

A Revised List of Dust Storms on Mars

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A table of dust clouds and storm observed on Mars by ground-based observers and spacecraft missions. List covers 1886 through 2020.

Year	1	Date Span	LS Span	Location	Type	Ref
1886	2	May 21-May 25	117-118	Syrtis Major-Meroe-Boreosyrtis	Regional	45
1873	3	May 24-25	146-147	Aeria	Dust Cloud	1
1877	4	Sep 24-oct 10	271-281	Thaumasia	Regional	45
1890	5	Jul 05-06	183-184	Tempe	Dust Cloud	3
1892	6	Jul 02-03	207-208	Hellespontus	Dust Cloud	4
1892	6	Jul 11-13	213-216	Hellespontus-Noachis	Dust Cloud	4
1894	7	Oct 10-nov 01	297-310	Libya-Isidis	Regional	45
1894	7	Nov 25-26	322-325	Protei, Argyre	Dust Cloud	8
1900	8	Dec 07-08	033-034	Sabaeus S-Icarium	Dust Cloud	11
1903	9	May 26-27	123-125	Chryse	Dust Cloud	11
1905	10	Apr 30-jun 15	139-163	Thaumasia	Regional	45
1905	10	Jul 27-29	186-187	Cerberus I-Elysium	Dust Cloud	10
1907	11	Jul 29-30	212-213	Libya-Cimmerium M	Dust Cloud	5
1909	12	Jun 03-Sept 20	206-274	Hellas	Encircling	18
1909	12	Oct 06-oct 19	284-292	Thaumasia	Regional	45
1911	13	Oct 06-07	310	Hellas-Ausonia	Dust Cloud	13
1911	13	Oct 11-18	312-316	Libya-Eridania	Local	5
1911	13	Oct 10-oct 20	312-318	Libya-Isidis	Regional	45
1911	13	Nov 13-14	325-015	Hellas	Regional	1
1912	14	Jan 15-16	003-004	Noachis-Hellas	Dust Cloud	13
1913	15	Dec 31-01	018-019	Argyre	Dust Cloud	13
1914	16	Jan 25-26	028-029	Argyre	Dust Cloud	13
1914	16	Jan 28-29	030-031	Argyre	Dust Cloud	13
1914	16	Feb 02-03	032-034	Deucalionis Regio	Dust Cloud	13
1914	16	Feb 06-07	034-035	Sabaeus S-Argyre	Dust Cloud	13
1914	16	Feb 10-11	036-042	Hellas-Eridania	Local	13
1914	16	Feb 17-18	039-040	Phaethontis	Dust Cloud	13
1915	17	Jan 24-25	206-207	Phaethontis-Icaria	Dust Cloud	13
1915	17	Dec 28-29	037-038	Aeolis-Elysium	Dust Cloud	13
1922	18	Jul 09-10	190-193	Margaritifer-Chryse	Local	5
1922	18	May 07-may 22	156-164	Thaumasia	Regional	45
1922	18	Jun 11-aug 01	175-205	Hellas	Regional	45
1922	18	Jul 09-jul 15	191-195	Margaritifer S.	Regional	45
1924	19	Jun 11-Aug 1	200-232	Hellas	Regional	18
1924	19	Aug 09-10	236-037	Isidis R.-Libya	Local	15
1924	19	Oct 10-13	275-278	Yaonis-Hellas-ThyleII	Local	1

1924	19	Oct 20-27	282-286	Hellas	Local	14
1924	19	Dec 09-Feb 25	312-355	Hellas	Encircling	18
1926	20	Nov 28-dec 17	330-341	Libya-Isidis	Regional	45
1926	20	Oct 25-26	310-311	Libya-Isidis-Ausonia	Local	5
1926	20	Dec 18-feb 03	341-005	Thaumasia	Regional	45
1935	21	Apr 04	110	Tempe-Arcadia	Regional	45
1937	22	May 02-05	145-147	Syrtis Major-Isidis	Dust Cloud	5
1937	22	May 25-29	158-159	Candor-Niliacus L.	Local	5
1937	22	Jun 02-jun 05	161-163	Thaumasia	Regional	45
1937	22	Jun 25-jul 08	173-181	Zephyria-Atlantis	Regional	45
1939	23	May 11-may 17	172-176	Libya-Isidis	Regional	45
1939	23	Jun 07-jun 12	188-191	Hellas	Regional	45
1939	23	Oct 02-oct 15	260-268	Thaumasia	Regional	45
1941	24	Aug 12-aug 24	255-263	Thaumasia	Regional	45
1941	24	Aug 23-aug 24	262-263	Electris-Phaethontis	Regional	45
1941	24	Nov 12-28	312-327	Libya-Phaethontis	Regional	5
1941	25	Nov 15-Dec 02	337-346	Hellas	Regional	45
1943	25	Sep 28-oct 16	311-321	Libya-Isidis	Regional	45
1943	25	Nov 03-05	310-315	Libya-Hesperia	Local	15
1943	25	Dec 20-Dec 27	356-359	Argyre-Noachis	Regional	45
1952	26	Apr 18-May 24	129-148	Tempe-Arcadia	Regional	45
1954	27	Jun 02	175	Ulysses-Phoenicia L.	Local	9
1954	27	Aug 17-Sep 06	221-233	Thrsrsis-Memmonia	Regional	45
1956	28	May 30-aug 15	199-247	?	Regional	45
1956	28	Aug 19-oct 25	249-291	Hellas	Regional	45
1956	28	Aug 22-25	251-253	Argyre-Noachis	Encircling	9
1956	28	Aug 28-Sep 04	254-259	Noachis-Syrtis	Encircling	9
1956	28	Oct 03-oct 07	278-280	Deucalionis R.	Regional	45
1958	29	Aug 03-aug 05	266-267	Thaumasia	Regional	45
1958	29	Oct 12-15	305-311	Isidis R.-Hesperia	Local	15
1958	29	Oct 13-Nov 22	310-332	Isidis-Neith R.	Regional	45
1958	29	Dec 24-dec 29	349-352	Thaumasia	Regional	45
1961	30	Jan 19-Jan 23	23-25	Neith R.-Casius	Regional	45
1961	30	Jan 19-21	019-021	Casius-Elysium	Local	15
1963	31	Fdb 18-Feb 28	56-61	Tempe-Arcadia	Regional	45
1965	32	Mar 30-apr 03	93-95	Thaumasia	Regional	45
1969	33	May 28-jun 13	163-172	Hellas	Regional	45
1971	34	Jul 10-29	213-224	Hellespontus	Regional	16,17
1971	34	Sep 22-Dec 31	260-019	Hellespontus	Global	16,17
1972	35	Jan 01-Apr 24	260-019	Hellespontus	Regional	16,17
1973	36	Jun 22-jun 30	229-234	Thaumasia	Regional	45
1973	36	Jul 16-Sep 01	244-273	Hellespontus	Regional	16,17
1973	36	Oct 13-Jan 30	300-359	Solis Planum	Encircling	16,17
1974	37	Feb 28	14	N. Ogygia	Local	18
1975	38	Jun 28-Jul 19	260-273	Hellas	Regional	18
1975	38	Jul 14-Oct 21	270-329	S. Thaumasia	Encircling	18

1975	38	Nov 20-21	345	S. Thaumasia/Claritas	Local	18
1975	38	Dec 5-8	353-354	Meridiani S.	Local	18
1976	39	May 15-24	68-72	Aetheria/Utopia/Syrtis Mjr	Regional	18
1977	40	Feb 15-Apr 30	204-250	Solis Planum	Encircling	19,20
1977	40	Jan 05-??	227-???	Solis Planum	Local	19,20
1977	40	May 27-Oct	268-342	Solis Planum	Encircling	19,20
1978	41	Jan 17-Feb 11	35-46	Tempe	Regional	45
1981	42	Jun 14-??	330-???	Chryse	Local	21,22
1981	42	Nov 20-??	048-050	Hellas-Yaonis Regio	Regional	23
1982	43	Feb 26-Mar 10	91-96	Elysium	Regional	23,24
1982	43	Apr 12-Apr 20	111-115	Elysium	Regional	45
1982	43	May 12-??	124-126	Hellespontus	Regional	23,24
1982	43	Oct 14-Jan 25	208-273	Hellas	Encircling	18
1983	44	Nov 27-Dec 28	070-083	Xanthe-Candor-Thau.	Local	25
1984	45	Jan 05-1	086-091	Chryse-Xanthe	Local	25
1984	45	Jan 29-Feb 15	097-105	Isidis Regio-Libya	Regional	25,26a,b,c
1986	46	May 25-Jun 04	176-181	Hellas	Local	26a,b,c
1986	46	Aug 05-11	218-222	Hellas	Local	26a,b,c
1986	46	Sep 12-18	242-246	Hellas	Local	26a,b,c
1986	46	Nov 08-nov 19	278-285	Hellas	Regional	45
1987	47	Jan 31-feb 02	328-329	Hellas	Regional	45
1988	48	May 04-07	189-191	Hellas	Local	26a,b,c
1988	48	Jun 03-27	206-221	Hellas	Regional	27a,b
1988	48	Jun 13-jul 09	213-229	Hellas	Regional	46
1988	48	Jun 17-jul 25	215-239	Argyre	Regional	46
1988	48	Oct 01-oct 04	282-284	Thaumasia	Regional	46
1988	48	Nov 23-Dec 06	313-321	Thaumasia	Regional	27a,b
1990	49	Oct 03-07	309-311	Chryse-Solis Planum	Regional	28,29,30,31
1990	49	Nov 03-09	327-330	Chryse-Solis Planum	Regional	28,29,30,31
1992	50	July 04	145	Hellas, Hadriacum	Dust Cloud	32
1992	50	Aug 31-Sep 07	316-320		Regional	46
1992	50	Oct 03-06	334-344	Aurorae Sinus, Ophir	Local	32
1992	50	Oct 15-25	340-346	Solis Lacus & Chryse	Local	32
1993	51	Feb 12-Mar 15	38-53		Regional	46
1994	52	Jun 05	290	Argyre	Dust Cloud	33
1994	52	Oct 05	358	Chryse	Dust Cloud	33
1994	52	Nov 03-14	012-017	Xanthe	Local	33
1995	53	Jan 14	045	Elysium	Dust Cloud	33
1995	53	Jan 26	050	Chryse-Xanthe-Tharsis	Dust Cloud	33
1995	53	Jan 26	050	Arcadia-Tempe	Local	33
1995	53	Mar ??	??	Xanthe	Dust Cloud	33
1995	53	Oct 05	168	Chryse	Dust Cloud	34,35
1995	53	Nov 03 -14	184-191	Xanthe	Local	34,35
1996	54	Sep 18	011	NPR	Dust Cloud	36
1997	55	Jun 27	126	Vallis Marineris	Dust Cloud	36
1997	55	November 26	224	Noachis	Local	48

1998	56	August 22	19	Tempe Terra	Local	49
1999	57	Feb 19-21	99-100	Valles Marineris	Dust Cloud	37
1999	57	Mar 27- Apr 5	115-120	Valles Marineris	Dust Cloud	37
1999	57	Apr 16	125	Margaritifer S./ Erythraeum M.	Streak	37
1999	57	Apr 20	127	Erythraeum/Eos	Streak	37
1999	57	May 10 - 16	136-139	Valles Marineris	Streak	37, 38
1999	57	Jun 2-3	148-149	Mare Boreum	Dust Cloud	37
1999	57	Jun 30	162	NPR/Mare Acidalium	Dust Cloud	37
2000	58	August 29	42	NPR/Mare Acidalium	Local	49
2001	59	April 08	142	Hellas	Dust Cloud	42a
2001	59	June 18-21	180-182	Hellas	Local	39
2001	59	June 24- Aug 02	184-206	Hellas	Global	40, 4748
2001	59	Sep 06	228	Solis Planitia	Dust Cloud	39
2002	60	Aug 01-07	49 - 51	Acidalia	Local	42
2003	61	Mar 07	148	NPR- Uchronia-Utipia	Dust Cloud	42b
2003	61	May 20-30	188 -194	Syria- Claritas	Dust Cloud	42c, 43
2003	61	May 28	193	Acidalia	Local	42d
2003	61	Jun 23-28	208 -211	SPC	Dust Cloud	43
2003	61	Jun 23-29	208 -212	Isidis R	Local	42e, 43
2003	61	Jun 28	211	Acidalium M	Local	42f, 43
2003	61	Jun 28	211	Cydonia-Arabia Terra	Dust Cloud	42g
2003	61	Jul 01 - 13	213 -221	Pandorae – Iapygia	Regional	43
2003	61	Jul 28-Aug 03	230 -233	Chryse - Erythraeum Mare	Local	43
2003	61	Jul 29	231	Isidis R	Local	43
2003	61	Jul 28 - 31	230 -232	Acidalium-Achillis P-Niliacus L	Local	43
2003	61	Aug 01-02	232 -233	Eos and Aurorae S.	Local	43
2003	61	Dec 13 - 14	315 -316	Chryse - Eos - Aurorae Sinus	Local	43
2003	61	Dec 13 - 14	315 -316	Erythraeum Mare-Argyre	Local	43
2003	61	Dec 14 - 16	316 -317	Bosporos – Argyre	Regional	43
2003	61	Dec 16 - 25	317 -322	Noachis- Hellespontus, Argyre	Regional	43
2003	61	Dec 16 - 25	317 -322	Tyrrhenum -Hadriacum - Hellas	Regional	43
2004	62	March 05	170	Noachis	Local	48
2005		Aug 02–Aug 04	261-262	Australe Mare-Dia	Local	49
2005		Oct 13-Oct 27	305-318	Chryse-Erythraeum,Eos - Argyre-Margaritiferr	Regional	49
2005		Oct 20	309	Ophir- Aurorae Sinus	Local	49
2005		Oct 23	311	Boreosyrtis- Nereidum Fretum	Local	49
2003		Oct 23	311	Hydraotes - Aurorae Fretum	Local	49
2005	63	Oct 27– Nov 04	313 -318	Edom-Eos -Aurorae-Argyre	Local	43, 49,
2005	63	Nov 23-24	329	Chryse	Local	43, 49
2006	64	May 24	57	Hellas	Local	48
2007		May 23-May 31	244-249	Eridania, Ausonia	Local	43, 49, 50
2007	65	Jun 22 - Aug 03	262– 289	Noachis-Hellespontus- Argyre	Encircling	43, 49, 50
2007		Oct 31	340	NPR	Local	43, 49, 50
2007		Nov 1-Nov 5	340-342	NPR	Local	43, 49, 50
2007		Nov 22-Nov 25	351-353	Niliacus Lacus	Local	43, 49, 50
2008		Jan 9-Jan 11	15-16	Tempe	Local	43, 49, 50

2008	66	Oct 06	138	Icaria Planum	Dust Cloud	49
2016	67	April 05	133	Hellas	Local	50
2018	68	May 31–Jun 22	184-198	Acidalium Mare	Global	51
2019	69	Jan 04-Jan 14(?)	318-324	Aurorae Sinus-Noachis-Hellas	Regional	51
2020	70	Feb 02	144	Sabeus S., Hellas, Pandoria F	Dust Cloud	52
2020	70	Feb 21 – Feb 27	154-158	Hellas	Dust Cloud	52
2020	70	Mar 08 - 10	163-164	Zephyria/Aeolis region	Dust Cloud	53
2020	70	Mar 20	169	Hellas	Dust Cloud	52
2020	71	May 19	204	Chryse	Dust Cloud	53
2020	71	June 23-26	226-227	Bospoeros G.,Chryse, Ganges, Erythraeum, Thaumasia	Dust Cloud	53
2020	72	Nov 05 –Nov 29	308-323	Juventae Fons – Erythraeum Mare - Hellas	Encircling	54

Notes: **Dust Cloud/Dust Streak**; stationary dust cloud observed for one to three Sols. **Local**; localized dust storm that displays movement and expansion. **Regional**; large expanding dust storm covering much of a Martian hemisphere. **Encircling**; Dust storm with major axis that completely encircles either one or both hemispheres of Mars. **Global**; entire planet covered by dust average Ls start 262 +/- 50.

REFERENCE

Sources 1-15 listed by: Gifford, F.A., 1964. "A Study of Martian Yellow Clouds That Display Movement", *Monthly Weather Rev.*, v92, No. 10, October, pp. 435-440.

1. Antoniadi, E.M., 1930. *La Planete Mars*, 1659-1929. p40-43.
2. Avigliano, D.P., 1954. "Mars in 1954," *The Strolling Astronomer*, Vol. 8, Nos. 9-10, September-October.
3. Campbell. W.W., 1890. "Notices of the Lick Observatory," *Publication, Astronomy Society of the Pacific*, Vol. 2, No. 10, pp. 248-249.
4. Campbell. W.W., 1890. "Notices of the Lick Observatory," *Publication, Astronomy Society of the Pacific*, Vol. 6, No. 35, pp. 104-112.
5. de Vaucouleurs, G., 1954. *Physics of the planet Mars*, Faber and Faber, London, pp365.
6. Dollfus, A., 1961. "Polarization Studies of Planets," pp. 343-399 in *The Solar System*, Vol. 3, Planets and Satellites, G.P. Kuiper and B.M. Middelhurst (eds.), University of Chicago Press, Chicago.
7. Douglas, A.E., 1895. *Annals of Lowell Observatory*, Vol. 1.
8. Douglas, A.E., 1895. "A Cloud-Like Spot on the Terminator of Mars," *Astrophysical Journal*, Vol. 1, No. 2, pp. 127-130, February.
9. Heintz, W.D., 1958. "On Martian Yellow Clouds," *The Observatory*, Vol. 78, pp. 203-204.
10. Lowell, P., 1906. *Drawings of Mars, 1905*. Lowell Observatory.
11. Lowell, P., 1911. *Mars and its Canals*, Macmillan CO., New York, pp.393.

12. Miyamoto, S., 1961. "Meteorological Observations of Mars During 1960-61 Opposition," Contribution No. 105, *Institute of Astrophysics and Kwasan Observatory*, University of Kyoto. 49 pp.
13. Observatories Jarry-Desloges, Observations des Surface Planetaires, Vol. 1-10 (1907-1941), Gauthier-Villars et Cie., Paris (1908-1946).
14. Pickering, W.H., 1914-1930. *Mars Reports*, Nos. 1 to 44, Popular Astronomy, Vols. 22-38.
15. Slipher, E.C., 1962. Mars, the Photographic Story, Sky Publishing Co., Cambridge, MA, 168 pp.
16. Capen, C.F. and Martin, L.J., 1972. Mars' Great Storm of 1971. *Sky & Telescope*, May 1972.
17. Capen, C.F., 1971. Martian Yellow Clouds-Past and Future, *Sky & Telescope*, v41, No. 2, p 2-4.
18. McKim, R., Telescopic Martian Dust Storms: A Narrative and Catalogue, BAA. June 1999.
19. Briggs, G.A., Baum, W.A., and Barnes, J., 1979. "Viking Orbiter Observations of Dust in the Martian Atmosphere," *Journal of Geophysical Research (JGR)*, 84:2795-820.
20. Peterfreund, A.R. and Kieffer, H.H., 1979. "Thermal Infrared Properties of the Martian Atmosphere," *Journal of Geophysical Research (JGR)*, 84:2853-63.
21. Viking-I Spacecraft, JPL photograph, *Sky & Telescope Magazine*, pp. 363, Vol.63, No.4, April 1982.
22. Viking-I Spacecraft, JPL photograph, *Astronomy Magazine*, pp. 66, Vol.10, No.5, May 1982.
23. Beish, J.D., Capen, C.F., and Parker, C.F., 1983. "Dust Storms of the Martian Equatorial Zone," *Proceedings, ALCON '83, National Convention of the Astronomical League*, at Jacksonville, Fl. July.
24. Capen, C.F., Parker, D.C., and Beish, J.D., 1983. "The 1981- 82 Aphelic Martian Apparition - A.L.P.O. Report," *Proceedings, ALCON '83, National Convention of the Astronomical League*, at Jacksonville, Fl. July.
25. Beish, J.D., Parker, D.C., and Capen, C.F., 1984. "A Major Martian Dust Storm in 1984," *The Strolling Astronomer*, Vol. 30, Nos. 9-10, August.
- 26a. Beish, J.D., 1989. "A Brief Report on the 1987-89 Perihelic Apparition of Mars," *The Strolling Astronomer*, Vol. 33, Nos. 5-6.
- 26b. Beish, J.D., D.C. Parker, "The International Mars Patrol in 1988-Part I," *J.A.L.P.O.*, Vol. 35, No. 1, March 1991.
- 26c. Beish, J.D., D.C. Parker, "The International Mars Patrol in 1988-Part II," *J.A.L.P.O.*, Vol. 35, No. 2, June 1991.
- 27a. Beish, J.D., "A Brief Report on the 1986 Perihelic Apparition of Mars," *OAA Communication #33*, May 1987.
- 27b. Beish, J.D., "A Brief Report on the 1986 Perihelic Apparition of Mars," *J.A.L.P.O.*, Vol. 32, Nos. 3-4, July 1987.
28. Martin, L.J., "Martian Dust Storms in 1990," *Bulletin American Astronomical Society. Soc.*, 23, 1217, 1990.
29. Beish, J.D. and D.C. Parker, "The 1990 Apparition of Mars," *Proceedings of the ALCON '90-A.L.P.O.*, St. Louis, MO, August 1990.

30. Parker, D.C. and J.D. Beish, "Dust Clouds on Mars in 1990, An International Event: Localized Dust Clouds—The Bench Marks of the 1990-91 Apparition of Mars." *Symposium for Research Amateur Astronomy-A.L.P.O.*, La Paz, Mexico, July 1991.
31. Martin, L.J., J.D. Beish, and D.C. Parker, "Martian Dust Storms in 1990," *The 23rd Annual Meeting of the Division for Planetary Sciences (DPS) of the AAS*, Session 28.02, Palo Alto, CA, November 4-8, 1991.
32. Troiani, D.M., J.D. Beish, D.C. Parker, and C.E. Hernandez, "The 1992-93 Aphelic Apparition of Mars," *J.A.L.P.O.*, Vol. 38, No. 3, July 1995.
33. Troiani, D. M., D.C. Parker, C.E. Hernandez, "The 1994-1995 Aphelic Apparition of Mars," *J.A.L.P.O.*, Vol. 38, No. 1, June 1996.
34. Parker, D.C. and J.D. Beish, "Telescopic Observations of Mars: The 1994-1995 Apparition," *J.A.L.P.O.*, Vol. 38, No. 4 January 1996.
35. Troiani, D. M., "1994-1995 Apparition of Mars Preliminary Results," *Mars Telescopic Observations Workshop*, Cornell University, Ithica, NY, August 14-15, 1995.
36. Parker, D.C., J.D. Beish, D. M. Troiani, D. P. Joyce, and C. E. Hernandez, "Telescopic Observations of Mars, 1996-1997: Results of the Marswatch Program," *ICARUS*, Vol. 138, No. 1, March 1999, P.3.
37. OAA Communications Mars Observations No. 217.
38. Cidado and McKim, *BAA Circular* No. 6
39. Mars Watch/ALPO Archives.
40. Parker, D.C., "The 2001 Martian Dust Storm," *Sky and Telescope Magazine*, Vol. 103, No. 6, P.117, December 2001.
41. Martin, L.J. and R.W. Zurek, "An Analysis of the History of Dust Activity on Mars," *JGR*, Vol. 98, No. E2, Feb 25, 1993.
- 42a. MGS MOC
- 42b. MGS MOC Release No. MOC2-334, 18 April 2003
- 42c. MGS MOC Release No. MOC2-366, 20 May 2003
- 42d. MGS MOC Release No. MOC2-374, 28 May 2003
- 42e. MGS MOC Release No. MOC2-405, 28 June 2003
- 42g. MGS MOC Release No. MOC2-405, 28 June 2003
43. MarsWatch/ALPO/OAA Archives
44. marsobservers , marsobservers@yahoo.com.
- 45 McKim, R. (1999)., "Telescopic Martian Dust Storms: A Narrative and Catalogue," *Memoires of the British Astronomical Association*, Vol. 44, June 1999.
- 46 McKim, Richard, "The opposition of Mars, 2001: Part I": <http://alpo-j.asahikawa-med.ac.jp/kk01/JBAA119123-143McKim.pdf>
- 47 McKim, Richard, "Mars in 2001 - Second interim report": <https://britastro.org/node/11532>
- 48 Malin Space Science Systems: <http://www.msss.com/>
49. Schmude, Richard (2017), "ALPO Observations of Mars During the 2005 Apparition," *J.A.L.P.O.*, Vol. 59, No. 1, Winter 2017
50. Venable, Roger (2018), "Report on the Mars Apparition of 2007-2008," *J.A.L.P.O.*, Vol. 60, No. 1, Winter 2018.
- 51 Association of Lunar and Planetary Observers (ALPO-Japan) <http://alpo-j.asahikawa-med.ac.jp/indexE.htm>

52 Association of Lunar and Planetary Observers (ALPO-Japan) <http://alpo-j.asahikawa-med.ac.jp/indexE.htm>

53. ALPO Web Site: Mars Section <http://alpo-astronomy.org/>

54. Cloudy Nights web site: <https://www.cloudynights.com/topic/738461-mars-november-5-with-dust-in-juventae-fons/?p=10636343>