

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-14T22:31:36.660
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377567572974261376
 2Mass ID (if available) : 06222223+2336092

Uranus 2033-11-14T22:31:36 K13.05 G15.76 PgtRgt

ICRS Star Coord at Epoch: 06h 22m 22.23902s +23:36:09.17985s

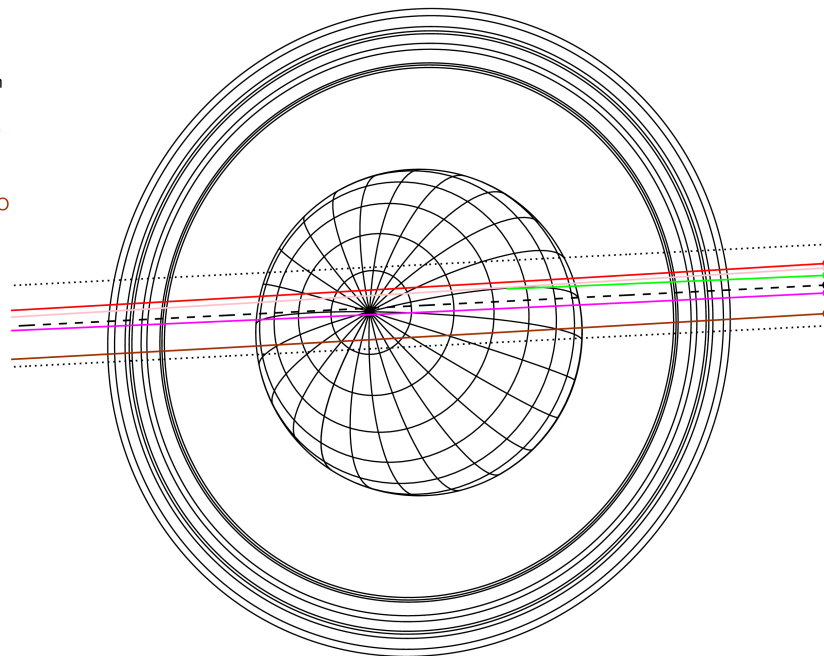
RUWE (>1.4 is poor) : 1.10
 K magnitude : 13.052
 G magnitude : 15.757
 RP magnitude : 14.888
 BP magnitude : 16.514
 DUPflag : 0
 Distance (au) : 18.222
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.49
 Sun-Target sep (deg) : 137.27
 Sun-Moon sep (deg) : 59.70
 B (ring opening deg) : 70.83
 PA of pole (deg) : 67.23

Uranus 2033-11-14T22:31:36 K13.05 G15.76
 PgtRgt



2033-11-14T22:31:36.6600 α: 06 22 22.2390 α: +23 36 09.180 C/A 0.327'' PA 182.89 deg v_sky -15.49 km/s D 18.22 AU
 Credit: Styled after SORA/Lucky Star

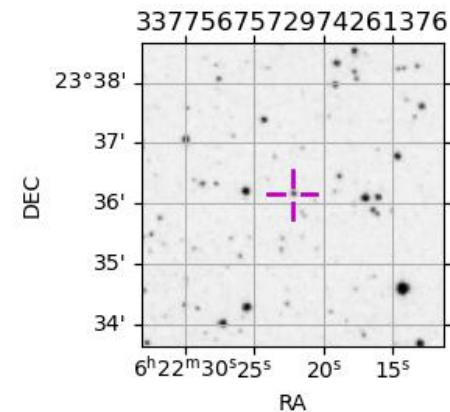
Earth
 PIC
 PMO
 TEN
 KAV
 SAAO



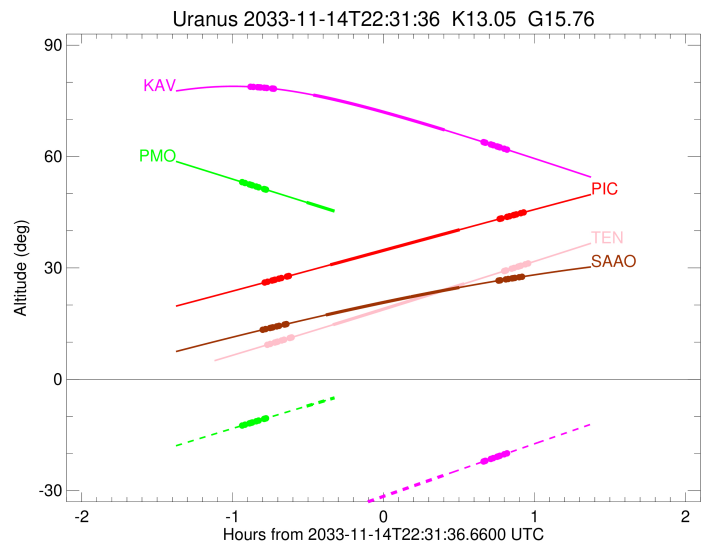
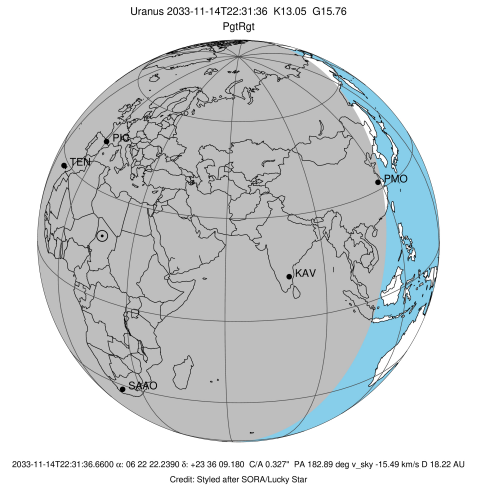
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++	+ +	+++++	NOV 14 21:44 - NOV 14 23:27	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+		NOV 14 21:35 - NOV 14 22:01	PinRin
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	+++++	+ +	+++++	NOV 14 21:45 - NOV 14 23:29	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	NOV 14 21:39 - NOV 14 23:21	PieRie
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	+++++	+ +	+++++	NOV 14 21:44 - NOV 14 23:27	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

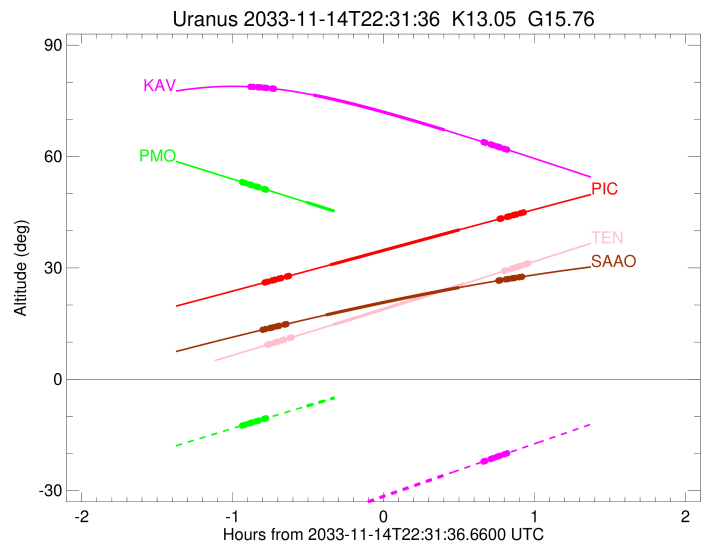
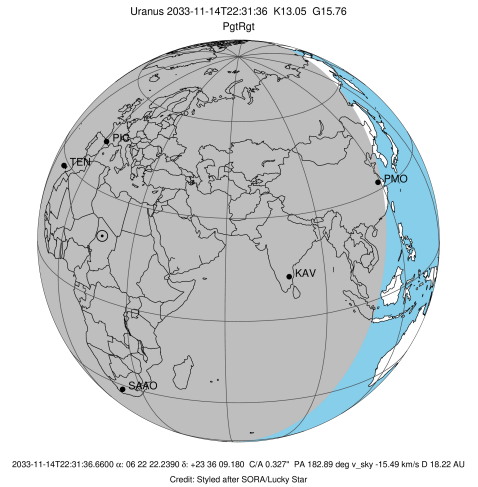


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-14T22:36:18.430
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3377567572974261376
 2Mass ID (if available) : 06222223+2336092
 ICRS Star Coord at Epoch: 06h 22m 22.23902s +23:36:09.17985s
 RUWE (>1.4 is poor) : 1.10
 K magnitude : 13.052
 G magnitude : 15.757
 RP magnitude : 14.888
 BP magnitude : 16.514
 DUPflag : 0
 Distance (au) : 18.222
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.49
 Sun-Target sep (deg) : 137.27
 Sun-Moon sep (deg) : 60.48
 B (ring opening deg) : 70.83
 PA of pole (deg) : 67.23
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.535
 C/A sky separation (km) : 7071.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.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



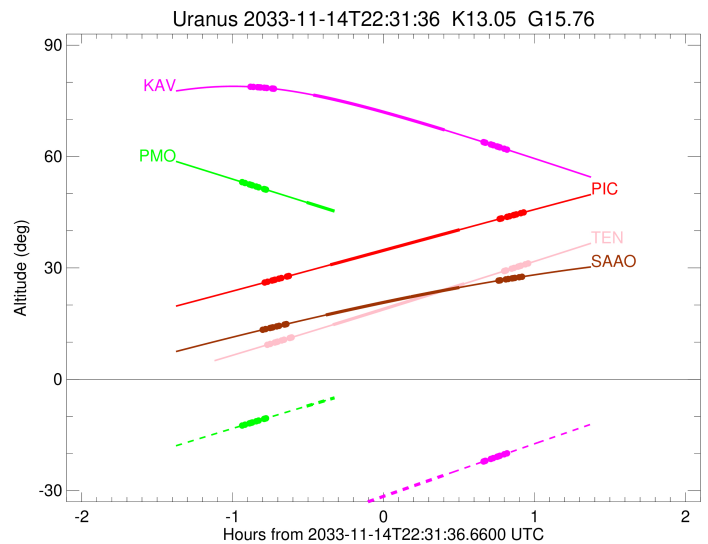
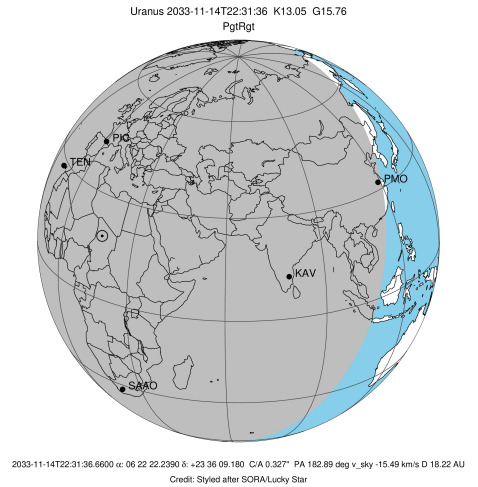
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-11-14T21:44:48.036		26.14	-55.05	50744.06	-16.14		
lambda	I	2033-11-14T21:45:32.477		26.27	-55.16	50026.71	-16.14		
delta	I	2033-11-14T21:47:19.471		26.60	-55.43	48300.35	-16.13		
gamma	I	2033-11-14T21:48:01.537		26.73	-55.53	47621.88	-16.13		
eta	I	2033-11-14T21:48:29.182		26.81	-55.60	47176.12	-16.12		
beta	I	2033-11-14T21:50:02.098		27.09	-55.83	45677.30	-16.11		
alpha	I	2033-11-14T21:51:00.072		27.27	-55.97	44747.91	-16.11		
4	I	2033-11-14T21:53:14.795		27.68	-56.30	42571.76	-16.09		
5	I	2033-11-14T21:53:39.865		27.76	-56.36	42168.32	-16.08		
6	I	2033-11-14T21:53:58.042		27.81	-56.41	41879.71	-16.08		
Uranus	I	2033-11-14T22:10:26.621		30.83	-58.71	25269.65		-14.05	-14.68
Uranus	E	2033-11-14T23:01:51.738		40.28	-64.16	25051.08		18.89	19.71
6	E	2033-11-14T23:17:43.508		43.19	-65.12	41796.75	16.22		
5	E	2033-11-14T23:18:13.772		43.28	-65.15	42282.67	16.22		
4	E	2033-11-14T23:18:32.834		43.34	-65.16	42585.83	16.23		
alpha	E	2033-11-14T23:20:42.133		43.74	-65.26	44696.04	16.25		
beta	E	2033-11-14T23:21:40.654		43.91	-65.30	45642.07	16.26		
eta	E	2033-11-14T23:23:14.871		44.20	-65.36	47176.12	16.28		
gamma	E	2033-11-14T23:23:42.725		44.28	-65.37	47629.55	16.28		
delta	E	2033-11-14T23:24:23.918		44.41	-65.40	48300.35	16.29		
lambda	E	2033-11-14T23:26:09.860		44.73	-65.46	50026.71	16.30		
epsilon	E	2033-11-14T23:27:42.915		45.01	-65.51	51544.35	16.31		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-14T22:26:57.900
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3377567572974261376
 2Mass ID (if available) : 06222223+2336092
 ICRS Star Coord at Epoch: 06h 22m 22.23902s +23:36:09.17985s
 RUWE (>1.4 is poor) : 1.10
 K magnitude : 13.052
 G magnitude : 15.757
 RP magnitude : 14.888
 BP magnitude : 16.514
 DUPflag : 0
 Distance (au) : 18.222
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.49
 Sun-Target sep (deg) : 137.27
 Sun-Moon sep (deg) : 59.92
 B (ring opening deg) : 70.83
 PA of pole (deg) : 67.23
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.472
 C/A sky separation (km) : 6240.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl1.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



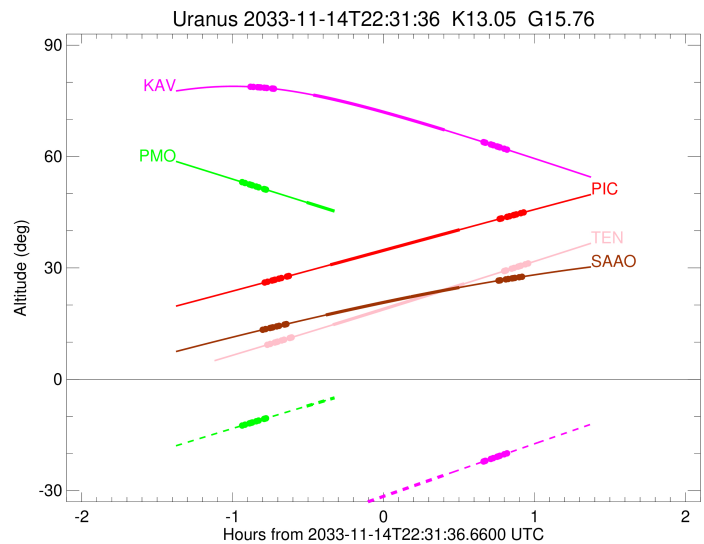
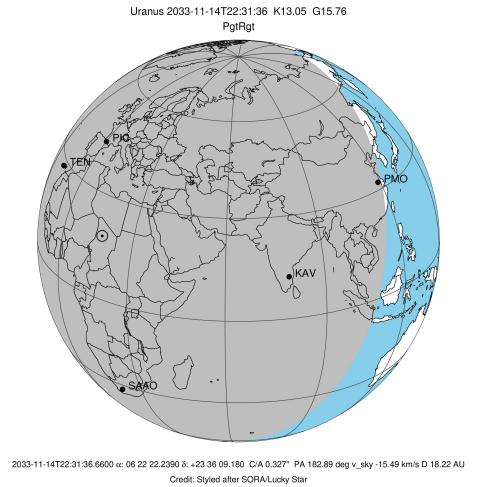
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-11-14T21:35:50.878		53.02	-12.38	50743.60	-16.40		
lambda	I	2033-11-14T21:36:34.608		52.86	-12.23	50026.71	-16.39		
delta	I	2033-11-14T21:38:19.968		52.49	-11.87	48300.35	-16.38		
gamma	I	2033-11-14T21:39:01.390		52.34	-11.73	47621.99	-16.37		
eta	I	2033-11-14T21:39:28.622		52.24	-11.64	47176.12	-16.37		
beta	I	2033-11-14T21:41:00.110		51.92	-11.32	45677.70	-16.36		
alpha	I	2033-11-14T21:41:57.280		51.72	-11.13	44747.31	-16.35		
4	I	2033-11-14T21:44:10.021		51.25	-10.67	42570.16	-16.33		
5	I	2033-11-14T21:44:34.556		51.16	-10.59	42169.93	-16.32		
6	I	2033-11-14T21:44:52.567		51.09	-10.53	41879.74	-16.33		
Uranus	I	2033-11-14T22:01:02.717		47.65	-7.24	25244.00		-14.68	-15.34
Uranus	E	2033-11-14T22:52:43.587		36.69	3.02x	25054.33		18.82	19.65
6	E	2033-11-14T23:08:31.899		33.35	6.05x	41796.68	16.23		
5	E	2033-11-14T23:09:02.171		33.25	6.15x	42283.00	16.22		
4	E	2033-11-14T23:09:21.186		33.18	6.21x	42585.62	16.23		
alpha	E	2033-11-14T23:11:30.496		32.73	6.62x	44695.94	16.25		
beta	E	2033-11-14T23:12:29.054		32.52	6.81x	45642.09	16.25		
eta	E	2033-11-14T23:14:03.351		32.19	7.10x	47176.12	16.26		
gamma	E	2033-11-14T23:14:31.238		32.10	7.19x	47629.56	16.26		
delta	E	2033-11-14T23:15:12.485		31.95	7.32x	48300.35	16.26		
lambda	E	2033-11-14T23:16:58.603		31.58	7.65x	50026.71	16.27		
epsilon	E	2033-11-14T23:18:31.862		31.26	7.95x	51544.47	16.27		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-14T22:37:44.400
 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 : 3377567572974261376
 2Mass ID (if available) : 06222223+2336092
 ICRS Star Coord at Epoch: 06h 22m 22.23902s +23:36:09.17985s
 RUWE (>1.4 is poor) : 1.10
 K magnitude : 13.052
 G magnitude : 15.757
 RP magnitude : 14.888
 BP magnitude : 16.514
 DUPflag : 0
 Distance (au) : 18.222
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.49
 Sun-Target sep (deg) : 137.27
 Sun-Moon sep (deg) : 60.37
 B (ring opening deg) : 70.83
 PA of pole (deg) : 67.23
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.470
 C/A sky separation (km) : 6217.8
 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	2033-11-14T21:45:51.675		9.37	-46.79	50743.80	-16.08		
lambda	I	2033-11-14T21:46:36.279		9.52	-46.95	50026.71	-16.08		
delta	I	2033-11-14T21:48:23.687		9.89	-47.35	48300.35	-16.07		
gamma	I	2033-11-14T21:49:05.908		10.04	-47.50	47621.93	-16.07		
eta	I	2033-11-14T21:49:33.656		10.13	-47.60	47176.12	-16.07		
beta	I	2033-11-14T21:51:06.886		10.45	-47.94	45677.49	-16.06		
alpha	I	2033-11-14T21:52:05.087		10.65	-48.16	44747.62	-16.06		
4	I	2033-11-14T21:54:20.244		11.12	-48.65	42570.95	-16.04		
5	I	2033-11-14T21:54:45.301		11.20	-48.75	42169.13	-16.03		
6	I	2033-11-14T21:55:03.583		11.27	-48.81	41879.74	-16.04		
Uranus	I	2033-11-14T22:11:30.621		14.68	-52.43	25253.10		-14.46	-15.11
Uranus	E	2033-11-14T23:03:40.024		25.73	-63.72	25058.21		18.74	19.57
6	E	2033-11-14T23:19:31.080		29.13	-67.05	41796.46	16.21		
5	E	2033-11-14T23:20:01.461		29.24	-67.16	42284.17	16.21		
4	E	2033-11-14T23:20:20.346		29.31	-67.22	42584.83	16.22		
alpha	E	2033-11-14T23:22:29.744		29.78	-67.67	44695.48	16.24		
beta	E	2033-11-14T23:23:28.346		29.99	-67.87	45642.21	16.25		
eta	E	2033-11-14T23:25:02.625		30.33	-68.19	47176.12	16.26		
gamma	E	2033-11-14T23:25:30.508		30.43	-68.29	47629.64	16.27		
delta	E	2033-11-14T23:26:11.732		30.57	-68.43	48300.35	16.27		
lambda	E	2033-11-14T23:27:57.778		30.96	-68.79	50026.71	16.29		
epsilon	E	2033-11-14T23:29:31.042		31.29	-69.10	51546.13	16.29		

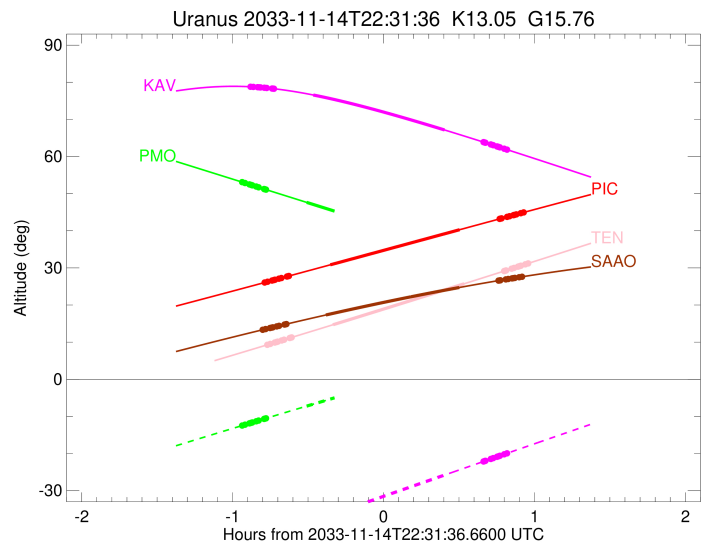
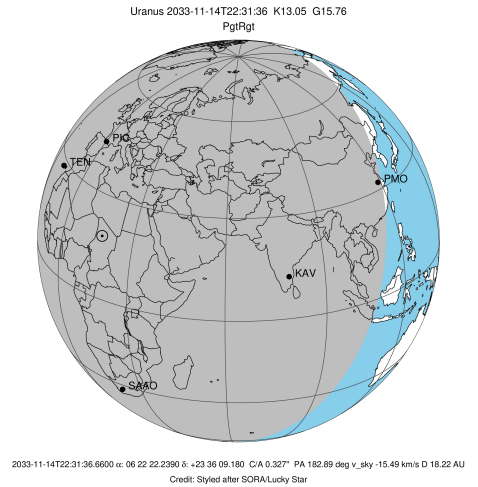
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-14T22:29:51.070
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3377567572974261376
 2Mass ID (if available) : 06222223+2336092
 ICRS Star Coord at Epoch: 06h 22m 22.23902s +23:36:09.17985s
 RUWE (>1.4 is poor) : 1.10
 K magnitude : 13.052
 G magnitude : 15.757
 RP magnitude : 14.888
 BP magnitude : 16.514
 DUPflag : 0
 Distance (au) : 18.222
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.49
 Sun-Target sep (deg) : 137.27
 Sun-Moon sep (deg) : 60.34
 B (ring opening deg) : 70.83
 PA of pole (deg) : 67.23
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.238
 C/A sky separation (km) : 3138.8
 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_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	2033-11-14T21:39:09.939		78.78	-43.96	50743.78	-16.66		
lambda	I	2033-11-14T21:39:52.992		78.75	-43.79	50026.71	-16.66		
delta	I	2033-11-14T21:41:36.654		78.67	-43.38	48300.35	-16.65		
gamma	I	2033-11-14T21:42:17.380		78.64	-43.22	47622.19	-16.65		
eta	I	2033-11-14T21:42:44.169		78.62	-43.12	47176.12	-16.65		
beta	I	2033-11-14T21:44:14.054		78.53	-42.76	45678.39	-16.65		
alpha	I	2033-11-14T21:45:10.352		78.47	-42.54	44746.07	-16.65		
4	I	2033-11-14T21:47:20.756		78.32	-42.02	42567.03	-16.64		
5	I	2033-11-14T21:47:44.509		78.29	-41.93	42173.37	-16.64		
6	I	2033-11-14T21:48:02.411		78.27	-41.86	41879.65	-16.64		
Uranus	I	2033-11-14T22:03:42.175		76.58	-38.15	25185.11		-16.06	-16.78
Uranus	E	2033-11-14T22:55:54.452		67.15	-25.80	25086.28		18.18	18.98
6	E	2033-11-14T23:11:19.402		63.89	-22.16	41795.81	16.62		
5	E	2033-11-14T23:11:49.297		63.79	-22.04	42287.89	16.62		
4	E	2033-11-14T23:12:07.276		63.72	-21.97	42582.23	16.62		
alpha	E	2033-11-14T23:14:13.737		63.27	-21.48	44694.12	16.62		
beta	E	2033-11-14T23:15:11.108		63.06	-21.25	45642.60	16.62		
eta	E	2033-11-14T23:16:43.277		62.73	-20.89	47176.12	16.63		
gamma	E	2033-11-14T23:17:10.567		62.63	-20.78	47629.84	16.63		
delta	E	2033-11-14T23:17:50.894		62.48	-20.62	48300.35	16.63		
lambda	E	2033-11-14T23:19:34.718		62.11	-20.22	50026.71	16.63		
epsilon	E	2033-11-14T23:21:06.304		61.78	-19.86	51549.70	16.63		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-11-14T22:35:13.300
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      : 3377567572974261376
2Mass ID (if available) : 06222223+2336092
ICRS Star Coord at Epoch: 06h 22m 22.23902s +23:36:09.17985s
RUWE (>1.4 is poor) : 1.10
K magnitude         : 13.052
G magnitude         : 15.757
RP magnitude        : 14.888
BP magnitude        : 16.514
DUPflag            : 0
Distance (au)       : 18.222
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -15.49
Sun-Target sep (deg) : 137.27
Sun-Moon sep (deg)  : 60.21
B (ring opening deg) : 70.83
PA of pole (deg)   : 67.23
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.053
C/A sky separation (km) : 702.0
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_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	2033-11-14T21:44:00.613		13.40	-38.54	50745.67	-16.45		
lambda	I	2033-11-14T21:44:44.319		13.52	-38.57	50026.71	-16.45		
delta	I	2033-11-14T21:46:29.254		13.81	-38.64	48300.35	-16.45		
gamma	I	2033-11-14T21:47:10.455		13.92	-38.67	47622.44	-16.45		
eta	I	2033-11-14T21:47:37.580		13.99	-38.68	47176.12	-16.45		
beta	I	2033-11-14T21:49:08.476		14.24	-38.74	45679.12	-16.46		
alpha	I	2033-11-14T21:50:05.578		14.39	-38.77	44744.46	-16.46		
4	I	2033-11-14T21:52:17.520		14.74	-38.85	42563.35	-16.46		
5	I	2033-11-14T21:52:41.132		14.81	-38.86	42177.82	-16.46		
6	I	2033-11-14T21:52:59.540		14.86	-38.87	41879.26	-16.46		
Uranus	I	2033-11-14T22:08:40.419		17.31	-39.23	25123.73		-17.40	-18.17
Uranus	E	2033-11-14T23:01:43.922		24.72	-38.39	25145.86		16.92	17.68
6	E	2033-11-14T23:17:16.458		26.57	-37.56	41795.06	16.58		
5	E	2033-11-14T23:17:46.789		26.63	-37.53	42293.74	16.58		
4	E	2033-11-14T23:18:04.064		26.66	-37.51	42577.75	16.58		
alpha	E	2033-11-14T23:20:10.974		26.90	-37.38	44691.97	16.59		
beta	E	2033-11-14T23:21:08.628		27.00	-37.31	45643.41	16.59		
eta	E	2033-11-14T23:22:40.932		27.18	-37.21	47176.12	16.59		
gamma	E	2033-11-14T23:23:08.297		27.23	-37.18	47630.19	16.59		
delta	E	2033-11-14T23:23:48.683		27.30	-37.14	48300.35	16.59		
lambda	E	2033-11-14T23:25:32.708		27.49	-37.02	50026.71	16.60		
epsilon	E	2033-11-14T23:27:04.724		27.65	-36.91	51553.98	16.60		