

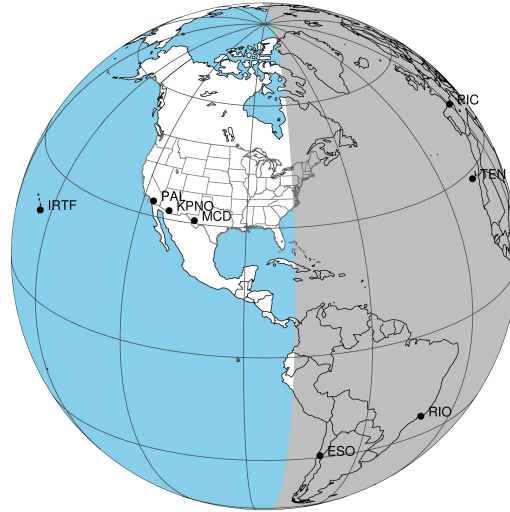
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-24T23:20:03.190
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427682492633067264
 2Mass ID (if available) : 05481156+2337371

Uranus 2033-03-24T23:20:03 K13.39 G16.71 PgtRgt

ICRS Star Coord at Epoch: 05h 48m 11.57088s +23:37:36.81878s

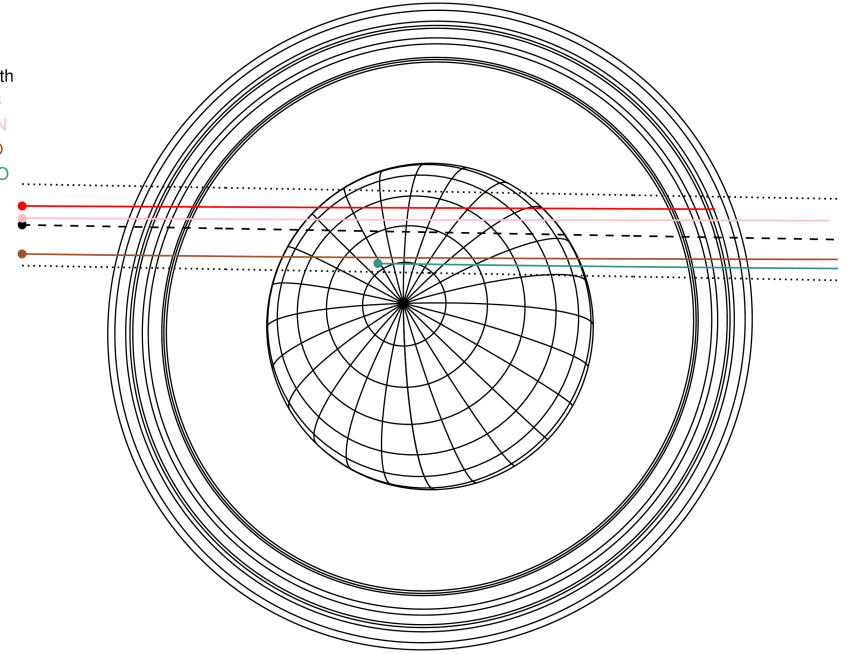
RUWE (>1.4 is poor) : 0.95
 K magnitude : 13.391
 G magnitude : 16.710
 RP magnitude : 15.684
 BP magnitude : 17.769
 DUPflag : 0
 Distance (au) : 19.096
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.91
 Sun-Target sep (deg) : 83.13
 Sun-Moon sep (deg) : 161.21
 B (ring opening deg) : 77.53
 PA of pole (deg) : 49.10

Uranus 2033-03-24T23:20:03 K13.39 G16.71
 PgtRgt



2033-03-24T23:20:03.1900 cr: 05 48 11.5709 s: +23 37 36.819 C/A 1.072° PA 178.96 deg v_sky + 9.91 km/s D 19.10 AU
 Credit: Styled after SORA/Lucky Star

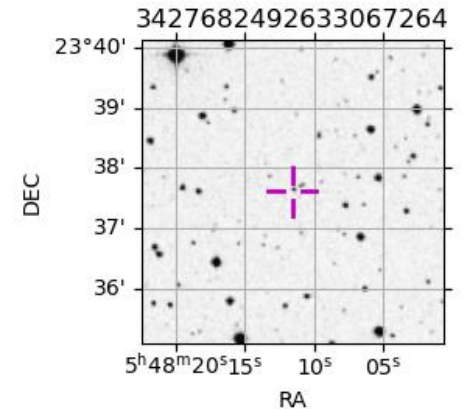
Earth
 PIC
 TEN
 RIO
 ESO



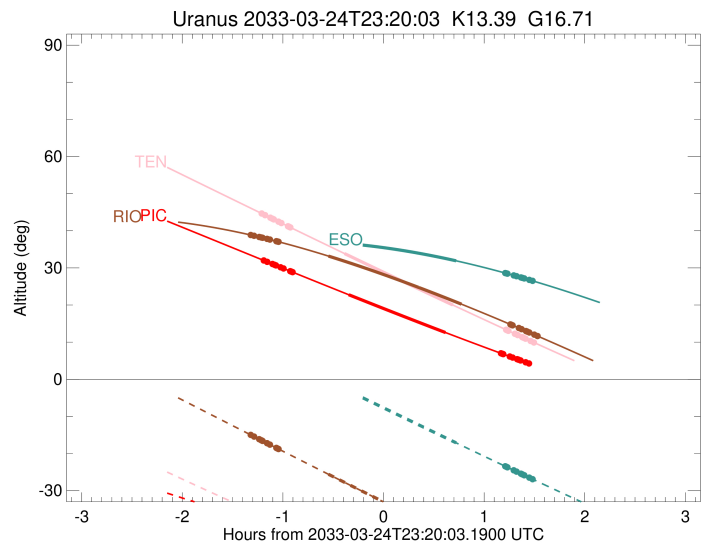
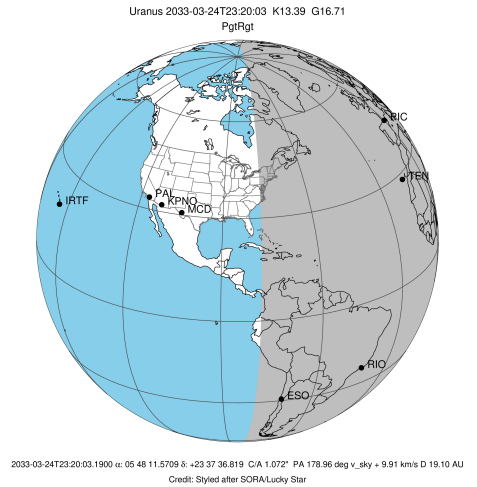
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++	+ +	+++++	MAR 24 22:08 - MAR 25 00:41	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	+++++	+ +	+++++	MAR 24 22:07 - MAR 25 00:49	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	+++++	+ +	+++++	MAR 24 22:00 - MAR 25 00:51	PieRie
ESO	European Southern Obs	-29.3	289.3		+	+++++	MAR 25 00:03 - MAR 25 00:48	PneRne
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

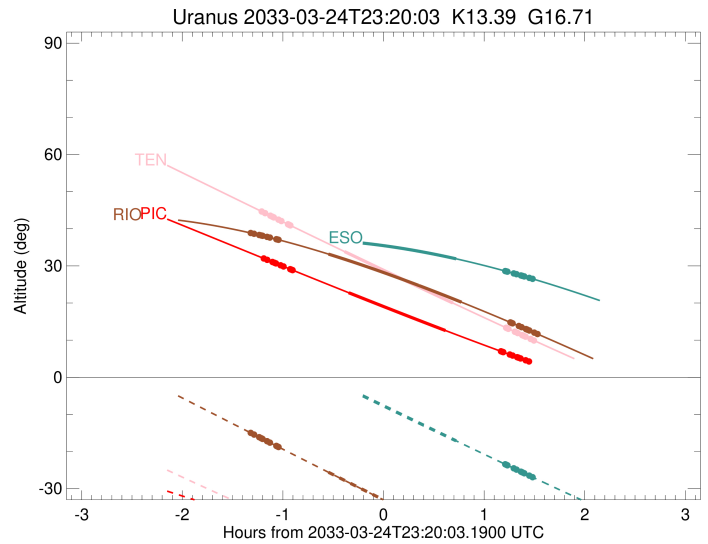
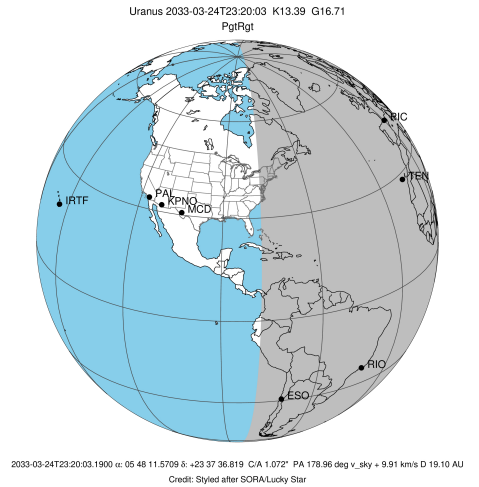


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-24T23:27:34.740
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3427682492633067264
 2Mass ID (if available) : 05481156+2337371
 ICRS Star Coord at Epoch: 05h 48m 11.57088s +23:37:36.81878s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 13.391
 G magnitude : 16.710
 RP magnitude : 15.684
 BP magnitude : 17.769
 DUPflag : 0
 Distance (au) : 19.096
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.91
 Sun-Target sep (deg) : 83.13
 Sun-Moon sep (deg) : 160.81
 B (ring opening deg) : 77.53
 PA of pole (deg) : 49.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.341
 C/A sky separation (km) : 18566.2
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



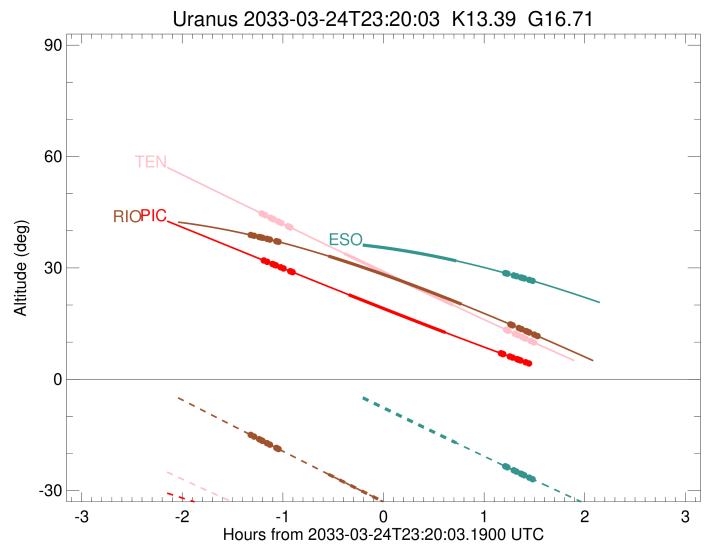
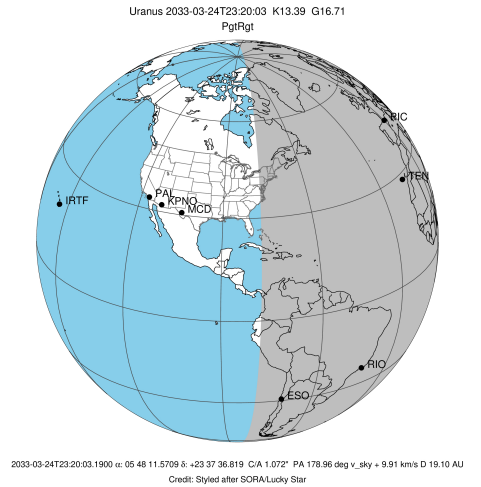
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-03-24T22:08:24.176		32.06	-38.23	51309.99	-9.17		
lambda	I	2033-03-24T22:10:43.921		31.63	-38.49	50026.71	-9.17		
delta	I	2033-03-24T22:13:52.768		31.05	-38.84	48300.35	-9.12		
gamma	I	2033-03-24T22:15:06.233		30.83	-38.98	47631.40	-9.09		
eta	I	2033-03-24T22:15:56.332		30.67	-39.07	47176.12	-9.08		
beta	I	2033-03-24T22:18:42.623		30.16	-39.36	45671.27	-9.03		
alpha	I	2033-03-24T22:20:28.048		29.84	-39.55	44718.20	-8.99		
4	I	2033-03-24T22:24:25.770		29.12	-39.96	42597.40	-8.89		
5	I	2033-03-24T22:25:13.835		28.97	-40.04	42158.61	-8.87		
6	I	2033-03-24T22:25:49.105		28.86	-40.10	41848.45	-8.86		
Uranus	I	2033-03-24T22:59:16.228		22.79	-42.99	25009.32		12.37	12.94
Uranus	E	2033-03-24T23:57:05.713		12.57	-45.37	25557.67		-0.59	-0.62
6	E	2033-03-25T00:30:07.737		6.99	-45.05	41863.20	9.07		
5	E	2033-03-25T00:30:51.543		6.87	-45.03	42262.00	9.08		
4	E	2033-03-25T00:31:20.041		6.79	-45.01	42525.98	9.10		
alpha	E	2033-03-25T00:35:16.953		6.14	-44.89	44692.95	9.21		
beta	E	2033-03-25T00:36:59.591		5.86	-44.83	45641.45	9.26		
eta	E	2033-03-25T00:39:44.823		5.41	-44.73	47176.12	9.32		
gamma	E	2033-03-25T00:40:32.588		5.28	-44.70	47621.74	9.34		
delta	E	2033-03-25T00:41:45.158		5.08	-44.65	48300.35	9.36		
lambda	E	2033-03-25T00:44:48.904		4.58x	-44.52	50026.71	9.43		
epsilon	E	2033-03-25T00:46:08.302		4.37x	-44.46	50776.09	9.44		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-24T23:28:35.800
 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 : 3427682492633067264
 2Mass ID (if available) : 05481156+2337371
 ICRS Star Coord at Epoch: 05h 48m 11.57088s +23:37:36.81878s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 13.391
 G magnitude : 16.710
 RP magnitude : 15.684
 BP magnitude : 17.769
 DUPflag : 0
 Distance (au) : 19.096
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.91
 Sun-Target sep (deg) : 83.13
 Sun-Moon sep (deg) : 160.72
 B (ring opening deg) : 77.53
 PA of pole (deg) : 49.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.206
 C/A sky separation (km) : 16700.9
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



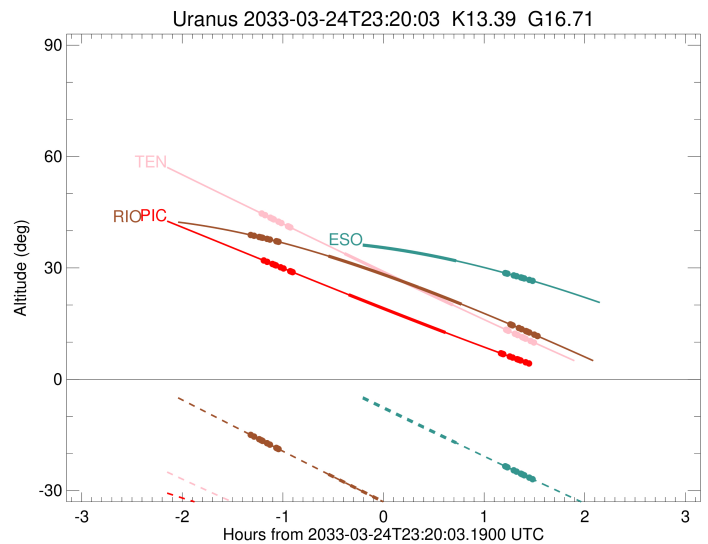
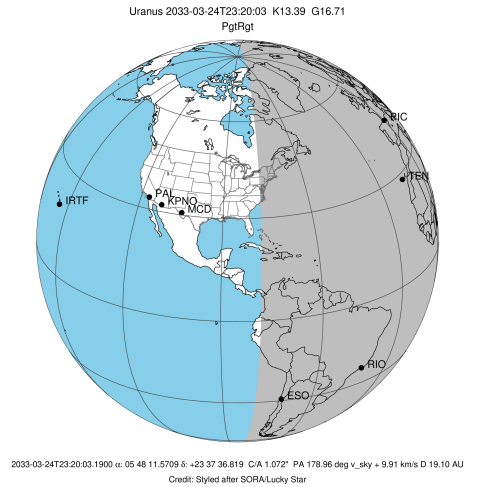
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-03-24T22:07:07.937		44.72	-36.51	51324.91	-9.19		
lambda	I	2033-03-24T22:09:29.056		44.20	-36.97	50026.71	-9.19		
delta	I	2033-03-24T22:12:37.367		43.51	-37.59	48300.35	-9.15		
gamma	I	2033-03-24T22:13:50.549		43.25	-37.82	47631.46	-9.13		
eta	I	2033-03-24T22:14:40.441		43.06	-37.99	47176.12	-9.12		
beta	I	2033-03-24T22:17:25.790		42.46	-38.52	45672.05	-9.08		
alpha	I	2033-03-24T22:19:10.468		42.08	-38.86	44719.80	-9.05		
4	I	2033-03-24T22:23:06.270		41.22	-39.62	42599.22	-8.98		
5	I	2033-03-24T22:23:53.918		41.04	-39.77	42159.94	-8.96		
6	I	2033-03-24T22:24:29.178		40.91	-39.89	41846.35	-8.95		
Uranus	I	2033-03-24T22:56:46.546		33.87	-45.83	25000.87		12.47	13.04
Uranus	E	2033-03-25T00:01:26.499		20.00	-55.56	25546.72		-1.81	-1.89
6	E	2033-03-25T00:33:13.180		13.33	-58.60	41861.58	9.19		
5	E	2033-03-25T00:33:56.946		13.18	-58.65	42265.50	9.20		
4	E	2033-03-25T00:34:24.637		13.08	-58.68	42526.12	9.22		
alpha	E	2033-03-25T00:38:18.885		12.27	-58.94	44693.94	9.31		
beta	E	2033-03-25T00:40:00.380		11.92	-59.04	45641.64	9.35		
eta	E	2033-03-25T00:42:44.100		11.36	-59.19	47176.12	9.40		
gamma	E	2033-03-25T00:43:31.461		11.19	-59.24	47621.63	9.41		
delta	E	2033-03-25T00:44:43.477		10.95	-59.30	48300.35	9.44		
lambda	E	2033-03-25T00:47:45.948		10.32	-59.45	50026.71	9.49		
epsilon	E	2033-03-25T00:49:05.503		10.05	-59.50	50782.20	9.50		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-24T23:26:33.820
 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 : 3427682492633067264
 2Mass ID (if available) : 05481156+2337371
 ICRS Star Coord at Epoch: 05h 48m 11.57088s +23:37:36.81878s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 13.391
 G magnitude : 16.710
 RP magnitude : 15.684
 BP magnitude : 17.769
 DUPflag : 0
 Distance (au) : 19.096
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.91
 Sun-Target sep (deg) : 83.13
 Sun-Moon sep (deg) : 160.66
 B (ring opening deg) : 77.53
 PA of pole (deg) : 49.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.775
 C/A sky separation (km) : 10738.5
 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_itrff93_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	2033-03-24T22:00:31.384		38.90	-14.90	51366.63	-9.39		
lambda	I	2033-03-24T22:02:54.008		38.65	-15.45	50026.71	-9.39		
delta	I	2033-03-24T22:05:57.996		38.33	-16.15	48300.35	-9.38		
gamma	I	2033-03-24T22:07:09.348		38.20	-16.42	47631.56	-9.37		
eta	I	2033-03-24T22:07:57.965		38.11	-16.61	47176.12	-9.37		
beta	I	2033-03-24T22:10:38.516		37.82	-17.22	45674.20	-9.35		
alpha	I	2033-03-24T22:12:19.828		37.63	-17.61	44724.41	-9.34		
4	I	2033-03-24T22:16:07.758		37.19	-18.48	42604.08	-9.31		
5	I	2033-03-24T22:16:53.671		37.10	-18.66	42164.86	-9.30		
6	I	2033-03-24T22:17:28.709		37.03	-18.79	41840.12	-9.31		
Uranus	I	2033-03-24T22:47:10.607		33.19	-25.58	25037.29		12.04	12.59
Uranus	E	2033-03-25T00:06:29.731		20.24	-43.28	25460.71		-5.13	-5.37
6	E	2033-03-25T00:35:44.950		14.77	-49.49	41855.89	9.52		
5	E	2033-03-25T00:36:28.994		14.63	-49.64	42276.52	9.52		
4	E	2033-03-25T00:36:54.521		14.55	-49.73	42527.28	9.53		
alpha	E	2033-03-25T00:40:42.092		13.82	-50.51	44697.56	9.57		
beta	E	2033-03-25T00:42:20.576		13.51	-50.85	45642.50	9.59		
eta	E	2033-03-25T00:45:00.326		12.99	-51.39	47176.12	9.61		
gamma	E	2033-03-25T00:45:46.622		12.84	-51.55	47621.32	9.62		
delta	E	2033-03-25T00:46:57.172		12.61	-51.79	48300.35	9.63		
lambda	E	2033-03-25T00:49:56.229		12.03	-52.39	50026.71	9.65		
epsilon	E	2033-03-25T00:51:16.982		11.77	-52.66	50806.63	9.65		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-24T23:22:18.010
 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 : 3427682492633067264
 2Mass ID (if available) : 05481156+2337371
 ICRS Star Coord at Epoch: 05h 48m 11.57088s +23:37:36.81878s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 13.391
 G magnitude : 16.710
 RP magnitude : 15.684
 BP magnitude : 17.769
 DUPflag : 0
 Distance (au) : 19.096
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.91
 Sun-Target sep (deg) : 83.13
 Sun-Moon sep (deg) : 160.99
 B (ring opening deg) : 77.53
 PA of pole (deg) : 49.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.704
 C/A sky separation (km) : 9744.1
 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	2033-03-24T21:55:27.612		36.87	10.75x	51370.61	-9.42		
lambda	I	2033-03-24T21:57:50.146		36.94	10.24x	50026.71	-9.42		
delta	I	2033-03-24T22:00:53.470		37.02	9.57x	48300.35	-9.41		
gamma	I	2033-03-24T22:02:04.562		37.04	9.32x	47631.56	-9.40		
eta	I	2033-03-24T22:02:53.001		37.06	9.14x	47176.12	-9.40		
beta	I	2033-03-24T22:05:32.932		37.12	8.56x	45674.42	-9.39		
alpha	I	2033-03-24T22:07:13.833		37.14	8.20x	44724.91	-9.37		
4	I	2033-03-24T22:11:00.861		37.20	7.38x	42604.58	-9.35		
5	I	2033-03-24T22:11:46.575		37.21	7.21x	42165.50	-9.34		
6	I	2033-03-24T22:12:21.599		37.22	7.08x	41839.42	-9.34		
Uranus	I	2033-03-24T22:41:50.354		37.06	0.66x	25047.51		11.91	12.46
Uranus	E	2033-03-25T00:03:21.727		31.91	-17.13	25438.38		-5.69	-5.95
6	E	2033-03-25T00:32:39.497		28.61	-23.44	41854.66	9.45		
5	E	2033-03-25T00:33:24.234		28.52	-23.60	42278.68	9.45		
4	E	2033-03-25T00:33:49.724		28.47	-23.69	42527.65	9.46		
alpha	E	2033-03-25T00:37:39.199		27.99	-24.51	44698.38	9.49		
beta	E	2033-03-25T00:39:18.465		27.78	-24.86	45642.74	9.50		
eta	E	2033-03-25T00:41:59.651		27.43	-25.43	47176.12	9.52		
gamma	E	2033-03-25T00:42:46.379		27.33	-25.60	47621.27	9.53		
delta	E	2033-03-25T00:43:57.615		27.17	-25.85	48300.35	9.54		
lambda	E	2033-03-25T00:46:58.465		26.78	-26.49	50026.71	9.55		
epsilon	E	2033-03-25T00:48:20.686		26.59	-26.79	50812.66	9.55		