Observations of G 29-38 with the Whole Earth Telescope for Xcov 23

PI: Scot Kleinman

SHORT SCIENTIFIC JUSTIFICATION

G29--38 is one of the most-studied of all DAVs, but still some mysteries remain. Despite having pulsation frequencies which can change from season to season, there are several pulsations which have remained stable in frequency over long periods of time. The most stable of these is present in all our data from 1975 to the present. Using data over an approximate 6 year time-span, Kleinman et al (1994) measured a preliminary rate of period change for this mode of $\approx -10^{-12}s/s$ whereas secular cooling models predict a period change on the order of $+10^{-15}s/s$. With the extensive observations the WET can provide on this target, we should be able to test this value and clearly confirm or deny it. It is also possible that the initial rate of change was due to a long-period companion to G29--38. New observations, separated by approximately 8 years from the previous result, will help answer this question as well.

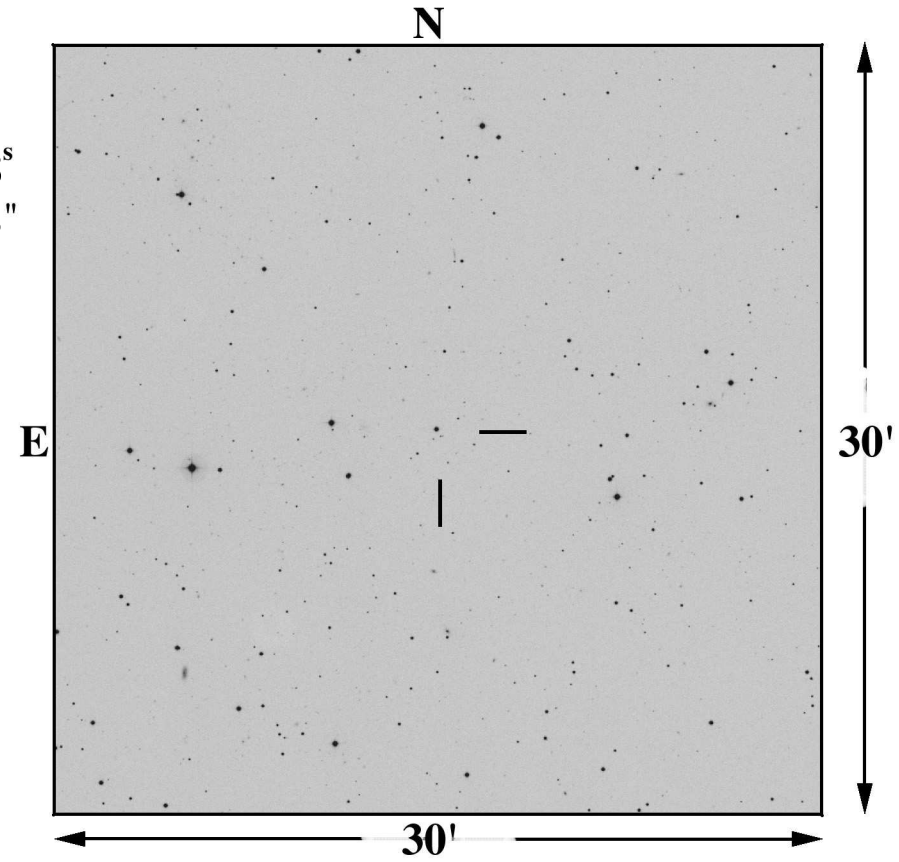
Download the G 29-38 proposal in text format.

Back to the XCov 23 page.

G 29-38

R.A. $23^h\,28^m\,48^s$
Dec. $+05^\circ\,14'\,53''$
Epoch 2000.0

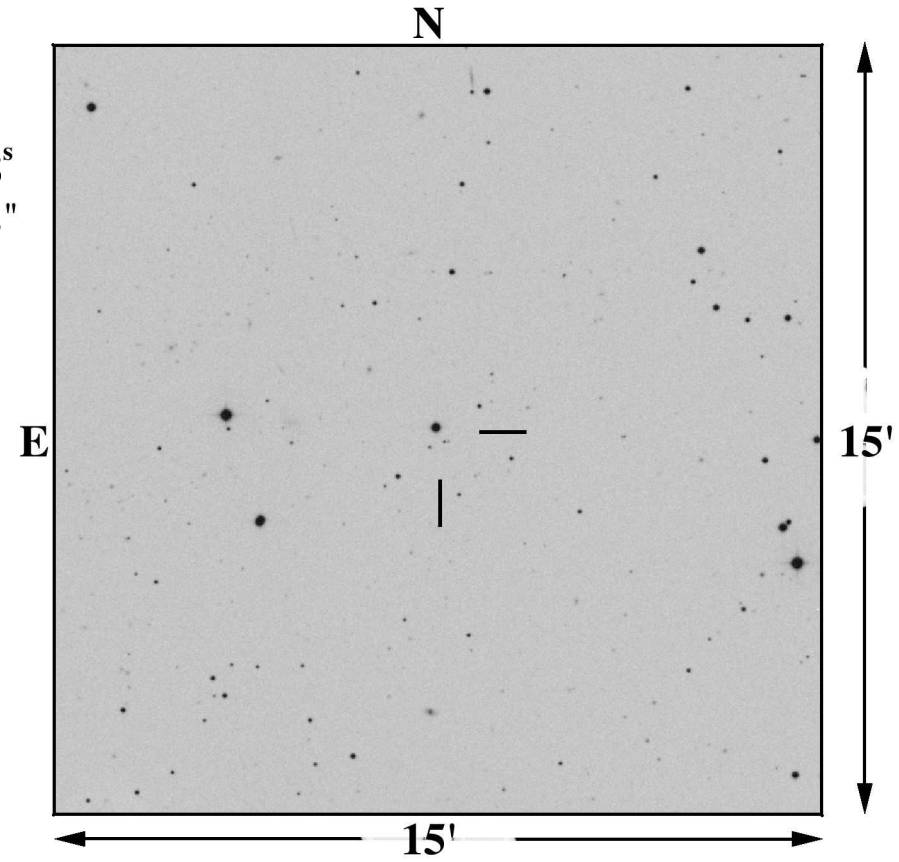
$m_v = 13.03$

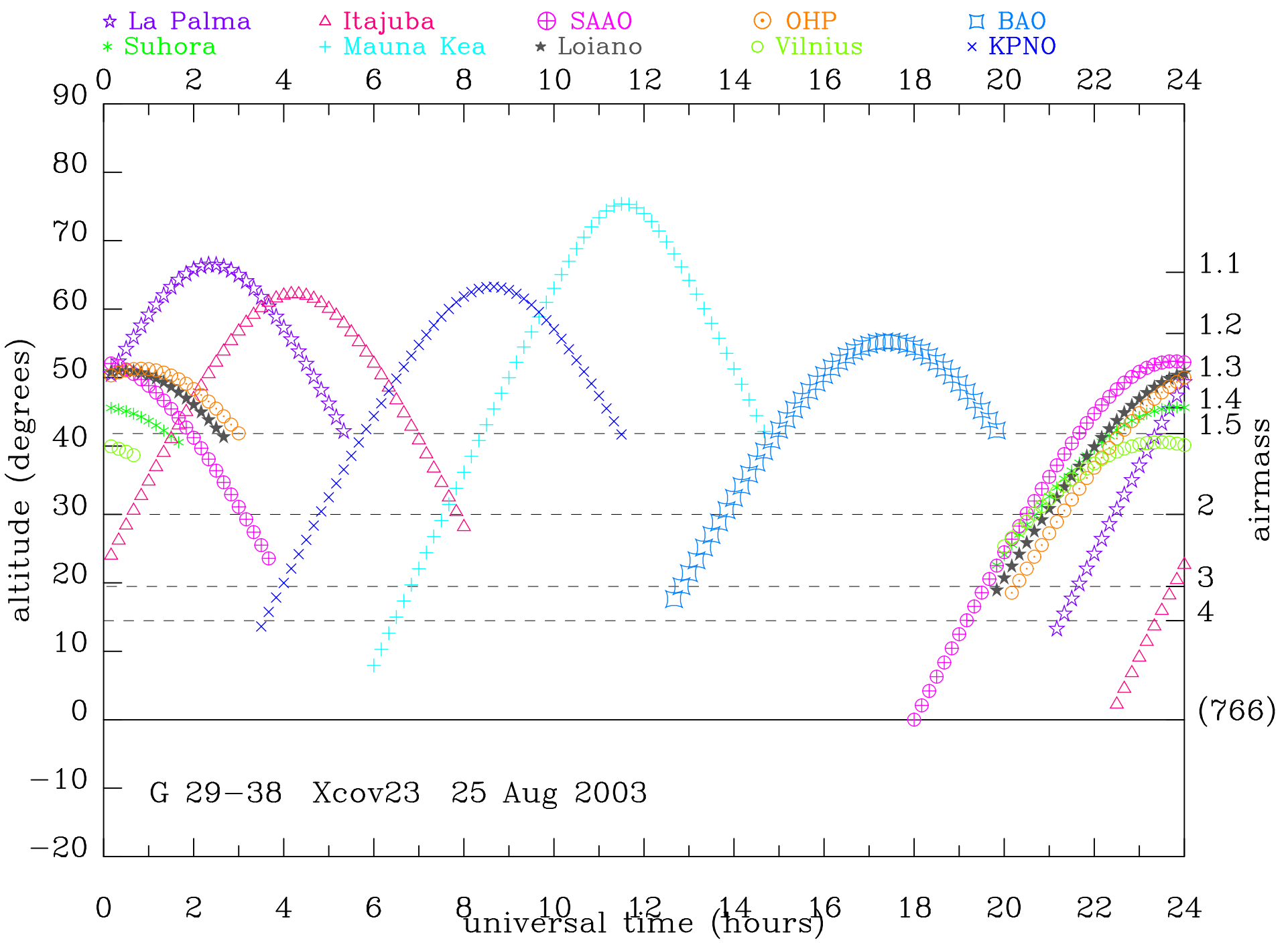


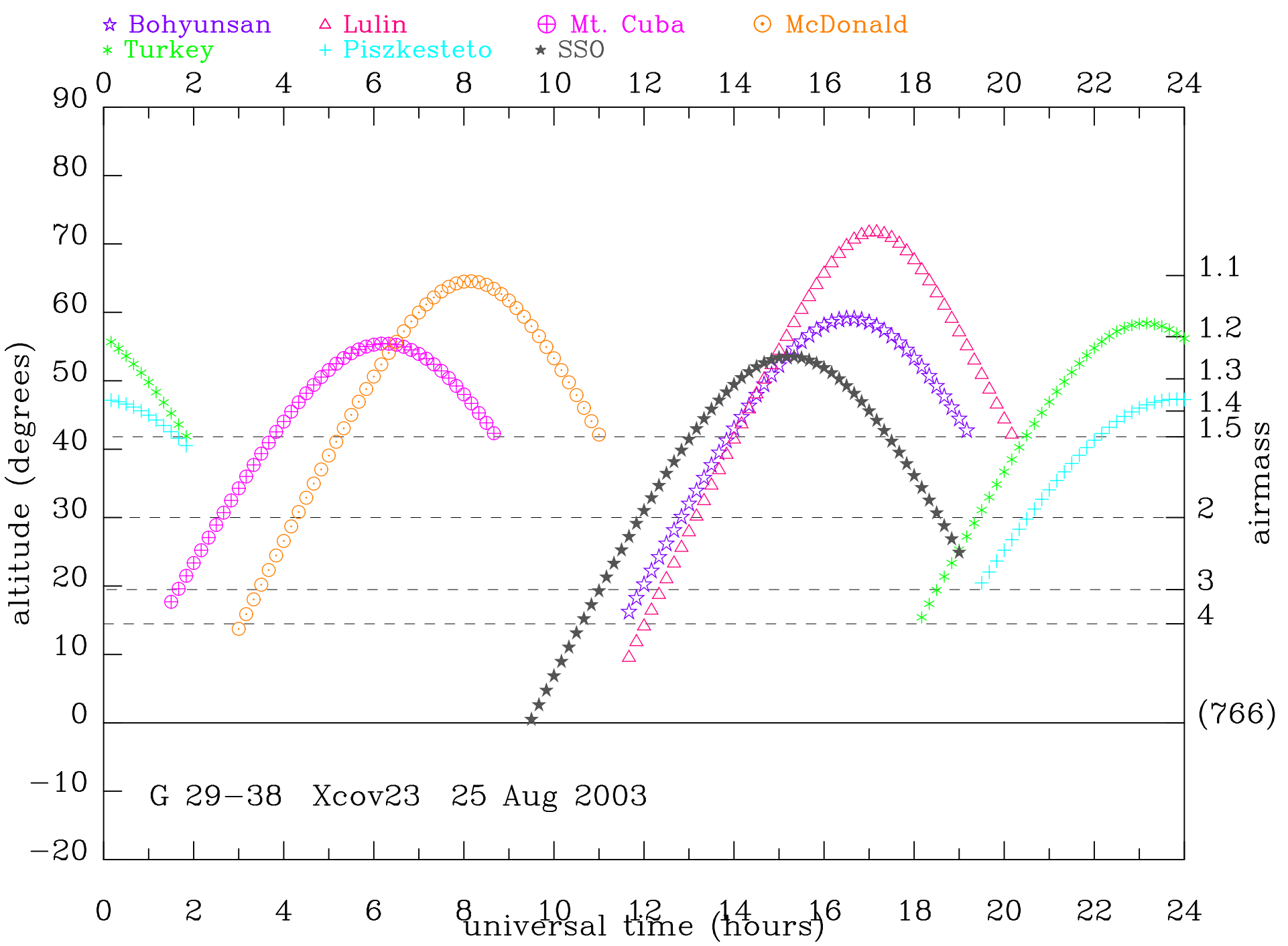
G 29-38

R.A. $23^h\ 28^m 48^s$
Dec. $+05^\circ\ 14'\ 53''$
Epoch 2000.0

$m_v = 13.03$




La Palma
Itajuba
SAAO
OHP
BAO
Suhora
Mauna Kea
Loiano
Vilnius
KPNO
altitude (degrees)
airmass
universal time (hours)
(766)
G 29−38 Xcov23 25 Aug 2003


Bohyunsan
Lulin
Mt. Cuba
McDonald
Turkey
Piszkesteto
SSO
altitude (degrees)
airmass
universal time (hours)
G 29−38 Xcov23 25 Aug 2003
(766)

Wet Run Info for G29-38

RA: 23 28 48.0 **dec**: 5 15 30 Epoch 2000.00

2003 Aug 15 to 2003 Sep 11

computed using Wetcalc

August 11, 2003

G29-38: 2003 Aug 15, Moon 87% full								
Site	Universal Time					Airmass		
	f.v.[1]	l.v.[1]	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary								
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland	1 40	8 34	6 54	1 40	8 34	4.80	1.33	1.21
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Aug 16, Moon 80% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary								
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland	1 39	8 35	6 51	1 39	8 35	4.64	1.34	1.21
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

[1] *f.v.* and *l.v.* denote the time when the object is "first visible" and "last visible", respectively. This takes into account both the rise and set times as well as the evening and morning twilight times.

G29-38: 2003 Aug 17, Moon 71% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary								
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland	1 37	8 37	6 47	1 37	8 37	4.50	1.36	1.21
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Aug 18, Moon 62% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.	18 23	1 44	23 40	18 22	1 44	5.00	1.36	1.17
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	19 52	1 37	0 22	19 52	1 37	3.11	1.43	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland	1 35	8 38	6 43	1 35	8 38	4.36	1.37	1.21
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii	6 44	14 47	12 01	6 05	14 47	5.00	1.36	1.03

G29-38: 2003 Aug 19, Moon 53% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.	18 20	1 45	23 36	18 20	1 45	4.90	1.37	1.17
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	19 49	1 40	0 18	19 49	1 40	3.07	1.44	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope	21 31	5 20	2 49	21 12	5 20	5.00	1.36	1.09
Itajuba, Brazil								
Mount Cuba, Maryland	1 33	8 39	6 39	1 33	8 39	4.23	1.39	1.21
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii	6 40	14 47	11 57	6 04	14 47	5.00	1.39	1.03

G29-38: 2003 Aug 20, Moon 44% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea	11 42	19 13	16 59	11 42	19 13	4.93	1.38	1.17
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.	18 18	1 46	23 32	18 18	1 46	4.72	1.39	1.17
Moletai, Lithuania	20 24	0 19	23 51	20 24	0 19	2.35	1.57	1.56
South Africa								
Suhora, Poland	19 56	1 31	0 13	19 56	1 31	2.87	1.47	1.40
Piszkesteto, Hungary	19 46	1 42	0 14	19 46	1 42	3.04	1.46	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope	21 27	5 21	2 45	21 10	5 21	5.00	1.38	1.09
Itajuba, Brazil	23 35	8 07	4 35	22 04	8 07	5.00	1.94	1.13
Mount Cuba, Maryland	1 31	8 41	6 35	1 31	8 41	4.11	1.41	1.21
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii	6 36	14 47	11 53	6 03	14 47	5.00	1.41	1.03

G29-38: 2003 Aug 21, Moon 34% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea	11 41	19 14	16 55	11 41	19 14	4.74	1.40	1.17
Lulin Obs., Taiwan	12 09	20 16	17 27	11 44	20 16	5.00	1.41	1.05
Beijing Observatory								
Turkish Natl. Obs.	18 17	1 47	23 28	18 17	1 47	4.55	1.41	1.17
Moletai, Lithuania	20 20	0 23	23 47	20 20	0 23	2.36	1.57	1.56
South Africa								
Suhora, Poland	19 53	1 33	0 09	19 53	1 33	2.85	1.49	1.40
Piszkesteto, Hungary	19 44	1 44	0 10	19 44	1 44	3.01	1.47	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope	21 23	5 21	2 41	21 09	5 21	5.00	1.41	1.09
Itajuba, Brazil	23 31	8 06	4 31	22 04	8 06	5.00	1.98	1.13
Mount Cuba, Maryland	1 30	8 42	6 31	1 30	8 42	4.00	1.43	1.21
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii	6 32	14 48	11 49	6 02	14 48	5.00	1.44	1.03

G29-38: 2003 Aug 22, Moon 26% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea	11 39	19 16	16 51	11 39	19 16	4.56	1.42	1.17
Lulin Obs., Taiwan	12 05	20 17	17 23	11 43	20 17	5.00	1.43	1.05
Beijing Observatory								
Turkish Natl. Obs.	18 15	1 48	23 24	18 15	1 48	4.39	1.43	1.17
Moletai, Lithuania	20 15	0 27	23 43	20 15	0 27	2.36	1.58	1.56
South Africa								
Suhora, Poland	19 50	1 36	0 05	19 50	1 36	2.83	1.50	1.40
Piszkesteto, Hungary	19 41	1 46	0 06	19 41	1 46	2.98	1.49	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence	20 19	3 02	1 02	20 19	3 02	3.39	1.46	1.28
Nordic Optical Telescope	21 19	5 22	2 37	21 08	5 22	5.00	1.43	1.09
Itajuba, Brazil	23 27	8 06	4 27	22 04	8 06	5.00	2.02	1.13
Mount Cuba, Maryland	1 28	8 43	6 27	1 28	8 43	3.89	1.45	1.21
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii	6 28	14 48	11 45	6 01	14 48	5.00	1.46	1.03

G29-38: 2003 Aug 23, Moon 17% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea	11 37	19 17	16 47	11 37	19 17	4.40	1.45	1.17
Lulin Obs., Taiwan	12 01	20 17	17 19	11 42	20 17	5.00	1.46	1.05
Beijing Observatory								
Turkish Natl. Obs.	18 13	1 50	23 20	18 13	1 50	4.25	1.45	1.17
Moletai, Lithuania	20 11	0 31	23 39	20 11	0 31	2.37	1.59	1.56
South Africa								
Suhora, Poland	19 47	1 38	0 01	19 47	1 38	2.80	1.52	1.40
Piszkesteto, Hungary	19 39	1 48	0 02	19 39	1 48	2.95	1.50	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence	20 16	3 04	0 59	20 16	3 04	3.33	1.48	1.28
Nordic Optical Telescope	21 15	5 23	2 33	21 07	5 23	5.00	1.45	1.09
Itajuba, Brazil	23 23	8 05	4 23	22 05	8 05	5.00	2.06	1.13
Mount Cuba, Maryland	1 26	8 45	6 23	1 26	8 45	3.79	1.47	1.21
McDonald Observatory								
Kitt Peak	3 29	11 30	8 47	3 28	11 30	5.00	1.46	1.12
Mauna Kea, Hawaii	6 24	14 49	11 41	6 00	14 49	5.00	1.49	1.03

G29-38: 2003 Aug 24, Moon 11% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia	10 31	19 08	15 23	9 04	19 08	5.00	2.37	1.24
Bohyunsan Obs., Korea	11 36	19 18	16 43	11 36	19 18	4.25	1.47	1.17
Lulin Obs., Taiwan	11 57	20 18	17 15	11 41	20 18	5.00	1.48	1.05
Beijing Observatory								
Turkish Natl. Obs.	18 12	1 51	23 16	18 12	1 51	4.11	1.48	1.17
Moletai, Lithuania	20 06	0 35	23 35	20 06	0 35	2.37	1.60	1.56
South Africa								
Suhora, Poland	19 45	1 40	23 57	19 45	1 40	2.78	1.54	1.40
Piszkesteto, Hungary	19 36	1 50	23 58	19 36	1 50	2.92	1.52	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence	20 14	3 05	0 55	20 14	3 05	3.27	1.50	1.28
Nordic Optical Telescope	21 11	5 23	2 29	21 05	5 23	5.00	1.48	1.09
Itajuba, Brazil	23 19	8 04	4 19	22 05	8 04	5.00	2.11	1.13
Mount Cuba, Maryland	1 24	8 46	6 19	1 24	8 46	3.70	1.49	1.21
McDonald Observatory	2 54	11 04	8 12	2 53	11 04	5.00	1.48	1.11
Kitt Peak	3 26	11 31	8 43	3 26	11 31	4.85	1.48	1.12
Mauna Kea, Hawaii	6 20	14 49	11 38	5 59	14 49	5.00	1.52	1.03

G29-38: 2003 Aug 25, Moon 5% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia	10 27	19 07	15 19	9 04	19 07	5.00	2.42	1.24
Bohyunsan Obs., Korea	11 34	19 19	16 39	11 34	19 19	4.11	1.49	1.17
Lulin Obs., Taiwan	11 53	20 18	17 11	11 40	20 18	5.00	1.51	1.05
Beijing Observatory								
Turkish Natl. Obs.	18 10	1 52	23 12	18 10	1 52	3.99	1.50	1.17
Moletai, Lithuania	20 02	0 38	23 32	20 02	0 38	2.38	1.62	1.56
South Africa								
Suhora, Poland	19 42	1 43	23 53	19 42	1 43	2.76	1.55	1.40
Piszkesteto, Hungary	19 33	1 52	23 54	19 33	1 52	2.89	1.54	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence	20 12	3 07	0 51	20 12	3 07	3.22	1.52	1.28
Nordic Optical Telescope								
Itajuba, Brazil	23 15	8 03	4 15	22 05	8 03	5.00	2.16	1.13
Mount Cuba, Maryland	1 22	8 47	6 15	1 22	8 47	3.61	1.51	1.21
McDonald Observatory	2 52	11 05	8 08	2 52	11 05	4.87	1.51	1.11
Kitt Peak	3 25	11 32	8 39	3 25	11 32	4.64	1.51	1.12
Mauna Kea, Hawaii	6 16	14 49	11 34	5 58	14 49	5.00	1.55	1.03

G29-38: 2003 Aug 26, Moon 1% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia	10 23	19 06	15 15	9 05	19 06	5.00	2.48	1.24
Bohyunsan Obs., Korea	11 32	19 20	16 35	11 32	19 20	3.99	1.52	1.17
Lulin Obs., Taiwan	11 49	20 19	17 07	11 38	20 19	5.00	1.54	1.05
Beijing Observatory	12 34	19 59	17 25	12 34	19 59	3.55	1.53	1.22
Turkish Natl. Obs.	18 08	1 53	23 09	18 08	1 53	3.87	1.53	1.17
Moletai, Lithuania	19 58	0 42	23 28	19 58	0 42	2.38	1.63	1.56
South Africa	18 56	3 39	23 46	17 38	3 39	5.00	2.54	1.26
Suhora, Poland	19 39	1 45	23 49	19 39	1 45	2.74	1.57	1.40
Piszkesteto, Hungary	19 31	1 54	23 50	19 31	1 54	2.86	1.56	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence	20 10	3 09	0 47	20 10	3 09	3.16	1.54	1.28
Nordic Optical Telescope								
Itajuba, Brazil	23 11	8 02	4 11	22 05	8 02	5.00	2.21	1.13
Mount Cuba, Maryland	1 20	8 49	6 11	1 20	8 49	3.53	1.54	1.21
McDonald Observatory	2 51	11 05	8 04	2 51	11 05	4.66	1.54	1.11
Kitt Peak	3 24	11 33	8 35	3 24	11 33	4.46	1.54	1.12
Mauna Kea, Hawaii	6 12	14 50	11 30	5 58	14 50	5.00	1.58	1.03

G29-38: 2003 Aug 27, Moon 0% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia	10 19	19 05	15 11	9 05	19 05	5.00	2.53	1.24
Bohyunsan Obs., Korea	11 31	19 21	16 31	11 31	19 21	3.86	1.55	1.17
Lulin Obs., Taiwan	11 45	20 19	17 03	11 37	20 19	5.00	1.57	1.05
Beijing Observatory	12 32	20 01	17 21	12 32	20 01	3.47	1.55	1.22
Turkish Natl. Obs.	18 07	1 54	23 05	18 07	1 54	3.76	1.56	1.17
Moletai, Lithuania	19 54	0 45	23 24	19 54	0 45	2.38	1.65	1.56
South Africa	18 52	3 38	23 43	17 38	3 38	5.00	2.60	1.26
Suhora, Poland	19 36	1 47	23 46	19 36	1 47	2.72	1.60	1.40
Piszkesteto, Hungary	19 28	1 56	23 46	19 28	1 56	2.83	1.59	1.36
Bologna Uni. Obs., Italy	19 46	2 46	0 20	19 46	2 46	3.09	1.57	1.29
Obs. of Haute-Provence	20 08	3 10	0 43	20 08	3 10	3.11	1.57	1.28
Nordic Optical Telescope								
Itajuba, Brazil	23 07	8 02	4 07	22 06	8 02	5.00	2.26	1.13
Mount Cuba, Maryland	1 18	8 50	6 07	1 18	8 50	3.44	1.57	1.21
McDonald Observatory	2 49	11 06	8 01	2 49	11 06	4.46	1.57	1.11
Kitt Peak	3 22	11 34	8 31	3 22	11 34	4.28	1.57	1.12
Mauna Kea, Hawaii	6 08	14 50	11 26	5 57	14 50	5.00	1.62	1.03

G29-38: 2003 Aug 28, Moon 1% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia	10 16	19 04	15 07	9 06	19 04	5.00	2.59	1.24
Bohyunsan Obs., Korea	11 29	19 22	16 27	11 29	19 22	3.75	1.58	1.17
Lulin Obs., Taiwan	11 42	20 20	16 59	11 36	20 20	5.00	1.61	1.05
Beijing Observatory	12 30	20 02	17 17	12 30	20 02	3.39	1.58	1.22
Turkish Natl. Obs.	18 05	1 55	23 01	18 05	1 55	3.66	1.59	1.17
Moletai, Lithuania	19 50	0 49	23 20	19 50	0 49	2.38	1.67	1.56
South Africa	18 48	3 37	23 39	17 39	3 37	5.00	2.66	1.26
Suhora, Poland	19 33	1 49	23 42	19 33	1 49	2.70	1.62	1.40
Piszkesteto, Hungary	19 26	1 58	23 42	19 26	1 58	2.80	1.61	1.36
Bologna Uni. Obs., Italy	19 44	2 48	0 16	19 44	2 48	3.04	1.60	1.29
Obs. of Haute-Provence	20 06	3 12	0 39	20 06	3 12	3.06	1.60	1.28
Nordic Optical Telescope								
Itajuba, Brazil	23 03	8 01	4 03	22 06	8 01	5.00	2.32	1.13
Mount Cuba, Maryland	1 17	8 51	6 03	1 17	8 51	3.37	1.60	1.21
McDonald Observatory	2 48	11 07	7 57	2 48	11 07	4.28	1.60	1.11
Kitt Peak	3 21	11 35	8 27	3 21	11 35	4.12	1.60	1.12
Mauna Kea, Hawaii	6 04	14 50	11 22	5 56	14 50	5.00	1.66	1.03

G29-38: 2003 Aug 29, Moon 4% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia	10 12	19 03	15 03	9 06	19 03	5.00	2.65	1.24
Bohyunsan Obs., Korea	11 28	19 23	16 23	11 28	19 23	3.65	1.61	1.17
Lulin Obs., Taiwan								
Beijing Observatory	12 28	20 03	17 14	12 28	20 03	3.32	1.61	1.22
Turkish Natl. Obs.	18 03	1 56	22 57	18 03	1 56	3.56	1.62	1.17
Moletai, Lithuania	19 46	0 52	23 16	19 46	0 52	2.38	1.69	1.56
South Africa	18 44	3 35	23 35	17 40	3 35	5.00	2.72	1.26
Suhora, Poland	19 31	1 51	23 38	19 31	1 51	2.68	1.64	1.40
Piszkesteto, Hungary	19 23	2 00	23 38	19 23	2 00	2.77	1.64	1.36
Bologna Uni. Obs., Italy	19 42	2 50	0 12	19 42	2 50	3.00	1.62	1.29
Obs. of Haute-Provence	20 03	3 13	0 35	20 03	3 13	3.02	1.62	1.28
Nordic Optical Telescope								
Itajuba, Brazil	23 00	8 00	3 59	22 06	8 00	5.00	2.37	1.13
Mount Cuba, Maryland	1 15	8 52	5 59	1 15	8 52	3.30	1.63	1.21
McDonald Observatory	2 46	11 08	7 53	2 46	11 08	4.12	1.64	1.11
Kitt Peak	3 19	11 36	8 23	3 19	11 36	3.98	1.64	1.12
Mauna Kea, Hawaii	6 00	14 51	11 18	5 55	14 51	5.00	1.69	1.03

G29-38: 2003 Aug 30, Moon 10% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia	10 08	19 02	14 59	9 07	19 02	5.00	2.72	1.24
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory	12 26	20 05	17 10	12 26	20 05	3.25	1.64	1.22
Turkish Natl. Obs.	18 02	1 57	22 53	18 02	1 57	3.46	1.65	1.17
Moletai, Lithuania	19 42	0 55	23 12	19 42	0 55	2.38	1.71	1.56
South Africa	18 41	3 34	23 31	17 40	3 34	5.00	2.79	1.26
Suhora, Poland	19 28	1 54	23 34	19 28	1 54	2.66	1.67	1.40
Piszkesteto, Hungary	19 20	2 02	23 34	19 20	2 02	2.74	1.66	1.36
Bologna Uni. Obs., Italy	19 40	2 51	0 09	19 40	2 51	2.95	1.65	1.29
Obs. of Haute-Provence	20 01	3 15	0 31	20 01	3 15	2.97	1.65	1.28
Nordic Optical Telescope								
Itajuba, Brazil	22 56	7 59	3 56	22 06	7 59	5.00	2.44	1.13
Mount Cuba, Maryland	1 13	8 54	5 55	1 13	8 54	3.23	1.66	1.21
McDonald Observatory	2 45	11 08	7 49	2 45	11 08	3.96	1.68	1.11
Kitt Peak	3 18	11 36	8 19	3 18	11 36	3.84	1.67	1.12
Mauna Kea, Hawaii	5 56	14 51	11 14	5 54	14 51	5.00	1.74	1.03

G29-38: 2003 Aug 31, Moon 18% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia	10 04	19 00	14 55	9 07	19 00	5.00	2.79	1.24
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory	12 25	20 06	17 06	12 25	20 06	3.18	1.67	1.22
Turkish Natl. Obs.	18 00	1 58	22 49	18 00	1 58	3.38	1.68	1.17
Moletai, Lithuania	19 38	0 59	23 08	19 38	0 59	2.38	1.73	1.56
South Africa	18 37	3 33	23 27	17 41	3 33	5.00	2.86	1.26
Suhora, Poland	19 25	1 56	23 30	19 25	1 56	2.64	1.70	1.40
Piszkesteto, Hungary	19 18	2 04	23 30	19 18	2 04	2.72	1.69	1.36
Bologna Uni. Obs., Italy	19 38	2 53	0 05	19 38	2 53	2.91	1.69	1.29
Obs. of Haute-Provence	19 59	3 16	0 27	19 59	3 16	2.93	1.69	1.28
Nordic Optical Telescope								
Itajuba, Brazil	22 52	7 58	3 52	22 07	7 58	5.00	2.50	1.13
Mount Cuba, Maryland	1 11	8 55	5 52	1 11	8 55	3.16	1.69	1.21
McDonald Observatory	2 44	11 09	7 45	2 44	11 09	3.82	1.72	1.11
Kitt Peak	3 16	11 37	8 15	3 16	11 37	3.71	1.71	1.12
Mauna Kea, Hawaii	5 53	14 52	11 10	5 53	14 52	4.97	1.78	1.03

G29-38: 2003 Sep 1, Moon 27% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory	12 23	20 07	17 02	12 23	20 07	3.12	1.71	1.22
Turkish Natl. Obs.								
Moletai, Lithuania	19 35	1 02	23 04	19 35	1 02	2.38	1.76	1.56
South Africa	18 33	3 32	23 23	17 41	3 32	5.00	2.94	1.26
Suhora, Poland	19 22	1 58	23 26	19 22	1 58	2.62	1.73	1.40
Piszkesteto, Hungary	19 15	2 06	23 27	19 15	2 06	2.69	1.73	1.36
Bologna Uni. Obs., Italy	19 36	2 54	0 01	19 36	2 54	2.87	1.72	1.29
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak	3 15	11 38	8 11	3 15	11 38	3.59	1.75	1.12
Mauna Kea, Hawaii								

G29-38: 2003 Sep 2, Moon 38% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania	19 31	1 05	23 00	19 31	1 05	2.37	1.79	1.56
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	19 13	2 08	23 23	19 13	2 08	2.66	1.76	1.36
Bologna Uni. Obs., Italy	19 33	2 56	23 57	19 33	2 56	2.83	1.76	1.29
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 3, Moon 49% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania	19 27	1 08	22 56	19 27	1 08	2.37	1.82	1.56
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	19 10	2 10	23 19	19 10	2 10	2.64	1.79	1.36
Bologna Uni. Obs., Italy	19 31	2 57	23 53	19 31	2 57	2.79	1.79	1.29
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 4, Moon 61% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	19 08	2 12	23 15	19 08	2 12	2.61	1.83	1.36
Bologna Uni. Obs., Italy	19 29	2 59	23 49	19 29	2 59	2.75	1.84	1.29
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 5, Moon 71% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	19 05	2 14	23 11	19 05	2 14	2.59	1.87	1.36
Bologna Uni. Obs., Italy	19 27	3 00	23 45	19 27	3 00	2.71	1.88	1.29
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 6, Moon 81% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	19 03	2 15	23 07	19 03	2 15	2.57	1.92	1.36
Bologna Uni. Obs., Italy	19 25	3 02	23 41	19 25	3 02	2.68	1.93	1.29
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 7, Moon 89% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	19 00	2 17	23 03	19 00	2 17	2.54	1.96	1.36
Bologna Uni. Obs., Italy	19 22	3 03	23 37	19 22	3 03	2.64	1.98	1.29
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 8, Moon 94% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	18 58	2 19	22 59	18 58	2 19	2.52	2.02	1.36
Bologna Uni. Obs., Italy	19 20	3 05	23 33	19 20	3 05	2.61	2.03	1.29
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 9, Moon 98% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	18 55	2 21	22 55	18 55	2 21	2.49	2.07	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 10, Moon 99% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	18 53	2 22	22 51	18 53	2 22	2.47	2.13	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								

G29-38: 2003 Sep 11, Moon 99% full								
Site	Universal Time					Airmass		
	f.v.	l.v.	meridian	eve. tw	morn. tw	rise	set	meridian
Siding Spring, Australia								
Bohyunsan Obs., Korea								
Lulin Obs., Taiwan								
Beijing Observatory								
Turkish Natl. Obs.								
Moletai, Lithuania								
South Africa								
Suhora, Poland								
Piszkesteto, Hungary	18 50	2 24	22 47	18 50	2 24	2.45	2.19	1.36
Bologna Uni. Obs., Italy								
Obs. of Haute-Provence								
Nordic Optical Telescope								
Itajuba, Brazil								
Mount Cuba, Maryland								
McDonald Observatory								
Kitt Peak								
Mauna Kea, Hawaii								