

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2023-10-23T05:34:54.160  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 55704527534006528  
 2Mass ID (if available) : 03170131+1750551

Uranus 2023-10-23T05:34:54 K13.11 G15.88 PgtRgt

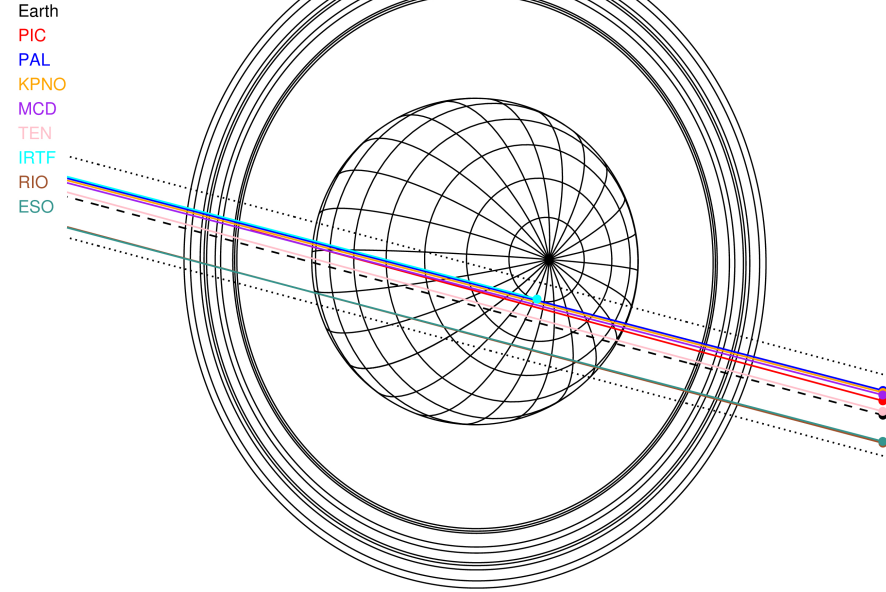
ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s

RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.105  
 G magnitude : 15.882  
 RP magnitude : 15.057  
 BP magnitude : 16.597  
 DUPflag : 0  
 Distance (au) : 18.701  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.20  
 Sun-Target sep (deg) : 157.64  
 Sun-Moon sep (deg) : 98.01  
 B (ring opening deg) : 62.99  
 PA of pole (deg) : -88.50

#	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

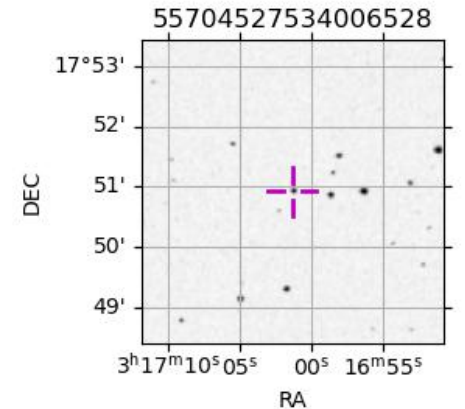


2023-10-23T05:34:54.1600 ex: 03 17 01.3262 s: +17 50 55.150 C/A 0.494° PA 345.01 deg v\_sky -21.20 km/s D 18.70 AU  
 Credit: Styled after SORA/Lucky Star

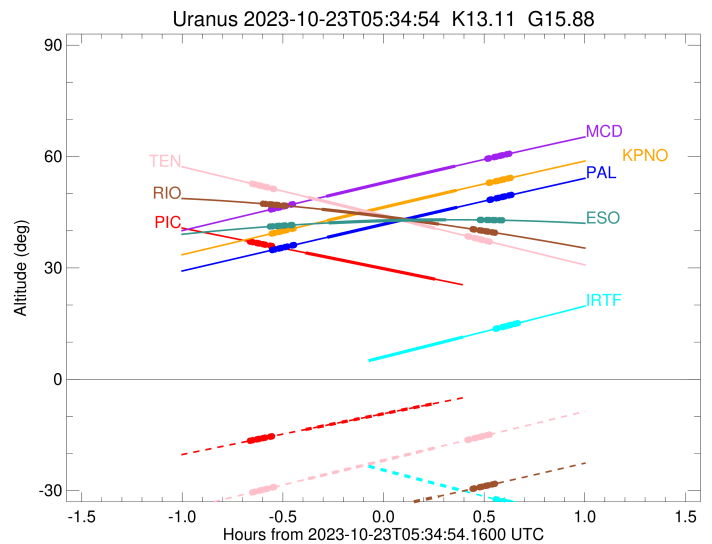
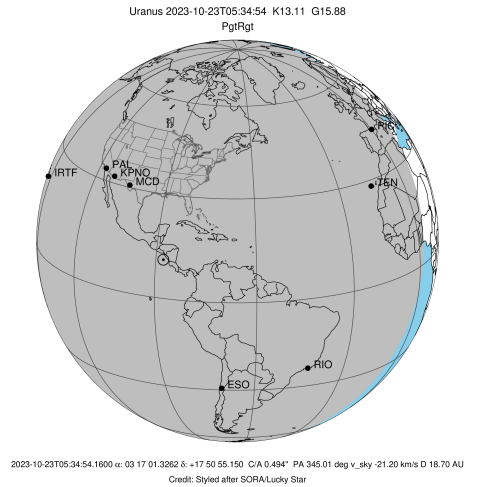


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +		OCT 23 04:55 - OCT 23 05:50	PieRin
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	OCT 23 05:01 - OCT 23 06:13	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	OCT 23 05:01 - OCT 23 06:13	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	OCT 23 05:01 - OCT 23 06:12	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	OCT 23 04:55 - OCT 23 06:06	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5		+	+++++	OCT 23 05:58 - OCT 23 06:15	PneRne
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	OCT 23 04:59 - OCT 23 06:08	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	OCT 23 05:01 - OCT 23 06:10	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

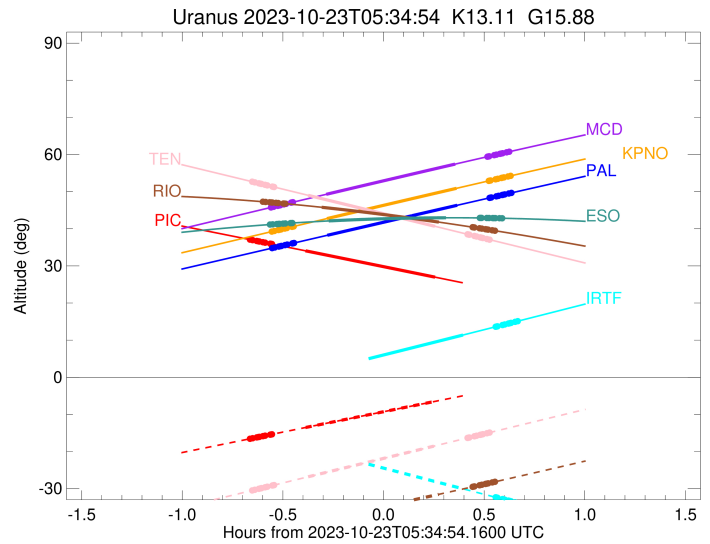
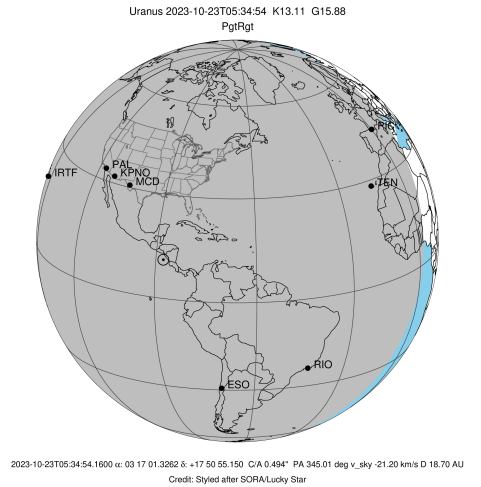


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2023-10-23T05:30:59.460  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 55704527534006528  
 2Mass ID (if available) : 03170131+1750551  
 ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.105  
 G magnitude : 15.882  
 RP magnitude : 15.057  
 BP magnitude : 16.597  
 DUPflag : 0  
 Distance (au) : 18.701  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.20  
 Sun-Target sep (deg) : 157.64  
 Sun-Moon sep (deg) : 98.37  
 B (ring opening deg) : 62.99  
 PA of pole (deg) : -88.50  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.327  
 C/A sky separation (km) : 4431.3  
 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



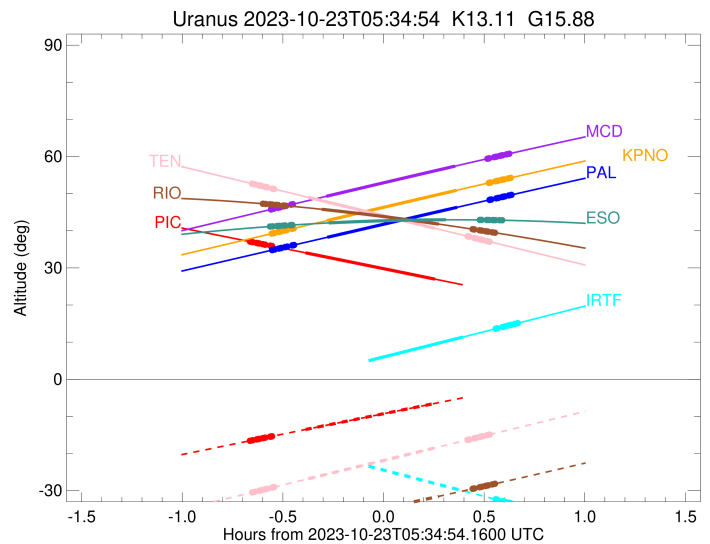
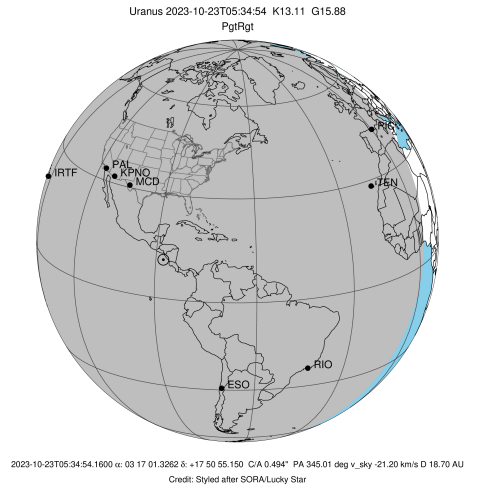
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-23T04:55:19.885		37.04	-16.53	50836.16	-23.72		
lambda	I	2023-10-23T04:55:54.023		36.93	-16.42	50026.71	-23.71		
delta	I	2023-10-23T04:57:06.850		36.71	-16.20	48300.35	-23.70		
gamma	I	2023-10-23T04:57:35.286		36.63	-16.11	47626.46	-23.70		
eta	I	2023-10-23T04:57:54.291		36.57	-16.05	47176.12	-23.69		
beta	I	2023-10-23T04:58:58.020		36.38	-15.86	45666.42	-23.68		
alpha	I	2023-10-23T04:59:37.522		36.26	-15.74	44732.04	-23.68		
4	I	2023-10-23T05:01:08.204		35.98	-15.46	42576.22	-23.66		
5	I	2023-10-23T05:01:24.388		35.93	-15.41	42182.46	-23.65		
6	I	2023-10-23T05:01:37.983		35.89	-15.37	41860.15	-23.65		
Uranus	I	2023-10-23T05:11:39.244		34.06	-13.53	25186.93		23.92	24.92
Uranus	E	2023-10-23T05:50:16.734		26.97	-6.49	25100.70		-26.82	-27.90
6	E	2023-10-23T05:59:58.121		25.19	-4.74x	41822.30	23.58		
5	E	2023-10-23T06:00:17.269		25.13	-4.69x	42273.64	23.57		
4	E	2023-10-23T06:00:29.565		25.09	-4.65x	42575.59	23.59		
alpha	E	2023-10-23T06:01:59.804		24.81	-4.38x	44711.33	23.60		
beta	E	2023-10-23T06:02:39.684		24.69	-4.26x	45652.22	23.60		
eta	E	2023-10-23T06:03:44.221		24.49	-4.07x	47176.12	23.61		
gamma	E	2023-10-23T06:04:03.320		24.43	-4.01x	47627.06	23.61		
delta	E	2023-10-23T06:04:31.832		24.35	-3.92x	48300.35	23.61		
lambda	E	2023-10-23T06:05:44.928		24.12	-3.70x	50026.71	23.62		
epsilon	E	2023-10-23T06:06:47.320		23.93	-3.52x	51500.58	23.63		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2023-10-23T05:37:33.560  
 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 : 55704527534006528  
 2Mass ID (if available) : 03170131+1750551  
 ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.105  
 G magnitude : 15.882  
 RP magnitude : 15.057  
 BP magnitude : 16.597  
 DUPflag : 0  
 Distance (au) : 18.701  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.20  
 Sun-Target sep (deg) : 157.64  
 Sun-Moon sep (deg) : 98.73  
 B (ring opening deg) : 62.99  
 PA of pole (deg) : -88.50  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.255  
 C/A sky separation (km) : 3464.7  
 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



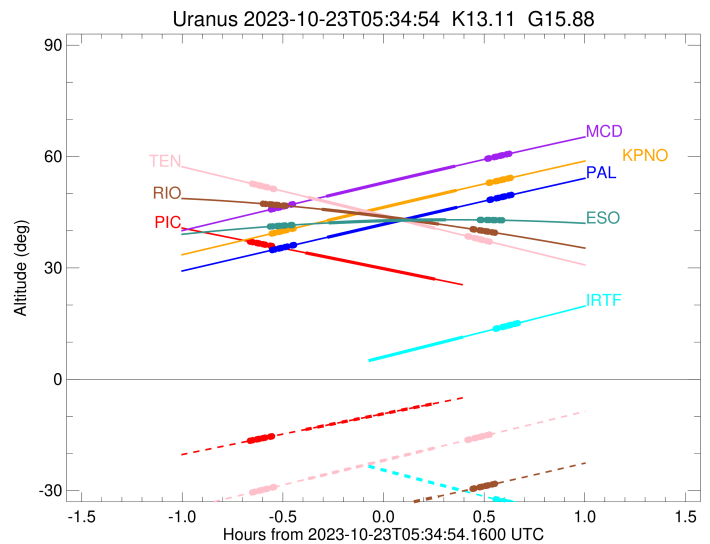
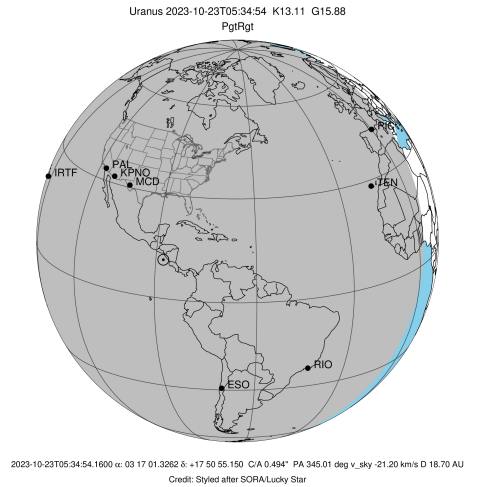
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-23T05:01:55.506		34.84	-49.34	50829.23	-23.72		
lambda	I	2023-10-23T05:02:29.348		34.96	-49.44	50026.71	-23.71		
delta	I	2023-10-23T05:03:42.154		35.22	-49.68	48300.35	-23.71		
gamma	I	2023-10-23T05:04:10.583		35.32	-49.77	47626.31	-23.71		
eta	I	2023-10-23T05:04:29.571		35.38	-49.83	47176.12	-23.71		
beta	I	2023-10-23T05:05:33.228		35.60	-50.03	45666.99	-23.70		
alpha	I	2023-10-23T05:06:12.753		35.74	-50.15	44731.10	-23.70		
4	I	2023-10-23T05:07:43.359		36.06	-50.44	42574.81	-23.70		
5	I	2023-10-23T05:07:59.369		36.12	-50.49	42184.39	-23.68		
6	I	2023-10-23T05:08:13.078		36.16	-50.54	41859.01	-23.69		
Uranus	I	2023-10-23T05:18:08.386		38.24	-52.40	25169.92		24.51	25.52
Uranus	E	2023-10-23T05:56:54.052		46.33	-59.17	25104.02		-26.71	-27.79
6	E	2023-10-23T06:06:30.814		48.32	-60.68	41821.72	23.78		
5	E	2023-10-23T06:06:49.860		48.39	-60.72	42274.65	23.78		
4	E	2023-10-23T06:07:01.982		48.43	-60.76	42574.95	23.79		
alpha	E	2023-10-23T06:08:31.440		48.74	-60.98	44710.90	23.81		
beta	E	2023-10-23T06:09:11.006		48.87	-61.08	45652.44	23.81		
eta	E	2023-10-23T06:10:14.975		49.09	-61.24	47176.12	23.82		
gamma	E	2023-10-23T06:10:33.906		49.16	-61.29	47627.00	23.82		
delta	E	2023-10-23T06:11:02.174		49.26	-61.36	48300.35	23.82		
lambda	E	2023-10-23T06:12:14.636		49.50	-61.53	50026.71	23.83		
epsilon	E	2023-10-23T06:13:16.397		49.72	-61.68	51498.51	23.84		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2023-10-23T05:37:24.400  
 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 : 55704527534006528  
 2Mass ID (if available) : 03170131+1750551  
 ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.105  
 G magnitude : 15.882  
 RP magnitude : 15.057  
 BP magnitude : 16.597  
 DUPflag : 0  
 Distance (au) : 18.701  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.20  
 Sun-Target sep (deg) : 157.64  
 Sun-Moon sep (deg) : 98.78  
 B (ring opening deg) : 62.99  
 PA of pole (deg) : -88.50  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.279  
 C/A sky separation (km) : 3777.4  
 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	2023-10-23T05:01:49.669		39.29	-53.92	50830.75	-23.75		
lambda	I	2023-10-23T05:02:23.537		39.41	-54.03	50026.71	-23.74		
delta	I	2023-10-23T05:03:36.264		39.67	-54.26	48300.35	-23.74		
gamma	I	2023-10-23T05:04:04.661		39.77	-54.35	47626.34	-23.73		
eta	I	2023-10-23T05:04:23.631		39.84	-54.41	47176.12	-23.73		
beta	I	2023-10-23T05:05:27.228		40.07	-54.60	45666.86	-23.73		
alpha	I	2023-10-23T05:06:06.700		40.21	-54.73	44731.32	-23.73		
4	I	2023-10-23T05:07:37.212		40.53	-55.01	42575.14	-23.72		
5	I	2023-10-23T05:07:53.243		40.58	-55.06	42183.93	-23.70		
6	I	2023-10-23T05:08:06.908		40.63	-55.10	41859.28	-23.71		
Uranus	I	2023-10-23T05:18:02.882		42.74	-56.92	25174.16		24.36	25.37
Uranus	E	2023-10-23T05:56:41.063		50.90	-63.33	25102.48		-26.76	-27.84
6	E	2023-10-23T06:06:17.279		52.90	-64.70	41822.02	23.80		
5	E	2023-10-23T06:06:36.278		52.97	-64.74	42274.12	23.80		
4	E	2023-10-23T06:06:48.427		53.01	-64.77	42575.28	23.81		
alpha	E	2023-10-23T06:08:17.821		53.32	-64.97	44711.14	23.83		
beta	E	2023-10-23T06:08:57.340		53.46	-65.05	45652.32	23.83		
eta	E	2023-10-23T06:10:01.264		53.68	-65.19	47176.12	23.84		
gamma	E	2023-10-23T06:10:20.181		53.74	-65.23	47627.03	23.84		
delta	E	2023-10-23T06:10:48.425		53.84	-65.30	48300.35	23.84		
lambda	E	2023-10-23T06:12:00.826		54.09	-65.45	50026.71	23.85		
epsilon	E	2023-10-23T06:13:02.588		54.31	-65.58	51499.79	23.86		

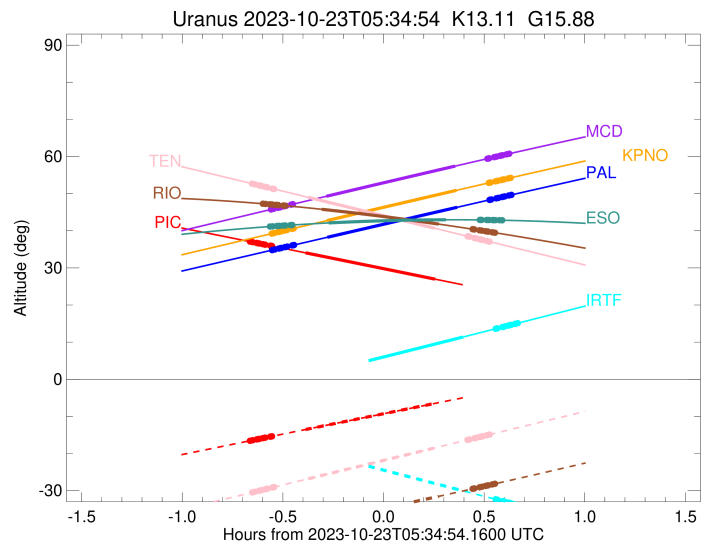
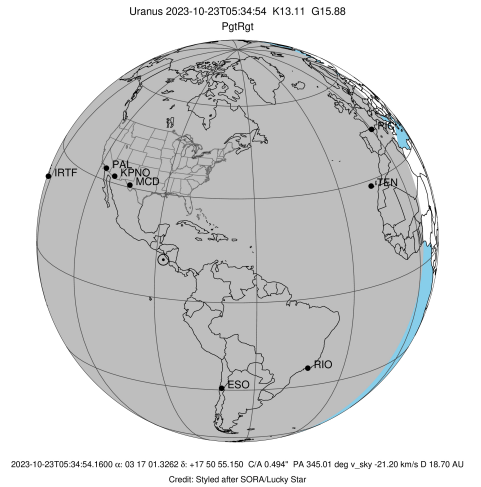
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2023-10-23T05:37:05.630  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 55704527534006528  
 2Mass ID (if available) : 03170131+1750551  
 ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.105  
 G magnitude : 15.882  
 RP magnitude : 15.057  
 BP magnitude : 16.597  
 DUPflag : 0  
 Distance (au) : 18.701  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.20  
 Sun-Target sep (deg) : 157.64  
 Sun-Moon sep (deg) : 98.85  
 B (ring opening deg) : 62.99  
 PA of pole (deg) : -88.50  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.308  
 C/A sky separation (km) : 4171.9  
 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	2023-10-23T05:01:35.312		45.80	-60.10	50832.71	-23.79		
lambda	I	2023-10-23T05:02:09.214		45.92	-60.20	50026.71	-23.77		
delta	I	2023-10-23T05:03:21.838		46.18	-60.42	48300.35	-23.77		
gamma	I	2023-10-23T05:03:50.194		46.28	-60.50	47626.38	-23.77		
eta	I	2023-10-23T05:04:09.140		46.35	-60.56	47176.12	-23.77		
beta	I	2023-10-23T05:05:12.661		46.58	-60.74	45666.69	-23.76		
alpha	I	2023-10-23T05:05:52.066		46.72	-60.86	44731.60	-23.76		
4	I	2023-10-23T05:07:22.458		47.04	-61.12	42575.56	-23.74		
5	I	2023-10-23T05:07:38.515		47.10	-61.16	42183.35	-23.73		
6	I	2023-10-23T05:07:52.124		47.15	-61.20	41859.62	-23.73		
Uranus	I	2023-10-23T05:17:49.016		49.28	-62.88	25179.72		24.17	25.18
Uranus	E	2023-10-23T05:56:17.189		57.43	-68.25	25100.76		-26.82	-27.90
6	E	2023-10-23T06:05:52.850		59.42	-69.21	41822.39	23.82		
5	E	2023-10-23T06:06:11.794		59.48	-69.24	42273.46	23.81		
4	E	2023-10-23T06:06:23.977		59.52	-69.25	42575.71	23.83		
alpha	E	2023-10-23T06:07:53.301		59.83	-69.38	44711.43	23.84		
beta	E	2023-10-23T06:08:32.767		59.97	-69.44	45652.16	23.85		
eta	E	2023-10-23T06:09:36.641		60.19	-69.53	47176.12	23.86		
gamma	E	2023-10-23T06:09:55.542		60.25	-69.55	47627.08	23.86		
delta	E	2023-10-23T06:10:23.759		60.35	-69.59	48300.35	23.86		
lambda	E	2023-10-23T06:11:36.091		60.59	-69.69	50026.71	23.87		
epsilon	E	2023-10-23T06:12:37.858		60.80	-69.76	51501.36	23.89		



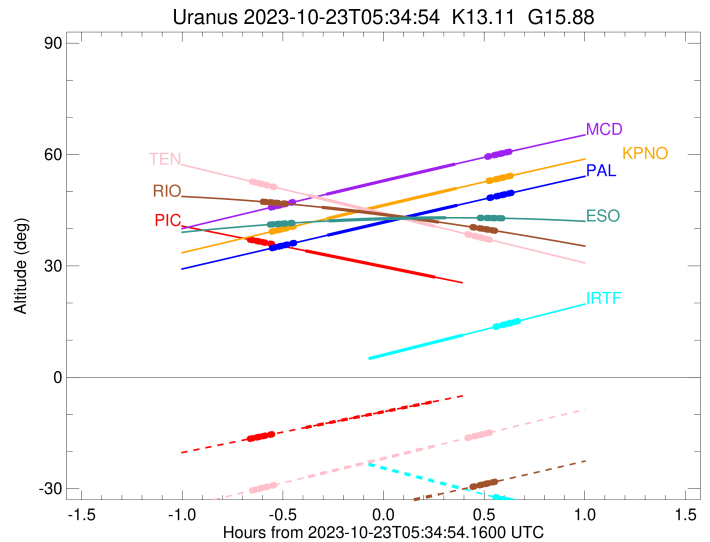
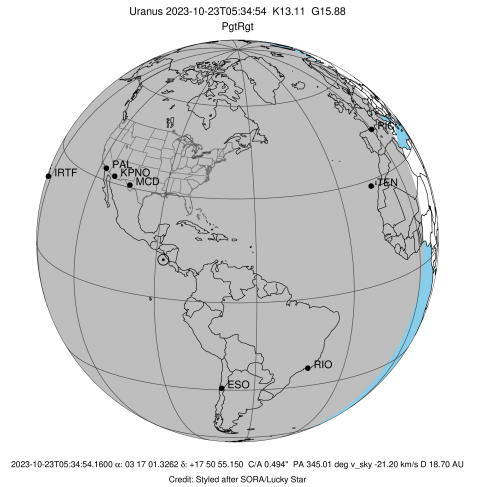
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2023-10-23T05:31:22.840  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 55704527534006528  
 2Mass ID (if available) : 03170131+1750551  
 ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.105  
 G magnitude : 15.882  
 RP magnitude : 15.057  
 BP magnitude : 16.597  
 DUPflag : 0  
 Distance (au) : 18.701  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.20  
 Sun-Target sep (deg) : 157.64  
 Sun-Moon sep (deg) : 98.58  
 B (ring opening deg) : 62.99  
 PA of pole (deg) : -88.50  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.454  
 C/A sky separation (km) : 6153.7  
 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	2023-10-23T04:55:58.343		52.64	-30.44	50844.74	-23.78		
lambda	I	2023-10-23T04:56:32.775		52.51	-30.31	50026.71	-23.75		
delta	I	2023-10-23T04:57:45.472		52.25	-30.04	48300.35	-23.74		
gamma	I	2023-10-23T04:58:13.856		52.14	-29.94	47626.64	-23.73		
eta	I	2023-10-23T04:58:32.841		52.07	-29.87	47176.12	-23.73		
beta	I	2023-10-23T04:59:36.519		51.84	-29.63	45665.70	-23.71		
alpha	I	2023-10-23T05:00:15.905		51.69	-29.49	44733.20	-23.70		
4	I	2023-10-23T05:01:46.479		51.36	-29.16	42578.00	-23.68		
5	I	2023-10-23T05:02:02.844		51.30	-29.10	42180.08	-23.65		
6	I	2023-10-23T05:02:16.268		51.25	-29.05	41861.58	-23.66		
Uranus	I	2023-10-23T05:12:25.174		49.02	-26.81	25213.12		22.99	23.96
Uranus	E	2023-10-23T05:50:15.938		40.66	-18.48	25095.72		-26.98	-28.06
6	E	2023-10-23T05:59:57.593		38.52	-16.34	41824.03	23.59		
5	E	2023-10-23T06:00:16.536		38.45	-16.28	42270.60	23.58		
4	E	2023-10-23T06:00:29.030		38.40	-16.23	42577.50	23.60		
alpha	E	2023-10-23T06:01:59.190		38.07	-15.90	44712.68	23.63		
beta	E	2023-10-23T06:02:38.927		37.92	-15.75	45651.51	23.63		
eta	E	2023-10-23T06:03:43.393		37.69	-15.52	47176.12	23.65		
gamma	E	2023-10-23T06:04:02.468		37.62	-15.45	47627.26	23.65		
delta	E	2023-10-23T06:04:30.922		37.51	-15.34	48300.35	23.66		
lambda	E	2023-10-23T06:05:43.874		37.24	-15.08	50026.71	23.67		
epsilon	E	2023-10-23T06:06:46.422		37.01	-14.85	51507.57	23.69		

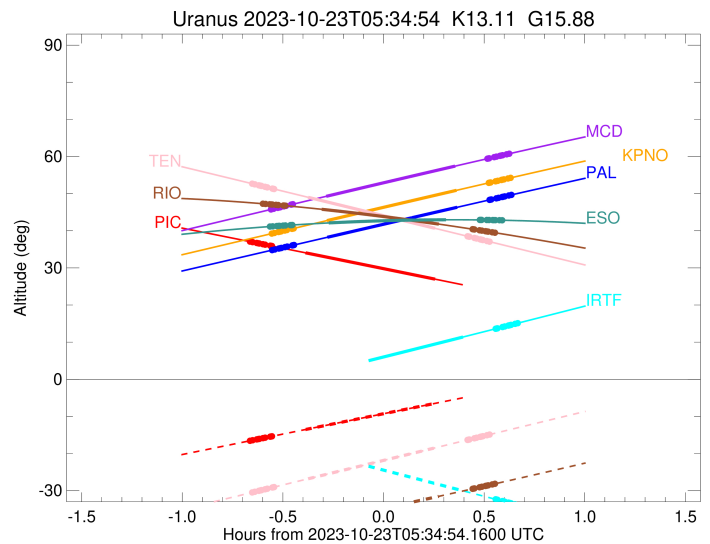
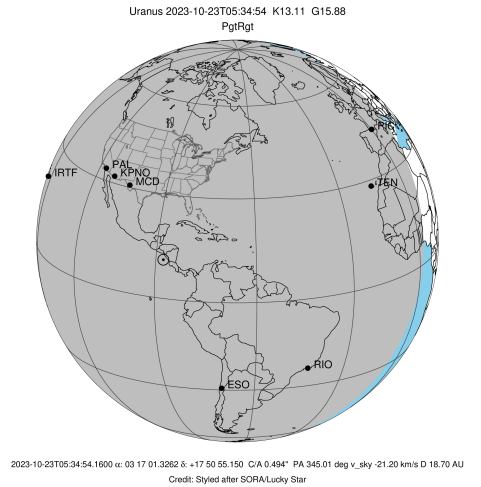
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2023-10-23T05:39:02.650
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       : 55704527534006528
2Mass ID (if available) : 03170131+1750551
ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 13.105
G magnitude           : 15.882
RP magnitude          : 15.057
BP magnitude          : 16.597
DUPflag               : 0
Distance (au)         : 18.701
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -21.20
Sun-Target sep (deg) : 157.64
Sun-Moon sep (deg)   : 98.22
B (ring opening deg) : 62.99
PA of pole (deg)     : -88.50
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.239
C/A sky separation (km) : 3239.3
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	2023-10-23T05:02:59.233	-1.15x	-16.98	50828.41	-23.44			
lambda	I	2023-10-23T05:03:33.443	-1.03x	-17.12	50026.71	-23.43			
delta	I	2023-10-23T05:04:47.115	-0.75x	-17.41	48300.35	-23.43			
gamma	I	2023-10-23T05:05:15.881	-0.65x	-17.52	47626.29	-23.43			
eta	I	2023-10-23T05:05:35.094	-0.57x	-17.59	47176.12	-23.43			
beta	I	2023-10-23T05:06:39.498	-0.34x	-17.84	45667.07	-23.43			
alpha	I	2023-10-23T05:07:19.497	-0.19x	-18.00	44730.98	-23.43			
4	I	2023-10-23T05:08:51.170	0.15x	-18.36	42574.62	-23.42			
5	I	2023-10-23T05:09:07.346	0.21x	-18.42	42184.65	-23.41			
6	I	2023-10-23T05:09:21.234	0.27x	-18.48	41858.85	-23.41			
Uranus	I	2023-10-23T05:19:22.663	2.51x	-20.83	25167.25			24.60	25.62
Uranus	E	2023-10-23T05:58:37.505	11.38	-30.05	25105.29			-26.67	-27.75
6	E	2023-10-23T06:08:20.333	13.60	-32.33	41821.48	23.54			
5	E	2023-10-23T06:08:39.597	13.67	-32.41	42275.07	23.54			
4	E	2023-10-23T06:08:51.813	13.72	-32.46	42574.68	23.55			
alpha	E	2023-10-23T06:10:22.174	14.06	-32.81	44710.71	23.57			
beta	E	2023-10-23T06:11:02.151	14.22	-32.97	45652.54	23.57			
eta	E	2023-10-23T06:12:06.761	14.46	-33.22	47176.12	23.58			
gamma	E	2023-10-23T06:12:25.881	14.54	-33.30	47626.97	23.58			
delta	E	2023-10-23T06:12:54.435	14.64	-33.41	48300.35	23.58			
lambda	E	2023-10-23T06:14:07.624	14.92	-33.70	50026.71	23.59			
epsilon	E	2023-10-23T06:15:09.961	15.16	-33.94	51497.49	23.60			

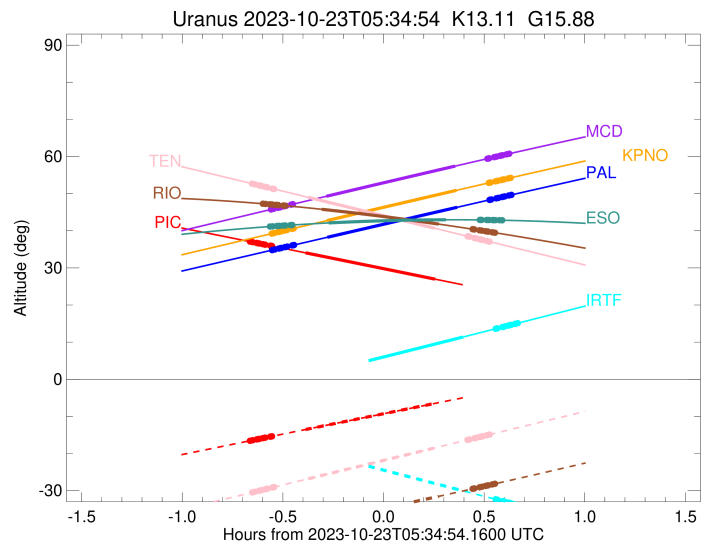
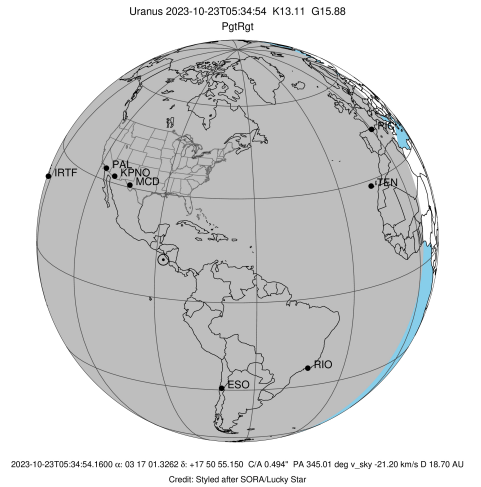
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2023-10-23T05:34:00.870  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 55704527534006528  
 2Mass ID (if available) : 03170131+1750551  
 ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.105  
 G magnitude : 15.882  
 RP magnitude : 15.057  
 BP magnitude : 16.597  
 DUPflag : 0  
 Distance (au) : 18.701  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.20  
 Sun-Target sep (deg) : 157.64  
 Sun-Moon sep (deg) : 98.67  
 B (ring opening deg) : 62.99  
 PA of pole (deg) : -88.50  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.824  
 C/A sky separation (km) : 11181.9  
 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	2023-10-23T04:59:08.780		47.27	-41.36	50872.31	-23.47		
lambda	I	2023-10-23T04:59:44.871		47.22	-41.25	50026.71	-23.42		
delta	I	2023-10-23T05:00:58.660		47.13	-41.03	48300.35	-23.37		
gamma	I	2023-10-23T05:01:27.473		47.09	-40.95	47627.20	-23.35		
eta	I	2023-10-23T05:01:46.795		47.07	-40.89	47176.12	-23.34		
beta	I	2023-10-23T05:02:51.682		46.98	-40.70	45663.52	-23.29		
alpha	I	2023-10-23T05:03:31.577		46.93	-40.58	44736.54	-23.26		
4	I	2023-10-23T05:05:03.873		46.81	-40.31	42583.26	-23.18		
5	I	2023-10-23T05:05:21.154		46.78	-40.26	42173.49	-23.14		
6	I	2023-10-23T05:05:34.403		46.76	-40.22	41865.61	-23.14		
Uranus	I	2023-10-23T05:16:29.611		45.79	-38.24	25304.01		19.54	20.39
Uranus	E	2023-10-23T05:51:22.386		41.80	-31.54	25108.81		-26.56	-27.63
6	E	2023-10-23T06:01:27.913		40.43	-29.51	41829.26	23.11		
5	E	2023-10-23T06:01:46.638		40.39	-29.45	42261.28	23.11		
4	E	2023-10-23T06:02:00.024		40.36	-29.41	42583.04	23.15		
alpha	E	2023-10-23T06:03:31.866		40.14	-29.10	44716.68	23.23		
beta	E	2023-10-23T06:04:11.986		40.05	-28.96	45649.53	23.26		
eta	E	2023-10-23T06:05:17.521		39.89	-28.74	47176.12	23.31		
gamma	E	2023-10-23T06:05:36.896		39.84	-28.67	47627.83	23.32		
delta	E	2023-10-23T06:06:05.722		39.77	-28.58	48300.35	23.34		
lambda	E	2023-10-23T06:07:19.615		39.60	-28.32	50026.71	23.39		
epsilon	E	2023-10-23T06:08:23.654		39.44	-28.11	51525.42	23.44		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2023-10-23T05:36:09.530  
 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 : 55704527534006528  
 2Mass ID (if available) : 03170131+1750551  
 ICRS Star Coord at Epoch: 03h 17m 01.32621s +17:50:55.15036s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.105  
 G magnitude : 15.882  
 RP magnitude : 15.057  
 BP magnitude : 16.597  
 DUPflag : 0  
 Distance (au) : 18.701  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.20  
 Sun-Target sep (deg) : 157.64  
 Sun-Moon sep (deg) : 98.72  
 B (ring opening deg) : 62.99  
 PA of pole (deg) : -88.50  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.819  
 C/A sky separation (km) : 11106.3  
 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\_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	2023-10-23T05:01:15.450		41.15	-48.78	50871.16	-23.44		
lambda	I	2023-10-23T05:01:51.533		41.19	-48.75	50026.71	-23.39		
delta	I	2023-10-23T05:03:05.403		41.27	-48.69	48300.35	-23.35		
gamma	I	2023-10-23T05:03:34.246		41.30	-48.66	47627.18	-23.33		
eta	I	2023-10-23T05:03:53.586		41.32	-48.64	47176.12	-23.32		
beta	I	2023-10-23T05:04:58.533		41.39	-48.59	45663.61	-23.27		
alpha	I	2023-10-23T05:05:38.472		41.43	-48.55	44736.43	-23.24		
4	I	2023-10-23T05:07:10.848		41.52	-48.47	42583.08	-23.16		
5	I	2023-10-23T05:07:28.123		41.54	-48.45	42173.70	-23.12		
6	I	2023-10-23T05:07:41.397		41.55	-48.44	41865.47	-23.12		
Uranus	I	2023-10-23T05:18:36.010		42.12	-47.74	25301.25		19.65	20.51
Uranus	E	2023-10-23T05:53:32.761		42.96	-44.54	25108.73		-26.56	-27.63
6	E	2023-10-23T06:03:37.333		42.93	-43.38	41829.28	23.14		
5	E	2023-10-23T06:03:56.027		42.92	-43.34	42261.24	23.14		
4	E	2023-10-23T06:04:09.398		42.92	-43.32	42583.07	23.18		
alpha	E	2023-10-23T06:05:41.108		42.90	-43.13	44716.70	23.27		
beta	E	2023-10-23T06:06:21.168		42.90	-43.05	45649.52	23.29		
eta	E	2023-10-23T06:07:26.608		42.88	-42.91	47176.12	23.34		
gamma	E	2023-10-23T06:07:45.955		42.88	-42.87	47627.84	23.36		
delta	E	2023-10-23T06:08:14.738		42.87	-42.81	48300.35	23.37		
lambda	E	2023-10-23T06:09:28.522		42.85	-42.66	50026.71	23.42		
epsilon	E	2023-10-23T06:10:32.471		42.83	-42.53	51525.58	23.47		