

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-02-06T23:02:04.970
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427676097423557888
 2Mass ID (if available) : 05484831+2337525

ICRS Star Coord at Epoch: 05h 48m 48.33512s +23:37:52.10907s

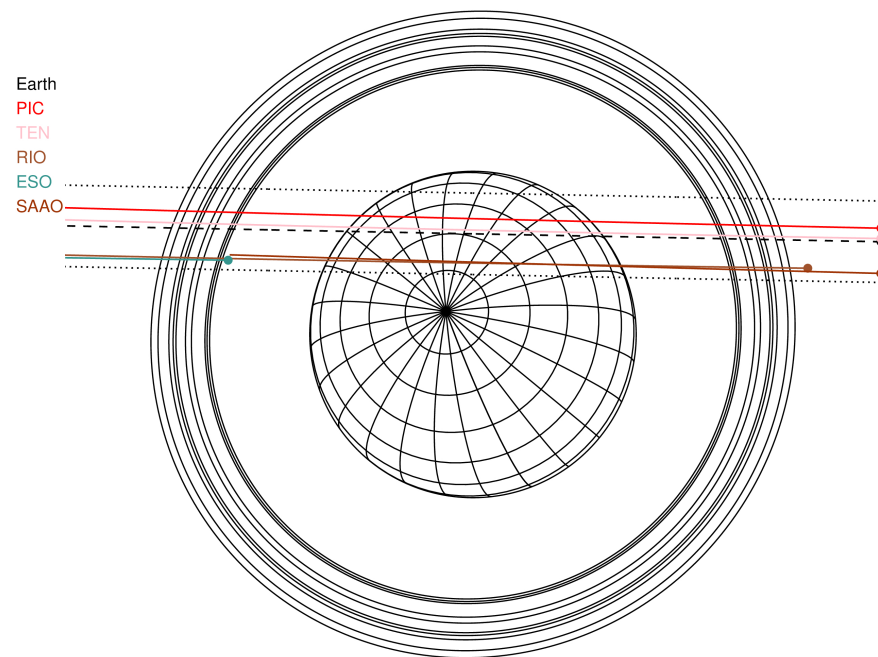
RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.574
 G magnitude : 14.789
 RP magnitude : 14.079
 BP magnitude : 15.351
 DUPflag : 0
 Distance (au) : 18.369
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.55
 Sun-Target sep (deg) : 129.42
 Sun-Moon sep (deg) : 34.59
 B (ring opening deg) : 77.42
 PA of pole (deg) : 49.56

#	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



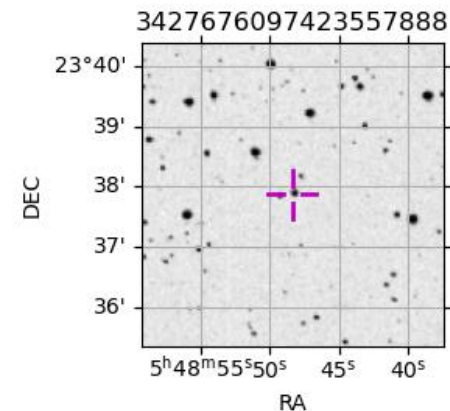
2033-02-06T23:02:04.9700 ra: 05 48 48.3351 s: +23 37 52.109 C/A 1.190° PA 178.89 deg v_sky -12.55 km/s D 18.37 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-02-06T23:02:04 K12.57 G14.79 PgtRgt

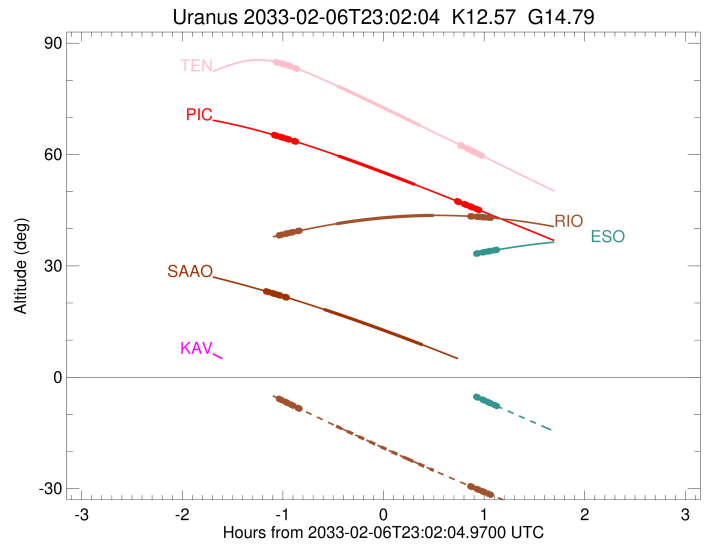
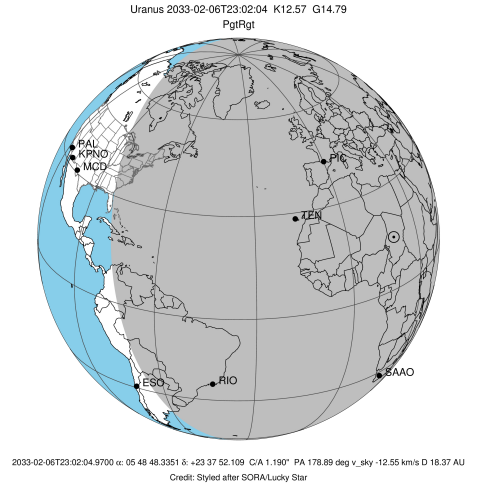


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	FEB 06 21:57 - FEB 06 23:59	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	+++++	+ +	+++++	FEB 06 21:58 - FEB 07 00:01	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	+++++	+ +	+++++	FEB 06 22:00 - FEB 07 00:06	PieRie
ESO	European Southern Obs	-29.3	289.3			+++++	FEB 06 23:57 - FEB 07 00:10	PnnRne
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +		FEB 06 21:52 - FEB 06 23:25	PieRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



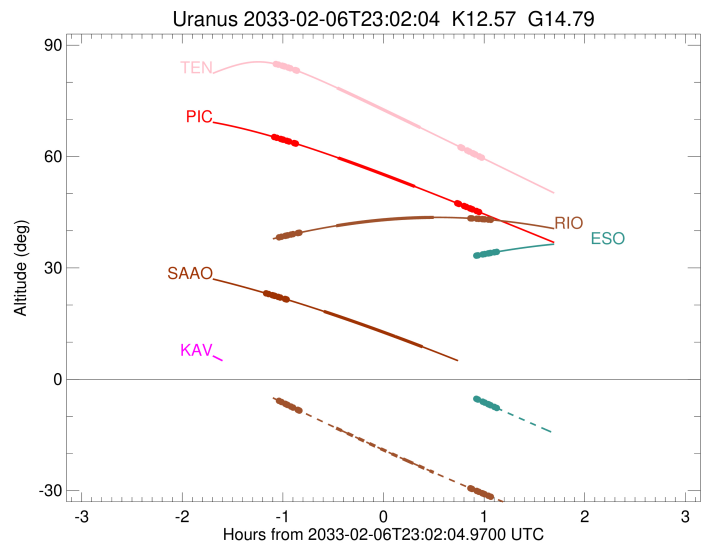
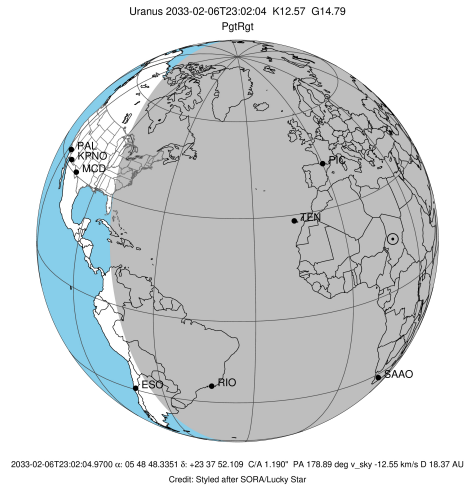
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-02-06T22:58:22.980
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3427676097423557888
 2Mass ID (if available) : 05484831+2337525
 ICRS Star Coord at Epoch: 05h 48m 48.33512s +23:37:52.10907s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.574
 G magnitude : 14.789
 RP magnitude : 14.079
 BP magnitude : 15.351
 DUPflag : 0
 Distance (au) : 18.369
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.55
 Sun-Target sep (deg) : 129.42
 Sun-Moon sep (deg) : 35.41
 B (ring opening deg) : 77.42
 PA of pole (deg) : 49.56
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.361
 C/A sky separation (km) : 18136.0
 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



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

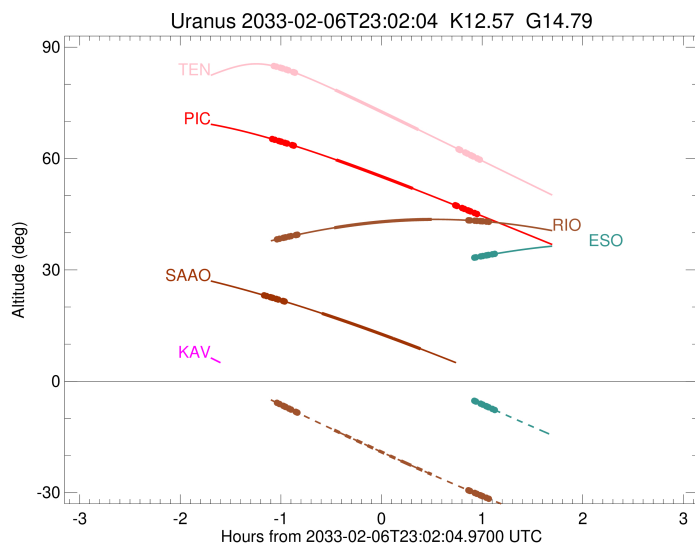
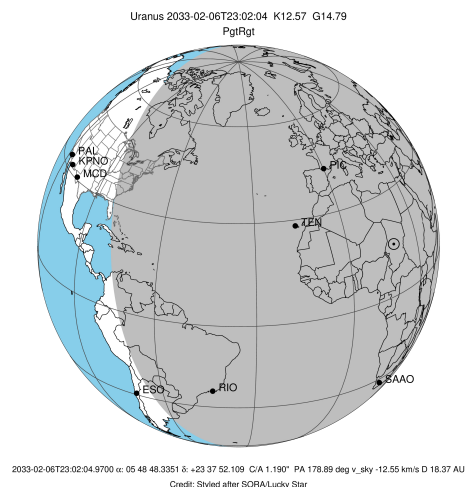
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-06T21:57:21.135		65.20	-50.01	50827.71	-12.23		
lambda	I	2033-02-06T21:58:26.829		65.05	-50.17	50026.71	-12.18		
delta	I	2033-02-06T22:00:49.002		64.74	-50.54	48300.35	-12.11		
gamma	I	2033-02-06T22:01:44.595		64.61	-50.68	47628.12	-12.08		
eta	I	2033-02-06T22:02:22.054		64.52	-50.77	47176.12	-12.06		
beta	I	2033-02-06T22:04:28.406		64.24	-51.09	45657.80	-11.98		
alpha	I	2033-02-06T22:05:48.368		64.05	-51.29	44700.46	-11.93		
4	I	2033-02-06T22:08:46.096		63.63	-51.73	42590.55	-11.81		
5	I	2033-02-06T22:09:22.972		63.54	-51.82	42156.46	-11.78		
6	I	2033-02-06T22:09:49.320		63.48	-51.88	41849.54	-11.75		
Uranus	I	2033-02-06T22:35:02.458		59.65	-55.39	25553.20		-1.25	-1.31
Uranus	E	2033-02-06T23:20:45.567		51.93	-60.30	25010.33		12.47	13.04
6	E	2033-02-06T23:45:56.729		47.43	-61.90	41797.53	11.66		
5	E	2033-02-06T23:46:39.770		47.30	-61.93	42296.33	11.68		
4	E	2033-02-06T23:47:05.934		47.23	-61.95	42591.06	11.71		
alpha	E	2033-02-06T23:50:09.120		46.67	-62.08	44751.99	11.83		
beta	E	2033-02-06T23:51:27.254		46.44	-62.12	45678.01	11.87		
eta	E	2033-02-06T23:53:33.095		46.06	-62.20	47176.12	11.94		
gamma	E	2033-02-06T23:54:10.949		45.94	-62.22	47628.51	11.96		
delta	E	2033-02-06T23:55:07.055		45.77	-62.25	48300.35	11.99		
lambda	E	2033-02-06T23:57:30.664		45.34	-62.31	50026.71	12.05		
epsilon	E	2033-02-06T23:59:37.110		44.96	-62.37	51554.12	12.10		

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2033-02-06T22:59:40.440
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 : 3427676097423557888
2Mass ID (if available) : 05484831+2337525
ICRS Star Coord at Epoch: 05h 48m 48.33512s +23:37:52.10907s
RUWE (>1.4 is poor) : 0.97
K magnitude : 12.574
G magnitude : 14.789
RP magnitude : 14.079
BP magnitude : 15.351
DUPflag : 0
Distance (au) : 18.369
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -12.55
Sun-Target sep (deg) : 129.42
Sun-Moon sep (deg) : 35.35
B (ring opening deg) : 77.42
PA of pole (deg) : 49.56
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.227
C/A sky separation (km) : 16347.5
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_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk



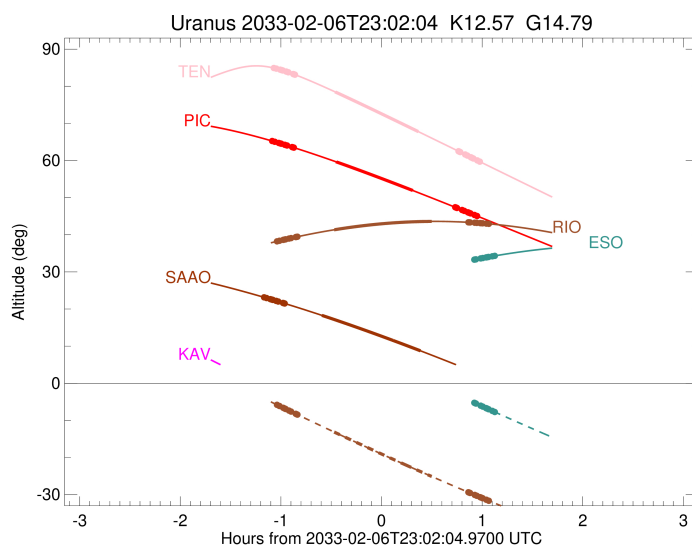
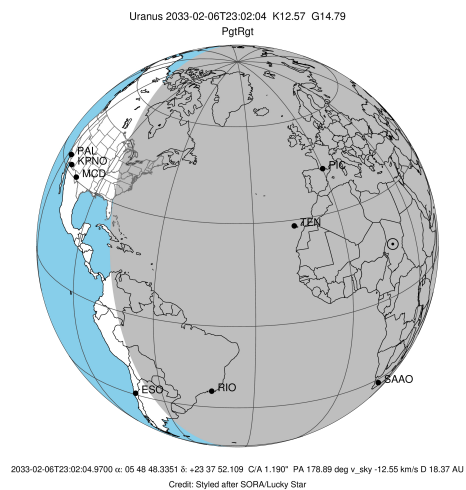
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-06T21:58:20.219		84.88	-41.78	50819.26	-12.48		
lambda	I	2033-02-06T21:59:23.888		84.76	-42.02	50026.71	-12.44		
delta	I	2033-02-06T22:01:43.021		84.47	-42.52	48300.35	-12.38		
gamma	I	2033-02-06T22:02:37.391		84.35	-42.72	47627.93	-12.36		
eta	I	2033-02-06T22:03:13.983		84.26	-42.86	47176.12	-12.34		
beta	I	2033-02-06T22:05:17.424		83.97	-43.31	45657.00	-12.28		
alpha	I	2033-02-06T22:06:35.438		83.77	-43.59	44699.29	-12.24		
4	I	2033-02-06T22:09:28.535		83.30	-44.23	42588.73	-12.14		
5	I	2033-02-06T22:10:04.320		83.20	-44.36	42155.82	-12.12		
6	I	2033-02-06T22:10:29.744		83.13	-44.45	41851.36	-12.10		
Uranus	I	2033-02-06T22:34:26.433		78.49	-49.68	25537.92		-2.39	-2.50
Uranus	E	2033-02-06T23:24:02.499		67.79	-60.26	25001.62		12.58	13.15
6	E	2033-02-06T23:47:55.545		62.52	-65.11	41798.33	12.02		
5	E	2033-02-06T23:48:37.440		62.37	-65.25	42298.78	12.04		
4	E	2033-02-06T23:49:02.417		62.28	-65.33	42589.07	12.07		
alpha	E	2033-02-06T23:52:00.538		61.62	-65.91	44751.71	12.16		
beta	E	2033-02-06T23:53:16.530		61.34	-66.16	45677.51	12.20		
eta	E	2033-02-06T23:55:19.140		60.89	-66.55	47176.12	12.25		
gamma	E	2033-02-06T23:55:56.022		60.76	-66.67	47628.31	12.27		
delta	E	2033-02-06T23:56:50.751		60.55	-66.85	48300.35	12.29		
lambda	E	2033-02-06T23:59:10.910		60.04	-67.29	50026.71	12.36		
epsilon	E	2033-02-07T00:01:14.518		59.58	-67.69	51555.02	12.38		

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2033-02-06T23:03:15.730
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 : 3427676097423557888
2Mass ID (if available) : 05484831+2337525
ICRS Star Coord at Epoch: 05h 48m 48.33512s +23:37:52.10907s
RUWE (>1.4 is poor) : 0.97
K magnitude : 12.574
G magnitude : 14.789
RP magnitude : 14.079
BP magnitude : 15.351
DUPflag : 0
Distance (au) : 18.369
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -12.55
Sun-Target sep (deg) : 129.42
Sun-Moon sep (deg) : 34.82
B (ring opening deg) : 77.42
PA of pole (deg) : 49.56
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.839
C/A sky separation (km) : 11182.4
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLvl.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.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	2033-02-06T22:00:14.706		38.28	-5.91	50797.30	-12.83		
lambda	I	2033-02-06T22:01:14.825		38.39	-6.13	50026.71	-12.81		
delta	I	2033-02-06T22:03:29.690		38.63	-6.62	48300.35	-12.79		
gamma	I	2033-02-06T22:04:22.335		38.72	-6.81	47627.37	-12.78		
eta	I	2033-02-06T22:04:57.660		38.78	-6.93	47176.12	-12.77		
beta	I	2033-02-06T22:06:56.939		38.98	-7.37	45654.79	-12.75		
alpha	I	2033-02-06T22:08:12.096		39.11	-7.64	44696.16	-12.73		
4	I	2033-02-06T22:10:58.284		39.38	-8.24	42583.43	-12.69		
5	I	2033-02-06T22:11:32.264		39.44	-8.36	42154.87	-12.68		
6	I	2033-02-06T22:11:56.142		39.48	-8.44	41856.30	-12.67		
Uranus	I	2033-02-06T22:33:53.398		41.35	-13.15	25460.85		-5.17	-5.41
Uranus	E	2033-02-06T23:32:00.933		43.60	-25.11	25027.95		12.26	12.82
6	E	2033-02-06T23:53:49.661		43.36	-29.35	41801.04	12.67		
5	E	2033-02-06T23:54:29.759		43.34	-29.48	42304.80	12.67		
4	E	2033-02-06T23:54:52.451		43.33	-29.55	42583.29	12.69		
alpha	E	2033-02-06T23:57:42.672		43.25	-30.09	44750.55	12.73		
beta	E	2033-02-06T23:58:55.272		43.21	-30.31	45675.92	12.75		
eta	E	2033-02-07T00:00:52.894		43.15	-30.68	47176.12	12.77		
gamma	E	2033-02-07T00:01:28.246		43.13	-30.79	47627.71	12.78		
delta	E	2033-02-07T00:02:20.867		43.10	-30.96	48300.35	12.79		
lambda	E	2033-02-07T00:04:35.736		43.01	-31.38	50026.71	12.81		
epsilon	E	2033-02-07T00:06:34.864		42.93	-31.75	51554.17	12.83		

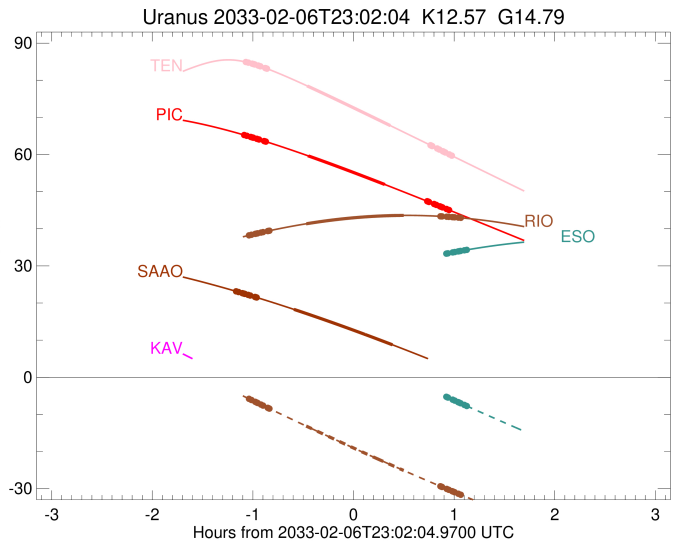
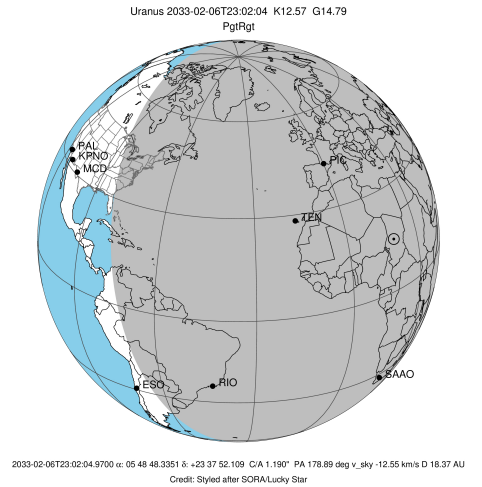
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-02-06T23:06:28.490
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 3427676097423557888
 2Mass ID (if available) : 05484831+2337525
 ICRS Star Coord at Epoch: 05h 48m 48.33512s +23:37:52.10907s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.574
 G magnitude : 14.789
 RP magnitude : 14.079
 BP magnitude : 15.351
 DUPflag : 0
 Distance (au) : 18.369
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.55
 Sun-Target sep (deg) : 129.42
 Sun-Moon sep (deg) : 34.39
 B (ring opening deg) : 77.42
 PA of pole (deg) : 49.56
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.836
 C/A sky separation (km) : 11132.3
 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_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	2033-02-06T22:02:52.276		18.40	18.99x	50798.05	-12.70		
lambda	I	2033-02-06T22:03:53.086		18.57	18.77x	50026.71	-12.68		
delta	I	2033-02-06T22:06:09.354		18.93	18.28x	48300.35	-12.66		
gamma	I	2033-02-06T22:07:02.541		19.08	18.09x	47627.39	-12.65		
eta	I	2033-02-06T22:07:38.229		19.17	17.96x	47176.12	-12.64		
beta	I	2033-02-06T22:09:38.718		19.49	17.52x	45654.86	-12.62		
alpha	I	2033-02-06T22:10:54.633		19.70	17.25x	44696.26	-12.60		
4	I	2033-02-06T22:13:42.473		20.14	16.65x	42583.58	-12.56		
5	I	2033-02-06T22:14:16.796		20.23	16.52x	42154.88	-12.55		
6	I	2033-02-06T22:14:40.920		20.29	16.44x	41856.17	-12.54		
Uranus	I	2033-02-06T22:36:50.000		23.66	11.67x	25462.07		-5.14	-5.38
Uranus	E	2033-02-06T23:35:26.676		31.15	-0.73x	25029.79		12.24	12.80
6	E	2033-02-06T23:57:21.036		33.30	-5.24	41801.19	12.62		
5	E	2033-02-06T23:58:01.299		33.36	-5.38	42305.06	12.63		
4	E	2033-02-06T23:58:24.027		33.39	-5.46	42583.01	12.64		
alpha	E	2033-02-07T00:01:14.902		33.64	-6.04	44750.47	12.68		
beta	E	2033-02-07T00:02:27.762		33.74	-6.29	45675.84	12.70		
eta	E	2033-02-07T00:04:25.807		33.90	-6.69	47176.12	12.73		
gamma	E	2033-02-07T00:05:01.279		33.95	-6.81	47627.67	12.73		
delta	E	2033-02-07T00:05:54.082		34.02	-6.99	48300.35	12.74		
lambda	E	2033-02-07T00:08:09.401		34.20	-7.44	50026.71	12.77		
epsilon	E	2033-02-07T00:10:08.896		34.36	-7.85	51553.96	12.79		

```

target          : Uranus
target radius (km) : 25559.00
C/A epoch       : 2033-02-06T22:56:11.740
Event type      : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code   : SAAO
Location        : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg)  : -32.37953
E. Longitude (deg) : 20.81070
Altitude (km)   : 1.768
Gaia source ID  : 3427676097423557888
2Mass ID (if available) : 05484831+2337525
ICRS Star Coord at Epoch: 05h 48m 48.33512s +23:37:52.10907s
RUWE (>1.4 is poor) : 0.97
K magnitude     : 12.574
G magnitude     : 14.789
RP magnitude    : 14.079
BP magnitude    : 15.351
DUPflag        : 0
Distance (au)   : 18.369
f0 (km)         : 0.000
g0 (km)         : 0.000
skyplane vel. (km/s) : -12.55
Sun-Target sep (deg) : 129.42
Sun-Moon sep (deg) : 35.22
B (ring opening deg) : 77.42
PA of pole (deg) : 49.56
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.850
C/A sky separation (km) : 11328.9
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	2033-02-06T21:52:33.546		23.09	-40.49	50795.41	-12.75		
lambda	I	2033-02-06T21:53:33.926		22.96	-40.56	50026.71	-12.72		
delta	I	2033-02-06T21:55:49.745		22.66	-40.71	48300.35	-12.70		
gamma	I	2033-02-06T21:56:42.780		22.54	-40.76	47627.32	-12.68		
eta	I	2033-02-06T21:57:18.365		22.46	-40.80	47176.12	-12.68		
beta	I	2033-02-06T21:59:18.574		22.19	-40.92	45654.62	-12.65		
alpha	I	2033-02-06T22:00:34.334		22.01	-41.00	44695.94	-12.63		
4	I	2033-02-06T22:03:21.913		21.63	-41.16	42583.05	-12.58		
5	I	2033-02-06T22:03:56.164		21.55	-41.19	42154.85	-12.57		
6	I	2033-02-06T22:04:20.226		21.50	-41.21	41856.63	-12.56		
Uranus	I	2033-02-06T22:26:32.073		18.29	-42.15	25458.30	-12.52	-5.24	-5.48
Uranus	E	2033-02-06T23:25:20.195		8.74	-41.80	25023.80	-12.52	12.31	12.87
6	E	2033-02-06T23:47:37.405	x	4.80x	-40.61	41800.72	12.39		
5	E	2033-02-06T23:48:18.377	x	4.68x	-40.57	42304.21	12.40		
4	E	2033-02-06T23:48:41.692	x	4.61x	-40.54	42583.93	12.41		
alpha	E	2033-02-06T23:51:35.712	x	4.08x	-40.34	44750.70	12.45		
beta	E	2033-02-06T23:52:49.971	x	3.86x	-40.26	45676.12	12.46		
eta	E	2033-02-06T23:54:50.271	x	3.49x	-40.11	47176.12	12.48		
gamma	E	2033-02-06T23:55:26.443	x	3.39x	-40.07	47627.78	12.49		
delta	E	2033-02-06T23:56:20.272	x	3.22x	-40.00	48300.35	12.50		
lambda	E	2033-02-06T23:58:38.275	x	2.80x	-39.82	50026.71	12.52		
epsilon	E	2033-02-07T00:00:40.224	x	2.43x	-39.67	51554.55	12.54		