

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-04-06T21:35:40.460  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415727468343212800  
 2Mass ID (if available) : 05123503+2305362

ICRS Star Coord at Epoch: 05h 12m 35.04350s +23:05:36.30246s

RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.367  
 G magnitude : 16.915  
 RP magnitude : 16.124  
 BP magnitude : 17.566  
 DUPflag : 0  
 Distance (au) : 19.573  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.01  
 Sun-Target sep (deg) : 62.65  
 Sun-Moon sep (deg) : 106.83  
 B (ring opening deg) : 82.04  
 PA of pole (deg) : 5.83

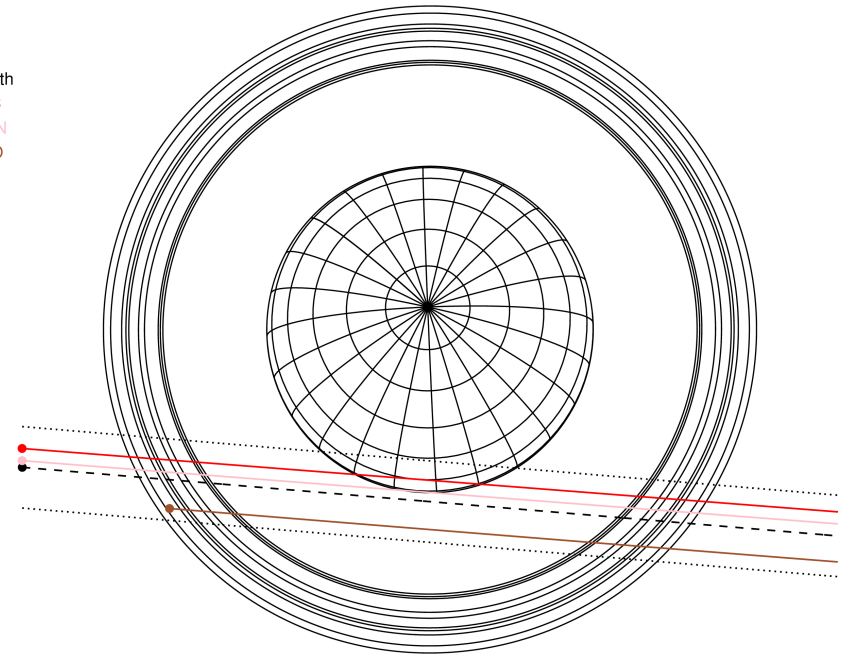
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-04-06T21:35:40.4600 ex: 05 12 35.0435 s: +23 05 36.302 C/A 1.887° PA 355.19 deg v\_sky +20.01 km/s D 19.57 AU  
 Credit: Styled after SORA/Lucky Star

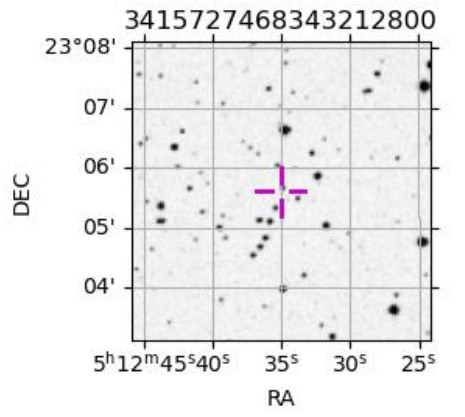
Uranus 2031-04-06T21:35:40 K14.37 G16.92 PtRgt

Earth  
 PIC  
 TEN  
 RIO

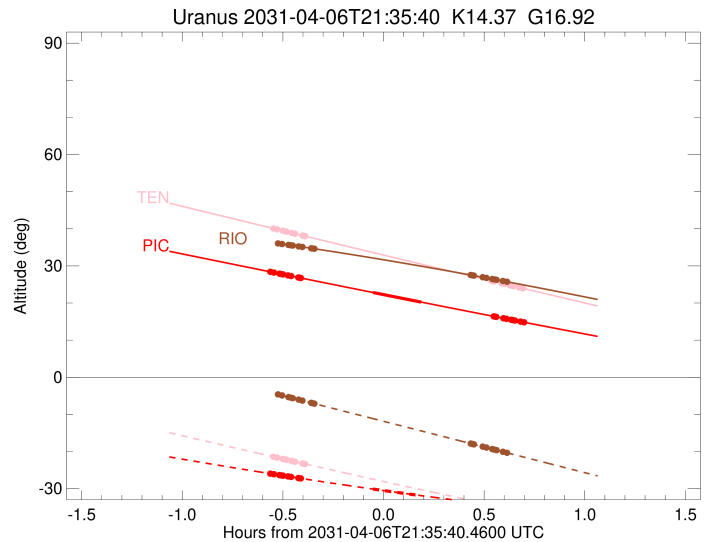
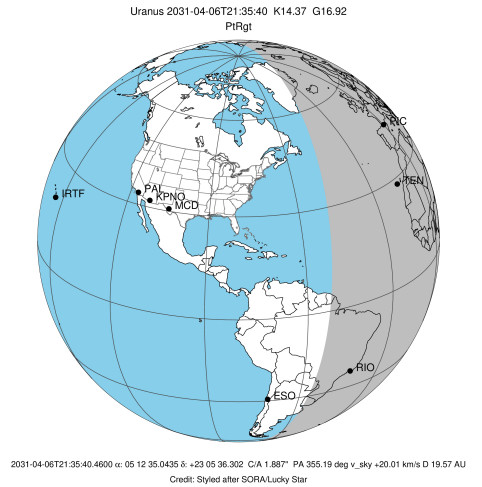


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	APR 06 21:02 - APR 06 22:17	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	+++++		+++++	APR 06 21:03 - APR 06 22:17	PnnRie
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	+++++		+++++	APR 06 21:07 - APR 06 22:12	PnnRie
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

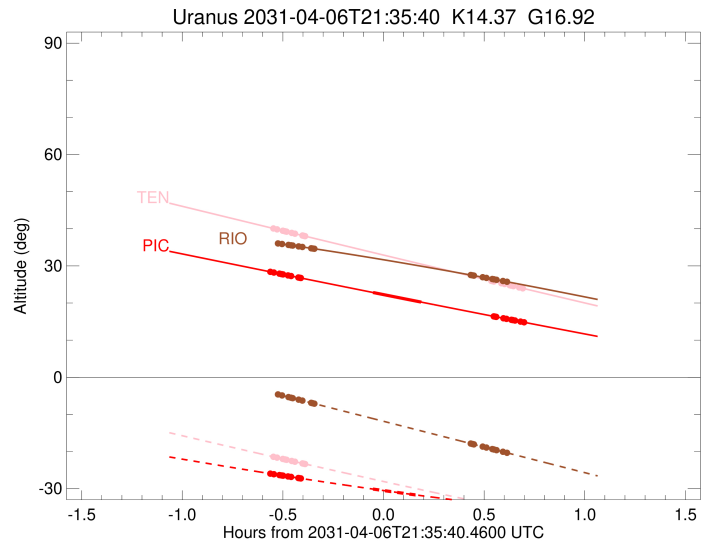
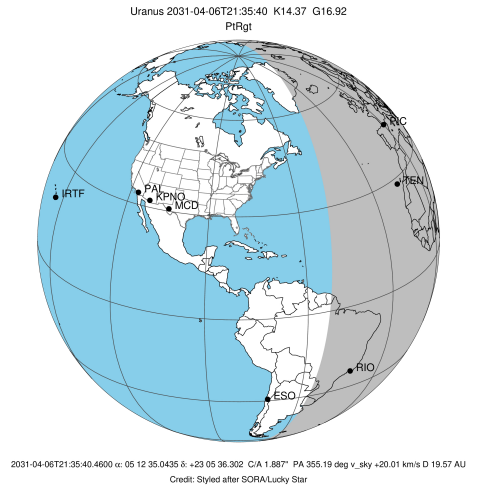


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-04-06T21:39:53.440  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3415727468343212800  
 2Mass ID (if available) : 05123503+2305362  
 ICRS Star Coord at Epoch: 05h 12m 35.04350s +23:05:36.30246s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.367  
 G magnitude : 16.915  
 RP magnitude : 16.124  
 BP magnitude : 17.566  
 DUPflag : 0  
 Distance (au) : 19.573  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.01  
 Sun-Target sep (deg) : 62.65  
 Sun-Moon sep (deg) : 107.39  
 B (ring opening deg) : 82.04  
 PA of pole (deg) : 5.83  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.659  
 C/A sky separation (km) : 23544.0  
 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\_itrfr93\_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	2031-04-06T21:02:07.605		28.37	-25.99	50952.32	-17.65		
lambda	I	2031-04-06T21:03:00.379		28.21	-26.12	50026.71	-17.49		
delta	I	2031-04-06T21:04:39.578		27.91	-26.35	48300.35	-17.31		
gamma	I	2031-04-06T21:05:18.861		27.79	-26.45	47621.93	-17.23		
eta	I	2031-04-06T21:05:44.776		27.71	-26.51	47176.12	-17.18		
beta	I	2031-04-06T21:07:12.322		27.44	-26.71	45680.68	-16.98		
alpha	I	2031-04-06T21:08:09.401		27.27	-26.85	44715.58	-16.84		
4	I	2031-04-06T21:10:16.994		26.88	-27.14	42586.48	-16.49		
5	I	2031-04-06T21:10:33.745		26.83	-27.18	42312.13	-16.45		
6	I	2031-04-06T21:11:00.526		26.75	-27.25	41869.06	-16.38		
Uranus	I	2031-04-06T21:32:32.696		22.83	-30.12	25130.79		-6.83	-7.15
Uranus	E	2031-04-06T21:46:54.658		20.25	-31.89	24999.11		-7.85	-8.22
6	E	2031-04-06T22:08:32.476		16.40	-34.31	41852.30	16.47		
5	E	2031-04-06T22:08:52.694		16.34	-34.35	42186.20	16.53		
4	E	2031-04-06T22:09:13.471		16.28	-34.38	42525.97	16.58		
alpha	E	2031-04-06T22:11:22.409		15.90	-34.60	44689.33	16.93		
beta	E	2031-04-06T22:12:18.799		15.74	-34.70	45648.05	17.08		
eta	E	2031-04-06T22:13:47.760		15.48	-34.85	47176.12	17.28		
gamma	E	2031-04-06T22:14:14.044		15.40	-34.89	47631.09	17.34		
delta	E	2031-04-06T22:14:52.555		15.29	-34.96	48300.35	17.42		
lambda	E	2031-04-06T22:16:31.117		15.00	-35.12	50026.71	17.61		
epsilon	E	2031-04-06T22:17:57.416		14.75	-35.26	51553.02	17.77		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-04-06T21:40:09.910  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 3415727468343212800  
 2Mass ID (if available) : 05123503+2305362  
 ICRS Star Coord at Epoch: 05h 12m 35.04350s +23:05:36.30246s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.367  
 G magnitude : 16.915  
 RP magnitude : 16.124  
 BP magnitude : 17.566  
 DUPflag : 0  
 Distance (au) : 19.573  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.01  
 Sun-Target sep (deg) : 62.65  
 Sun-Moon sep (deg) : 107.56  
 B (ring opening deg) : 82.04  
 PA of pole (deg) : 5.83  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.793  
 C/A sky separation (km) : 25451.8  
 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

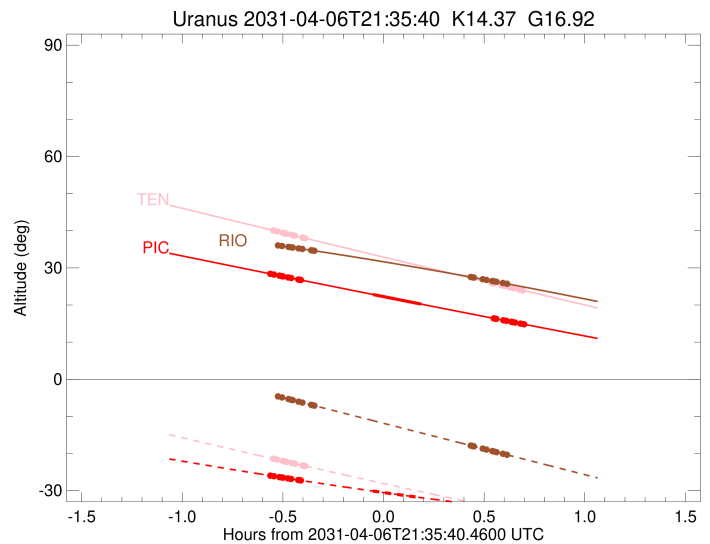
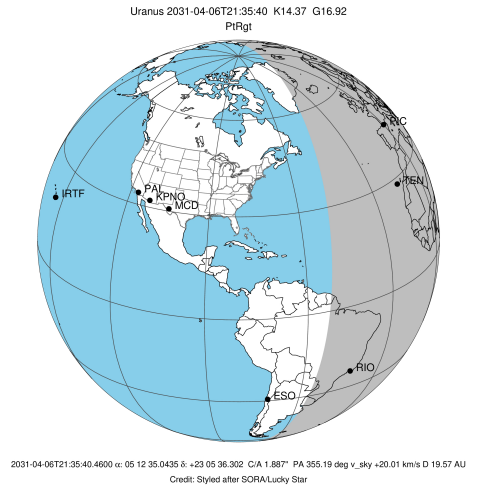


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-04-06T21:03:02.185		40.04	-21.46	50967.72	-17.13		
lambda	I	2031-04-06T21:03:57.528		39.84	-21.65	50026.71	-16.95		
delta	I	2031-04-06T21:05:40.047		39.47	-22.01	48300.35	-16.73		
gamma	I	2031-04-06T21:06:20.709		39.32	-22.14	47622.08	-16.63		
eta	I	2031-04-06T21:06:47.573		39.22	-22.24	47176.12	-16.57		
beta	I	2031-04-06T21:08:18.470		38.89	-22.55	45680.42	-16.33		
alpha	I	2031-04-06T21:09:17.962		38.67	-22.75	44713.84	-16.16		
4	I	2031-04-06T21:11:31.245		38.18	-23.21	42584.08	-15.75		
5	I	2031-04-06T21:11:48.755		38.12	-23.27	42310.76	-15.69		
6	I	2031-04-06T21:12:16.620		38.02	-23.36	41870.61	-15.61		

No planet occultations

6	E	2031-04-06T22:07:48.453		25.98	-34.29	41854.53	15.70		
5	E	2031-04-06T22:08:09.717		25.90	-34.36	42189.83	15.78		
4	E	2031-04-06T22:08:31.284		25.82	-34.43	42525.94	15.83		
alpha	E	2031-04-06T22:10:45.853		25.34	-34.85	44688.48	16.26		
beta	E	2031-04-06T22:11:44.622		25.13	-35.03	45648.83	16.44		
eta	E	2031-04-06T22:13:16.898		24.80	-35.31	47176.12	16.68		
gamma	E	2031-04-06T22:13:44.120		24.70	-35.40	47630.99	16.74		
delta	E	2031-04-06T22:14:23.983		24.56	-35.52	48300.35	16.84		
lambda	E	2031-04-06T22:16:05.805		24.20	-35.83	50026.71	17.07		
epsilon	E	2031-04-06T22:17:34.844		23.88	-36.11	51554.48	17.25		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-04-06T21:38:29.310  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 3415727468343212800  
 2Mass ID (if available) : 05123503+2305362  
 ICRS Star Coord at Epoch: 05h 12m 35.04350s +23:05:36.30246s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.367  
 G magnitude : 16.915  
 RP magnitude : 16.124  
 BP magnitude : 17.566  
 DUPflag : 0  
 Distance (au) : 19.573  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 20.01  
 Sun-Target sep (deg) : 62.65  
 Sun-Moon sep (deg) : 107.47  
 B (ring opening deg) : 82.04  
 PA of pole (deg) : 5.83  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.200  
 C/A sky separation (km) : 31233.3  
 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	2031-04-06T21:04:22.152		36.03	-4.65x	51018.03	-15.51		
lambda	I	2031-04-06T21:05:26.859		35.89	-4.90x	50026.71	-15.22		
delta	I	2031-04-06T21:07:21.624		35.65	-5.34	48300.35	-14.85		
gamma	I	2031-04-06T21:08:07.490		35.55	-5.52	47622.62	-14.70		
eta	I	2031-04-06T21:08:37.984		35.48	-5.63	47176.12	-14.59		
beta	I	2031-04-06T21:10:21.988		35.25	-6.03	45679.26	-14.19		
alpha	I	2031-04-06T21:11:31.150		35.10	-6.30	44708.30	-13.89		
4	I	2031-04-06T21:14:08.361		34.74	-6.90	42575.95	-13.16		
5	I	2031-04-06T21:14:29.311		34.70	-6.98	42304.56	-13.06		
6	I	2031-04-06T21:15:01.941		34.62	-7.11	41874.97	-12.91		

No planet occultations

6	E	2031-04-06T22:01:41.826		27.54	-17.86	41861.71	12.96		
5	E	2031-04-06T22:02:07.868		27.47	-17.96	42203.26	13.10		
4	E	2031-04-06T22:02:32.965		27.40	-18.06	42526.87	13.21		
alpha	E	2031-04-06T22:05:11.649		26.96	-18.67	44686.22	13.95		
beta	E	2031-04-06T22:06:20.179		26.77	-18.93	45651.64	14.25		
eta	E	2031-04-06T22:08:05.725		26.47	-19.34	47176.12	14.65		
gamma	E	2031-04-06T22:08:36.624		26.39	-19.45	47630.55	14.76		
delta	E	2031-04-06T22:09:21.751		26.26	-19.63	48300.35	14.92		
lambda	E	2031-04-06T22:11:15.987		25.94	-20.07	50026.71	15.30		
epsilon	E	2031-04-06T22:12:54.877		25.66	-20.45	51554.11	15.58		