

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-04-04T21:50:32.530  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415726158377405568  
 2Mass ID (if available) : 05121789+2305200

Uranus 2031-04-04T21:50:32 K13.82 G17.25 PgtRgt

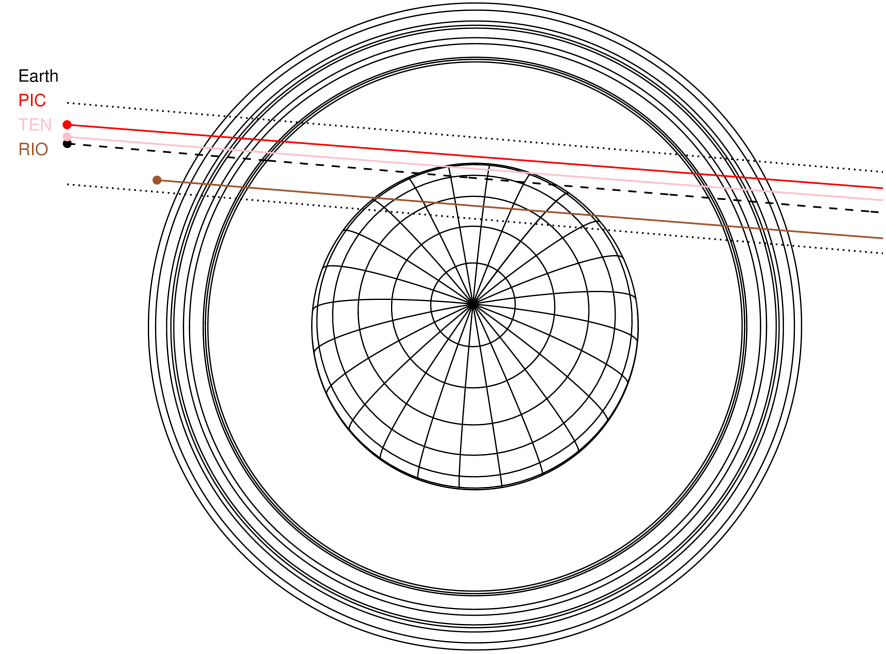
ICRS Star Coord at Epoch: 05h 12m 17.89312s +23:05:19.86962s

RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.825  
 G magnitude : 17.254  
 RP magnitude : 16.261  
 BP magnitude : 18.273  
 DUPflag : 0  
 Distance (au) : 19.543  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.13  
 Sun-Target sep (deg) : 64.54  
 Sun-Moon sep (deg) : 80.60  
 B (ring opening deg) : 82.05  
 PA of pole (deg) : 5.34

#	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

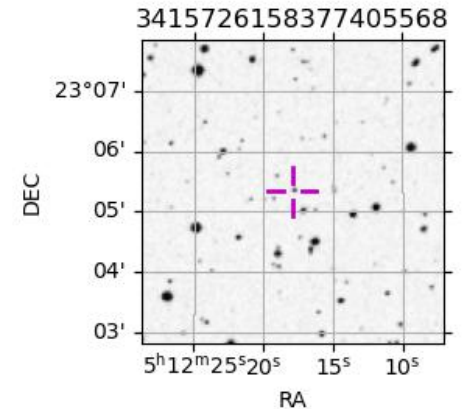


2031-04-04T21:50:32.5300 ex: 05 12 17.8931 2: +23 05 19.870 C/A 1.639° PA 175.16 deg v\_sky +19.13 km/s D 19.54 AU  
 Credit: Styled after SORA/Lucky Star



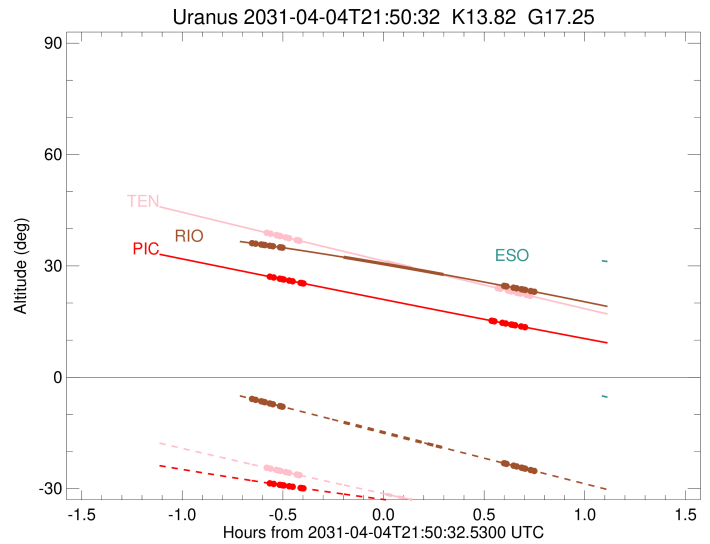
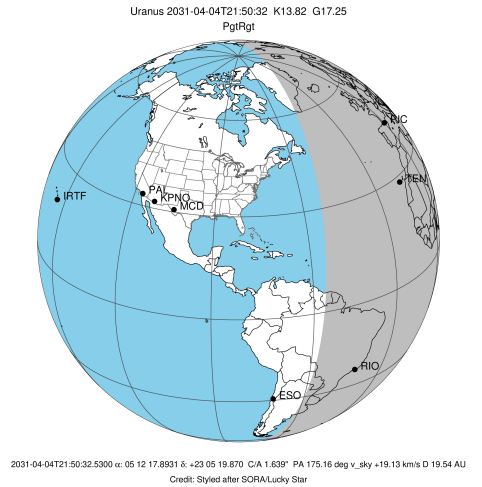
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	APR 04 21:17 - APR 04 22:32	PnnRie
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 04 21:16 - APR 04 22:34	PieRie
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 04 21:11 - APR 04 22:35	PieRie
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            : 2031-04-04T21:54:41.150
Event type           : PgtRgt
: 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       : 3415726158377405568
2Mass ID (if available) : 05121789+2305200
ICRS Star Coord at Epoch: 05h 12m 17.89312s +23:05:19.86962s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 13.825
G magnitude           : 17.254
RP magnitude          : 16.261
BP magnitude          : 18.273
DUPflag              : 0
Distance (au)        : 19.543
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : 19.13
Sun-Target sep (deg) : 64.54
Sun-Moon sep (deg)   : 80.82
B (ring opening deg) : 82.05
PA of pole (deg)     : 5.34
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.872
C/A sky separation (km) : 26532.4
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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
  
```

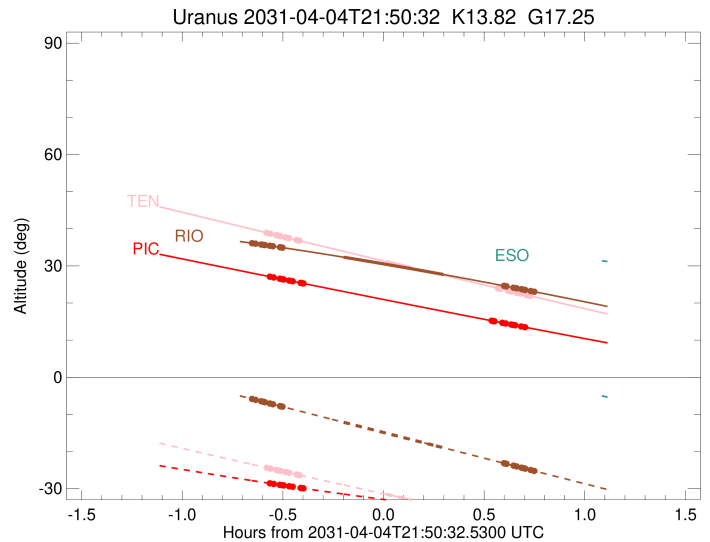
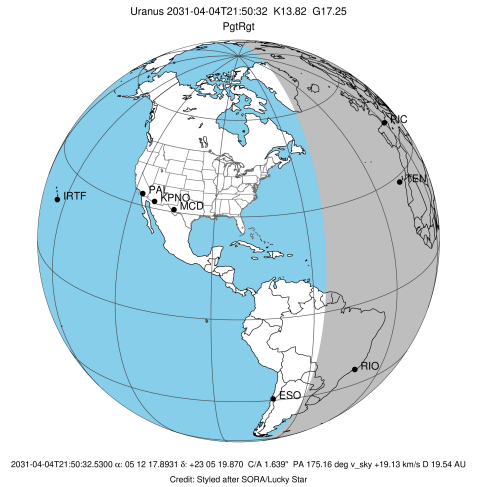


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-04-04T21:17:04.950		27.02	-28.63	50744.69	-16.15		
lambda	I	2031-04-04T21:17:49.523		26.88	-28.74	50026.71	-16.06		
delta	I	2031-04-04T21:19:37.775		26.55	-28.98	48300.35	-15.83		
gamma	I	2031-04-04T21:20:20.800		26.42	-29.08	47621.47	-15.73		
eta	I	2031-04-04T21:20:49.178		26.34	-29.14	47176.12	-15.66		
beta	I	2031-04-04T21:22:25.880		26.04	-29.36	45674.12	-15.41		
alpha	I	2031-04-04T21:23:26.357		25.86	-29.50	44747.76	-15.24		
4	I	2031-04-04T21:25:48.024		25.43	-29.81	42616.52	-14.80		
5	I	2031-04-04T21:26:10.896		25.36	-29.86	42284.14	-14.70		
6	I	2031-04-04T21:26:42.243		25.26	-29.93	41822.38	-14.60		

No planet occultations

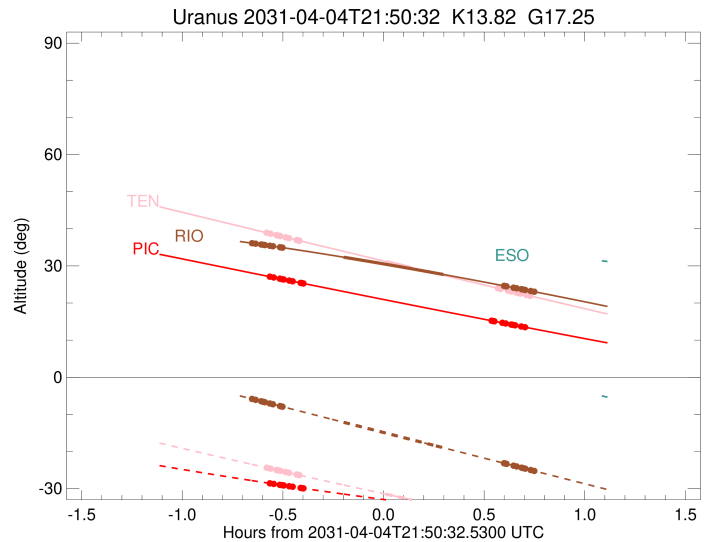
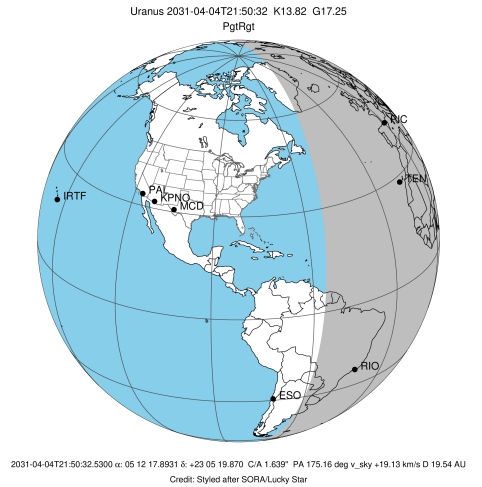
6	E	2031-04-04T22:22:43.610		15.24	-36.36	41800.73	14.68		
5	E	2031-04-04T22:23:07.936		15.17	-36.40	42163.24	14.78		
4	E	2031-04-04T22:23:35.096		15.09	-36.45	42563.70	14.88		
alpha	E	2031-04-04T22:25:58.237		14.67	-36.67	44726.65	15.33		
beta	E	2031-04-04T22:26:57.693		14.49	-36.76	45642.52	15.50		
eta	E	2031-04-04T22:28:35.811		14.21	-36.91	47176.12	15.76		
gamma	E	2031-04-04T22:29:04.559		14.13	-36.95	47630.15	15.83		
delta	E	2031-04-04T22:29:46.760		14.00	-37.02	48300.35	15.93		
lambda	E	2031-04-04T22:31:34.293		13.69	-37.18	50026.71	16.17		
epsilon	E	2031-04-04T22:32:52.667		13.46	-37.29	51300.65	16.26		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-04-04T21:55:00.520  
 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 : 3415726158377405568  
 2Mass ID (if available) : 05121789+2305200  
 ICRS Star Coord at Epoch: 05h 12m 17.89312s +23:05:19.86962s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.825  
 G magnitude : 17.254  
 RP magnitude : 16.261  
 BP magnitude : 18.273  
 DUPflag : 0  
 Distance (au) : 19.543  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.13  
 Sun-Target sep (deg) : 64.54  
 Sun-Moon sep (deg) : 80.96  
 B (ring opening deg) : 82.05  
 PA of pole (deg) : 5.34  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.737  
 C/A sky separation (km) : 24626.7  
 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	2031-04-04T21:16:08.971		38.83	-24.47	50746.44	-16.46		
lambda	I	2031-04-04T21:16:52.772		38.67	-24.61	50026.71	-16.39		
delta	I	2031-04-04T21:18:38.693		38.28	-24.98	48300.35	-16.20		
gamma	I	2031-04-04T21:19:20.715		38.13	-25.12	47621.37	-16.12		
eta	I	2031-04-04T21:19:48.391		38.03	-25.21	47176.12	-16.06		
beta	I	2031-04-04T21:21:22.488		37.69	-25.53	45674.89	-15.85		
alpha	I	2031-04-04T21:22:21.313		37.47	-25.73	44746.81	-15.72		
4	I	2031-04-04T21:24:38.281		36.97	-26.19	42616.33	-15.35		
5	I	2031-04-04T21:25:00.038		36.89	-26.27	42287.72	-15.27		
6	I	2031-04-04T21:25:30.311		36.78	-26.37	41824.74	-15.19		
Uranus	I	2031-04-04T21:51:18.358		31.17	-31.50	24984.33		7.95	8.32
Uranus	E	2031-04-04T21:59:02.761		29.49	-33.00	25051.70		7.45	7.80
6	E	2031-04-04T22:24:32.613		24.01	-37.79	41802.06	15.28		
5	E	2031-04-04T22:24:55.819		23.93	-37.86	42161.31	15.37		
4	E	2031-04-04T22:25:21.896		23.83	-37.94	42561.20	15.45		
alpha	E	2031-04-04T22:27:40.263		23.34	-38.36	44724.92	15.82		
beta	E	2031-04-04T22:28:38.025		23.13	-38.53	45642.16	15.96		
eta	E	2031-04-04T22:30:13.491		22.79	-38.82	47176.12	16.17		
gamma	E	2031-04-04T22:30:41.521		22.69	-38.90	47630.32	16.23		
delta	E	2031-04-04T22:31:22.686		22.55	-39.02	48300.35	16.32		
lambda	E	2031-04-04T22:33:07.815		22.17	-39.34	50026.71	16.52		
epsilon	E	2031-04-04T22:34:25.576		21.90	-39.57	51316.78	16.59		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-04-04T21:53:26.440  
 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 : 3415726158377405568  
 2Mass ID (if available) : 05121789+2305200  
 ICRS Star Coord at Epoch: 05h 12m 17.89312s +23:05:19.86962s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 13.825  
 G magnitude : 17.254  
 RP magnitude : 16.261  
 BP magnitude : 18.273  
 DUPflag : 0  
 Distance (au) : 19.543  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 19.13  
 Sun-Target sep (deg) : 64.54  
 Sun-Moon sep (deg) : 80.98  
 B (ring opening deg) : 82.05  
 PA of pole (deg) : 5.34  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.328  
 C/A sky separation (km) : 18821.9  
 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	2031-04-04T21:11:44.140		36.06	-5.93	50755.57	-17.37		
lambda	I	2031-04-04T21:12:26.121		35.97	-6.09	50026.71	-17.34		
delta	I	2031-04-04T21:14:05.974		35.76	-6.47	48300.35	-17.24		
gamma	I	2031-04-04T21:14:45.433		35.67	-6.62	47621.13	-17.19		
eta	I	2031-04-04T21:15:11.343		35.62	-6.72	47176.12	-17.16		
beta	I	2031-04-04T21:16:39.008		35.43	-7.06	45676.84	-17.05		
alpha	I	2031-04-04T21:17:33.869		35.30	-7.27	44743.76	-16.98		
4	I	2031-04-04T21:19:39.869		35.02	-7.75	42615.04	-16.79		
5	I	2031-04-04T21:19:59.053		34.98	-7.83	42296.68	-16.74		
6	I	2031-04-04T21:20:26.844		34.92	-7.93	41831.46	-16.70		
Uranus	I	2031-04-04T21:38:39.641		32.34	-12.13	25137.98		6.76	7.08
Uranus	E	2031-04-04T22:08:28.016		27.68	-19.01	25335.94		4.89	5.12
6	E	2031-04-04T22:26:26.359		24.64	-23.15	41806.53	16.78		
5	E	2031-04-04T22:26:47.091		24.58	-23.23	42157.11	16.83		
4	E	2031-04-04T22:27:10.699		24.51	-23.32	42554.13	16.87		
alpha	E	2031-04-04T22:29:18.293		24.14	-23.81	44719.76	17.07		
beta	E	2031-04-04T22:30:12.182		23.98	-24.02	45641.40	17.14		
eta	E	2031-04-04T22:31:41.385		23.72	-24.36	47176.12	17.26		
gamma	E	2031-04-04T22:32:07.699		23.64	-24.46	47630.76	17.29		
delta	E	2031-04-04T22:32:46.364		23.53	-24.61	48300.35	17.34		
lambda	E	2031-04-04T22:34:25.600		23.24	-24.99	50026.71	17.45		
epsilon	E	2031-04-04T22:35:42.016		23.01	-25.28	51363.26	17.48		