

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-10-23T07:40:06.450  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3377405090070124288  
 2Mass ID (if available) : 06241813+2334370

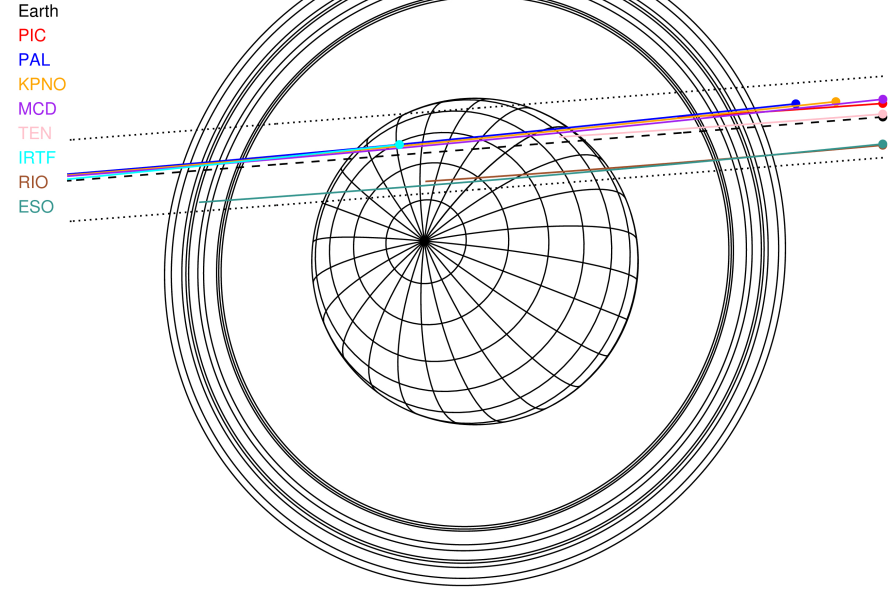
Uranus 2033-10-23T07:40:06 K14.94 G17.63 PgtRgt

ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s

RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.944  
 G magnitude : 17.630  
 RP magnitude : 16.821  
 BP magnitude : 18.368  
 DUPflag : 0  
 Distance (au) : 18.535  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -5.82  
 Sun-Target sep (deg) : 114.18  
 Sun-Moon sep (deg) : 114.25  
 B (ring opening deg) : 70.43  
 PA of pole (deg) : 67.97



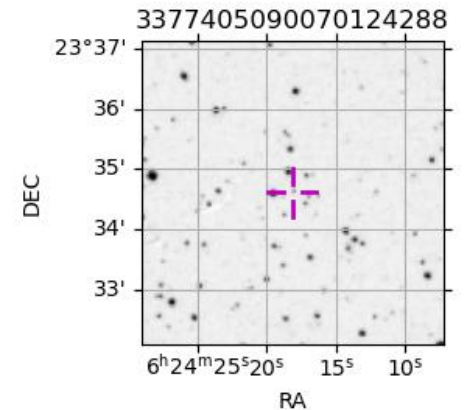
2033-10-23T07:40:06.4500 α: 06 24 18.1382 δ: +23 34 36.965 C/A 1.320° PA 184.48 deg v\_sky - 5.82 km/s D 18.54 AU  
 Credit: Styled after SORA/Lucky Star



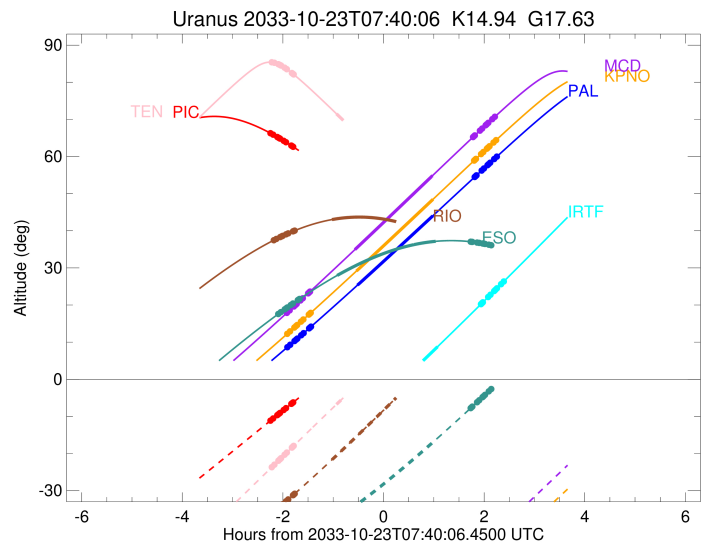
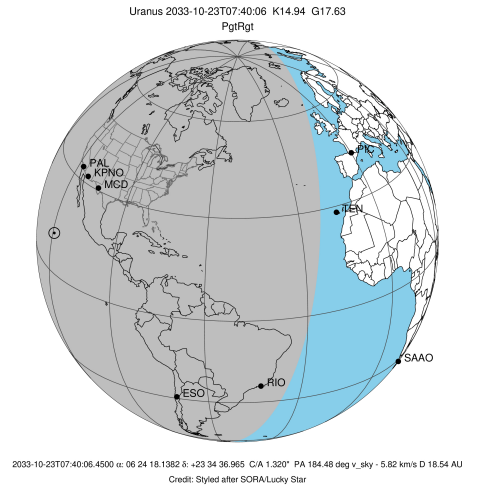
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++			OCT 23 05:26 - OCT 23 05:52	PnnRin
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	OCT 23 05:46 - OCT 23 09:56	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	OCT 23 05:46 - OCT 23 09:55	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	OCT 23 05:45 - OCT 23 09:53	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+		OCT 23 05:27 - OCT 23 06:44	PinRin
IRTF	Mauna Kea/IRTF	19.8	204.5		+	+++++	OCT 23 08:44 - OCT 23 10:04	PneRne
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+		OCT 23 05:30 - OCT 23 06:38	PinRin
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	OCT 23 05:35 - OCT 23 09:34	PieRie
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

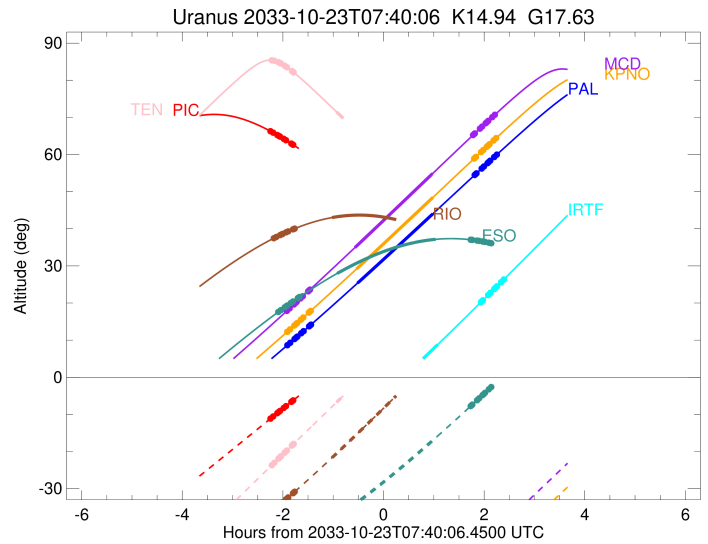
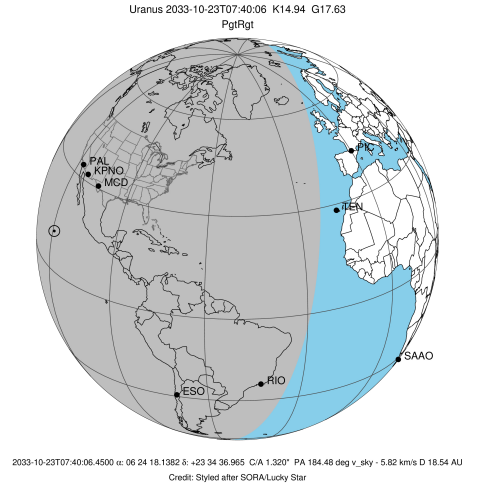


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-10-23T07:29:39.110  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3377405090070124288  
 2Mass ID (if available) : 06241813+2334370  
 ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.944  
 G magnitude : 17.630  
 RP magnitude : 16.821  
 BP magnitude : 18.368  
 DUPflag : 0  
 Distance (au) : 18.535  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -5.82  
 Sun-Target sep (deg) : 114.18  
 Sun-Moon sep (deg) : 115.03  
 B (ring opening deg) : 70.43  
 PA of pole (deg) : 67.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.529  
 C/A sky separation (km) : 20558.5  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



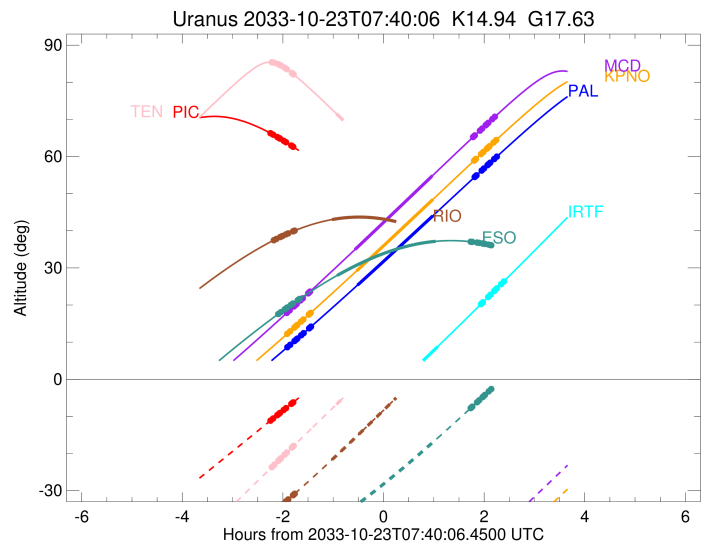
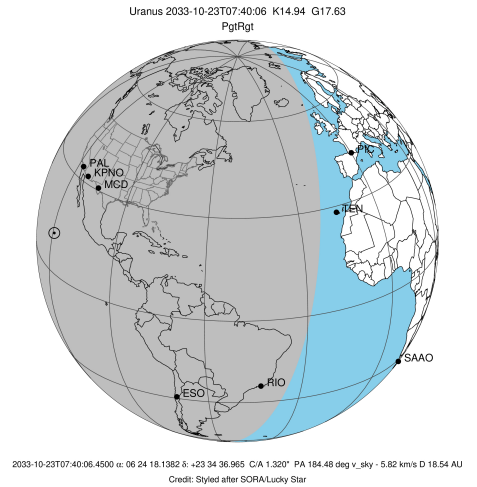
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-10-23T05:26:04.932		66.19	-11.00	50886.56	-5.87		
lambda	I	2033-10-23T05:28:32.009		65.89	-10.56	50026.71	-5.84		
delta	I	2033-10-23T05:33:28.969		65.26	-9.65	48300.35	-5.79		
gamma	I	2033-10-23T05:35:26.425		65.00	-9.30	47621.37	-5.77		
eta	I	2033-10-23T05:36:43.665		64.83	-9.06	47176.12	-5.76		
beta	I	2033-10-23T05:41:08.379		64.23	-8.26	45657.44	-5.71		
alpha	I	2033-10-23T05:43:49.171		63.85	-7.78	44745.18	-5.68		
4	I	2033-10-23T05:50:05.554		62.96	-6.64	42615.75	-5.60		
5	I	2033-10-23T05:51:24.961		62.77	-6.40	42179.80	-5.58		
6	I	2033-10-23T05:52:26.350		62.62	-6.22	41841.07	-5.56		
Uranus	I	2033-10-23T06:48:00.495		53.59	3.64x	25539.67		-3.65	-3.82
Uranus	E	2033-10-23T08:09:44.961		38.86	16.98x	25162.34		16.95	17.70
6	E	2033-10-23T09:02:53.202		29.09	24.42x	41798.57	5.42		
5	E	2033-10-23T09:04:28.171		28.80	24.62x	42313.18	5.44		
4	E	2033-10-23T09:05:16.355		28.65	24.72x	42555.65	5.46		
alpha	E	2033-10-23T09:11:43.138		27.47	25.52x	44686.25	5.53		
beta	E	2033-10-23T09:14:36.839		26.95	25.87x	45647.14	5.55		
eta	E	2033-10-23T09:19:11.073		26.11	26.42x	47176.12	5.60		
gamma	E	2033-10-23T09:20:32.267		25.87	26.58x	47630.88	5.61		
delta	E	2033-10-23T09:22:31.504		25.51	26.81x	48300.35	5.62		
lambda	E	2033-10-23T09:27:37.503		24.58	27.39x	50026.71	5.66		
epsilon	E	2033-10-23T09:32:06.826		23.77	27.90x	51555.15	5.69		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-10-23T07:55:15.620  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3377405090070124288  
 2Mass ID (if available) : 06241813+2334370  
 ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.944  
 G magnitude : 17.630  
 RP magnitude : 16.821  
 BP magnitude : 18.368  
 DUPflag : 0  
 Distance (au) : 18.535  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -5.82  
 Sun-Target sep (deg) : 114.18  
 Sun-Moon sep (deg) : 114.40  
 B (ring opening deg) : 70.43  
 PA of pole (deg) : 67.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.443  
 C/A sky separation (km) : 19392.6  
 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



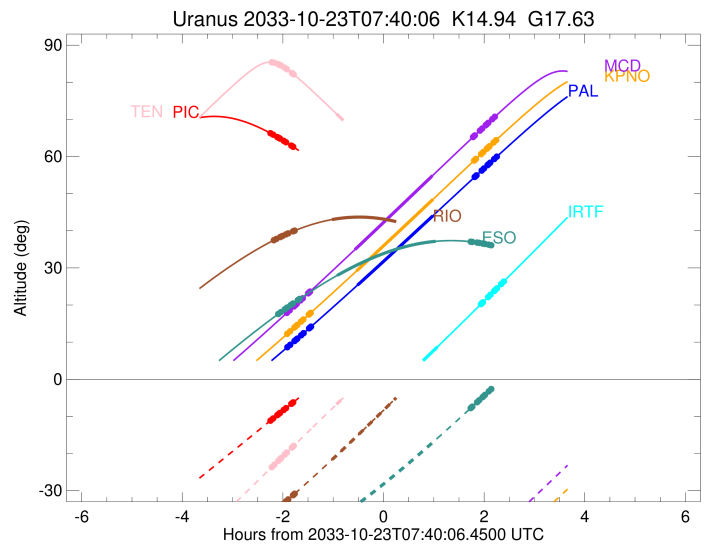
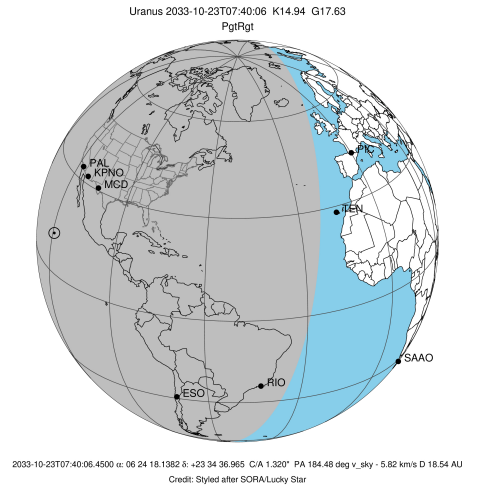
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-10-23T05:46:16.100		8.80	-57.57	50890.83	-5.59		
lambda	I	2033-10-23T05:48:51.125		9.30	-58.01	50026.71	-5.57		
delta	I	2033-10-23T05:54:01.906		10.31	-58.87	48300.35	-5.54		
gamma	I	2033-10-23T05:56:04.565		10.71	-59.20	47621.39	-5.53		
eta	I	2033-10-23T05:57:25.152		10.97	-59.42	47176.12	-5.52		
beta	I	2033-10-23T06:02:00.855		11.87	-60.15	45657.24	-5.49		
alpha	I	2033-10-23T06:04:47.898		12.42	-60.59	44744.97	-5.47		
4	I	2033-10-23T06:11:17.670		13.70	-61.57	42615.82	-5.42		
5	I	2033-10-23T06:12:39.581		13.97	-61.77	42180.23	-5.41		
6	I	2033-10-23T06:13:43.056		14.18	-61.93	41840.77	-5.39		
Uranus	I	2033-10-23T07:09:01.653		25.34	-67.74	25532.71		-4.26	-4.46
Uranus	E	2033-10-23T08:39:05.244		44.05	-63.45	25116.57		17.96	18.75
6	E	2033-10-23T09:28:40.239		54.45	-55.62	41799.84	5.72		
5	E	2033-10-23T09:30:10.314		54.76	-55.35	42314.21	5.74		
4	E	2033-10-23T09:30:55.372		54.92	-55.22	42552.87	5.75		
alpha	E	2033-10-23T09:37:02.218		56.19	-54.12	44685.64	5.83		
beta	E	2033-10-23T09:39:47.081		56.76	-53.62	45648.08	5.86		
eta	E	2033-10-23T09:44:06.526		57.66	-52.82	47176.12	5.91		
gamma	E	2033-10-23T09:45:23.381		57.93	-52.58	47631.03	5.93		
delta	E	2033-10-23T09:47:16.148		58.32	-52.23	48300.35	5.94		
lambda	E	2033-10-23T09:52:05.409		59.32	-51.33	50026.71	5.99		
epsilon	E	2033-10-23T09:56:19.518		60.19	-50.53	51553.78	6.03		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-10-23T07:54:37.430  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 3377405090070124288  
 2Mass ID (if available) : 06241813+2334370  
 ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.944  
 G magnitude : 17.630  
 RP magnitude : 16.821  
 BP magnitude : 18.368  
 DUPflag : 0  
 Distance (au) : 18.535  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -5.82  
 Sun-Target sep (deg) : 114.18  
 Sun-Moon sep (deg) : 114.45  
 B (ring opening deg) : 70.43  
 PA of pole (deg) : 67.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.421  
 C/A sky separation (km) : 19105.2  
 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	2033-10-23T05:46:08.744		12.41	-61.89	50888.67	-5.64		
lambda	I	2033-10-23T05:48:41.994		12.92	-62.29	50026.71	-5.62		
delta	I	2033-10-23T05:53:49.934		13.95	-63.08	48300.35	-5.59		
gamma	I	2033-10-23T05:55:51.455		14.36	-63.39	47621.37	-5.58		
eta	I	2033-10-23T05:57:11.284		14.62	-63.59	47176.12	-5.57		
beta	I	2033-10-23T06:01:44.330		15.54	-64.25	45657.39	-5.54		
alpha	I	2033-10-23T06:04:29.749		16.10	-64.63	44745.14	-5.52		
4	I	2033-10-23T06:10:55.643		17.41	-65.50	42615.75	-5.47		
5	I	2033-10-23T06:12:16.822		17.68	-65.67	42179.72	-5.46		
6	I	2033-10-23T06:13:19.483		17.89	-65.80	41841.15	-5.45		
Uranus	I	2033-10-23T07:07:45.454		29.14	-69.74	25528.37		-4.60	-4.81
Uranus	E	2033-10-23T08:39:07.796		48.48	-61.29	25110.81		18.08	18.88
6	E	2033-10-23T09:28:01.000		58.87	-52.50	41799.97	5.77		
5	E	2033-10-23T09:29:30.333		59.19	-52.21	42314.29	5.79		
4	E	2033-10-23T09:30:14.972		59.34	-52.06	42552.62	5.80		
alpha	E	2033-10-23T09:36:19.000		60.63	-50.88	44685.60	5.88		
beta	E	2033-10-23T09:39:02.679		61.20	-50.35	45648.16	5.91		
eta	E	2033-10-23T09:43:20.277		62.10	-49.50	47176.12	5.95		
gamma	E	2033-10-23T09:44:36.608		62.37	-49.25	47631.04	5.97		
delta	E	2033-10-23T09:46:28.615		62.76	-48.88	48300.35	5.98		
lambda	E	2033-10-23T09:51:16.000		63.77	-47.92	50026.71	6.03		
epsilon	E	2033-10-23T09:55:28.511		64.64	-47.08	51553.62	6.07		

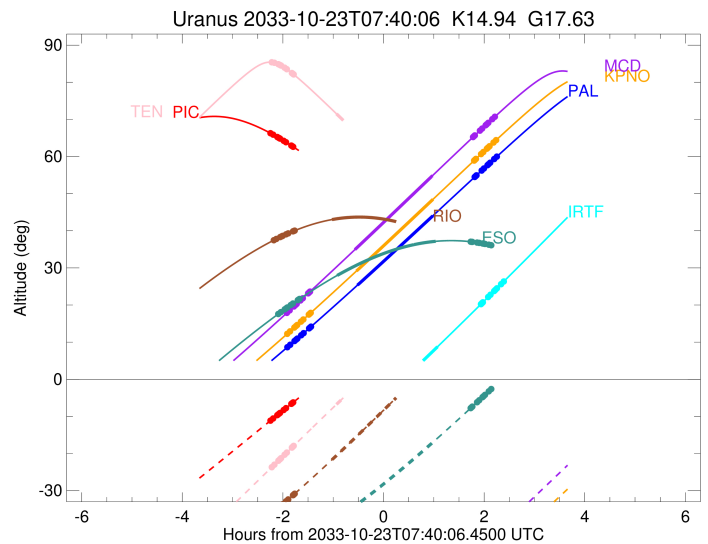
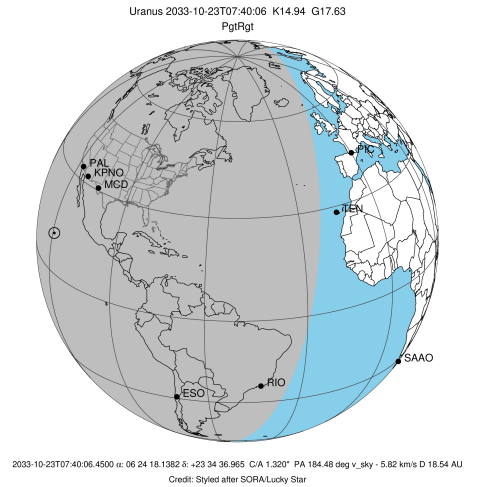
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-10-23T07:53:24.170  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 3377405090070124288  
 2Mass ID (if available) : 06241813+2334370  
 ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.944  
 G magnitude : 17.630  
 RP magnitude : 16.821  
 BP magnitude : 18.368  
 DUPflag : 0  
 Distance (au) : 18.535  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -5.82  
 Sun-Target sep (deg) : 114.18  
 Sun-Moon sep (deg) : 114.54  
 B (ring opening deg) : 70.43  
 PA of pole (deg) : 67.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.397  
 C/A sky separation (km) : 18780.9  
 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\_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	2033-10-23T05:45:42.164		18.05	-67.18	50886.02	-5.71		
lambda	I	2033-10-23T05:48:13.106		18.57	-67.49	50026.71	-5.69		
delta	I	2033-10-23T05:53:17.299		19.62	-68.10	48300.35	-5.66		
gamma	I	2033-10-23T05:55:17.326		20.03	-68.33	47621.36	-5.65		
eta	I	2033-10-23T05:56:36.161		20.30	-68.48	47176.12	-5.64		
beta	I	2033-10-23T06:01:05.747		21.24	-68.95	45657.58	-5.61		
alpha	I	2033-10-23T06:03:49.061		21.80	-69.21	44745.35	-5.60		
4	I	2033-10-23T06:10:09.966		23.13	-69.77	42615.66	-5.54		
5	I	2033-10-23T06:11:30.197		23.41	-69.88	42179.11	-5.54		
6	I	2033-10-23T06:12:31.836		23.62	-69.95	41841.60	-5.52		
Uranus	I	2033-10-23T07:05:55.458		34.92	-70.13	25523.00		-4.99	-5.22
Uranus	E	2033-10-23T08:38:35.916		54.86	-56.72	25104.98		18.21	19.01
6	E	2033-10-23T09:26:43.164		65.20	-47.15	41800.10	5.82		
5	E	2033-10-23T09:28:11.669		65.51	-46.85	42314.36	5.84		
4	E	2033-10-23T09:28:55.848		65.67	-46.70	42552.36	5.85		
alpha	E	2033-10-23T09:34:56.735		66.95	-45.45	44685.55	5.93		
beta	E	2033-10-23T09:37:39.095		67.52	-44.89	45648.25	5.95		
eta	E	2033-10-23T09:41:54.651		68.41	-44.00	47176.12	6.00		
gamma	E	2033-10-23T09:43:10.405		68.68	-43.74	47631.06	6.01		
delta	E	2033-10-23T09:45:01.574		69.07	-43.35	48300.35	6.03		
lambda	E	2033-10-23T09:49:46.901		70.06	-42.35	50026.71	6.07		
epsilon	E	2033-10-23T09:53:57.671		70.93	-41.48	51553.45	6.11		



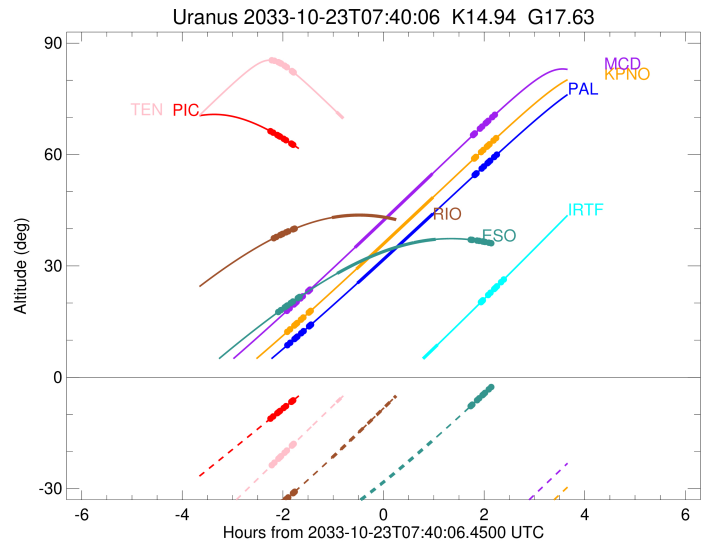
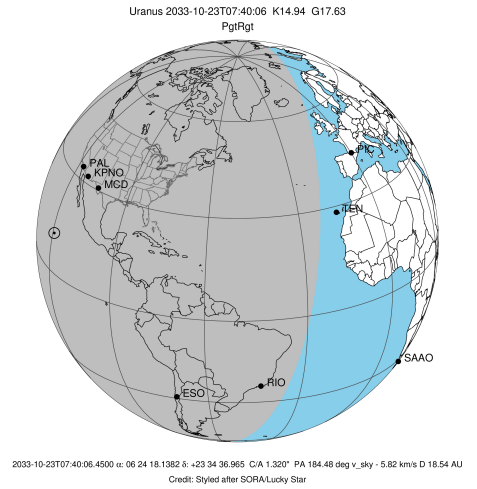
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-10-23T07:30:53.300  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 3377405090070124288  
 2Mass ID (if available) : 06241813+2334370  
 ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.944  
 G magnitude : 17.630  
 RP magnitude : 16.821  
 BP magnitude : 18.368  
 DUPflag : 0  
 Distance (au) : 18.535  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -5.82  
 Sun-Target sep (deg) : 114.18  
 Sun-Moon sep (deg) : 115.14  
 B (ring opening deg) : 70.43  
 PA of pole (deg) : 67.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.387  
 C/A sky separation (km) : 18651.6  
 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	2033-10-23T05:27:40.652		85.37	-23.51	50875.10	-6.06		
lambda	I	2033-10-23T05:30:01.177		85.26	-23.00	50026.71	-6.03		
delta	I	2033-10-23T05:34:48.338		84.87	-21.94	48300.35	-5.99		
gamma	I	2033-10-23T05:36:41.776		84.66	-21.52	47621.29	-5.98		
eta	I	2033-10-23T05:37:56.301		84.51	-21.25	47176.12	-5.97		
beta	I	2033-10-23T05:42:11.280		83.93	-20.32	45658.31	-5.93		
alpha	I	2033-10-23T05:44:46.001		83.53	-19.75	44746.10	-5.90		
4	I	2033-10-23T05:50:47.444		82.51	-18.42	42615.29	-5.84		
5	I	2033-10-23T05:52:04.061		82.28	-18.14	42177.02	-5.83		
6	I	2033-10-23T05:53:02.009		82.11	-17.93	41843.16	-5.81		
Uranus	I	2033-10-23T06:44:00.734		71.51	-6.77	25510.93		-5.76	-6.04
Uranus	E	2033-10-23T08:16:24.890		51.15	12.87x	25114.35		18.01	18.80
6	E	2033-10-23T09:05:04.257		40.45	22.63x	41799.54	5.70		
5	E	2033-10-23T09:06:34.677		40.12	22.92x	42314.00	5.72		
4	E	2033-10-23T09:07:20.085		39.95	23.07x	42553.52	5.73		
alpha	E	2033-10-23T09:13:29.342		38.60	24.26x	44685.79	5.78		
beta	E	2033-10-23T09:16:15.675		38.00	24.79x	45647.82	5.80		
eta	E	2033-10-23T09:20:38.161		37.04	25.62x	47176.12	5.84		
gamma	E	2033-10-23T09:21:56.020		36.76	25.87x	47630.99	5.85		
delta	E	2033-10-23T09:23:50.379		36.35	26.23x	48300.35	5.86		
lambda	E	2033-10-23T09:28:44.248		35.28	27.15x	50026.71	5.89		
epsilon	E	2033-10-23T09:33:03.141		34.34	27.95x	51554.40	5.91		

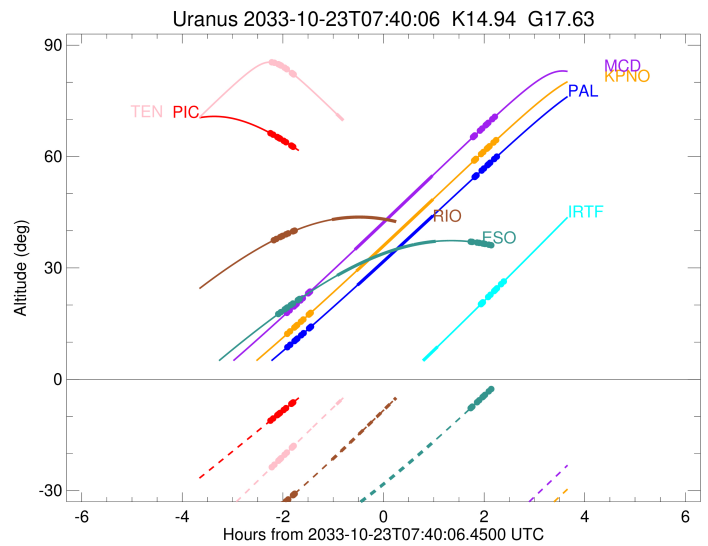
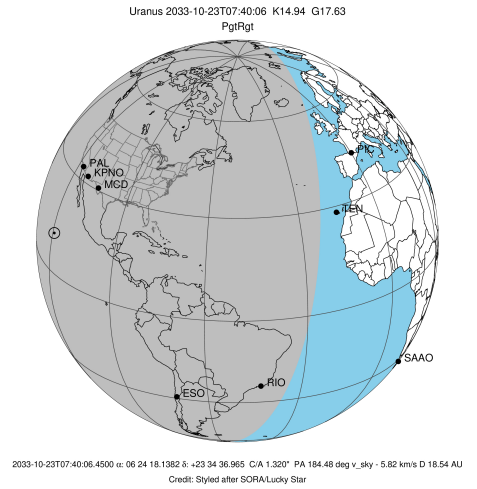
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-10-23T07:59:14.590
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : IRTF
Location            : Mauna Kea/IRTF
Latitude (deg)      : 19.82622
E. Longitude (deg)  : 204.52800
Altitude (km)       : 4.168
Gaia source ID      : 3377405090070124288
2Mass ID (if available) : 06241813+2334370
ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s
RUWE (>1.4 is poor) : 1.06
K magnitude          : 14.944
G magnitude          : 17.630
RP magnitude         : 16.821
BP magnitude         : 18.368
DUPflag             : 0
Distance (au)       : 18.535
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -5.82
Sun-Target sep (deg) : 114.18
Sun-Moon sep (deg)  : 113.84
B (ring opening deg) : 70.43
PA of pole (deg)    : 67.97
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.449
C/A sky separation (km) : 19481.9
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.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	2033-10-23T05:43:49.533	-27.79x	-26.65	50893.18	-5.31			
lambda	I	2033-10-23T05:46:33.250	-27.31x	-27.29	50026.71	-5.29			
delta	I	2033-10-23T05:52:00.598	-26.34x	-28.58	48300.35	-5.26			
gamma	I	2033-10-23T05:54:09.804	-25.95x	-29.08	47621.41	-5.25			
eta	I	2033-10-23T05:55:34.700	-25.70x	-29.42	47176.12	-5.24			
beta	I	2033-10-23T06:00:25.185	-24.82x	-30.56	45657.07	-5.21			
alpha	I	2033-10-23T06:03:21.175	-24.28x	-31.25	44744.79	-5.19			
4	I	2033-10-23T06:10:11.823	-23.01x	-32.86	42615.89	-5.14			
5	I	2033-10-23T06:11:38.008	-22.74x	-33.19	42180.76	-5.13			
6	I	2033-10-23T06:12:45.068	-22.54x	-33.46	41840.38	-5.12			
Uranus	I	2033-10-23T07:11:06.574	-11.08x	-47.19	25535.87			-3.99	-4.18
Uranus	E	2033-10-23T08:44:36.550	8.78	-68.77	25114.39			18.01	18.80
6	E	2033-10-23T09:36:08.490	20.18	-79.13	41800.03	5.53			
5	E	2033-10-23T09:37:41.621	20.53	-79.37	42314.33	5.55			
4	E	2033-10-23T09:38:28.111	20.70	-79.49	42552.47	5.57			
alpha	E	2033-10-23T09:44:47.133	22.12	-80.38	44685.56	5.65			
beta	E	2033-10-23T09:47:37.363	22.76	-80.73	45648.23	5.68			
eta	E	2033-10-23T09:52:04.968	23.76	-81.20	47176.12	5.73			
gamma	E	2033-10-23T09:53:24.212	24.05	-81.32	47631.06	5.75			
delta	E	2033-10-23T09:55:20.441	24.49	-81.47	48300.35	5.77			
lambda	E	2033-10-23T10:00:18.413	25.61	-81.76	50026.71	5.82			
epsilon	E	2033-10-23T10:04:39.890	26.59	-81.87	51553.37	5.86			

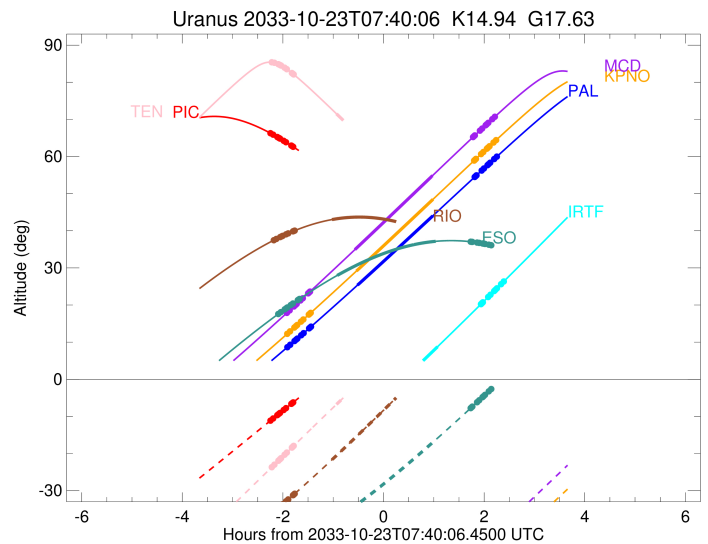
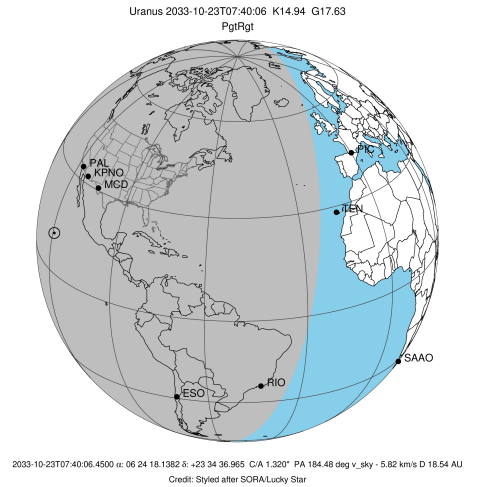
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-10-23T07:36:49.780  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 3377405090070124288  
 2Mass ID (if available) : 06241813+2334370  
 ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.944  
 G magnitude : 17.630  
 RP magnitude : 16.821  
 BP magnitude : 18.368  
 DUPflag : 0  
 Distance (au) : 18.535  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -5.82  
 Sun-Target sep (deg) : 114.18  
 Sun-Moon sep (deg) : 114.86  
 B (ring opening deg) : 70.43  
 PA of pole (deg) : 67.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.970  
 C/A sky separation (km) : 13041.3  
 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	2033-10-23T05:30:07.558		37.56	-35.53	50845.05	-6.27		
lambda	I	2033-10-23T05:32:18.270		37.80	-35.12	50026.71	-6.26		
delta	I	2033-10-23T05:36:54.393		38.31	-34.23	48300.35	-6.25		
gamma	I	2033-10-23T05:38:43.190		38.51	-33.88	47621.11	-6.24		
eta	I	2033-10-23T05:39:54.517		38.63	-33.65	47176.12	-6.24		
beta	I	2033-10-23T05:43:57.624		39.05	-32.86	45660.75	-6.22		
alpha	I	2033-10-23T05:46:24.938		39.30	-32.38	44748.34	-6.21		
4	I	2033-10-23T05:52:07.752		39.85	-31.25	42613.48	-6.19		
5	I	2033-10-23T05:53:21.259		39.96	-31.00	42170.12	-6.19		
6	I	2033-10-23T05:54:13.847		40.04	-30.83	41848.82	-6.18		
Uranus	I	2033-10-23T06:38:42.328		43.02	-21.67	25402.33		-10.48	-10.97
Uranus	E	2033-10-23T08:33:48.488		39.50	3.68x	25044.15		19.47	20.32
6	E	2033-10-23T09:15:58.833		34.59	13.28x	41803.00	6.20		
5	E	2033-10-23T09:17:21.826		34.41	13.60x	42315.23	6.21		
4	E	2033-10-23T09:18:02.481		34.31	13.76x	42547.44	6.21		
alpha	E	2033-10-23T09:23:44.502		33.53	15.06x	44684.86	6.24		
beta	E	2033-10-23T09:26:19.514		33.17	15.65x	45650.05	6.25		
eta	E	2033-10-23T09:30:23.436		32.59	16.59x	47176.12	6.26		
gamma	E	2033-10-23T09:31:36.094		32.41	16.86x	47631.27	6.27		
delta	E	2033-10-23T09:33:22.817		32.16	17.27x	48300.35	6.27		
lambda	E	2033-10-23T09:37:57.756		31.48	18.33x	50026.71	6.29		
epsilon	E	2033-10-23T09:41:59.571		30.88	19.25x	51547.96	6.30		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-10-23T07:44:18.190  
 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 : 3377405090070124288  
 2Mass ID (if available) : 06241813+2334370  
 ICRS Star Coord at Epoch: 06h 24m 18.13817s +23:34:36.96478s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.944  
 G magnitude : 17.630  
 RP magnitude : 16.821  
 BP magnitude : 18.368  
 DUPflag : 0  
 Distance (au) : 18.535  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -5.82  
 Sun-Target sep (deg) : 114.18  
 Sun-Moon sep (deg) : 114.60  
 B (ring opening deg) : 70.43  
 PA of pole (deg) : 67.97  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.929  
 C/A sky separation (km) : 12489.3  
 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	2033-10-23T05:35:28.053		17.72	-46.18	50845.05	-6.16		
lambda	I	2033-10-23T05:37:41.207		18.09	-45.97	50026.71	-6.14		
delta	I	2033-10-23T05:42:22.338		18.85	-45.52	48300.35	-6.14		
gamma	I	2033-10-23T05:44:13.050		19.15	-45.34	47621.11	-6.13		
eta	I	2033-10-23T05:45:25.614		19.34	-45.21	47176.12	-6.13		
beta	I	2033-10-23T05:49:32.820		20.00	-44.79	45660.78	-6.12		
alpha	I	2033-10-23T05:52:02.535		20.40	-44.52	44748.37	-6.12		
4	I	2033-10-23T05:57:50.679		21.30	-43.87	42613.45	-6.10		
5	I	2033-10-23T05:59:05.297		21.49	-43.73	42170.01	-6.10		
6	I	2033-10-23T05:59:58.619		21.63	-43.62	41848.92	-6.09		
Uranus	I	2033-10-23T06:44:47.295		27.96	-37.54	25396.11		-10.69	-11.19
Uranus	E	2033-10-23T08:42:14.838		37.16	-16.32	25041.19		19.53	20.38
6	E	2033-10-23T09:23:54.462		37.06	-7.81	41803.64	6.27		
5	E	2033-10-23T09:25:16.434		37.02	-7.53	42315.25	6.28		
4	E	2033-10-23T09:25:56.456		37.00	-7.39	42546.49	6.28		
alpha	E	2033-10-23T09:31:34.637		36.83	-6.21	44684.77	6.31		
beta	E	2033-10-23T09:34:07.921		36.74	-5.68	45650.45	6.32		
eta	E	2033-10-23T09:38:08.855		36.59	-4.84x	47176.12	6.34		
gamma	E	2033-10-23T09:39:20.638		36.54	-4.58x	47631.31	6.34		
delta	E	2033-10-23T09:41:06.048		36.46	-4.22x	48300.35	6.35		
lambda	E	2033-10-23T09:45:37.558		36.25	-3.26x	50026.71	6.37		
epsilon	E	2033-10-23T09:49:35.994		36.05	-2.42x	51546.14	6.38		