

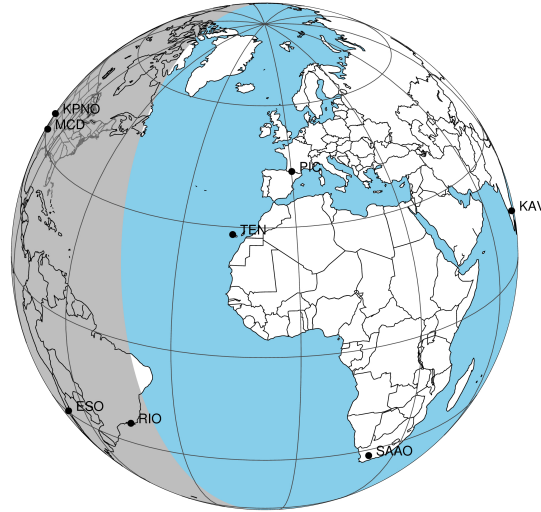
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-08-23T08:47:22.540
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377537130246426624
 2Mass ID (if available) : 06200734+2335274

Uranus 2033-08-23T08:47:22 K14.10 G16.50 PgtRgt

ICRS Star Coord at Epoch: 06h 20m 07.35388s +23:35:27.38605s

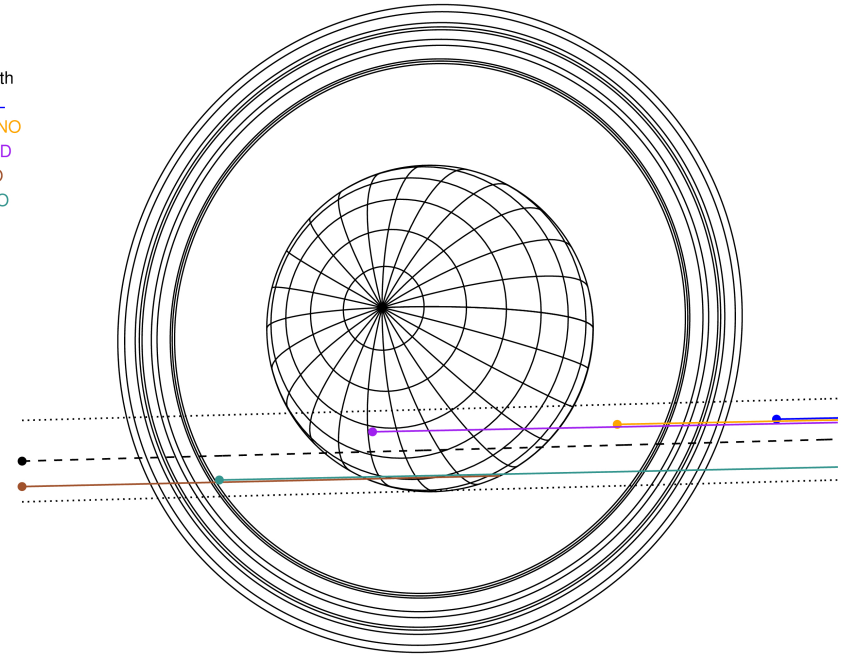
RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.101
 G magnitude : 16.498
 RP magnitude : 15.735
 BP magnitude : 17.087
 DUPflag : 0
 Distance (au) : 19.530
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.28
 Sun-Target sep (deg) : 55.48
 Sun-Moon sep (deg) : 38.27
 B (ring opening deg) : 71.31
 PA of pole (deg) : 66.45

Uranus 2033-08-23T08:47:22 K14.10 G16.50
 PgtRgt



2033-08-23T08:47:22.5400 α: 06 20 07.3539 β: +23 35 27.386 C/A 1.340° PA 1.54 deg v_sky +23.28 km/s D 19.53 AU
 Credit: Styled after SORA/Lucky Star

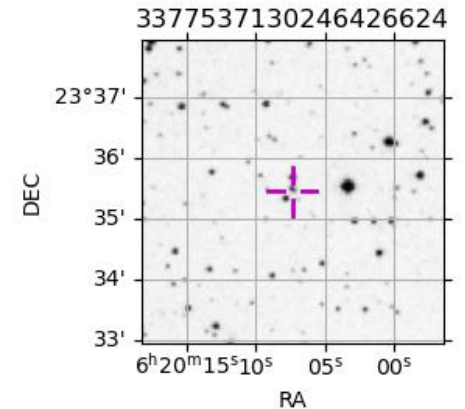
Earth
 PAL
 KPNO
 MCD
 RIO
 ESO



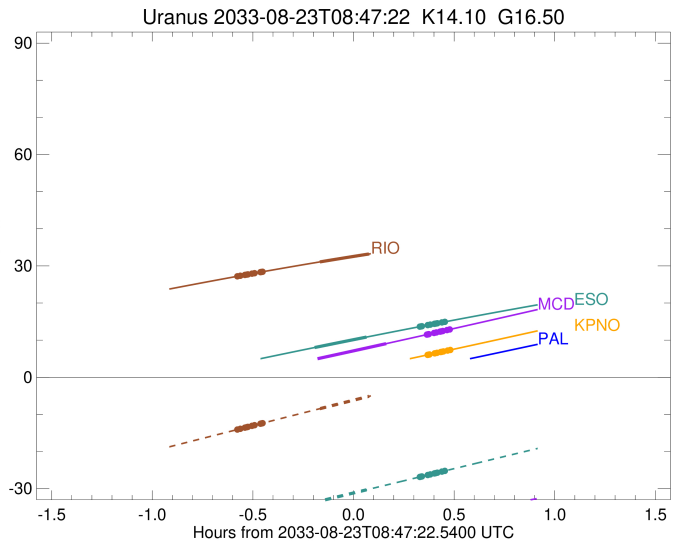
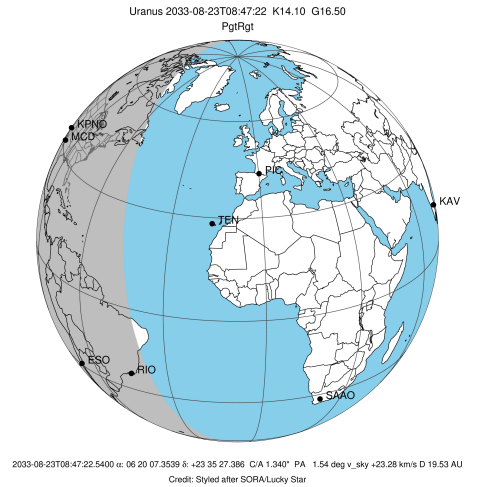
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4			+++++	AUG 23 09:09 - AUG 23 09:16	PnnRne
MCD	McDonald Obs. 2.7m	30.7	256.0		+	+++++	AUG 23 08:57 - AUG 23 09:16	PneRne
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
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	+++++	+ +		AUG 23 08:12 - AUG 23 08:52	PieRin
ESO	European Southern Obs	-29.3	289.3		+ +	+++++	AUG 23 08:35 - AUG 23 09:14	PieRne
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

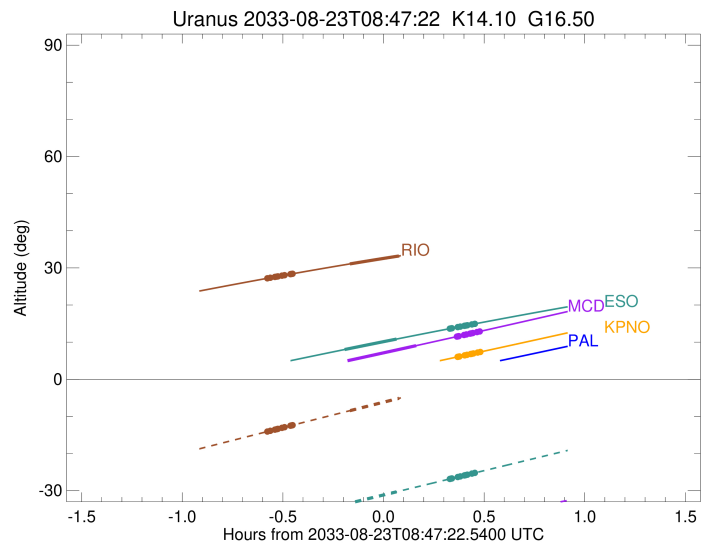
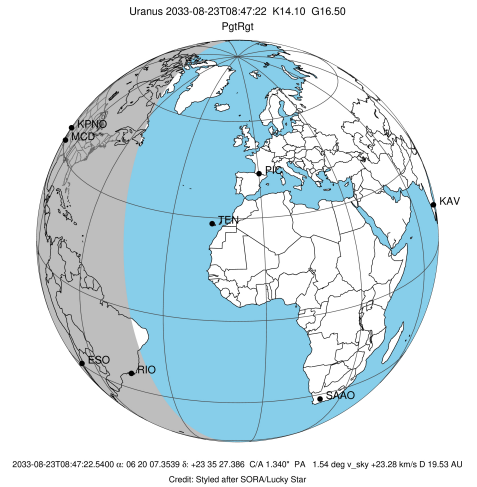


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-08-23T08:43:27.930
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3377537130246426624
 2Mass ID (if available) : 06200734+2335274
 ICRS Star Coord at Epoch: 06h 20m 07.35388s +23:35:27.38605s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.101
 G magnitude : 16.498
 RP magnitude : 15.735
 BP magnitude : 17.087
 DUPflag : 0
 Distance (au) : 19.530
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.28
 Sun-Target sep (deg) : 55.48
 Sun-Moon sep (deg) : 38.94
 B (ring opening deg) : 71.31
 PA of pole (deg) : 66.45
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.101
 C/A sky separation (km) : 15600.6
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



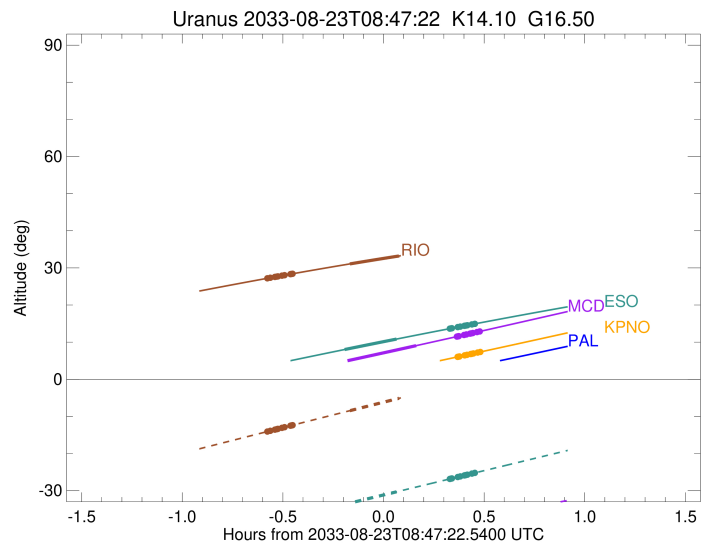
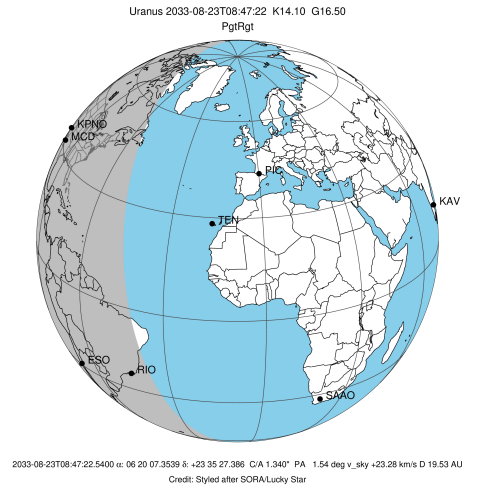
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-08-23T08:10:04.687	-5.14x	-45.82	50914.48	-23.26			
lambda	I	2033-08-23T08:10:42.809	-5.03x	-45.79	50026.71	-23.26			
delta	I	2033-08-23T08:11:57.166	-4.81x	-45.72	48300.35	-23.17			
gamma	I	2033-08-23T08:12:26.403	-4.72x	-45.69	47623.55	-23.13			
eta	I	2033-08-23T08:12:45.761	-4.66x	-45.67	47176.12	-23.10			
beta	I	2033-08-23T08:13:50.815	-4.46x	-45.61	45677.50	-23.00			
alpha	I	2033-08-23T08:14:31.002	-4.34x	-45.57	44750.82	-22.93			
4	I	2033-08-23T08:16:05.257	-4.05x	-45.48	42604.90	-22.77			
5	I	2033-08-23T08:16:24.537	-3.99x	-45.46	42159.55	-22.73			
6	I	2033-08-23T08:16:37.693	-3.95x	-45.45	41856.20	-22.68			
Uranus	I	2033-08-23T08:29:08.444	-1.65x	-44.59	25444.43			8.50	8.90
Uranus	E	2033-08-23T08:57:27.671	3.71x	-42.01	25062.80			-18.13	-18.93
6	E	2033-08-23T09:09:26.415	6.03	-40.68	41797.08	22.58			
5	E	2033-08-23T09:09:48.860	6.10	-40.64	42308.25	22.62			
4	E	2033-08-23T09:09:59.484	6.13	-40.62	42567.66	22.67			
alpha	E	2033-08-23T09:11:33.806	6.44	-40.44	44701.07	22.82			
beta	E	2033-08-23T09:12:14.721	6.57	-40.35	45641.13	22.89			
eta	E	2033-08-23T09:13:21.707	6.79	-40.22	47176.12	22.98			
gamma	E	2033-08-23T09:13:41.251	6.85	-40.18	47625.54	23.01			
delta	E	2033-08-23T09:14:10.555	6.95	-40.12	48300.35	23.05			
lambda	E	2033-08-23T09:15:25.312	7.19	-39.97	50026.71	23.14			
epsilon	E	2033-08-23T09:16:13.324	7.35	-39.87	51138.89	23.13			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-08-23T08:43:19.410
 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 : 3377537130246426624
 2Mass ID (if available) : 06200734+2335274
 ICRS Star Coord at Epoch: 06h 20m 07.35388s +23:35:27.38605s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.101
 G magnitude : 16.498
 RP magnitude : 15.735
 BP magnitude : 17.087
 DUPflag : 0
 Distance (au) : 19.530
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.28
 Sun-Target sep (deg) : 55.48
 Sun-Moon sep (deg) : 39.01
 B (ring opening deg) : 71.31
 PA of pole (deg) : 66.45
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.129
 C/A sky separation (km) : 15995.5
 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



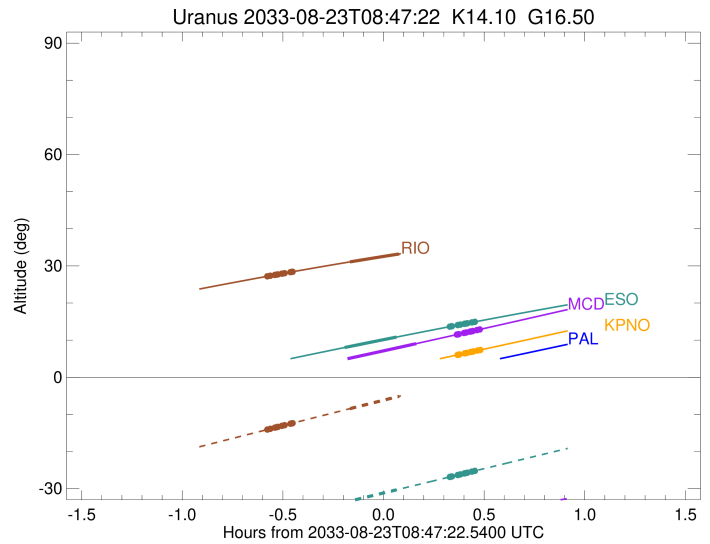
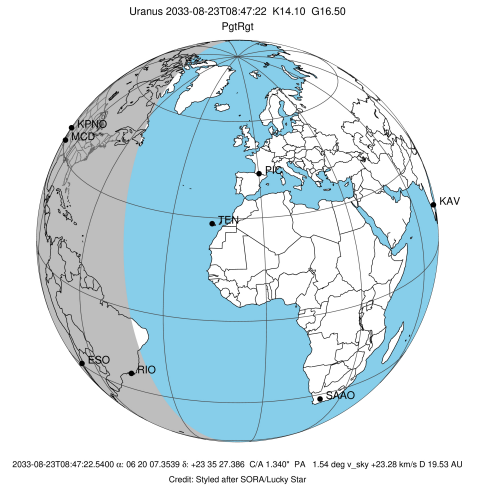
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-08-23T08:09:56.751	-0.18x	-44.84	50911.85	-23.15			
lambda	I	2033-08-23T08:10:34.944	-0.06x	-44.78	50026.71	-23.15			
delta	I	2033-08-23T08:11:49.674	0.18x	-44.67	48300.35	-23.05			
gamma	I	2033-08-23T08:12:19.065	0.27x	-44.62	47623.51	-23.01			
eta	I	2033-08-23T08:12:38.523	0.34x	-44.59	47176.12	-22.98			
beta	I	2033-08-23T08:13:43.934	0.54x	-44.49	45677.40	-22.87			
alpha	I	2033-08-23T08:14:24.340	0.67x	-44.43	44750.91	-22.80			
4	I	2033-08-23T08:15:59.142	0.98x	-44.27	42605.20	-22.63			
5	I	2033-08-23T08:16:18.551	1.04x	-44.24	42159.83	-22.58			
6	I	2033-08-23T08:16:31.821	1.08x	-44.22	41855.82	-22.54			
Uranus	I	2033-08-23T08:29:11.006	3.53x	-42.90	25452.77			8.18	8.57
Uranus	E	2033-08-23T08:57:07.518	9.06	-39.45	25067.79			-18.03	-18.83
6	E	2033-08-23T09:09:13.929	11.49	-37.76	41796.94	22.43			
5	E	2033-08-23T09:09:36.513	11.57	-37.71	42307.90	22.48			
4	E	2033-08-23T09:09:47.237	11.61	-37.68	42568.12	22.53			
alpha	E	2033-08-23T09:11:22.127	11.93	-37.45	44701.35	22.69			
beta	E	2033-08-23T09:12:03.269	12.06	-37.35	45641.15	22.75			
eta	E	2033-08-23T09:13:10.629	12.29	-37.19	47176.12	22.86			
gamma	E	2033-08-23T09:13:30.277	12.36	-37.14	47625.49	22.88			
delta	E	2033-08-23T09:13:59.741	12.46	-37.07	48300.35	22.92			
lambda	E	2033-08-23T09:15:14.887	12.71	-36.89	50026.71	23.02			
epsilon	E	2033-08-23T09:16:02.993	12.87	-36.77	51135.49	23.02			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-08-23T08:44:57.300
 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 : 3377537130246426624
 2Mass ID (if available) : 06200734+2335274
 ICRS Star Coord at Epoch: 06h 20m 07.35388s +23:35:27.38605s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.101
 G magnitude : 16.498
 RP magnitude : 15.735
 BP magnitude : 17.087
 DUPflag : 0
 Distance (au) : 19.530
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.28
 Sun-Target sep (deg) : 55.48
 Sun-Moon sep (deg) : 38.88
 B (ring opening deg) : 71.31
 PA of pole (deg) : 66.45
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.647
 C/A sky separation (km) : 23327.3
 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_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	2033-08-23T08:12:59.005		27.24	-14.03	50862.39	-21.23		
lambda	I	2033-08-23T08:13:38.346		27.35	-13.88	50026.71	-21.19		
delta	I	2033-08-23T08:15:00.235		27.57	-13.57	48300.35	-20.97		
gamma	I	2033-08-23T08:15:32.622		27.66	-13.45	47622.77	-20.87		
eta	I	2033-08-23T08:15:54.053		27.71	-13.36	47176.12	-20.81		
beta	I	2033-08-23T08:17:06.630		27.91	-13.09	45674.98	-20.57		
alpha	I	2033-08-23T08:17:51.521		28.03	-12.92	44752.21	-20.42		
4	I	2033-08-23T08:19:37.728		28.32	-12.51	42610.48	-20.02		
5	I	2033-08-23T08:19:59.787		28.38	-12.43	42166.93	-19.92		
6	I	2033-08-23T08:20:15.669		28.42	-12.37	41847.69	-19.82		
Uranus	I	2033-08-23T08:37:21.723		31.08	-8.46	25558.92		-0.24	-0.25
Uranus	E	2033-08-23T08:52:01.248		33.21	-5.12	25269.64		-13.66	-14.28
6	E	2033-08-23T09:08:17.667		35.41	-1.44x	41795.07	19.77		
5	E	2033-08-23T09:08:43.013		35.46	-1.34x	42299.97	19.86		
4	E	2033-08-23T09:08:55.951		35.49	-1.29x	42576.89	19.96		
alpha	E	2033-08-23T09:10:42.198		35.72	-0.89x	44706.92	20.35		
beta	E	2033-08-23T09:11:27.753		35.81	-0.72x	45641.80	20.50		
eta	E	2033-08-23T09:12:42.219		35.97	-0.44x	47176.12	20.74		
gamma	E	2033-08-23T09:13:03.815		36.02	-0.36x	47624.62	20.80		
delta	E	2033-08-23T09:13:36.229		36.08	-0.24x	48300.35	20.89		
lambda	E	2033-08-23T09:14:58.421		36.25	0.07x	50026.71	21.11		
epsilon	E	2033-08-23T09:15:47.849		36.35	0.26x	51073.22	21.15		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-08-23T08:43:47.760
 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 : 3377537130246426624
 2Mass ID (if available) : 06200734+2335274
 ICRS Star Coord at Epoch: 06h 20m 07.35388s +23:35:27.38605s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.101
 G magnitude : 16.498
 RP magnitude : 15.735
 BP magnitude : 17.087
 DUPflag : 0
 Distance (au) : 19.530
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.28
 Sun-Target sep (deg) : 55.48
 Sun-Moon sep (deg) : 38.85
 B (ring opening deg) : 71.31
 PA of pole (deg) : 66.45
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.627
 C/A sky separation (km) : 23043.0
 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	2033-08-23T08:11:58.513		3.55x	-38.85	50864.77	-21.47		
lambda	I	2033-08-23T08:12:37.521		3.67x	-38.71	50026.71	-21.43		
delta	I	2033-08-23T08:13:58.467		3.93x	-38.42	48300.35	-21.22		
gamma	I	2033-08-23T08:14:30.472		4.03x	-38.30	47622.80	-21.12		
eta	I	2033-08-23T08:14:51.651		4.10x	-38.23	47176.12	-21.06		
beta	I	2033-08-23T08:16:03.347		4.32x	-37.97	45675.11	-20.83		
alpha	I	2033-08-23T08:16:47.689		4.46x	-37.81	44752.18	-20.67		
4	I	2033-08-23T08:18:32.553		4.79x	-37.43	42610.25	-20.28		
5	I	2033-08-23T08:18:54.324		4.86x	-37.35	42166.51	-20.19		
6	I	2033-08-23T08:19:09.949		4.91x	-37.30	41848.11	-20.09		
Uranus	I	2033-08-23T08:35:49.004		8.02	-33.68	25558.87		0.29	0.30
Uranus	E	2033-08-23T08:51:15.723		10.83	-30.32	25256.67		-13.98	-14.61
6	E	2033-08-23T09:07:06.919		13.63	-26.86	41795.11	20.01		
5	E	2033-08-23T09:07:31.963		13.71	-26.77	42300.26	20.11		
4	E	2033-08-23T09:07:44.716		13.74	-26.72	42576.62	20.20		
alpha	E	2033-08-23T09:09:29.722		14.05	-26.34	44706.75	20.58		
beta	E	2033-08-23T09:10:14.770		14.18	-26.17	45641.78	20.73		
eta	E	2033-08-23T09:11:28.424		14.39	-25.91	47176.12	20.96		
gamma	E	2033-08-23T09:11:49.791		14.45	-25.83	47624.65	21.02		
delta	E	2033-08-23T09:12:21.863		14.54	-25.71	48300.35	21.11		
lambda	E	2033-08-23T09:13:43.210		14.78	-25.41	50026.71	21.33		
epsilon	E	2033-08-23T09:14:32.220		14.92	-25.24	51074.87	21.36		