

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-09T00:09:37.150
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 674573134084386688
 2Mass ID (if available) : 07491217+2137387

ICRS Star Coord at Epoch: 07h 49m 12.17149s +21:37:38.58946s

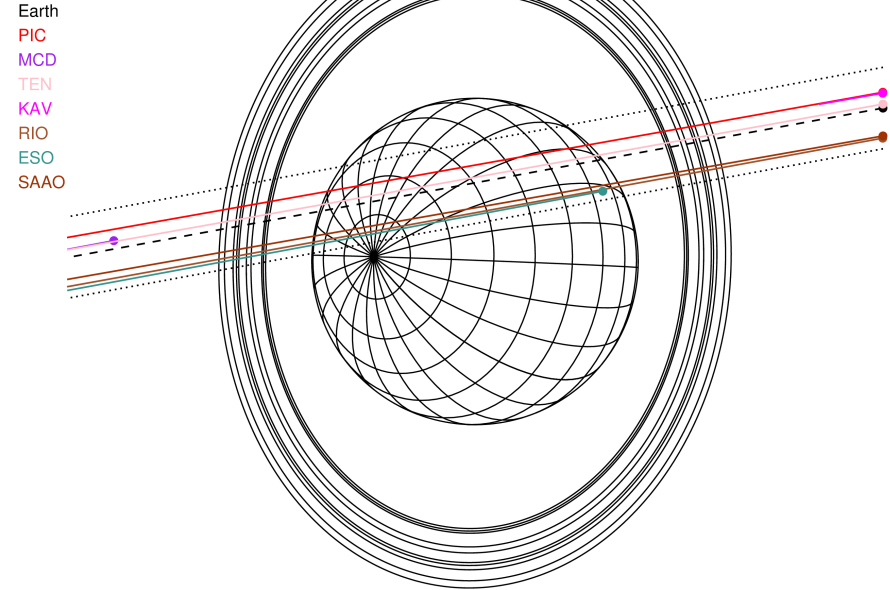
RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.027
 G magnitude : 15.058
 RP magnitude : 14.671
 BP magnitude : 15.293
 DUPflag : 0
 Distance (au) : 17.738
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.62
 Sun-Target sep (deg) : 155.69
 Sun-Moon sep (deg) : 22.71
 B (ring opening deg) : 51.62
 PA of pole (deg) : 87.30

#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



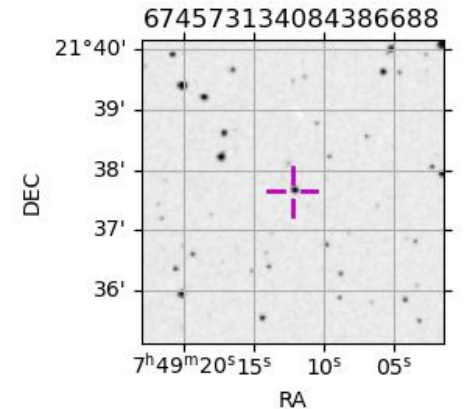
2039-02-09T00:09:37.1500 ra: 07 49 12.1715 s: +21 37 38.589 C/A 0.949° PA 190.38 deg v_sky -20.62 km/s D 17.74 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2039-02-09T00:09:37 K14.03 G15.06 PgtRgt

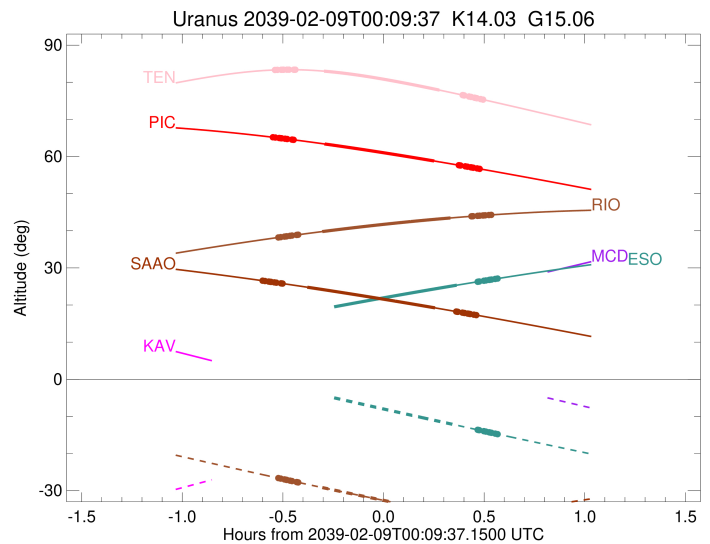
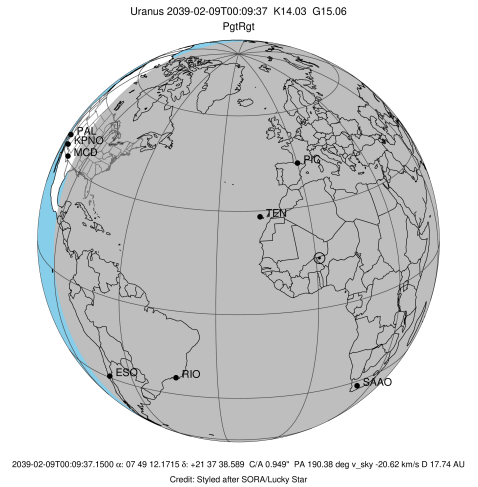


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	FEB 08 23:36 - FEB 09 00:38	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	FEB 08 23:37 - FEB 09 00:39	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	FEB 08 23:38 - FEB 09 00:41	PieRie
ESO	European Southern Obs	-29.3	289.3		+	+++++	FEB 09 00:31 - FEB 09 00:43	PneRne
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +	+++++	FEB 08 23:33 - FEB 09 00:37	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

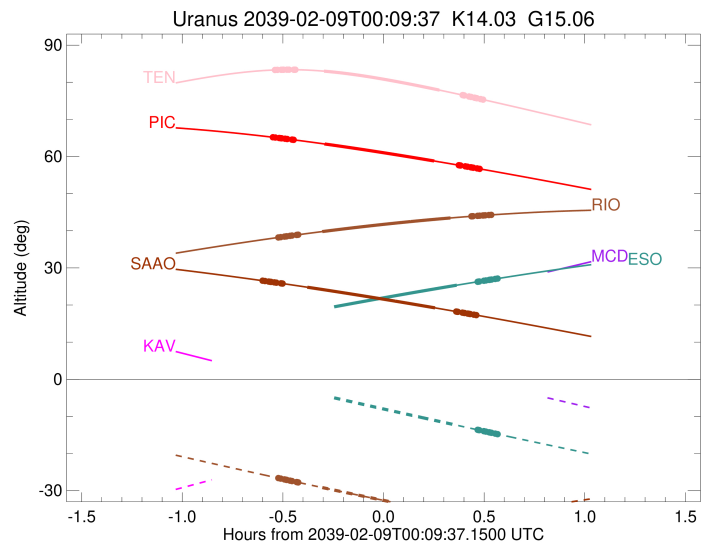
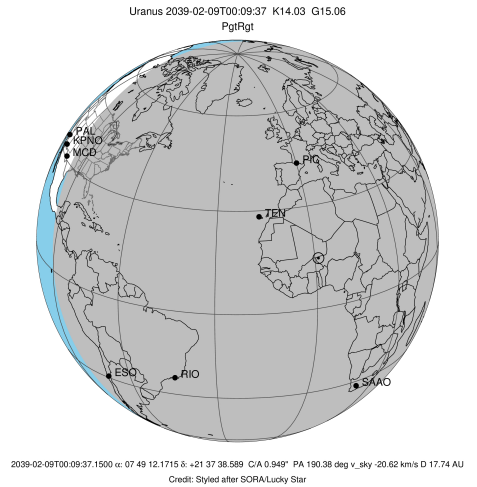


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-09T00:08:26.890
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 674573134084386688
 2Mass ID (if available) : 07491217+2137387
 ICRS Star Coord at Epoch: 07h 49m 12.17149s +21:37:38.58946s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.027
 G magnitude : 15.058
 RP magnitude : 14.671
 BP magnitude : 15.293
 DUPflag : 0
 Distance (au) : 17.738
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.62
 Sun-Target sep (deg) : 155.69
 Sun-Moon sep (deg) : 22.79
 B (ring opening deg) : 51.62
 PA of pole (deg) : 87.30
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.155
 C/A sky separation (km) : 14860.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



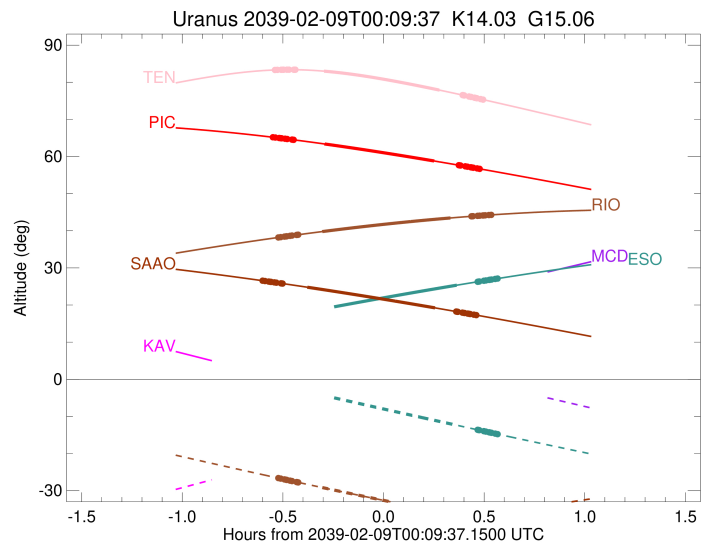
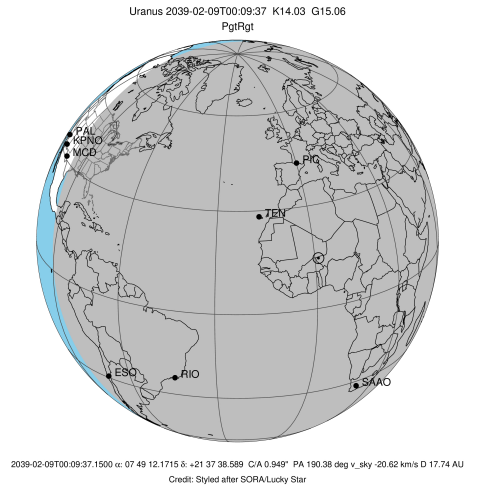
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-08T23:36:42.634		65.19	-60.95	51052.52	-25.23		
lambda	I	2039-02-08T23:37:23.240		65.11	-60.99	50026.71	-25.24		
delta	I	2039-02-08T23:38:31.769		64.99	-61.06	48300.35	-25.14		
gamma	I	2039-02-08T23:38:58.448		64.94	-61.08	47630.02	-25.11		
eta	I	2039-02-08T23:39:16.538		64.91	-61.10	47176.12	-25.08		
beta	I	2039-02-08T23:40:17.463		64.79	-61.15	45650.51	-24.98		
alpha	I	2039-02-08T23:40:55.332		64.72	-61.18	44701.33	-24.91		
4	I	2039-02-08T23:42:18.881		64.56	-61.26	42616.15	-24.75		
5	I	2039-02-08T23:42:33.626		64.53	-61.27	42238.57	-24.69		
6	I	2039-02-08T23:42:53.211		64.50	-61.28	41809.56	-24.69		
Uranus	I	2039-02-08T23:52:02.617		63.39	-61.67	25400.39		-24.24	-25.25
Uranus	E	2039-02-09T00:24:43.234		58.80	-61.93	25255.48		34.78	36.03
6	E	2039-02-09T00:32:02.959		57.67	-61.75	41836.04	24.64		
5	E	2039-02-09T00:32:18.322		57.63	-61.75	42178.82	24.64		
4	E	2039-02-09T00:32:32.418		57.59	-61.74	42541.57	24.70		
alpha	E	2039-02-09T00:34:00.060		57.36	-61.69	44713.25	24.85		
beta	E	2039-02-09T00:34:37.618		57.26	-61.67	45658.84	24.92		
eta	E	2039-02-09T00:35:38.420		57.10	-61.63	47176.12	25.02		
gamma	E	2039-02-09T00:35:56.190		57.06	-61.62	47621.01	25.05		
delta	E	2039-02-09T00:36:23.289		56.99	-61.61	48300.35	25.09		
lambda	E	2039-02-09T00:37:31.977		56.80	-61.56	50026.71	25.18		
epsilon	E	2039-02-09T00:38:10.661		56.70	-61.54	51001.61	25.17		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-09T00:09:08.900
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 674573134084386688
 2Mass ID (if available) : 07491217+2137387
 ICRS Star Coord at Epoch: 07h 49m 12.17149s +21:37:38.58946s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.027
 G magnitude : 15.058
 RP magnitude : 14.671
 BP magnitude : 15.293
 DUPflag : 0
 Distance (au) : 17.738
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.62
 Sun-Target sep (deg) : 155.69
 Sun-Moon sep (deg) : 22.99
 B (ring opening deg) : 51.62
 PA of pole (deg) : 87.30
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.009
 C/A sky separation (km) : 12974.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



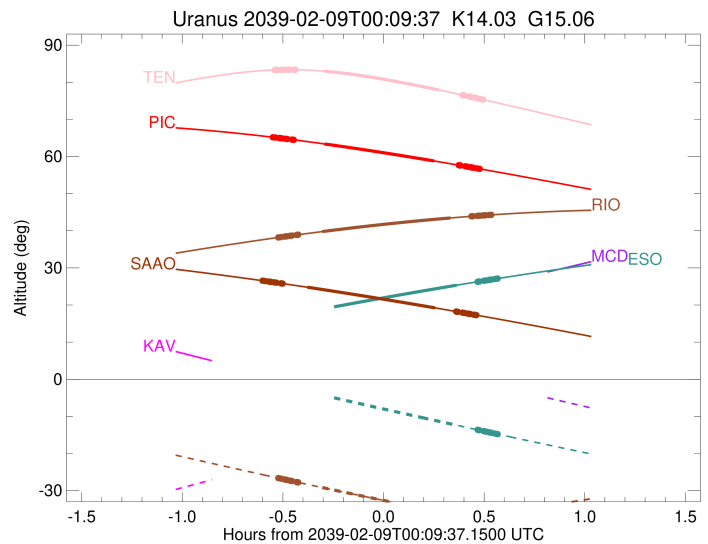
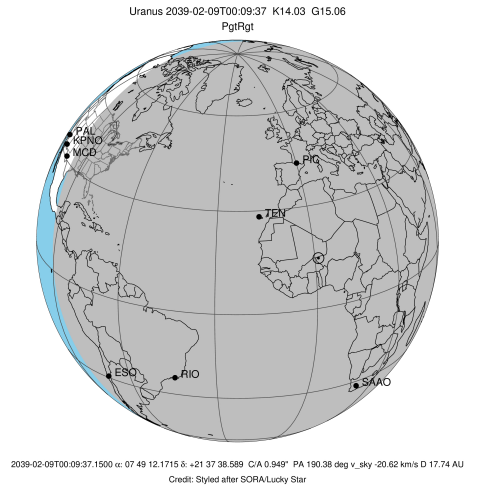
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-08T23:37:19.337		83.32	-62.72	51067.63	-25.62		
lambda	I	2039-02-08T23:37:59.911		83.34	-62.86	50026.71	-25.64		
delta	I	2039-02-08T23:39:07.345		83.37	-63.08	48300.35	-25.57		
gamma	I	2039-02-08T23:39:33.574		83.38	-63.17	47630.18	-25.54		
eta	I	2039-02-08T23:39:51.362		83.38	-63.23	47176.12	-25.52		
beta	I	2039-02-08T23:40:51.189		83.39	-63.43	45651.26	-25.44		
alpha	I	2039-02-08T23:41:28.317		83.40	-63.55	44702.63	-25.38		
4	I	2039-02-08T23:42:50.305		83.39	-63.83	42615.82	-25.26		
5	I	2039-02-08T23:43:04.560		83.39	-63.87	42242.35	-25.21		
6	I	2039-02-08T23:43:23.850		83.38	-63.94	41811.13	-25.23		
Uranus	I	2039-02-08T23:51:52.005		83.00	-65.60	25369.12		-26.72	-27.80
Uranus	E	2039-02-09T00:26:18.753		77.89	-71.74	25234.59		36.16	37.43
6	E	2039-02-09T00:33:11.295		76.56	-72.79	41838.11	25.20		
5	E	2039-02-09T00:33:26.467		76.51	-72.82	42181.65	25.19		
4	E	2039-02-09T00:33:40.070		76.46	-72.86	42539.97	25.24		
alpha	E	2039-02-09T00:35:06.003		76.18	-73.06	44714.77	25.35		
beta	E	2039-02-09T00:35:42.815		76.06	-73.15	45659.73	25.41		
eta	E	2039-02-09T00:36:42.450		75.86	-73.29	47176.12	25.48		
gamma	E	2039-02-09T00:36:59.902		75.80	-73.33	47621.05	25.50		
delta	E	2039-02-09T00:37:26.522		75.71	-73.39	48300.35	25.53		
lambda	E	2039-02-09T00:38:34.042		75.48	-73.54	50026.71	25.60		
epsilon	E	2039-02-09T00:39:12.677		75.35	-73.63	51016.54	25.59		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-09T00:10:31.690
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 674573134084386688
 2Mass ID (if available) : 07491217+2137387
 ICRS Star Coord at Epoch: 07h 49m 12.17149s +21:37:38.58946s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.027
 G magnitude : 15.058
 RP magnitude : 14.671
 BP magnitude : 15.293
 DUPflag : 0
 Distance (au) : 17.738
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.62
 Sun-Target sep (deg) : 155.69
 Sun-Moon sep (deg) : 23.22
 B (ring opening deg) : 51.62
 PA of pole (deg) : 87.30
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.583
 C/A sky separation (km) : 7500.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



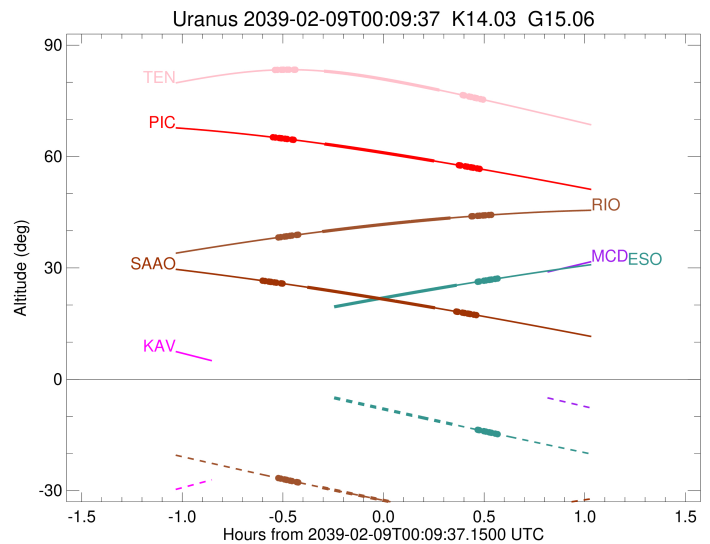
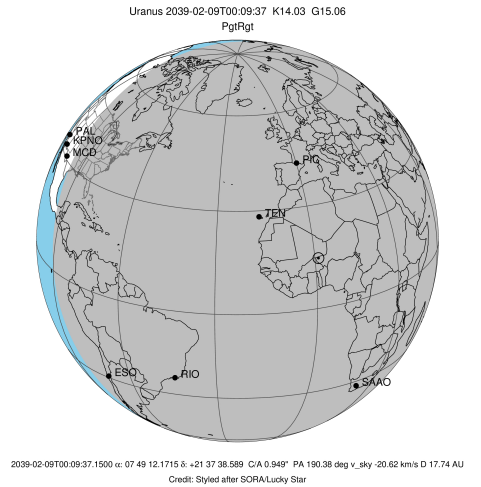
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-08T23:38:18.131		38.20	-26.63	51110.90	-26.21		
lambda	I	2039-02-08T23:38:59.461		38.29	-26.76	50026.71	-26.23		
delta	I	2039-02-08T23:40:05.315		38.43	-26.98	48300.35	-26.20		
gamma	I	2039-02-08T23:40:30.880		38.48	-27.06	47630.57	-26.19		
eta	I	2039-02-08T23:40:48.231		38.52	-27.12	47176.12	-26.19		
beta	I	2039-02-08T23:41:46.395		38.64	-27.31	45653.45	-26.16		
alpha	I	2039-02-08T23:42:22.355		38.71	-27.43	44706.48	-26.14		
4	I	2039-02-08T23:43:42.096		38.88	-27.69	42614.36	-26.10		
5	I	2039-02-08T23:43:55.380		38.90	-27.73	42252.84	-26.07		
6	I	2039-02-08T23:44:14.274		38.94	-27.79	41815.83	-26.10		
Uranus	I	2039-02-08T23:51:22.993		39.79	-29.18	25290.30		-32.42	-33.63
Uranus	E	2039-02-09T00:29:35.660		43.45	-36.22	25202.54		38.26	39.54
6	E	2039-02-09T00:35:48.059		43.90	-37.30	41843.99	26.13		
5	E	2039-02-09T00:36:03.088		43.91	-37.34	42190.37	26.10		
4	E	2039-02-09T00:36:15.702		43.93	-37.38	42535.80	26.13		
alpha	E	2039-02-09T00:37:39.066		44.02	-37.62	44719.16	26.17		
beta	E	2039-02-09T00:38:14.718		44.06	-37.72	45662.27	26.19		
eta	E	2039-02-09T00:39:12.522		44.12	-37.88	47176.12	26.22		
gamma	E	2039-02-09T00:39:29.497		44.14	-37.93	47621.20	26.22		
delta	E	2039-02-09T00:39:55.391		44.17	-38.00	48300.35	26.23		
lambda	E	2039-02-09T00:41:01.169		44.24	-38.19	50026.71	26.26		
epsilon	E	2039-02-09T00:41:40.538		44.28	-38.30	51060.68	26.24		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-09T00:12:12.720
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 674573134084386688
 2Mass ID (if available) : 07491217+2137387
 ICRS Star Coord at Epoch: 07h 49m 12.17149s +21:37:38.58946s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.027
 G magnitude : 15.058
 RP magnitude : 14.671
 BP magnitude : 15.293
 DUPflag : 0
 Distance (au) : 17.738
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.62
 Sun-Target sep (deg) : 155.69
 Sun-Moon sep (deg) : 23.40
 B (ring opening deg) : 51.62
 PA of pole (deg) : 87.30
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.556
 C/A sky separation (km) : 7155.0
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-08T23:39:46.073		16.93	-1.87x	51112.50	-26.06		
lambda	I	2039-02-08T23:40:27.700		17.05	-2.02x	50026.71	-26.08		
delta	I	2039-02-08T23:41:33.923		17.24	-2.25x	48300.35	-26.06		
gamma	I	2039-02-08T23:41:59.629		17.31	-2.33x	47630.58	-26.05		
eta	I	2039-02-08T23:42:17.076		17.36	-2.39x	47176.12	-26.05		
beta	I	2039-02-08T23:43:15.552		17.53	-2.60x	45653.54	-26.02		
alpha	I	2039-02-08T23:43:51.700		17.64	-2.72x	44706.63	-26.00		
4	I	2039-02-08T23:45:11.867		17.86	-3.00x	42614.29	-25.97		
5	I	2039-02-08T23:45:25.197		17.90	-3.04x	42253.26	-25.94		
6	I	2039-02-08T23:45:44.195		17.96	-3.11x	41816.04	-25.97		
Uranus	I	2039-02-08T23:52:52.606		19.17	-4.58x	25287.06		-32.65	-33.86
Uranus	E	2039-02-09T00:31:27.463		25.34	-12.38	25201.70		38.31	39.60
6	E	2039-02-09T00:37:40.433		26.26	-13.61	41844.46	26.04		
5	E	2039-02-09T00:37:55.544		26.30	-13.66	42191.12	26.01		
4	E	2039-02-09T00:38:08.158		26.33	-13.70	42535.49	26.04		
alpha	E	2039-02-09T00:39:31.825		26.53	-13.98	44719.52	26.08		
beta	E	2039-02-09T00:40:07.598		26.62	-14.09	45662.49	26.10		
eta	E	2039-02-09T00:41:05.596		26.76	-14.28	47176.12	26.12		
gamma	E	2039-02-09T00:41:22.631		26.80	-14.34	47621.22	26.13		
delta	E	2039-02-09T00:41:48.617		26.86	-14.42	48300.35	26.14		
lambda	E	2039-02-09T00:42:54.631		27.02	-14.64	50026.71	26.16		
epsilon	E	2039-02-09T00:43:34.292		27.12	-14.77	51064.57	26.15		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-02-09T00:05:56.670
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 674573134084386688
 2Mass ID (if available) : 07491217+2137387
 ICRS Star Coord at Epoch: 07h 49m 12.17149s +21:37:38.58946s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.027
 G magnitude : 15.058
 RP magnitude : 14.671
 BP magnitude : 15.293
 DUPflag : 0
 Distance (au) : 17.738
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.62
 Sun-Target sep (deg) : 155.69
 Sun-Moon sep (deg) : 22.31
 B (ring opening deg) : 51.62
 PA of pole (deg) : 87.30
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.643
 C/A sky separation (km) : 8276.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-08T23:33:36.006		26.55	-41.90	51106.72	-26.05		
lambda	I	2039-02-08T23:34:17.427		26.46	-41.86	50026.71	-26.07		
delta	I	2039-02-08T23:35:23.695		26.32	-41.81	48300.35	-26.04		
gamma	I	2039-02-08T23:35:49.428		26.26	-41.78	47630.53	-26.02		
eta	I	2039-02-08T23:36:06.892		26.23	-41.77	47176.12	-26.01		
beta	I	2039-02-08T23:37:05.458		26.10	-41.72	45653.23	-25.98		
alpha	I	2039-02-08T23:37:41.683		26.02	-41.68	44706.08	-25.96		
4	I	2039-02-08T23:39:01.982		25.85	-41.61	42614.55	-25.91		
5	I	2039-02-08T23:39:15.420		25.82	-41.59	42251.75	-25.88		
6	I	2039-02-08T23:39:34.440		25.78	-41.58	41815.32	-25.90		
Uranus	I	2039-02-08T23:46:52.739		24.80	-41.13	25298.40		-31.86	-33.06
Uranus	E	2039-02-09T00:24:57.335		19.24	-37.89	25205.06		38.09	39.38
6	E	2039-02-09T00:31:16.250		18.24	-37.22	41843.00	25.81		
5	E	2039-02-09T00:31:31.397		18.20	-37.19	42188.83	25.78		
4	E	2039-02-09T00:31:44.252		18.17	-37.17	42536.46	25.81		
alpha	E	2039-02-09T00:33:08.580		17.95	-37.01	44718.41	25.86		
beta	E	2039-02-09T00:33:44.660		17.85	-36.95	45661.84	25.88		
eta	E	2039-02-09T00:34:43.163		17.69	-36.84	47176.12	25.91		
gamma	E	2039-02-09T00:35:00.335		17.65	-36.81	47621.17	25.92		
delta	E	2039-02-09T00:35:26.532		17.58	-36.76	48300.35	25.93		
lambda	E	2039-02-09T00:36:33.071		17.40	-36.63	50026.71	25.96		
epsilon	E	2039-02-09T00:37:12.589		17.29	-36.56	51052.80	25.94		