

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-19T20:55:57.320
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 145349699116323456
 2Mass ID (if available) : 04245271+2132470

ICRS Star Coord at Epoch: 04h 24m 52.73373s +21:32:47.01712s

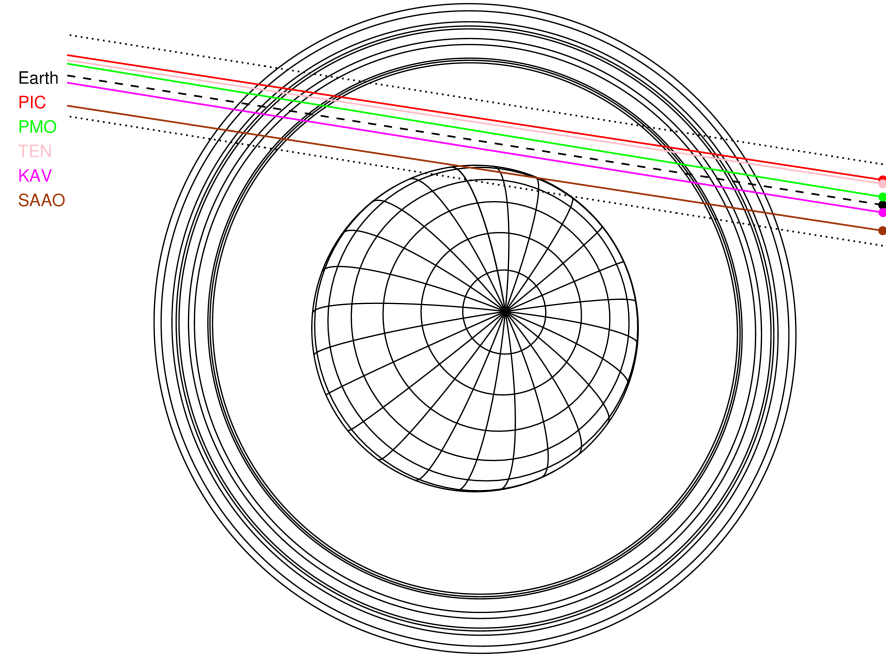
RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.493
 G magnitude : 18.835
 RP magnitude : 17.565
 BP magnitude : 20.411
 DUPflag : 0
 Distance (au) : 18.394
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.90
 Sun-Target sep (deg) : 168.93
 Sun-Moon sep (deg) : 63.71
 B (ring opening deg) : 77.70
 PA of pole (deg) : -60.66

#	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



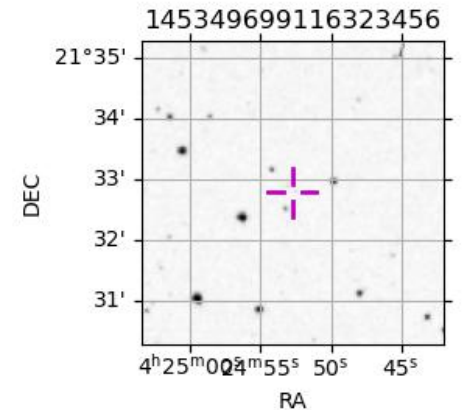
2027-11-19T20:55:57.3200 ra: 04 24 52.7337 s: +21 32 47.017 C/A 2.1877 PA 170.97 deg v_sky -22.90 km/s D 18.39 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2027-11-19T20:55:57 K14.49 G18.84 PtRgt

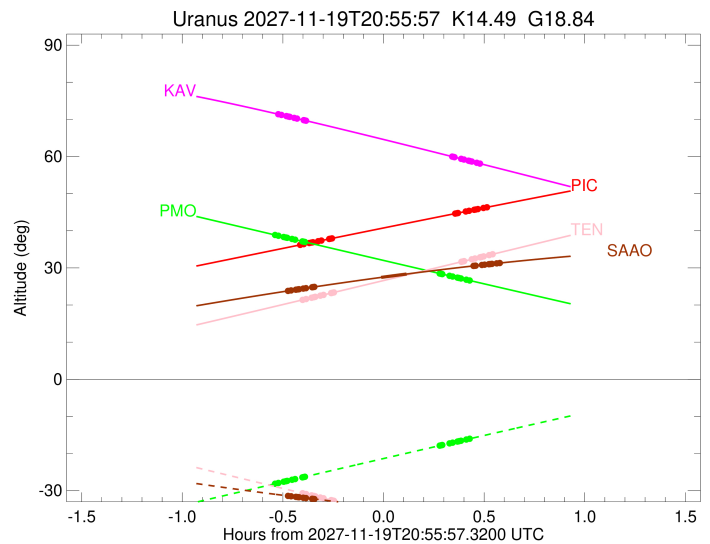
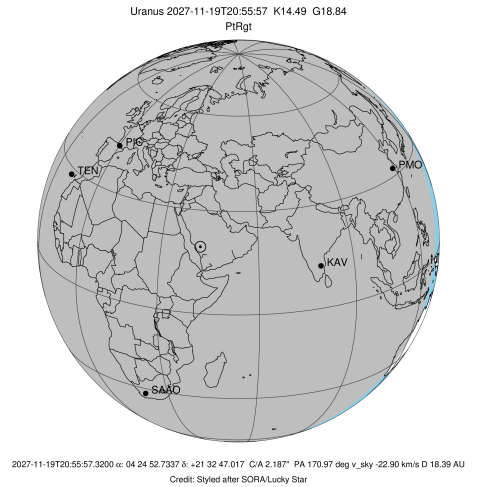


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	NOV 19 20:30 - NOV 19 21:27	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	NOV 19 20:23 - NOV 19 21:21	PnnRie
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 19 20:31 - NOV 19 21:28	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	NOV 19 20:24 - NOV 19 21:24	PnnRie
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 19 20:27 - NOV 19 21:30	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-19T20:58:26.980
 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 : 145349699116323456
 2Mass ID (if available) : 04245271+2132470
 ICRS Star Coord at Epoch: 04h 24m 52.73373s +21:32:47.01712s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.493
 G magnitude : 18.835
 RP magnitude : 17.565
 BP magnitude : 20.411
 DUPflag : 0
 Distance (au) : 18.394
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.90
 Sun-Target sep (deg) : 168.93
 Sun-Moon sep (deg) : 64.51
 B (ring opening deg) : 77.70
 PA of pole (deg) : -60.66
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.447
 C/A sky separation (km) : 32650.1
 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

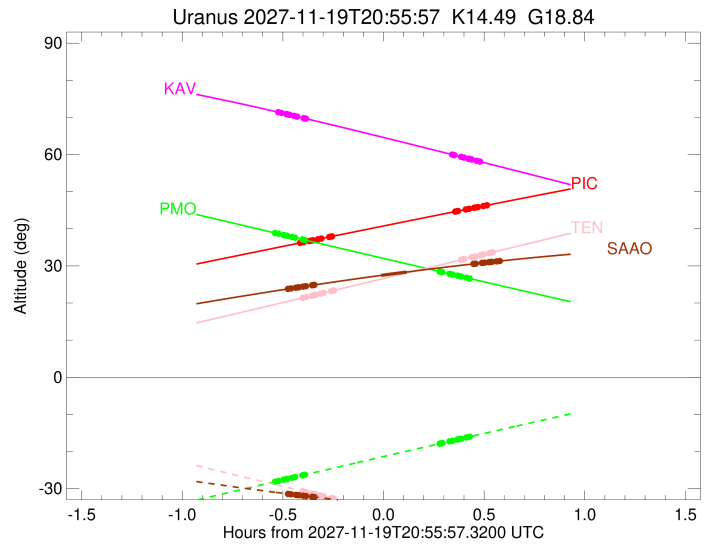
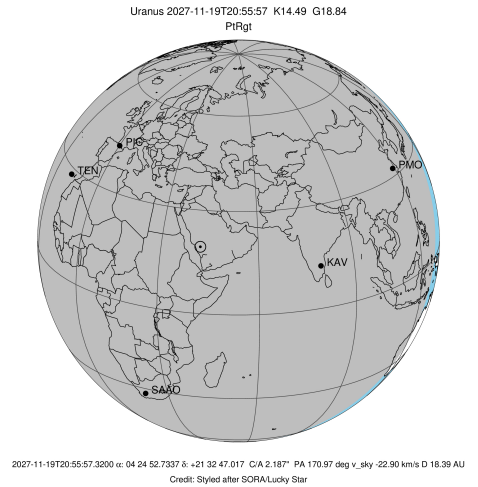


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-19T20:30:51.171		36.15	-43.29	51440.48	-18.04		
lambda	I	2027-11-19T20:32:10.696		36.40	-43.53	50026.71	-17.59		
delta	I	2027-11-19T20:33:50.192		36.70	-43.83	48300.35	-17.10		
gamma	I	2027-11-19T20:34:29.661		36.82	-43.94	47629.64	-16.89		
eta	I	2027-11-19T20:34:56.636		36.91	-44.02	47176.12	-16.74		
beta	I	2027-11-19T20:36:29.839		37.19	-44.30	45641.71	-16.18		
alpha	I	2027-11-19T20:37:28.041		37.37	-44.47	44708.45	-15.80		
4	I	2027-11-19T20:39:49.143		37.80	-44.88	42544.25	-14.81		
5	I	2027-11-19T20:40:10.397		37.87	-44.95	42235.08	-14.66		
6	I	2027-11-19T20:40:35.944		37.94	-45.02	41871.80	-14.45		

No planet occultations

6	E	2027-11-19T21:17:20.555		44.63	-51.33	41869.51	14.48		
5	E	2027-11-19T21:17:51.006		44.73	-51.42	42313.39	14.70		
4	E	2027-11-19T21:18:10.482		44.78	-51.47	42601.54	14.85		
alpha	E	2027-11-19T21:20:26.139		45.19	-51.85	44685.38	15.84		
beta	E	2027-11-19T21:21:27.258		45.37	-52.01	45665.37	16.23		
eta	E	2027-11-19T21:22:58.738		45.65	-52.26	47176.12	16.78		
gamma	E	2027-11-19T21:23:25.189		45.73	-52.34	47622.03	16.93		
delta	E	2027-11-19T21:24:04.995		45.84	-52.45	48300.35	17.15		
lambda	E	2027-11-19T21:25:44.195		46.14	-52.72	50026.71	17.65		
epsilon	E	2027-11-19T21:26:59.668		46.37	-52.92	51372.03	18.10		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-19T20:52:06.630
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 145349699116323456
 2Mass ID (if available) : 04245271+2132470
 ICRS Star Coord at Epoch: 04h 24m 52.73373s +21:32:47.01712s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.493
 G magnitude : 18.835
 RP magnitude : 17.565
 BP magnitude : 20.411
 DUPflag : 0
 Distance (au) : 18.394
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.90
 Sun-Target sep (deg) : 168.93
 Sun-Moon sep (deg) : 63.83
 B (ring opening deg) : 77.70
 PA of pole (deg) : -60.66
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.293
 C/A sky separation (km) : 30595.9
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

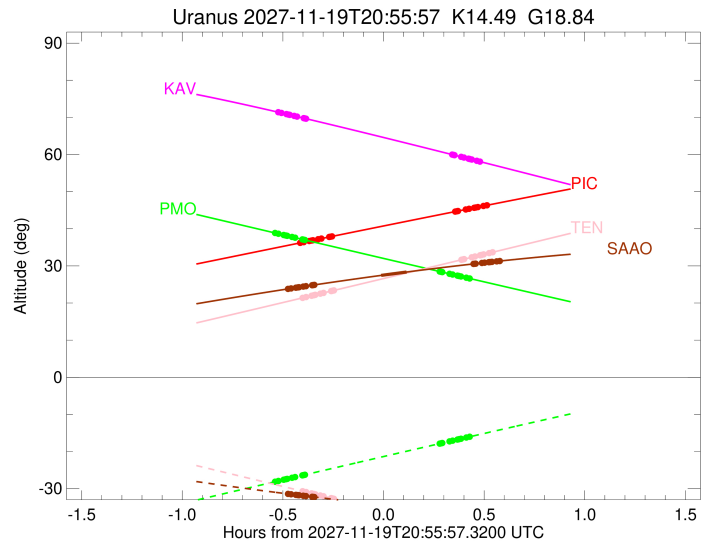
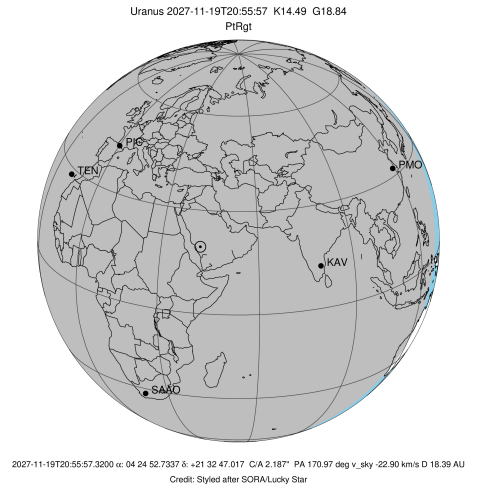


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-19T20:23:23.256		38.92	-28.19	51422.70	-18.84		
lambda	I	2027-11-19T20:24:38.267		38.66	-27.93	50026.71	-18.46		
delta	I	2027-11-19T20:26:12.861		38.32	-27.60	48300.35	-18.04		
gamma	I	2027-11-19T20:26:50.216		38.19	-27.47	47629.91	-17.86		
eta	I	2027-11-19T20:27:15.717		38.10	-27.38	47176.12	-17.73		
beta	I	2027-11-19T20:28:43.400		37.79	-27.07	45641.39	-17.27		
alpha	I	2027-11-19T20:29:37.648		37.60	-26.88	44710.93	-16.95		
4	I	2027-11-19T20:31:48.522		37.13	-26.42	42541.32	-16.14		
5	I	2027-11-19T20:32:08.194		37.06	-26.35	42228.34	-16.02		
6	I	2027-11-19T20:32:31.336		36.98	-26.27	41869.55	-15.84		

No planet occultations

6	E	2027-11-19T21:12:43.438		28.48	-17.87	41867.61	15.81		
5	E	2027-11-19T21:13:11.626		28.38	-17.78	42314.33	15.98		
4	E	2027-11-19T21:13:29.601		28.32	-17.71	42603.61	16.10		
alpha	E	2027-11-19T21:15:35.665		27.88	-17.28	44685.83	16.90		
beta	E	2027-11-19T21:16:33.147		27.68	-17.08	45666.41	17.22		
eta	E	2027-11-19T21:17:59.631		27.38	-16.78	47176.12	17.68		
gamma	E	2027-11-19T21:18:24.761		27.29	-16.69	47621.88	17.80		
delta	E	2027-11-19T21:19:02.688		27.16	-16.56	48300.35	17.98		
lambda	E	2027-11-19T21:20:37.600		26.82	-16.24	50026.71	18.39		
epsilon	E	2027-11-19T21:21:49.408		26.57	-15.99	51357.89	18.78		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-19T20:59:40.520
 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 : 145349699116323456
 2Mass ID (if available) : 04245271+2132470
 ICRS Star Coord at Epoch: 04h 24m 52.73373s +21:32:47.01712s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.493
 G magnitude : 18.835
 RP magnitude : 17.565
 BP magnitude : 20.411
 DUPflag : 0
 Distance (au) : 18.394
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.90
 Sun-Target sep (deg) : 168.93
 Sun-Moon sep (deg) : 64.44
 B (ring opening deg) : 77.70
 PA of pole (deg) : -60.66
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.397
 C/A sky separation (km) : 31978.7
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

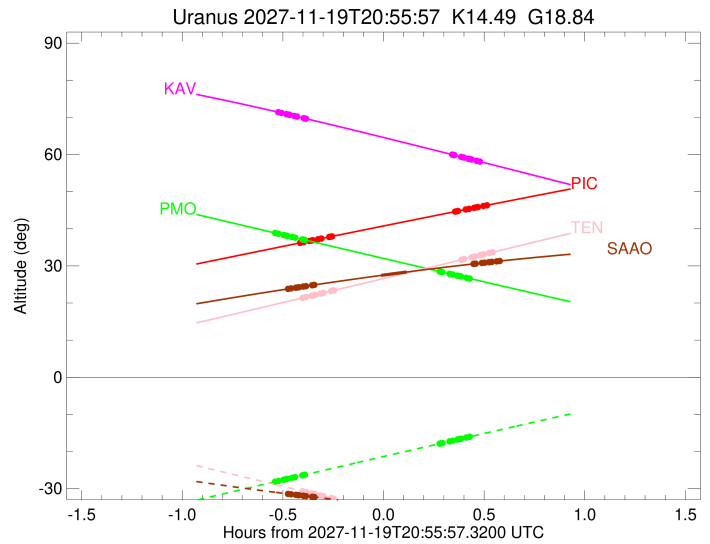
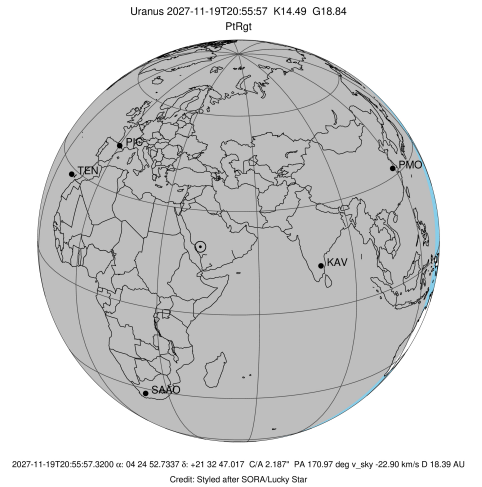


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-19T20:31:35.131		21.33	-30.64	51435.97	-18.22		
lambda	I	2027-11-19T20:32:53.529		21.61	-30.93	50026.71	-17.80		
delta	I	2027-11-19T20:34:31.755		21.97	-31.28	48300.35	-17.34		
gamma	I	2027-11-19T20:35:10.656		22.11	-31.43	47629.71	-17.14		
eta	I	2027-11-19T20:35:37.229		22.20	-31.52	47176.12	-17.00		
beta	I	2027-11-19T20:37:08.880		22.53	-31.86	45641.61	-16.48		
alpha	I	2027-11-19T20:38:05.929		22.73	-32.07	44709.13	-16.12		
4	I	2027-11-19T20:40:23.912		23.23	-32.57	42543.40	-15.20		
5	I	2027-11-19T20:40:44.665		23.30	-32.65	42233.17	-15.07		
6	I	2027-11-19T20:41:09.448		23.39	-32.74	41871.19	-14.87		

No planet occultations

6	E	2027-11-19T21:19:12.403		31.65	-41.10	41868.75	14.91		
5	E	2027-11-19T21:19:42.096		31.75	-41.21	42313.82	15.11		
4	E	2027-11-19T21:20:01.059		31.82	-41.28	42602.41	15.25		
alpha	E	2027-11-19T21:22:13.460		32.31	-41.77	44685.56	16.18		
beta	E	2027-11-19T21:23:13.377		32.52	-41.99	45665.82	16.54		
eta	E	2027-11-19T21:24:43.209		32.85	-42.32	47176.12	17.06		
gamma	E	2027-11-19T21:25:09.228		32.95	-42.41	47621.96	17.21		
delta	E	2027-11-19T21:25:48.426		33.09	-42.56	48300.35	17.41		
lambda	E	2027-11-19T21:27:26.247		33.44	-42.92	50026.71	17.88		
epsilon	E	2027-11-19T21:28:40.447		33.72	-43.19	51365.72	18.31		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-19T20:54:11.490
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 145349699116323456
 2Mass ID (if available) : 04245271+2132470
 ICRS Star Coord at Epoch: 04h 24m 52.73373s +21:32:47.01712s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.493
 G magnitude : 18.835
 RP magnitude : 17.565
 BP magnitude : 20.411
 DUPflag : 0
 Distance (au) : 18.394
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.90
 Sun-Target sep (deg) : 168.93
 Sun-Moon sep (deg) : 64.35
 B (ring opening deg) : 77.70
 PA of pole (deg) : -60.66
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.093
 C/A sky separation (km) : 27926.2
 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

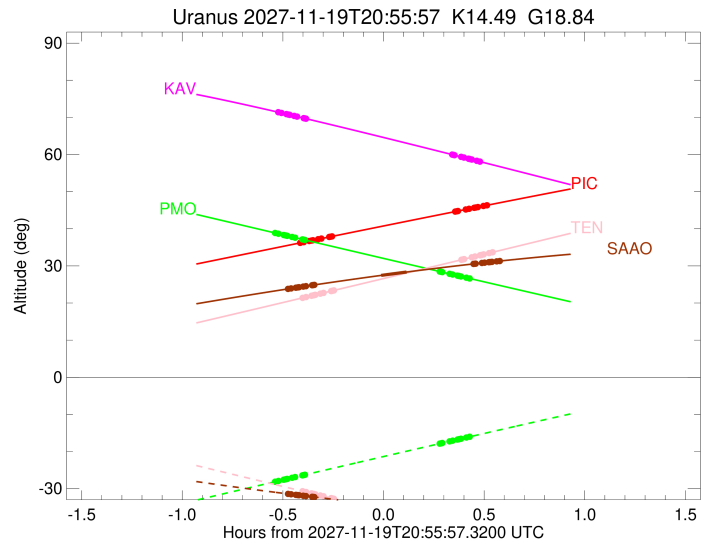
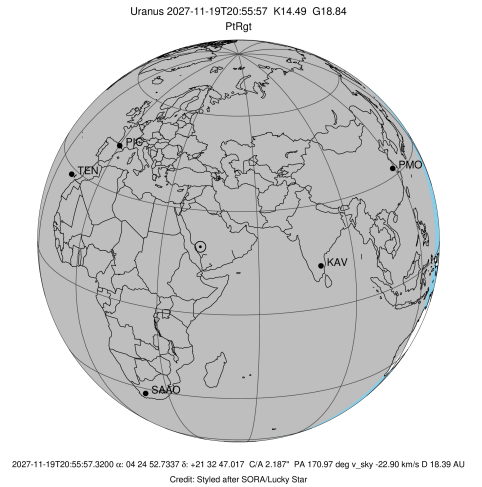


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-19T20:24:22.703		71.45	-61.69	51404.28	-19.88		
lambda	I	2027-11-19T20:25:32.704		71.20	-61.42	50026.71	-19.56		
delta	I	2027-11-19T20:27:01.724		70.89	-61.07	48300.35	-19.22		
gamma	I	2027-11-19T20:27:36.716		70.77	-60.94	47630.16	-19.08		
eta	I	2027-11-19T20:28:00.574		70.68	-60.84	47176.12	-18.98		
beta	I	2027-11-19T20:29:22.213		70.40	-60.53	45641.17	-18.62		
alpha	I	2027-11-19T20:30:12.275		70.22	-60.33	44713.46	-18.36		
4	I	2027-11-19T20:32:12.528		69.79	-59.87	42538.58	-17.74		
5	I	2027-11-19T20:32:30.589		69.73	-59.80	42221.57	-17.65		
6	I	2027-11-19T20:32:51.393		69.66	-59.72	41867.04	-17.51		

No planet occultations

6	E	2027-11-19T21:16:26.470		59.98	-49.51	41864.66	17.49		
5	E	2027-11-19T21:16:52.284		59.89	-49.41	42315.12	17.62		
4	E	2027-11-19T21:17:08.671		59.82	-49.35	42606.39	17.71		
alpha	E	2027-11-19T21:19:03.964		59.39	-48.89	44686.71	18.34		
beta	E	2027-11-19T21:19:57.120		59.18	-48.69	45667.97	18.59		
eta	E	2027-11-19T21:21:17.423		58.88	-48.37	47176.12	18.95		
gamma	E	2027-11-19T21:21:40.870		58.79	-48.28	47621.66	19.05		
delta	E	2027-11-19T21:22:16.361		58.65	-48.14	48300.35	19.19		
lambda	E	2027-11-19T21:23:45.521		58.32	-47.79	50026.71	19.53		
epsilon	E	2027-11-19T21:24:52.066		58.06	-47.53	51333.69	19.84		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-19T20:58:40.850
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 145349699116323456
 2Mass ID (if available) : 04245271+2132470
 ICRS Star Coord at Epoch: 04h 24m 52.73373s +21:32:47.01712s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 14.493
 G magnitude : 18.835
 RP magnitude : 17.565
 BP magnitude : 20.411
 DUPflag : 0
 Distance (au) : 18.394
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.90
 Sun-Target sep (deg) : 168.93
 Sun-Moon sep (deg) : 64.37
 B (ring opening deg) : 77.70
 PA of pole (deg) : -60.66
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.858
 C/A sky separation (km) : 24790.3
 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_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	2027-11-19T20:27:18.541		23.78	-31.40	51382.64	-20.61		
lambda	I	2027-11-19T20:28:24.838		23.93	-31.52	50026.71	-20.36		
delta	I	2027-11-19T20:29:50.124		24.13	-31.68	48300.35	-20.12		
gamma	I	2027-11-19T20:30:23.514		24.21	-31.74	47630.42	-20.01		
eta	I	2027-11-19T20:30:46.257		24.26	-31.78	47176.12	-19.94		
beta	I	2027-11-19T20:32:03.758		24.44	-31.92	45641.06	-19.67		
alpha	I	2027-11-19T20:32:50.906		24.54	-32.01	44716.25	-19.48		
4	I	2027-11-19T20:34:43.913		24.80	-32.21	42535.89	-19.03		
5	I	2027-11-19T20:35:00.917		24.84	-32.24	42214.43	-18.97		
6	I	2027-11-19T20:35:20.089		24.88	-32.27	41864.11	-18.87		
Uranus	I	2027-11-19T20:55:17.123		27.45	-34.22	25237.48		9.23	9.66
Uranus	E	2027-11-19T21:02:50.138		28.35	-34.87	25457.11		5.15	5.39
6	E	2027-11-19T21:22:48.113		30.54	-36.32	41861.14	18.91		
5	E	2027-11-19T21:23:12.300		30.58	-36.35	42315.18	19.01		
4	E	2027-11-19T21:23:27.608		30.60	-36.36	42609.10	19.07		
alpha	E	2027-11-19T21:25:15.213		30.78	-36.47	44687.95	19.53		
beta	E	2027-11-19T21:26:05.257		30.87	-36.52	45669.66	19.72		
eta	E	2027-11-19T21:27:21.098		30.99	-36.60	47176.12	19.99		
gamma	E	2027-11-19T21:27:43.335		31.03	-36.62	47621.45	20.06		
delta	E	2027-11-19T21:28:17.082		31.08	-36.65	48300.35	20.17		
lambda	E	2027-11-19T21:29:42.132		31.22	-36.73	50026.71	20.42		
epsilon	E	2027-11-19T21:30:44.467		31.32	-36.79	51304.98	20.67		