

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-10-20T12:03:35.980
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427632877170068864
 2Mass ID (if available) : 05453162+2332145

ICRS Star Coord at Epoch: 05h 45m 31.62119s +23:32:14.38929s

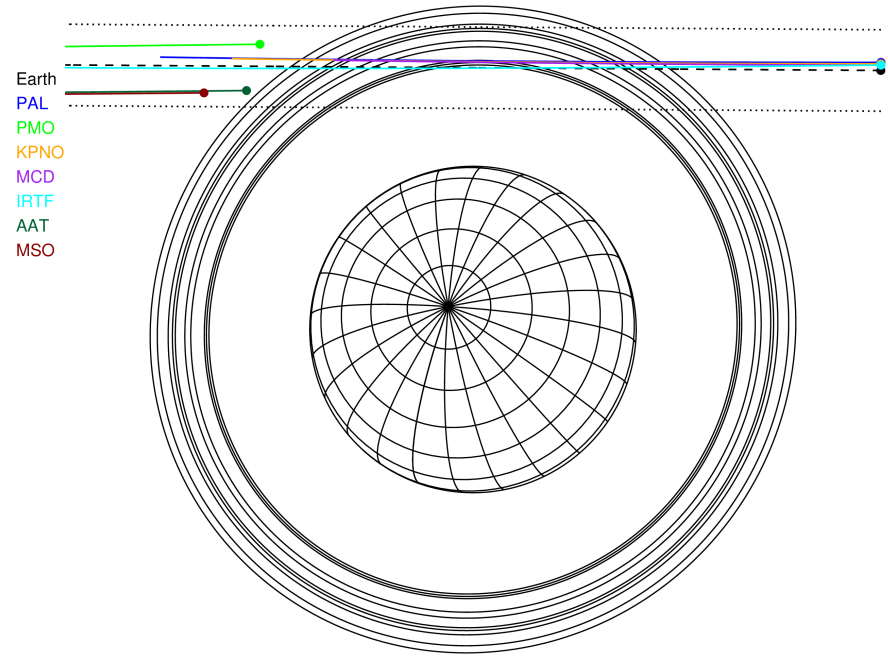
RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.075
 G magnitude : 15.098
 RP magnitude : 14.436
 BP magnitude : 15.601
 DUPflag : 0
 Distance (au) : 18.583
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.46
 Sun-Target sep (deg) : 119.78
 Sun-Moon sep (deg) : 172.21
 B (ring opening deg) : 78.04
 PA of pole (deg) : 47.26

#	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



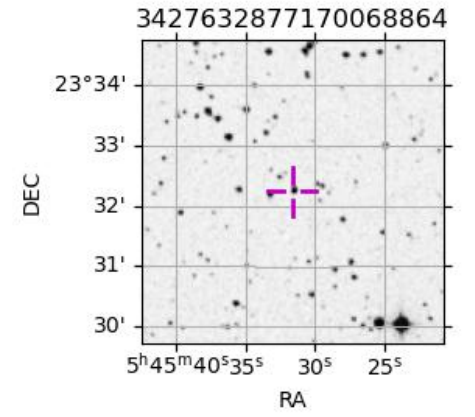
2031-10-20T12:03:35.9800 α: 05 45 31.6212 δ: +23 32 14.389 C/A 3.050° PA 179.61 deg v_sky - 8.46 km/s D 18.58 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-10-20T12:03:35 K13.07 G15.10 XRgt

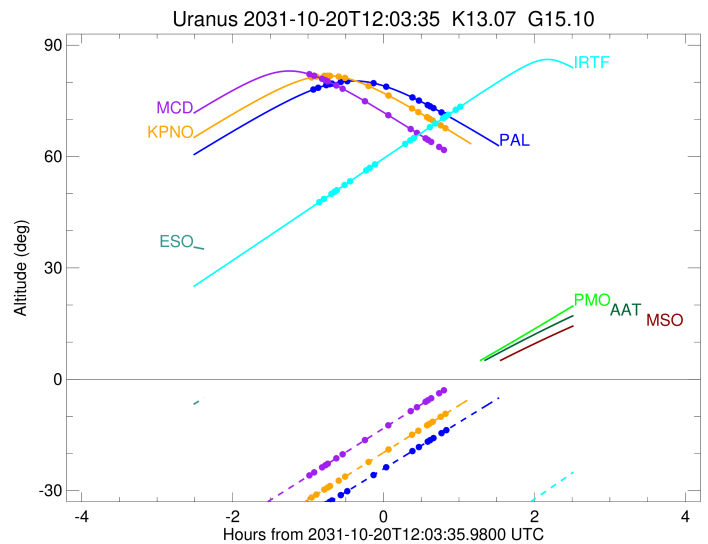
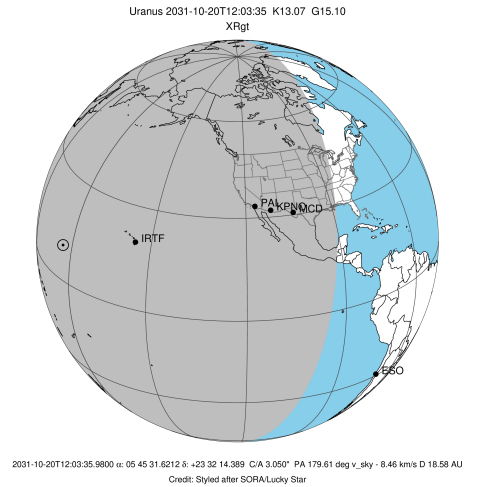


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	OCT 20 11:09 - OCT 20 12:53	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	OCT 20 11:07 - OCT 20 12:52	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	OCT 20 11:06 - OCT 20 12:41	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	OCT 20 11:13 - OCT 20 13:04	PnnRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European Southern Obs	-29.3	289.3					PnnRnn
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 : 2031-10-20T12:02:25.760
 Event type : XRgt
 : No Uranus occs
 : 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 : 3427632877170068864
 2Mass ID (if available) : 05453162+2332145
 ICRS Star Coord at Epoch: 05h 45m 31.62119s +23:32:14.38929s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.075
 G magnitude : 15.098
 RP magnitude : 14.436
 BP magnitude : 15.601
 DUPflag : 0
 Distance (au) : 18.583
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.46
 Sun-Target sep (deg) : 119.78
 Sun-Moon sep (deg) : 172.48
 B (ring opening deg) : 78.04
 PA of pole (deg) : 47.26
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.121
 C/A sky separation (km) : 42070.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

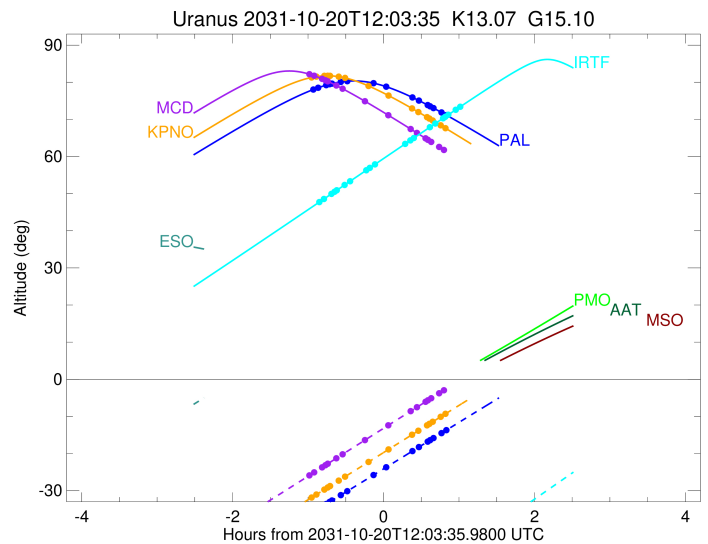
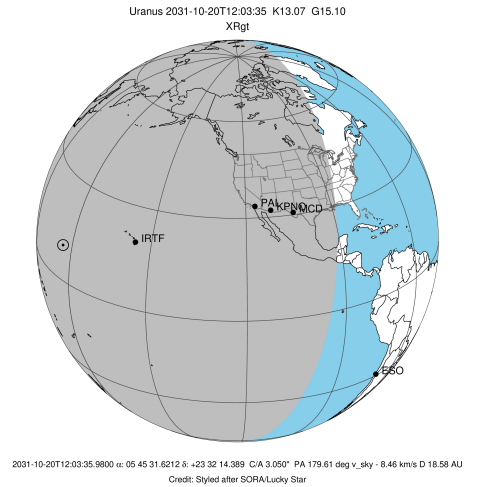


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-10-20T11:09:13.308		78.23	-35.42	50744.13	-4.90		
lambda	I	2031-10-20T11:11:42.372		78.54	-34.91	50026.71	-4.73		
delta	I	2031-10-20T11:18:06.160		79.23	-33.60	48300.35	-4.26		
gamma	I	2031-10-20T11:20:48.308		79.49	-33.04	47626.73	-4.05		
eta	I	2031-10-20T11:22:41.805		79.65	-32.65	47176.12	-3.89		
beta	I	2031-10-20T11:29:49.735		80.11	-31.18	45641.51	-3.27		
alpha	I	2031-10-20T11:34:59.225		80.30	-30.11	44704.64	-2.79		
4	I	2031-10-20T11:57:57.389		79.58	-25.33	42531.21	-0.31		

No planet occultations

4	E	2031-10-20T12:03:22.859		79.07	-24.20	42530.03	0.31		
alpha	E	2031-10-20T12:26:33.024		75.93	-19.35	44725.48	2.79		
beta	E	2031-10-20T12:31:36.872		75.10	-18.29	45649.56	3.27		
eta	E	2031-10-20T12:38:41.949		73.88	-16.81	47176.12	3.90		
gamma	E	2031-10-20T12:40:34.186		73.55	-16.42	47622.30	4.05		
delta	E	2031-10-20T12:43:17.176		73.06	-15.85	48300.35	4.27		
lambda	E	2031-10-20T12:49:40.301		71.89	-14.52	50026.71	4.74		
epsilon	E	2031-10-20T12:53:01.915		71.26	-13.82	51004.88	4.91		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-10-20T12:01:21.820
 Event type : XRgt
 : No Uranus occs
 : 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 : 3427632877170068864
 2Mass ID (if available) : 05453162+2332145
 ICRS Star Coord at Epoch: 05h 45m 31.62119s +23:32:14.38929s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.075
 G magnitude : 15.098
 RP magnitude : 14.436
 BP magnitude : 15.601
 DUPflag : 0
 Distance (au) : 18.583
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.46
 Sun-Target sep (deg) : 119.78
 Sun-Moon sep (deg) : 172.54
 B (ring opening deg) : 78.04
 PA of pole (deg) : 47.26
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.112
 C/A sky separation (km) : 41943.0
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

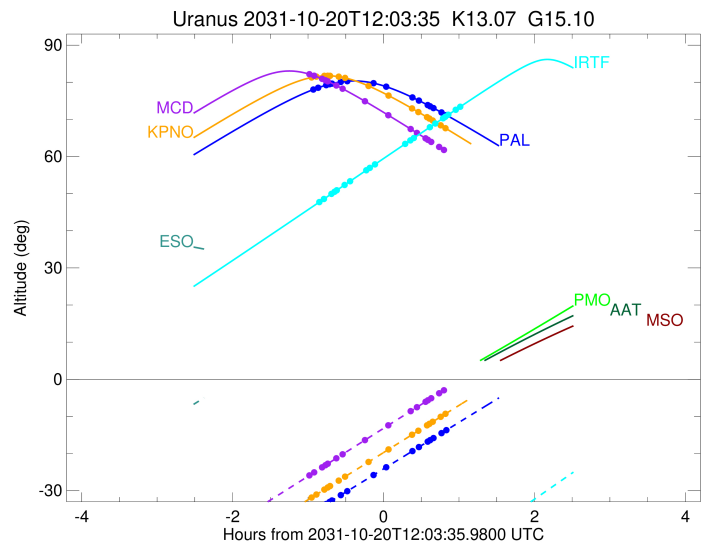
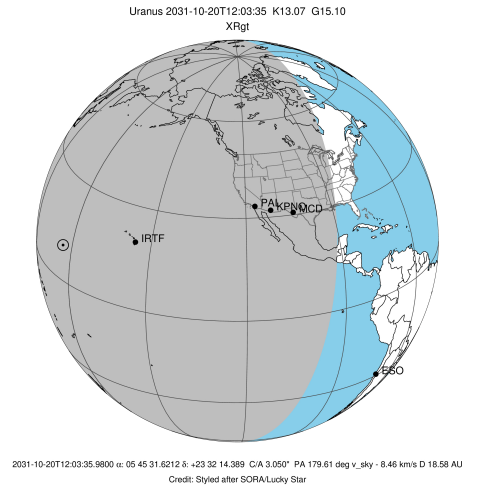


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-10-20T11:07:49.641		81.39	-31.56	50744.00	-4.94		
lambda	I	2031-10-20T11:10:17.416		81.53	-31.04	50026.71	-4.77		
delta	I	2031-10-20T11:16:37.396		81.74	-29.71	48300.35	-4.31		
gamma	I	2031-10-20T11:19:17.614		81.75	-29.14	47626.77	-4.10		
eta	I	2031-10-20T11:21:09.632		81.74	-28.75	47176.12	-3.95		
beta	I	2031-10-20T11:28:10.499		81.50	-27.27	45641.47	-3.34		
alpha	I	2031-10-20T11:33:12.760		81.17	-26.20	44704.31	-2.87		
4	I	2031-10-20T11:52:52.705		78.84	-22.03	42531.53	-0.77		

No planet occultations

4	E	2031-10-20T12:06:20.379		76.65	-19.17	42528.43	0.77		
alpha	E	2031-10-20T12:26:13.033		72.97	-14.95	44725.74	2.87		
beta	E	2031-10-20T12:31:09.957		72.00	-13.90	45649.66	3.34		
eta	E	2031-10-20T12:38:08.495		70.62	-12.42	47176.12	3.95		
gamma	E	2031-10-20T12:39:59.408		70.25	-12.03	47622.28	4.10		
delta	E	2031-10-20T12:42:40.703		69.71	-11.46	48300.35	4.31		
lambda	E	2031-10-20T12:49:00.638		68.42	-10.12	50026.71	4.77		
epsilon	E	2031-10-20T12:52:21.156		67.74	-9.42	51006.04	4.94		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-10-20T11:59:50.130
 Event type : XRgt
 : No Uranus occs
 : 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 : 3427632877170068864
 2Mass ID (if available) : 05453162+2332145
 ICRS Star Coord at Epoch: 05h 45m 31.62119s +23:32:14.38929s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.075
 G magnitude : 15.098
 RP magnitude : 14.436
 BP magnitude : 15.601
 DUPflag : 0
 Distance (au) : 18.583
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.46
 Sun-Target sep (deg) : 119.78
 Sun-Moon sep (deg) : 172.63
 B (ring opening deg) : 78.04
 PA of pole (deg) : 47.26
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.106
 C/A sky separation (km) : 41867.4
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



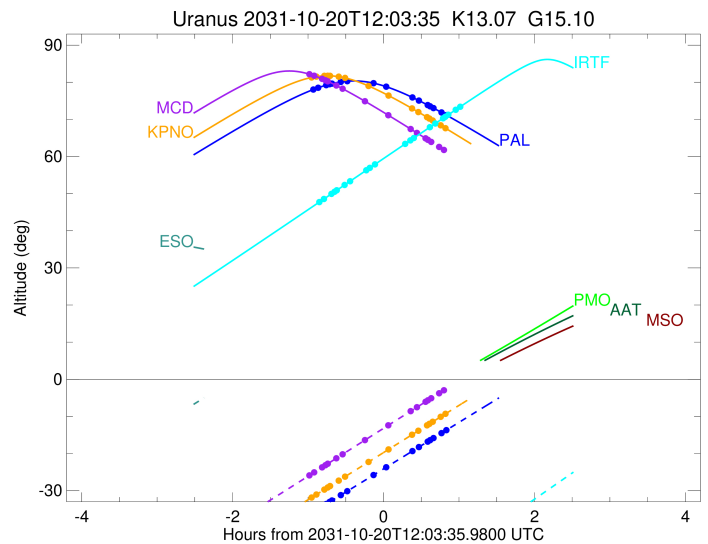
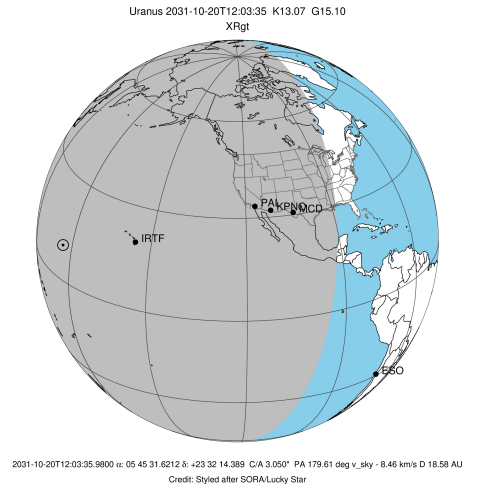
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-10-20T11:06:04.512		82.04	-25.60	50743.91	-4.96		
lambda	I	2031-10-20T11:08:31.537		81.76	-25.07	50026.71	-4.79		
delta	I	2031-10-20T11:14:49.340		80.93	-23.71	48300.35	-4.34		
gamma	I	2031-10-20T11:17:28.461		80.54	-23.14	47626.80	-4.13		
eta	I	2031-10-20T11:19:19.647		80.25	-22.74	47176.12	-3.98		
beta	I	2031-10-20T11:26:16.560		79.11	-21.25	45641.45	-3.38		
alpha	I	2031-10-20T11:31:14.839		78.24	-20.18	44704.07	-2.91		
4	I	2031-10-20T11:49:49.154		74.70	-16.18	42532.00	-0.94		

No planet occultations

4	E	2031-10-20T12:06:20.913		71.35	-12.63	42528.17	0.94		
alpha	E	2031-10-20T12:25:08.964		67.42	-8.60	44725.84	2.91		
beta	E	2031-10-20T12:30:02.340		66.39	-7.56	45649.70	3.37		
eta	E	2031-10-20T12:36:57.675		64.91	-6.08	47176.12	3.97		
gamma	E	2031-10-20T12:38:47.977		64.52	-5.69	47622.28	4.12		
delta	E	2031-10-20T12:41:28.518		63.95	-5.12	48300.35	4.33		
lambda	E	2031-10-20T12:47:47.164		62.60	-3.78x	50026.71	4.78		
epsilon	E	2031-10-20T12:51:07.265		61.89	-3.08x	51006.26	4.95		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2031-10-20T12:10:30.940
Event type           : XRgt
: No Uranus occs
: 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       : 3427632877170068864
2Mass ID (if available) : 05453162+2332145
ICRS Star Coord at Epoch: 05h 45m 31.62119s +23:32:14.38929s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 13.075
G magnitude          : 15.098
RP magnitude         : 14.436
BP magnitude         : 15.601
DUPflag             : 0
Distance (au)        : 18.583
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -8.46
Sun-Target sep (deg) : 119.78
Sun-Moon sep (deg)   : 171.87
B (ring opening deg) : 78.04
PA of pole (deg)     : 47.26
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.036
C/A sky separation (km) : 40921.5
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.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	2031-10-20T11:13:55.532		48.04	-71.29	50743.66	-5.15		
lambda	I	2031-10-20T11:16:16.828		48.58	-70.80	50026.71	-5.00		
delta	I	2031-10-20T11:22:16.341		49.95	-69.53	48300.35	-4.60		
gamma	I	2031-10-20T11:24:45.779		50.53	-68.99	47626.94	-4.41		
eta	I	2031-10-20T11:26:29.413		50.92	-68.62	47176.12	-4.28		
beta	I	2031-10-20T11:32:50.060		52.38	-67.23	45641.32	-3.77		
alpha	I	2031-10-20T11:37:12.236		53.38	-66.27	44702.74	-3.39		
4	I	2031-10-20T11:50:19.160		56.40	-63.34	42534.83	-2.08		
5	I	2031-10-20T11:52:39.168		56.93	-62.81	42254.20	-1.83		
6	I	2031-10-20T11:56:33.160		57.83	-61.93	41879.68	-1.41		

No planet occultations

6	E	2031-10-20T12:21:04.789		63.46	-56.31	41876.86	1.42		
5	E	2031-10-20T12:24:43.059		64.30	-55.47	42221.62	1.84		
4	E	2031-10-20T12:27:13.312		64.87	-54.89	42526.58	2.10		
alpha	E	2031-10-20T12:40:26.834		67.90	-51.82	44728.30	3.43		
beta	E	2031-10-20T12:44:41.051		68.87	-50.83	45650.83	3.81		
eta	E	2031-10-20T12:50:54.846		70.29	-49.38	47176.12	4.34		
gamma	E	2031-10-20T12:52:36.042		70.68	-48.99	47622.08	4.47		
delta	E	2031-10-20T12:55:04.519		71.24	-48.41	48300.35	4.66		
lambda	E	2031-10-20T13:00:58.660		72.58	-47.03	50026.71	5.08		
epsilon	E	2031-10-20T13:04:11.059		73.31	-46.28	51024.60	5.24		