$ W to 164° W: It was considered to have passed the CM around at $\omega=150^\circ$ W. At Naha *Mn* observed at $\omega=132^\circ$ W, 142° W, 151° W, 161° W, 171° W, 180° W, 190° W, and saw the spot, but the spot had been apparent around since 22 July ($\lambda=226^\circ$ Ls) and rather was brighter at the beginning. Otherwise there appeared a bright perimeter spot on 23 July ($\lambda=227^\circ$ Ls) at $\omega=217^\circ$ W it was near the CM: The spc was complex around the days and another spot at the perimeter was observed on 24 July ($\lambda=228^\circ$ Ls) which was near the CM at $\omega=208^\circ$ W. On 25 July ($\lambda=228^\circ$ Ls) the spc further appeared more complex. The appearance of the perimeter bright spots was earlier: We may say it was at the end of July around at $\lambda=212^\circ$ Ls, and it was similar to the period when the dark segments were observed inside the spc. A most impressive fact was the decay of the perimeter spot to the north on 4 July ($\lambda=215^\circ$ Ls): *Mn* was not aware of it at $\omega=355^\circ$ W, but quite apparent at $\omega=005^\circ$ W: It was considered the decay of the water ice but it might have been a dust ejected from the spc perimeter. Already it was evening and *Mn* just chased it at $\omega=009^\circ$ W, 019° W. This was also observed by Hiroshi ISHADOH. To tell more, 4 July was the day when a prominent dust occurred at Noachis to Deucalionis R and concealed the eastern part of S Sabaeus. The western part of S Sabaeus showed a dense tint of reddish brown and it was evident this side was under a high pressure atmosphere and from this area a low blow of wind send the dust to the eastern side. S Sabaeus was recovered on the following 5 July ($\lambda=216^\circ$ Ls) and the remnant of the dust was active on Noachis. *Mn* chased this dust until 9 July ($\lambda=218^\circ$ Ls), and the observations are listed in Plate 4 below (made of 59 drawings). After the diminishment of the dust, M Serpentis was darker and became broader. Further analysis will be made in a coming issue of this Journal.

A tip of Novus Mons was seen already on 5 July ($\lambda=216^\circ$ Ls) and the following bright spot must have been Argenteus Mons to the north of which Argyre lay. On 20 July ($\lambda=225^\circ$ Ls) at $\Omega=200^\circ$ W there was seen a spot which was going to decay. On 25 July ($\lambda=228^\circ$ Ls) the half of the spc was quite shadowy in a tinge of ochre seen from $\omega=140^\circ$ W, and this must have been related with Depressio Parva: This implied there came the time when the centre of the spc began to deviate from the pole. On 27 July ($\lambda=230^\circ$ Ls) Olympus Mons began to be seen near the evening terminator associated with a shadowy spot: This might have been the shadow of the area of caldera to the preceding flank. Already the season of the orographic cloud passed. The inside of the spc looked further complex. We also

should note that the surface was still rather yellowish because of the dust activity at the beginning of July.

At the end of July, a dust disturbance was discovered at Capri Cornu at the US, and on 2 Aug ($\lambda=233^\circ$ Ls) it became observable from Naha, and on the day *Mn* together with Tohru IWASAKI observed the dust by the use of a 35cm SCT at the Tabata Observatory at $\omega=048^\circ$ W, 058° W, 068° W, 077° W, 087° W. This dust however became blurred on the following days.

Incidentally the area of Solis L was apparent around from 1 Aug ($\lambda=233^\circ$ Ls) and the area of Aurea Cerse was well observed until mid-August. Novus Mons was considered to be detached around from 9 Aug ($\lambda=238^\circ$ Ls): On 10 Aug and 11 Aug its rotation was well observed in detail.

At Fukui, on 2 Aug ($\lambda=233^\circ$ Ls) *Nj* could observe at $\omega=075^\circ$ W, 085° W, 114° W, 124° W, and chased the area of Solis L. The spc was still large, and at $\omega=133^\circ$ W *Nj* saw a bright spot at the perimeter of the spc. *Nj* also observed on 10 Aug ($\lambda=238^\circ$ Ls) the region of Syrtis Mj and S Sabaeus at $\omega=312^\circ$ W and 331° W, but the transparency was very poor.

In mid-Aug, the diameter went up to $\delta=24''$, and at Naha the details were increasingly trapped. Hellas was off-white but on 15 Aug ($\lambda=242^\circ$ Ls) it was rather reddish. On 19 Aug ($\lambda=244^\circ$ Ls) *Mn* was invited by Isao MIYAZAKI who owns a 40 cm Newtonian, and *Mn* observed 7 times the night. On 20 Aug ($\lambda=245^\circ$ Ls, $\delta=24.9''$) also *Mn* observed 9 times at the Miyazaki Observatory at Uruma through the night: At $\omega=267^\circ$ W, the circumpolar region including the spc was reddish. At the same time Phobos was seen. The preceding side of the spc (peripherally the preceding side of Novus Mons) looked ochre at $\omega=277^\circ$ W (*Mn-604D*). The spc was very complex. At Fukui, on 20 Aug the sky was a bit cleared but transparency was very poor: *Nj* however chased at $\omega=213^\circ$ W, 223° W, 233° W, 242° W. On 22 Aug ($\lambda=246^\circ$ Ls) *Mn* visited the Wakugawa Observatory near Naha and observed by using another 40cm Newtonian. At Naha, the sky continued to be fine every night: On 24 Aug ($\lambda=247^\circ$ Ls, $\delta=25.1''$) and 25 Aug ($\lambda=248^\circ$ Ls) *Mn* visited again the Miyazaki Observatory: On 24 Aug, *Mn* watched at $\omega=200^\circ$ W, 209° W, 219° W (Phobos and Deimos were visible), 231° W, 241° W, 251° W, 273° W, and on 25 Aug at $\omega=176^\circ$ W, 186° W, 196° W, 213° W, 223° W, 232° W, 257° W, 266° W, 276° W. On 26 Aug ($\lambda=249^\circ$ Ls) *Mn* observed at the routine place at Ameku at $\omega=187^\circ$ W, 197° W, 206° W, 216° W, 226° W, 236° W, 253° W, 263° W: On 27 Aug ($\lambda=249^\circ$ Ls) when the planet was closest to the Earth, *Mn* began to observe at 11:40 GMT at the Miyazaki Observatory and observed at $\omega=149^\circ$ W, $\omega=159^\circ$ W and returned to the routine place

and continued to observe from 14:20 GMT at $\omega=188^\circ\text{W}$, 197°W , 207°W , 217°W , 240°W (18:30 GMT): At Fukui it was cloudy on the day. The planet was at opposition on 28 Aug ($\lambda=250^\circ\text{Ls}$): *Mn* observed 9 times from $\omega=169^\circ\text{W}$ to $\omega=259^\circ\text{W}$. On 29 Aug ($\lambda=250^\circ\text{Ls}$) *Mn* also watched 8 times. The season was the time when the great dust storm occurred in 1956, but no news this time. On 30 Aug ($\lambda=251^\circ\text{Ls}$) *Mn* observed 7 times and at $\omega=251^\circ\text{W}$, 171°W Olympus Mons came into sight and bright because of the "opposition effect". A projection was seen from the spc. The day was the last *Mn* observed at Naha. At Fukui *Nj* observed on 31 Aug at $\omega=111^\circ\text{W}$, 121°W but the condition was very poor and could not continue though $\delta=25.0''$.

Observations in this period were mainly made at Naha, and so we omitted the details because the data are enormous: Instead we will supplement the observations by showing the sketches at Naha in plates below. Further analysis will be given in the following issues.

4 The Third Period

The following are the data made by *Nj* and *Mn* at the Fukui observatory from 1 September on. On 1 Sept ($\lambda=252^\circ\text{Ls}$) *Mn* returned home and observed at the Fukui City Observatory. *Mn* watched 9 times from 12:10 GMT to 17:40 GMT (from $\omega=112^\circ\text{W}$ to 193°W). Nix Olympica was apparent from morning to evening (the phase angle $\iota=6^\circ$). The preceding part of the spc was seen in ochre colour and then a projection appeared: The latter must have been from Thyles Mons. On 2 Sept ($\lambda=252^\circ\text{Ls}$) again *Mn* saw Nix Olympica. Temperature inside the dome was 27°C which was lower at Naha by 10°C . *Nj* joined on 3 Sept ($\lambda=253^\circ\text{Ls}$) and observed the area of Solis L at $\omega=085^\circ\text{W}$. On 4 Sept ($\lambda=254^\circ\text{Ls}$) *Nj* met the best condition this summer at $\omega=083^\circ\text{W}$ and watched the region of the singular Solis L and the area of the complex spc at $\delta=24.8''$. *Mn* also watched and caught the area of Solis L: Iuventae Fons and Aurea Cherso were caught as in Naha. On 5 Sept ($\lambda=255^\circ\text{Ls}$) *Mn* observed 8 times from $\omega=069^\circ\text{W}$ to $\omega=155^\circ\text{W}$ and saw Nix Olympica at $\omega=118^\circ\text{W}$, 128°W : Since $\iota=8^\circ$, it was reaching a limit. On 6 Sept ($\lambda=255^\circ\text{Ls}$) *Nj* observed 6 times from $\omega=056^\circ\text{W}$ to 105°W , and first caught Aurea Cherso. On the day *Mn* watched 5 times from $\omega=070^\circ\text{W}$ to $\omega=109^\circ\text{W}$: *Nj* and *Mn* observed that the spc looked split into two. On 7 Sept ($\lambda=256^\circ\text{Ls}$) we observed at $\omega=047^\circ\text{W}$ (*Nj*), 054°W (*Mn*), 065°W (*Nj*), 071°W (*Mn*), 080°W (*Mn*), 090°W (*Mn*), 100°W (*Mn*), 110°W (*Mn*). At 100°W (*Mn*), 110°W (*Mn*), Nix Olympica was seen in the morning: Since $\iota=10^\circ$, this must have been a limit.

On 8 Sept ($\lambda=256^\circ\text{Ls}$), *Nj* observed at $\omega=038^\circ\text{W}$, 048°W , 057°W : The spc is rather off-white. On 9 Sept ($\lambda=257^\circ\text{Ls}$), *Mn* observed 4 times from $\omega=061^\circ\text{W}$ to $\omega=092^\circ\text{W}$. On 11 Sept ($\lambda=259^\circ\text{Ls}$), *Mn* noticed the south circumpolar large area showed the wine colour when seen at $\omega=045^\circ\text{W}$ under a good seeing: The NH was rather yellowish. On 12 Sept ($\lambda=259^\circ\text{Ls}$) the seeing condition was very poor. δ decreased to $24''$. On 13 Sept ($\lambda=260^\circ\text{Ls}$), the seeing was poor. On 14 Sept ($\lambda=260^\circ$) *Mn* started at 10:20 GMT and ended at 16:20 GMT. On 15 Sept ($\lambda=261^\circ\text{Ls}$), the seeing improved, *Mn* observed 9 times from 10:20 GMT ($\omega=321^\circ\text{W}$) to 17:00 GMT ($\omega=058^\circ\text{W}$): Novus Mons became smaller, and its rotation was well chased; on the surface where Solis L was seen the spc looked split. Orestes and Electra were visible as *Mn* saw at Naha. On the NH, Niliacus L was seen. *Nj* observed at 12:20 GMT ($\omega=350^\circ\text{W}$) and checked the smaller Novus Mons. On 16 Sept ($\lambda=262^\circ\text{Ls}$), *Mn* and *Nj* observed at $\omega=322^\circ\text{W}$ (*Mn*), 326°W (*Nj*), 331°W (*Mn*), 336°W (*Nj*), 341°W (*Mn*), 346°W (*Nj*), 351°W (*Mn*), 001°W (*Mn*), 010°W (*Mn*), 020°W (*Mn*), 030°W (*Mn*): On 17 Sept ($\lambda=262^\circ\text{Ls}$) we began at $\omega=313^\circ\text{W}$ (*Mn*) and continued as follows at 318°W (*Nj*), 322°W (*Mn*), 327°W (*Nj*), 332°W (*Mn*), 337°W (*Nj*), 342°W (*Mn*), 351°W (*Mn*), 001°W (*Mn*), 011°W (*Mn*), 021°W (*Mn*), 030°W (*Mn*) (16:20 GMT). The high latitude SH looked misty but Novus Mons faintly seen. On 18 Sept ($\lambda=263^\circ\text{Ls}$) *Mn* observed 7 times from $\omega=292^\circ\text{W}$ to 012°W : At $\omega=321^\circ\text{W}$ Hellas appeared to be disturbed at the N part. The weather then grew worse though we observed on 21 and 22 Sept ($\lambda=266^\circ\text{Ls}$): Still Novus Mons was visible. The sky improved on 26 Sept ($\lambda=268^\circ\text{Ls}$) when we observed at $\omega=229^\circ\text{W}$ (*Mn*), 234°W (*Nj*), 239°W (*Mn*), 244°W (*Nj*), 249°W (*Mn*), 254°W (*Nj*), 258°W (*Mn*), 263°W (*Nj*), 268°W (*Mn*), 273°W (*Nj*), 278°W (*Mn*), 283°W (*Nj*), 288°W (*Mn*), 293°W (*Nj*), 297°W (*Mn*): Trinacria was interesting to watch. On 27 Sept ($\lambda=269^\circ\text{Ls}$) Novus Mons was still checked. Now $\delta=21.4''$. *Mn* observed 4 times from $\omega=259^\circ\text{W}$ to 288°W : M Tyrrhenum was rather darker than Syrtis Mj. On 28 Sept ($\lambda=270^\circ\text{Ls}$) *Mn* watched 7 times from $\omega=211^\circ\text{W}$ to $\omega=279^\circ\text{W}$ and *Nj* did 4 times from $\omega=206^\circ\text{W}$ to 236°W . Syrtis Mj was seen at the morning terminator but showed no particular colours. The spc became smaller but the perimeter was not yet smooth. Next it was possible to observe on 30 Sept ($\lambda=271^\circ\text{Ls}$) from 9:30 GMT: *Mn* watched 4 times from $\omega=173^\circ\text{W}$ and *Nj* did 3 times from $\omega=198^\circ\text{W}$.

On 2 Oct ($\lambda=272^\circ\text{Ls}$) we observed at $\omega=165^\circ\text{W}$ (*Mn*), 174°W (*Mn*), 179°W (*Nj*), 184°W (*Mn*), 189°W (*Nj*), cloudy, 199°W (*Nj*), 203°W (*Mn*), 213°W (*Mn*), $\omega=230^\circ\text{W}$ (*Mn*), 242°W (*Mn*): On 3 Oct ($\lambda=273^\circ\text{Ls}$), *Mn* chased 6 times from $\omega=165^\circ\text{W}$ to 238°W and similarly on 4 Oct ($\lambda=273^\circ\text{Ls}$)

Mn did 7 times from $\omega=136^\circ$ W to $\omega=205^\circ$ W: δ went down just to $20''$. At the morning terminator to the west of the spc there was seen a frost. On 6 Oct ($\lambda=274^\circ$ Ls) we observed at 128° W (*Mn*), 137° W (*Mn*), 142° W (*Nj*), 147° W (*Mn*), 152° W (*Nj*), 157° W (*Mn*), 162° W (*Nj*), 167° W (*Mn*): The northern limb was light. On 7 Oct ($\lambda=275^\circ$ Ls), *Mn* observed 8 times from $\omega=099^\circ$ W to $\omega=172^\circ$ W. The spc was still roundish visible. On 8 Oct ($\lambda=276^\circ$ Ls), *Mn* began to watch from the twilight time at 8:50 GMT and observed 9 times from $\omega=090^\circ$ W to $\omega=167^\circ$ W: The southern high latitude region has a tint of wine colour. At $\omega=090^\circ$ W the western part of the spc was brighter. On 9 Oct ($\lambda=276^\circ$ Ls) we watched at $\omega=080^\circ$ W (*Mn*), 090° W (*Mn*), 100° W (*Mn*), 105° W (*Nj*), 110° W (*Mn*), 115° W (*Nj*), 119° W (*Mn*), 125° W (*Nj*), 129° W (*Mn*), 135° W (*Nj*), 139° W (*Mn*), 149° W (*Mn*), 159° W (*Mn*): Temperature inside the dome was 17° C. On 12 Oct ($\lambda=278^\circ$ Ls) *Mn* observed 6 times up until $\omega=113^\circ$ W. The morning and the evening mist looked thick. The evening side showed Chryse. On 15 Oct ($\lambda=280^\circ$ Ls) we started at 8:50 GMT (17:50 JST) and observed at $\omega=025^\circ$ W (*Mn*), 034° W (*Mn*), 044° W (*Mn*), 049° W (*Nj*), 054° W (*Mn*), 059° W (*Nj*), 068° W (*Nj*), 073° W (*Mn*), 083° W (*Mn*), 098° W (*Mn*): The limb peripheral side of the planet was covered by mist, and around at $\omega=083^\circ$ W the morning side of the southern higher latitudes was more whitish and the evening side was off-white (dusty colour). The spc was well bright. On 16 Oct ($\lambda=281^\circ$ Ls) *Mn* observed 4 times from $\omega=045^\circ$ W to $\omega=074^\circ$ W. The time of setting of Mars became earlier, and so on 17 Oct ($\lambda=281^\circ$ Ls) we searched the planet before the Sunset and could begin to observe at 8:10 GMT ($\omega=357^\circ$ W): Hellas was bright near the evening limb and the both sides were misty. The morning side near the spc looked frosty. The SH was a bit faded ruddy, and the rest was yellowish. On 18 Oct ($\lambda=272^\circ$ Ls) *Mn* observed 7 times from $\omega=357^\circ$ W to $\omega=072^\circ$ W until S Meridiani set to the rear side. Upper Noachis appeared sandy. On 19 Oct ($\omega=282^\circ$ W) *Mn* started from 8:10 GMT before sunset and observed 11 times from $\omega=337^\circ$ W to $\omega=072^\circ$ W. The southern higher latitudes were wine coloured, and the NH was reddish though generally the surface was yellowish. At $\omega=357^\circ$ W the spc looked slightly deformed and at $\omega=016^\circ$ W, there was seen a small protrusion from the spc. At $\omega=026^\circ$ W, Aonius S appeared dark. On 20 Oct ($\lambda=283^\circ$ Ls) δ became under $17''$: *Mn* observed from 7:30 GMT (16:30 JST) before the Sunset from $\omega=328^\circ$ W to $\omega=040^\circ$ W: Mare Australe was extremely dark. On 22 Oct ($\lambda=284^\circ$ Ls) we began from 8:50 GMT at $\omega=319^\circ$ W (*Mn*) and continued at 329° W (*Mn*), 338° W (*Mn*), 343° W (*Nj*), 348° W (*Mn*), 353° W (*Nj*), 358° W (*Mn*), 008° W (*Mn*): On 24 Oct ($\lambda=286^\circ$ Ls) *Mn* watched from $\omega=307^\circ$ W to $\omega=006^\circ$ W. On 25 Oct ($\lambda=286^\circ$ Ls) *Nj* observed at $\omega=312^\circ$ W and $\omega=$

322° W. $\delta=16''$. On 26 Oct ($\lambda=287^\circ$ Ls) *Mn* observed 10 times from $\omega=259^\circ$ W to $\omega=347^\circ$ W and *Nj* did 4 times from $\omega=303^\circ$ W to $\omega=332^\circ$ W. On 27 Oct ($\lambda=287^\circ$ Ls) *Mn* watched 10 times from $\omega=250^\circ$ W (before Sunset) to $\omega=337^\circ$ W and *Nj* did 4 times from $\omega=294^\circ$ W to $\omega=323^\circ$ W: The NW part of Hellas was habitually light in crème colour and Ausonia was bright near the evening limb. The both sides were whitish misty. On 30 Oct ($\lambda=289^\circ$ Ls), *Mn* observed 9 times from $\omega=221^\circ$ W (7:20 GMT) to $\omega=299^\circ$ W: The northern end of M Tyrrhenum was particularly dark. At $\omega=280^\circ$ W the south circumpolar region was quite wine coloured. Even as the next month came in, we were able to continue as well: On 1 Nov ($\lambda=290^\circ$ Ls, $\delta=14.9''$) *Mn* and *Nj* observed 9 times and 7 times respectively: *Mn* from $\omega=222^\circ$ W to $\omega=300^\circ$ W and *Nj* from $\omega=227^\circ$ W to $\omega=285^\circ$ W. On 2 Nov ($\lambda=291^\circ$ Ls) *Nj* observed 6 times from $\omega=217^\circ$ W to $\omega=266^\circ$ W. On 4 Nov ($\lambda=291^\circ$ Ls) *Mn* watched 8 times from $\omega=183^\circ$ W to $\omega=252^\circ$ W:

On the very night there was detected an unprecedented phenomenon: That is, *Mn* discovered at $\omega=203^\circ$ W (9:20 GMT) a strange protrusion from the terminator of the SH. It was considered near Ausonia. It was apparent that it was not any dust disturbance because the area to the spc was wine coloured, but it was possible it was a mere temporary phenomenon. The sky was cloudy on 5 Nov: On 6 Nov ($\lambda=293^\circ$ Ls) *Mn* could observe from $\omega=164^\circ$ W to $\omega=194^\circ$ W but then it became cloudy and so he could not reach $\omega=203^\circ$ W. However at $\omega=194^\circ$ W, the seeing was better so that Thyle appeared roundish made of several small spots. On 7 Nov ($\lambda=294^\circ$ Ls) *Mn* began to observe from $\omega=155^\circ$ W until $\omega=242^\circ$ W 9 times, and at $\omega=203^\circ$ W, surprisingly *Mn* detected the same protrusion as he saw on 4 Nov. Its existence was thus not doubtful and not so temporary. Ausonia was not bright. It was seen also at $\omega=213^\circ$ W, and so by a mobile *Mn* called up MIYAZAKI at Naha and asked to check the observation: Unfortunately it was cloudy at Okinawa, but on the following day he was quite successful in taking several ccd images of the protrusion. $\delta=13.9''$. On 8 Nov it was cloudy at Fukui. Later we found that Yukio MORITA at Hiroshima had imaged the protrusion on 7 Nov at $\omega=211^\circ$ W by ccd. As to this phenomenon we will discuss in a coming issue in relation with the Solar activity at that time.

At Fukui, *Mn* and *Nj* eagerly waited but the weather remained poor, and on 11 Nov ($\lambda=297^\circ$ Ls) we could a bit observe but until 185° W under a poor seeing. We tried on 12 Nov, 13 Nov, 14 Nov but the angle was far away. From 14 Nov ($\lambda=298^\circ$ Ls) we returned to the routine observations, and *Mn* observed 8 times from $\omega=075^\circ$ W to $\omega=163^\circ$ W, and *Nj* did twice at $\omega=119^\circ$ W and 129° W. On 17 Nov

($\lambda=300^\circ$ Ls) similarly we started before Sunset from $\omega=046^\circ$ W(*Mn*) to $\omega=100^\circ$ W(*Nj*). *Mn* observed on 18 Nov ($\lambda=301^\circ$ W), 23 Nov ($\lambda=304^\circ$ Ls), 26 Nov ($\lambda=305^\circ$ Ls) and obtained 22 drawings. On 23 Nov at $\omega=348^\circ$ W, the total observations of *Mn* reached 1000 when $\delta=11.9''$.

In December the weather became dismal. On 3 Dec ($\lambda=309^\circ$ Ls) *Mn* observed 3 times at $\omega=305^\circ$ W etc. On 5 Dec ($\lambda=311^\circ$ Ls) *Mn* did at $\omega=298^\circ$ W etc, and on 10 Dec ($\lambda=314^\circ$ Ls) watched at $\omega=181^\circ$ W ~ $\omega=242^\circ$ W.

On 13 Dec ($\lambda=315^\circ$ Ls) Don PARKER in Florida discovered a conspicuous dust cloud in Chryse at $\omega=072^\circ$ W, 092° W when $\delta=9.9''$. We could not wait for the cloud because of the bad weather. On 22 Dec ($\lambda=321^\circ$ Ls) *Mn* watched at $\omega=085^\circ$ W et al, and on 25 Dec ($\lambda=037^\circ$ Ls) at $\omega=046^\circ$ W, but it was not any chase though the effect of the dust was noticed. *Mn* and *Nj* observed the region of S Sabaeus on 28 Dec ($\lambda=324^\circ$ Ls), and on 30 Dec ($\lambda=325^\circ$ Ls).

As the 2004 New Year came in, *Mn* and *Nj* first observed on 4 Jan 2004 ($\lambda=328^\circ$ Ls) when *Mn* observed 7 times from $\omega=301^\circ$ W (7:20 GMT) to $\omega=317^\circ$ W and *Nj* 3 times from $\omega=306^\circ$ W to $\omega=334^\circ$ W. On 5 Jan ($\lambda=329^\circ$ Ls) *Mn* chased 11 times from 6:40 GMT ($\omega=282^\circ$ W), and on 6 Jan ($\lambda=329^\circ$ Ls) 10 times from 6:00 GMT ($\omega=262^\circ$ W). On 9 Jan ($\lambda=330^\circ$ Ls) *Mn* observed 9 times from 5:30 GMT ($\omega=225^\circ$ W). However the winter weather prevailed then. It snowed several times and once the snow was 50cm thick. We could reopen the dome on 31 Jan ($\lambda=343^\circ$ Ls) and observed 8 times from $\omega=027^\circ$ W to $\omega=095^\circ$ W. Succeeding observations were as follows: *Mn* observed 7 times on 10 Feb ($\lambda=348^\circ$ Ls), 9 times on 18 Feb ($\lambda=352^\circ$ Ls), 6 times on 19 Feb ($\lambda=353^\circ$ Ls), 6 times on 20 Feb ($\lambda=353^\circ$ Ls). In March, we observed on 10 Mar ($\lambda=002^\circ$ Ls); just the northern spring equinox, but the tilt was still $\phi=14^\circ$ S. In the following we observed on 13 Mar ($\lambda=002^\circ$ Ls) by *Mn* and *Nj*, 15 Mar ($\lambda=005^\circ$ Ls) by *Mn*, 16 Mar ($\lambda=005^\circ$ Ls) by *Mn*, 21 Mar ($\lambda=008^\circ$ Ls) by *Mn* and *Nj*, 27 Mar ($\lambda=011^\circ$ Ls) by *Mn* and *Nj*, 28 Mar ($\lambda=012^\circ$ Ls) by *Mn* and *Nj*. In April, it was as follows: on 8 Apr ($\lambda=012^\circ$ Ls) by *Mn*, 12 Apr ($\lambda=019^\circ$ Ls) by *Mn*, 20 Apr ($\lambda=022^\circ$ Ls) by *Mn*. From 22 Apr to 9 May, Bill SHEEHAN stayed in Japan and attended the Lowell Conference which was held at Anamidzu. He also visited the Fukui City Observatory. Still *Mn* observed on 14 May ($\lambda=033^\circ$ Ls), 25 May ($\lambda=038^\circ$ Ls), 1 June ($\lambda=041^\circ$ Ls), and finally on 4 June ($\lambda=043^\circ$ Ls). A total of 1158 drawings were obtained in this great season. The last sketch was at $\omega=298^\circ$ W, $\phi=10^\circ$ N and the north polar cap was seen. The observations in the Third Period were all made at the Fukui City Observatory.

Appendix: The following are data of the drawings in Plates:

Plate 1:

Mn-451D: 24 July $\lambda=228^\circ$ Ls $\omega=169^\circ$ W 25cm spec
 Mn-490D: 31 July $\lambda=232^\circ$ Ls $\omega=115^\circ$ W 25cm spec
 Mn-493D: 31 July $\lambda=232^\circ$ Ls $\omega=144^\circ$ W 25cm spec
 Mn-505D: 02 Aug $\lambda=233^\circ$ Ls $\omega=058^\circ$ W 35cm SCT
 Mn-508D: 02 Aug $\lambda=233^\circ$ Ls $\omega=087^\circ$ W 35cm SCT
 Mn-515D: 03 Aug $\lambda=234^\circ$ Ls $\omega=059^\circ$ W 25cm spec
 Mn-521D: 04 Aug $\lambda=235^\circ$ Ls $\omega=040^\circ$ W 25cm spec
 Mn-540D: 09 Aug $\lambda=238^\circ$ Ls $\omega=063^\circ$ W 25cm spec
 Mn-551D: 11 Aug $\lambda=239^\circ$ Ls $\omega=337^\circ$ W 25cm spec
 Mn-554D: 11 Aug $\lambda=239^\circ$ Ls $\omega=006^\circ$ W 25cm spec
 Mn-555D: 11 Aug $\lambda=239^\circ$ Ls $\omega=026^\circ$ W 25cm spec
 Mn-562D: 12 Aug $\lambda=240^\circ$ Ls $\omega=027^\circ$ W 25cm spec

Plate 2:

Mn-563D: 12 Aug $\lambda=240^\circ$ Ls $\omega=036^\circ$ W 25cm spec
 Mn-566D: 13 Aug $\lambda=240^\circ$ Ls $\omega=339^\circ$ W 25cm spec
 Mn-570D: 13 Aug $\lambda=240^\circ$ Ls $\omega=018^\circ$ W 25cm spec
 Mn-584D: 17 Aug $\lambda=243^\circ$ Ls $\omega=274^\circ$ W 25cm spec
 Mn-591D: 18 Aug $\lambda=240^\circ$ Ls $\omega=285^\circ$ W 25cm spec
 Mn-595D: 19 Aug $\lambda=244^\circ$ Ls $\omega=271^\circ$ W 40cm spec
 Mn-601D: 20 Aug $\lambda=245^\circ$ Ls $\omega=238^\circ$ W 40cm spec
 Mn-605D: 20 Aug $\lambda=245^\circ$ Ls $\omega=286^\circ$ W 40cm spec
 Mn-608D: 20 Aug $\lambda=245^\circ$ Ls $\omega=316^\circ$ W 40cm spec
 Mn-620D: 23 Aug $\lambda=247^\circ$ Ls $\omega=243^\circ$ W 25cm spec
 Mn-623D: 23 Aug $\lambda=247^\circ$ Ls $\omega=289^\circ$ W 25cm spec
 Mn-629D: 24 Aug $\lambda=247^\circ$ Ls $\omega=241^\circ$ W 40cm spec

Plate 3:

Mn-633D: 25 Aug $\lambda=248^\circ$ Ls $\omega=186^\circ$ W 40cm spec
 Mn-638D: 25 Aug $\lambda=248^\circ$ Ls $\omega=257^\circ$ W 40cm spec
 Mn-640D: 25 Aug $\lambda=248^\circ$ Ls $\omega=276^\circ$ W 40cm spec
 Mn-644D: 26 Aug $\lambda=249^\circ$ Ls $\omega=216^\circ$ W 25cm spec
 Mn-649D: 27 Aug $\lambda=249^\circ$ Ls $\omega=149^\circ$ W 40cm spec
 Mn-659D: 28 Aug $\lambda=250^\circ$ Ls $\omega=199^\circ$ W 25cm spec
 Mn-681D: 01 Sept $\lambda=252^\circ$ Ls $\omega=124^\circ$ W 20cm refr
 Mn-684D: 01 Sept $\lambda=252^\circ$ Ls $\omega=153^\circ$ W 20cm refr
 Mn-709D: 06 Sept $\lambda=256^\circ$ Ls $\omega=099^\circ$ W 20cm refr
 Mn-722D: 11 Sept $\lambda=259^\circ$ Ls $\omega=045^\circ$ W 20cm refr
 Mn-741D: 15 Sept $\lambda=261^\circ$ Ls $\omega=029^\circ$ W 20cm refr
 Mn-754D: 17 Sept $\lambda=262^\circ$ Ls $\omega=322^\circ$ W 20cm refr

Plate 4: Dust Disturbance from 4 July to 10 July

2003年の火星(その1)

中島 孝*・南 政次**

(要旨) 第一部として2003年のわれわれ二人の観測(於: 福井, 沖縄)について概略を述べた。

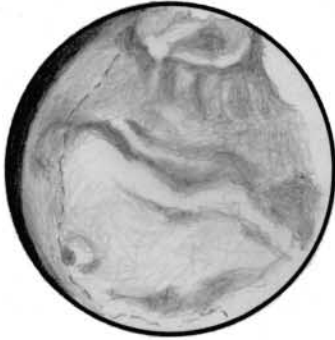
キーワード: 2003年の火星, 福井市自然史博物館天文台, 沖縄遠征での観測

*〒918-8056 福井市若杉浜1丁目407

**〒913-0048 坂井市三国町緑ヶ丘3-6-74

Plate I

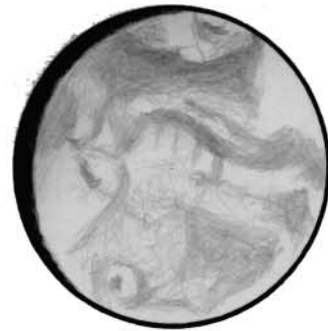
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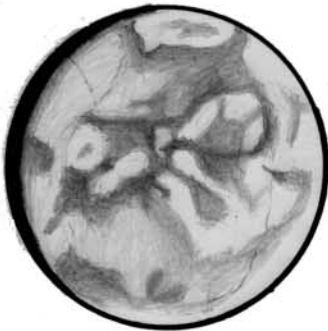
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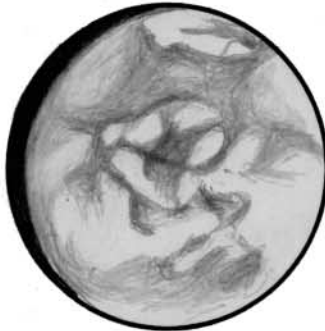
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Mn-505D



Mn-508D



Mn-515D



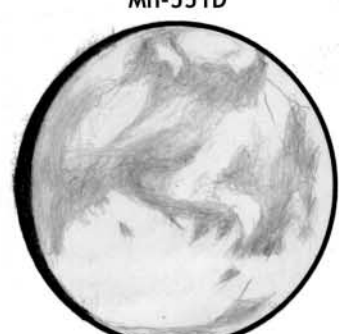
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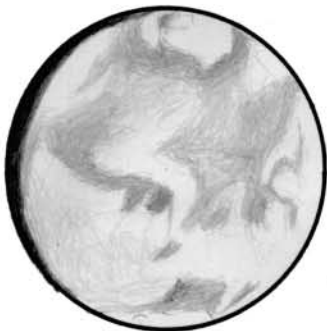
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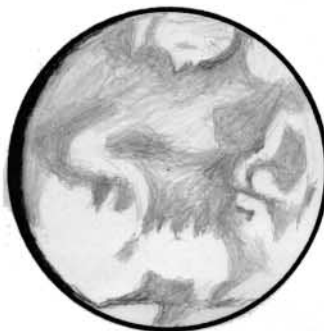
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Mn-554D



Mn-555D



Mn-562D

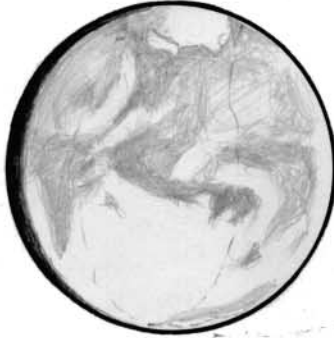


Plate II

Mn-563D



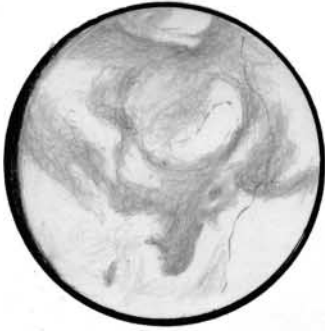
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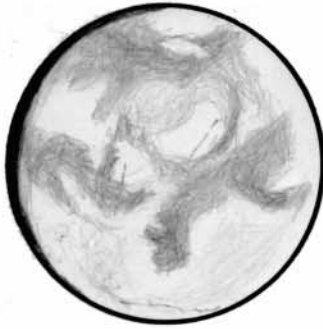
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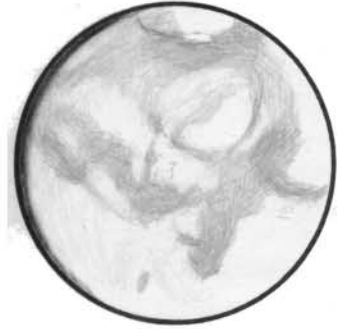
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Mn-591D



Mn-595D



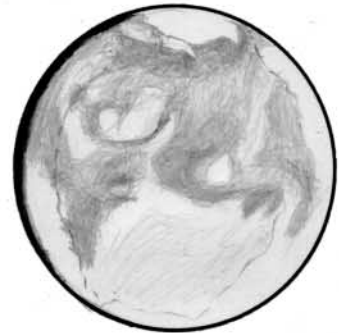
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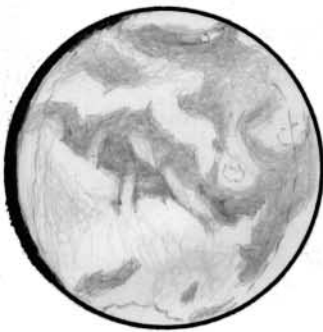
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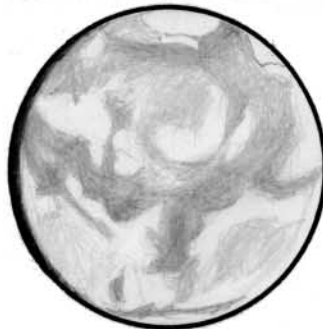
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Mn-620D



Mn-623D



Mn-629D

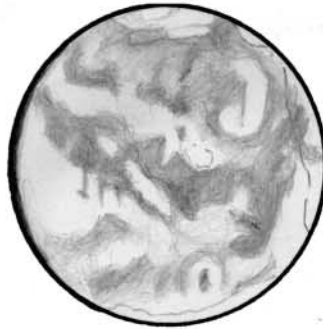


Plate III

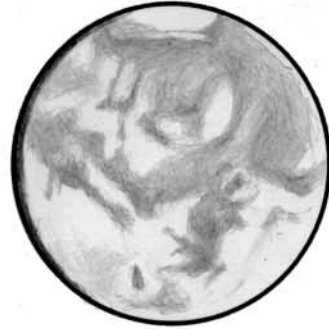
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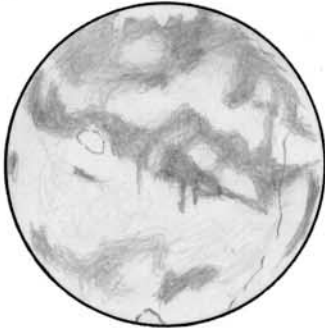
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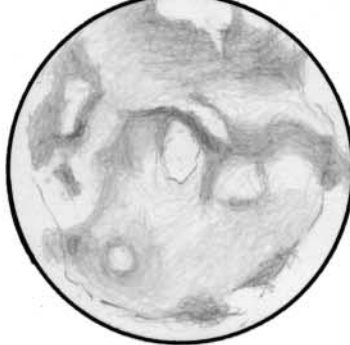
Mn-640D



Mn-644D



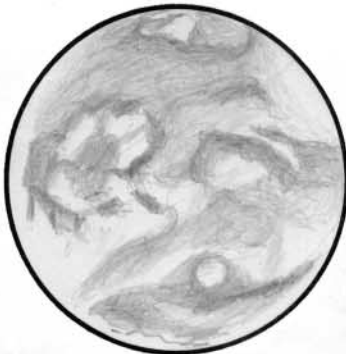
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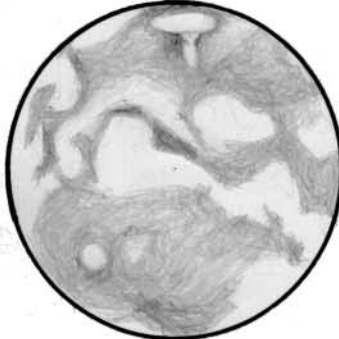
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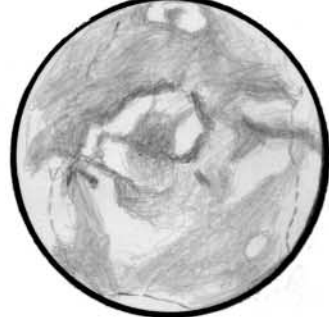
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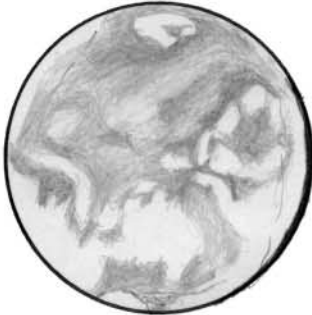
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Mn-709D



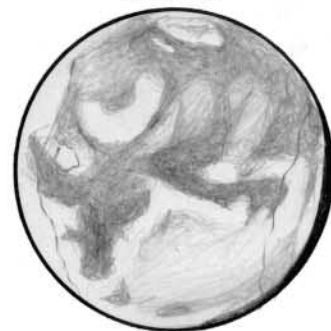
Mn-722D



Mn-741D

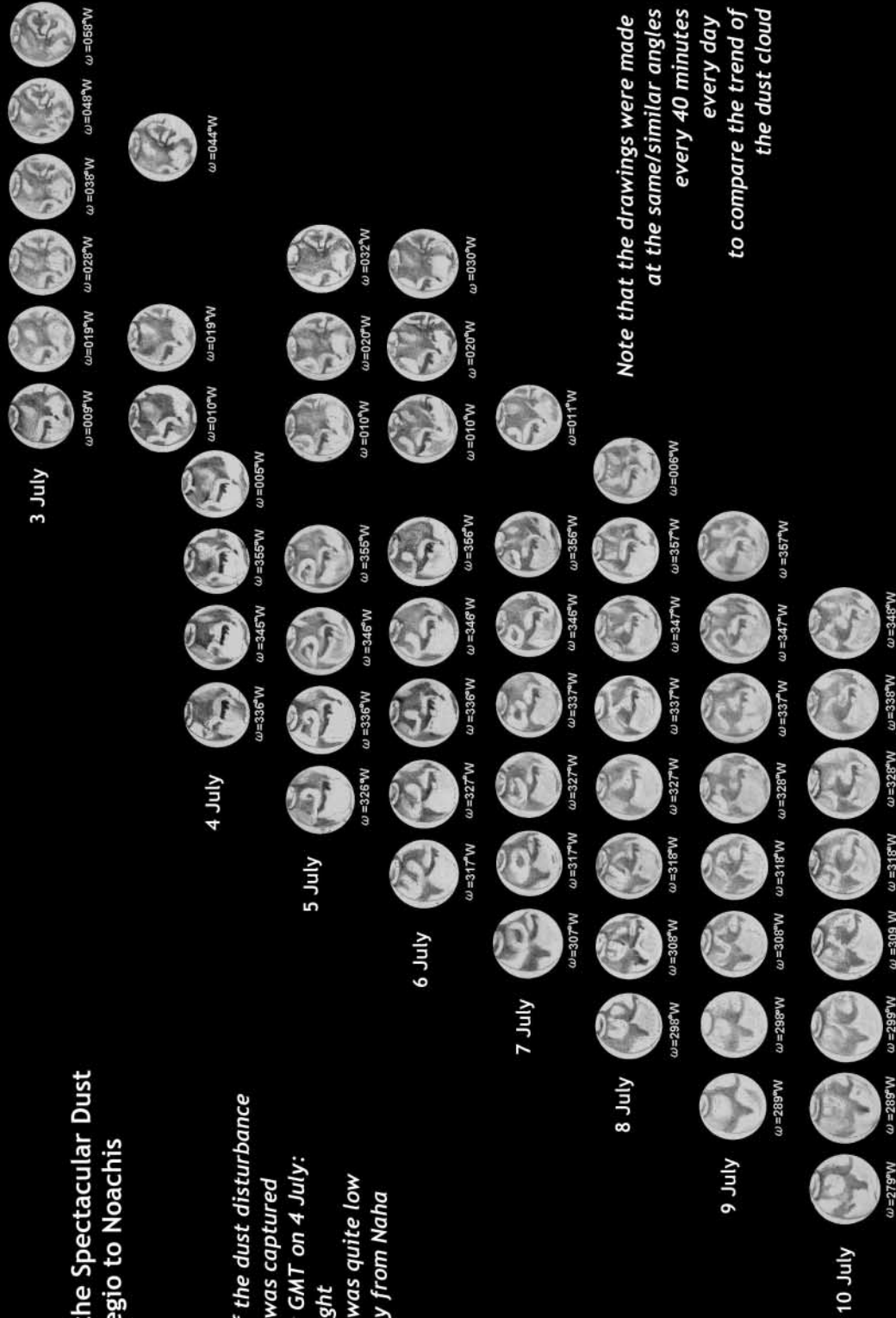


Mn-754D



**Rise and Fall of the Spectacular Dust
at Deucalionis Regio to Noachis
in July 2003**

*The first sight of the dust disturbance
at Deucalionis R was captured
at Naha at 15hrs GMT on 4 July:
It was still midnight
when the planet was quite low
in the eastern sky from Naha*



*Note that the drawings were made
at the same/similar angles
every 40 minutes
to compare the trend of
the dust cloud*

**Observer: Masatsugu MINAMI
by the use of a 25cm Newtonian
on the expedition to Naha, Okinawa, JAPAN**

$$\lambda=215^{\circ}\text{Ls} - \lambda = 218^{\circ}\text{Ls}, \quad \phi = 21^{\circ}\text{S}, \quad \delta = 17.1^{\circ} - \delta = 18.4^{\circ}, \quad \iota = 36^{\circ} - \iota = 34^{\circ}$$