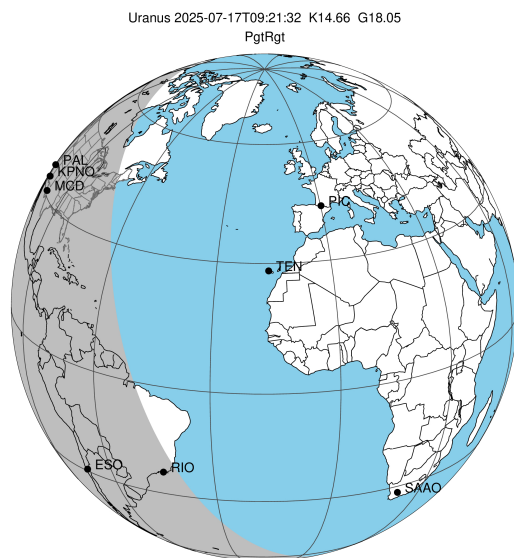


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-07-17T09:21:32.050
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 51128222702163968
 2Mass ID (if available) : 03514472+1957255

ICRS Star Coord at Epoch: 03h 51m 44.72897s +19:57:25.76273s

RUWE (>1.4 is poor) : 1.05
 K magnitude : 14.662
 G magnitude : 18.049
 RP magnitude : 16.995
 BP magnitude : 19.189
 DUPflag : 0
 Distance (au) : 20.090
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.59
 Sun-Target sep (deg) : 54.64
 Sun-Moon sep (deg) : 43.77
 B (ring opening deg) : 70.93
 PA of pole (deg) : -78.57

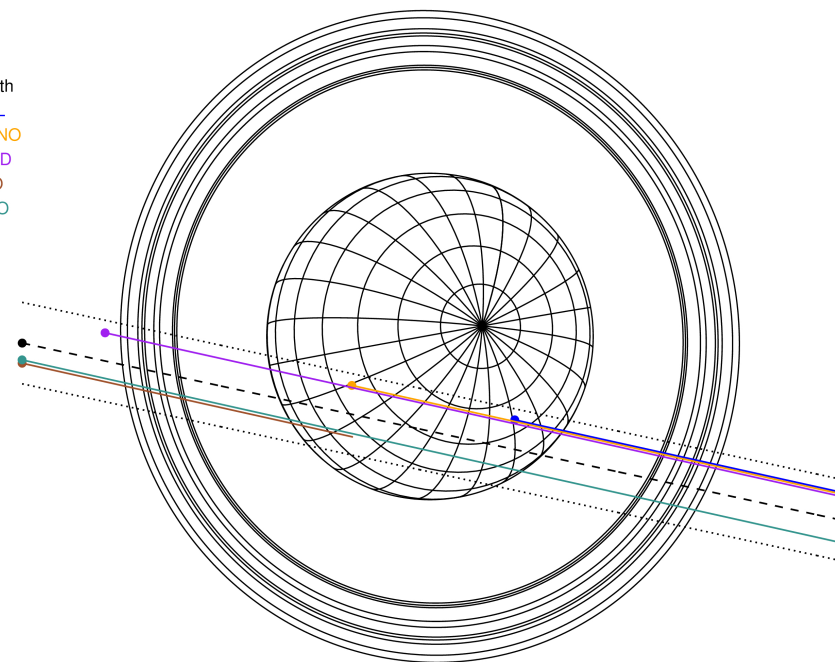
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2025-07-17T09:21:32.0500 ex: 03 51 44.7290 r: +19 57 25.763 C/A 0.992° PA 347.81 deg v_sky +23.59 km/s D 20.09 AU
 Credit: Styled after SORA/Lucky Star

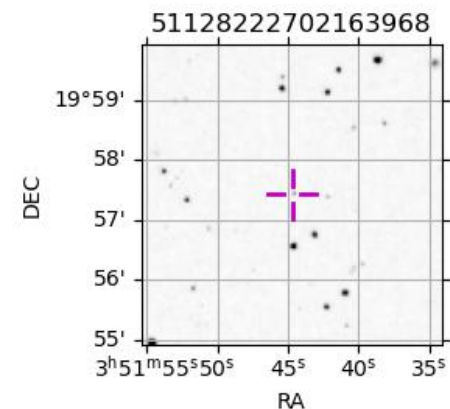
Uranus 2025-07-17T09:21:32 K14.66 G18.05 PgtRgt

Earth
 PAL
 KPNO
 MCD
 RIO
 ESO

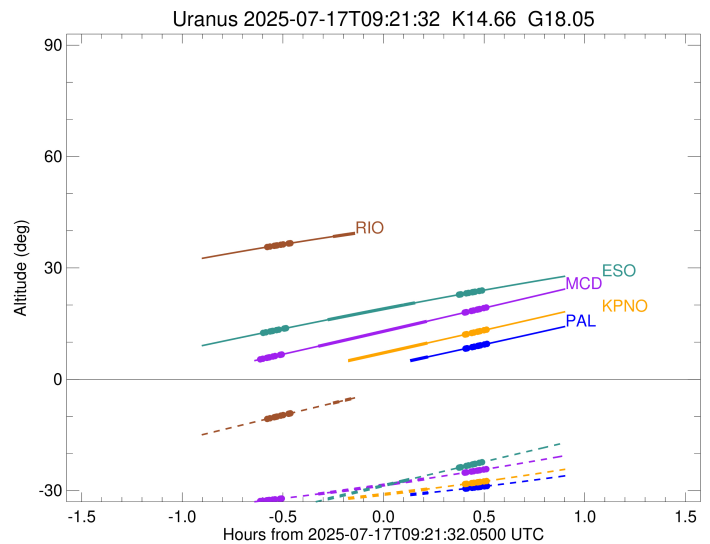
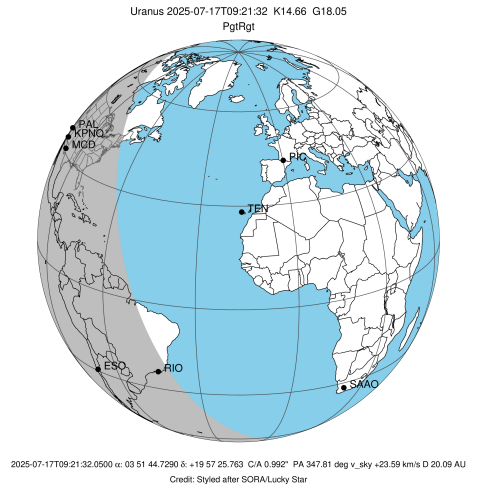


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1		+	+++++	JUL 17 09:34 - JUL 17 09:52	PneRne
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4		+	+++++	JUL 17 09:34 - JUL 17 09:52	PneRne
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+	+++++	JUL 17 08:45 - JUL 17 09:52	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
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	+++++	+		JUL 17 08:47 - JUL 17 09:06	PinRin
ESO	European Southern Obs	-29.3	289.3	+++++	+	+++++	JUL 17 08:45 - JUL 17 09:51	PieRie
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



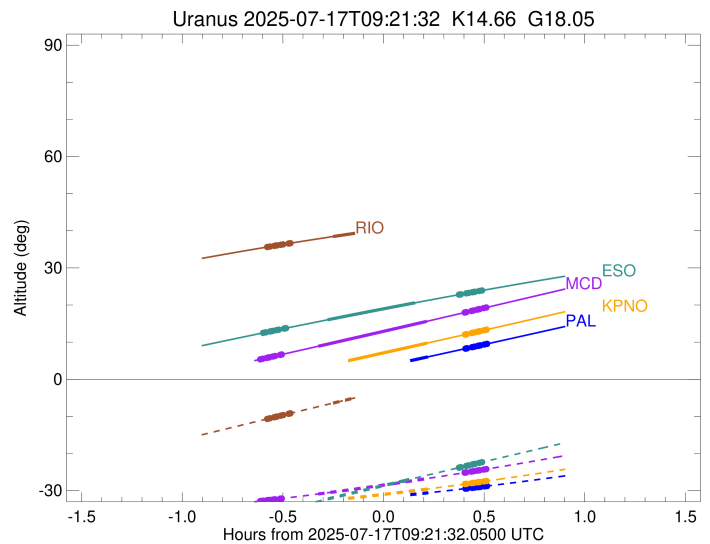
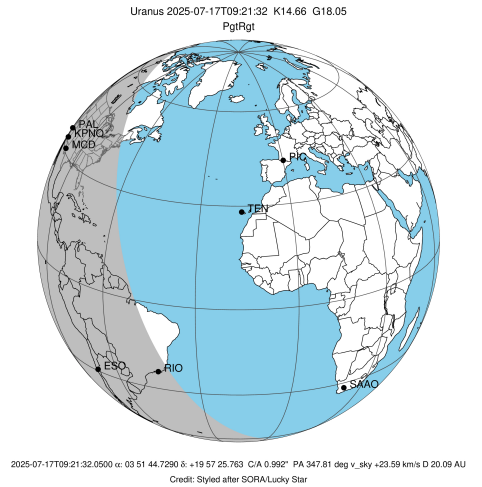
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-07-17T09:18:24.180
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 51128222702163968
 2Mass ID (if available) : 03514472+1957255
 ICRS Star Coord at Epoch: 03h 51m 44.72897s +19:57:25.76273s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 14.662
 G magnitude : 18.049
 RP magnitude : 16.995
 BP magnitude : 19.189
 DUPflag : 0
 Distance (au) : 20.090
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.59
 Sun-Target sep (deg) : 54.64
 Sun-Moon sep (deg) : 43.29
 B (ring opening deg) : 70.93
 PA of pole (deg) : -78.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.678
 C/A sky separation (km) : 9881.6
 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	2025-07-17T08:45:20.557	-3.48x	-34.32	50754.11	-24.42			
lambda	I	2025-07-17T08:45:50.368	-3.39x	-34.29	50026.71	-24.39			
delta	I	2025-07-17T08:47:01.199	-3.17x	-34.23	48300.35	-24.35			
gamma	I	2025-07-17T08:47:28.939	-3.08x	-34.20	47625.02	-24.34			
eta	I	2025-07-17T08:47:47.390	-3.02x	-34.19	47176.12	-24.32			
beta	I	2025-07-17T08:48:49.651	-2.83x	-34.13	45663.78	-24.29			
alpha	I	2025-07-17T08:49:27.604	-2.71x	-34.09	44744.99	-24.26			
4	I	2025-07-17T08:50:56.856	-2.43x	-34.01	42580.54	-24.18			
5	I	2025-07-17T08:51:14.315	-2.37x	-33.99	42154.91	-24.17			
6	I	2025-07-17T08:51:25.866	-2.34x	-33.98	41863.60	-24.16			
Uranus	I	2025-07-17T09:02:13.473	-0.29x	-33.29	25036.24	-19.06		-19.90	
Uranus	E	2025-07-17T09:34:48.775	6.04	-30.59	25310.74	12.90		13.49	
6	E	2025-07-17T09:45:58.061	8.25	-29.46	41829.34	24.05			
5	E	2025-07-17T09:46:17.273	8.31	-29.42	42304.34	24.07			
4	E	2025-07-17T09:46:27.156	8.35	-29.41	42542.63	24.07			
alpha	E	2025-07-17T09:47:56.802	8.64	-29.25	44703.93	24.15			
beta	E	2025-07-17T09:48:36.809	8.78	-29.18	45667.27	24.17			
eta	E	2025-07-17T09:49:39.207	8.98	-29.06	47176.12	24.20			
gamma	E	2025-07-17T09:49:57.936	9.05	-29.03	47629.53	24.21			
delta	E	2025-07-17T09:50:25.631	9.14	-28.98	48300.35	24.23			
lambda	E	2025-07-17T09:51:36.831	9.38	-28.85	50026.71	24.26			
epsilon	E	2025-07-17T09:52:39.567	9.58	-28.74	51549.80	24.29			

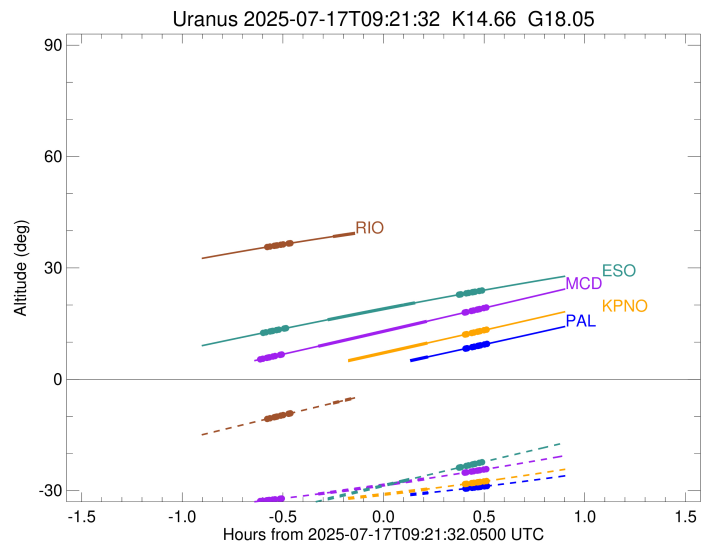
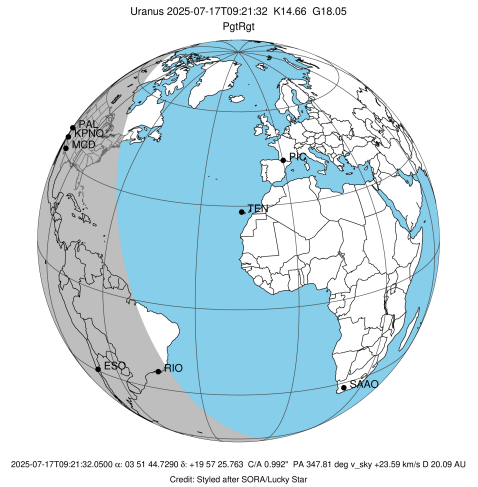
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2025-07-17T09:18:15.320
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : KPNO
Location            : Kitt Peak Natl Obs
Latitude (deg)      : 31.96333
E. Longitude (deg)  : 248.40000
Altitude (km)       : 2.120
Gaia source ID      : 51128222702163968
2Mass ID (if available) : 03514472+1957255
ICRS Star Coord at Epoch: 03h 51m 44.72897s +19:57:25.76273s
RUWE (>1.4 is poor) : 1.05
K magnitude          : 14.662
G magnitude          : 18.049
RP magnitude         : 16.995
BP magnitude         : 19.189
DUPflag             : 0
Distance (au)       : 20.090
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 23.59
Sun-Target sep (deg) : 54.64
Sun-Moon sep (deg)  : 43.31
B (ring opening deg) : 70.93
PA of pole (deg)    : -78.57
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.695
C/A sky separation (km) : 10129.4
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_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



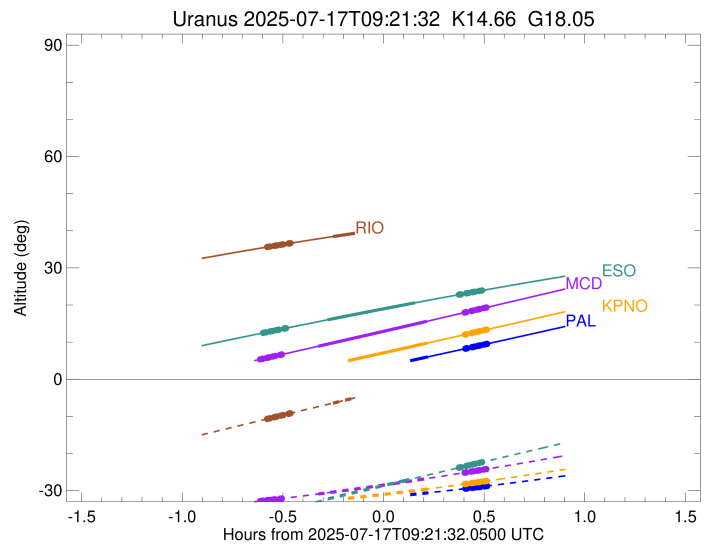
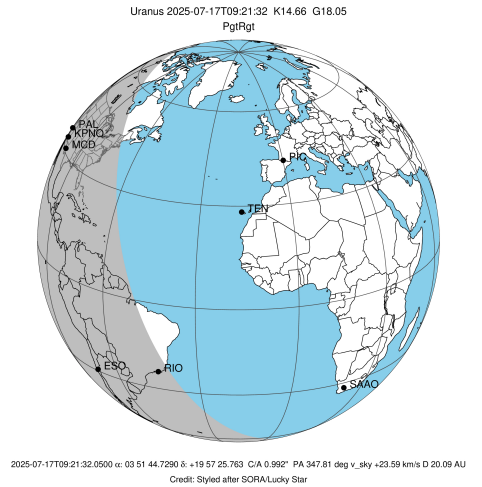
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2025-07-17T08:45:11.430	-0.09x	-34.31	50754.53	-24.36			
lambda	I	2025-07-17T08:45:41.329	0.01x	-34.27	50026.71	-24.33			
delta	I	2025-07-17T08:46:52.331	0.24x	-34.18	48300.35	-24.29			
gamma	I	2025-07-17T08:47:20.140	0.33x	-34.14	47625.04	-24.28			
eta	I	2025-07-17T08:47:38.637	0.39x	-34.12	47176.12	-24.26			
beta	I	2025-07-17T08:48:41.054	0.59x	-34.04	45663.88	-24.22			
alpha	I	2025-07-17T08:49:19.107	0.72x	-33.99	44745.10	-24.20			
4	I	2025-07-17T08:50:48.617	1.01x	-33.87	42580.29	-24.11			
5	I	2025-07-17T08:51:06.115	1.07x	-33.85	42154.90	-24.10			
6	I	2025-07-17T08:51:17.693	1.10x	-33.83	41863.79	-24.09			
Uranus	I	2025-07-17T09:02:07.834	3.24x	-32.91	25036.18	-19.07	-19.90		
Uranus	E	2025-07-17T09:34:37.058	9.76	-29.57	25316.49	12.75	13.33		
6	E	2025-07-17T09:45:49.525	12.04	-28.23	41829.62	23.98			
5	E	2025-07-17T09:46:08.774	12.11	-28.19	42304.07	23.99			
4	E	2025-07-17T09:46:18.689	12.14	-28.17	42542.40	24.00			
alpha	E	2025-07-17T09:47:48.613	12.45	-27.98	44704.12	24.08			
beta	E	2025-07-17T09:48:28.728	12.59	-27.90	45667.39	24.10			
eta	E	2025-07-17T09:49:31.290	12.80	-27.77	47176.12	24.14			
gamma	E	2025-07-17T09:49:50.069	12.86	-27.73	47629.55	24.15			
delta	E	2025-07-17T09:50:17.837	12.96	-27.67	48300.35	24.17			
lambda	E	2025-07-17T09:51:29.220	13.20	-27.52	50026.71	24.20			
epsilon	E	2025-07-17T09:52:32.099	13.42	-27.38	51549.44	24.22			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-07-17T09:18:08.140
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 51128222702163968
 2Mass ID (if available) : 03514472+1957255
 ICRS Star Coord at Epoch: 03h 51m 44.72897s +19:57:25.76273s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 14.662
 G magnitude : 18.049
 RP magnitude : 16.995
 BP magnitude : 19.189
 DUPflag : 0
 Distance (au) : 20.090
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.59
 Sun-Target sep (deg) : 54.64
 Sun-Moon sep (deg) : 43.36
 B (ring opening deg) : 70.93
 PA of pole (deg) : -78.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.718
 C/A sky separation (km) : 10463.5
 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



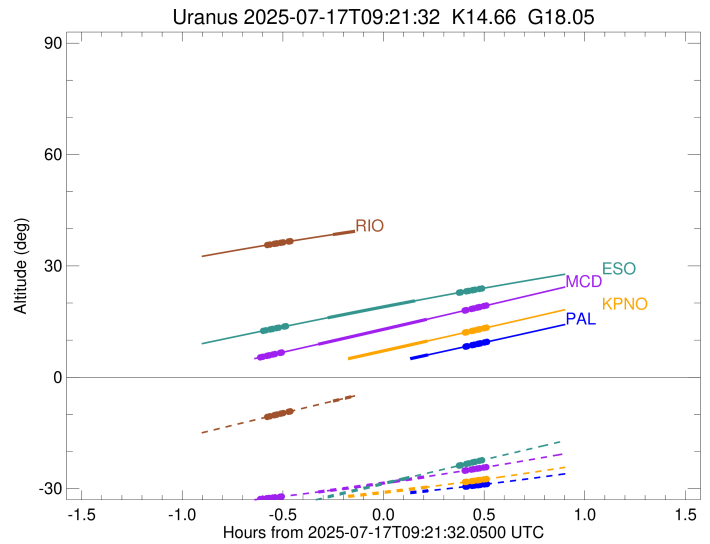
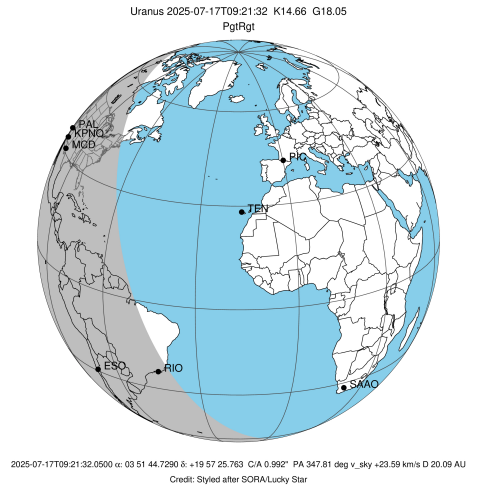
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2025-07-17T08:45:03.434		5.42	-32.78	50755.12	-24.28		
lambda	I	2025-07-17T08:45:33.462		5.52	-32.73	50026.71	-24.25		
delta	I	2025-07-17T08:46:44.721		5.76	-32.60	48300.35	-24.20		
gamma	I	2025-07-17T08:47:12.631		5.86	-32.55	47625.08	-24.19		
eta	I	2025-07-17T08:47:31.199		5.92	-32.52	47176.12	-24.17		
beta	I	2025-07-17T08:48:33.849		6.13	-32.41	45664.02	-24.13		
alpha	I	2025-07-17T08:49:12.049		6.26	-32.34	44745.25	-24.10		
4	I	2025-07-17T08:50:41.941		6.57	-32.18	42579.95	-24.01		
5	I	2025-07-17T08:50:59.496		6.63	-32.15	42154.87	-24.00		
6	I	2025-07-17T08:51:11.115		6.67	-32.13	41864.05	-23.99		
Uranus	I	2025-07-17T09:02:04.970		8.90	-30.90	25036.27		-19.06	-19.90
Uranus	E	2025-07-17T09:34:26.054		15.60	-26.76	25324.23		12.53	13.11
6	E	2025-07-17T09:45:43.076		17.97	-25.16	41829.99	23.88		
5	E	2025-07-17T09:46:02.381		18.04	-25.11	42303.71	23.89		
4	E	2025-07-17T09:46:12.343		18.07	-25.09	42542.10	23.90		
alpha	E	2025-07-17T09:47:42.667		18.39	-24.87	44704.37	23.98		
beta	E	2025-07-17T09:48:22.940		18.53	-24.77	45667.54	24.01		
eta	E	2025-07-17T09:49:25.741		18.75	-24.62	47176.12	24.05		
gamma	E	2025-07-17T09:49:44.594		18.82	-24.57	47629.58	24.06		
delta	E	2025-07-17T09:50:12.466		18.92	-24.50	48300.35	24.07		
lambda	E	2025-07-17T09:51:24.117		19.17	-24.33	50026.71	24.11		
epsilon	E	2025-07-17T09:52:27.203		19.39	-24.17	51548.93	24.14		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-07-17T09:19:02.740
 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 : 51128222702163968
 2Mass ID (if available) : 03514472+1957255
 ICRS Star Coord at Epoch: 03h 51m 44.72897s +19:57:25.76273s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 14.662
 G magnitude : 18.049
 RP magnitude : 16.995
 BP magnitude : 19.189
 DUPflag : 0
 Distance (au) : 20.090
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.59
 Sun-Target sep (deg) : 54.64
 Sun-Moon sep (deg) : 43.87
 B (ring opening deg) : 70.93
 PA of pole (deg) : -78.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.234
 C/A sky separation (km) : 17984.2
 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	2025-07-17T08:47:09.095		35.67	-10.62	50774.55	-22.80		
lambda	I	2025-07-17T08:47:41.965		35.75	-10.50	50026.71	-22.73		
delta	I	2025-07-17T08:48:58.142		35.94	-10.22	48300.35	-22.60		
gamma	I	2025-07-17T08:49:28.022		36.02	-10.12	47625.95	-22.54		
eta	I	2025-07-17T08:49:47.992		36.07	-10.04	47176.12	-22.51		
beta	I	2025-07-17T08:50:55.272		36.23	-9.80	45667.43	-22.38		
alpha	I	2025-07-17T08:51:36.501		36.33	-9.65	44748.53	-22.29		
4	I	2025-07-17T08:53:14.540		36.57	-9.29	42571.44	-22.04		
5	I	2025-07-17T08:53:33.202		36.62	-9.22	42155.80	-22.00		
6	I	2025-07-17T08:53:45.760		36.65	-9.18	41869.87	-21.96		
Uranus	I	2025-07-17T09:06:28.609		38.45	-6.42	25106.20		-17.66	-18.44
Uranus	E	2025-07-17T09:32:00.826		41.65	-0.94x	25489.04		6.77	7.09
6	E	2025-07-17T09:45:22.457		43.08	1.89x	41838.17	21.91		
5	E	2025-07-17T09:45:42.776		43.12	1.97x	42294.57	21.95		
4	E	2025-07-17T09:45:53.796		43.13	2.00x	42536.08	21.98		
alpha	E	2025-07-17T09:47:32.192		43.30	2.35x	44710.10	22.23		
beta	E	2025-07-17T09:48:15.470		43.37	2.50x	45670.77	22.31		
eta	E	2025-07-17T09:49:22.758		43.47	2.74x	47176.12	22.44		
gamma	E	2025-07-17T09:49:42.980		43.51	2.81x	47630.23	22.48		
delta	E	2025-07-17T09:50:12.762		43.55	2.91x	48300.35	22.53		
lambda	E	2025-07-17T09:51:29.183		43.67	3.18x	50026.71	22.65		
epsilon	E	2025-07-17T09:52:35.543		43.78	3.41x	51533.14	22.73		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2025-07-17T09:17:44.030
 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 : 51128222702163968
 2Mass ID (if available) : 03514472+1957255
 ICRS Star Coord at Epoch: 03h 51m 44.72897s +19:57:25.76273s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 14.662
 G magnitude : 18.049
 RP magnitude : 16.995
 BP magnitude : 19.189
 DUPflag : 0
 Distance (au) : 20.090
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 23.59
 Sun-Target sep (deg) : 54.64
 Sun-Moon sep (deg) : 43.43
 B (ring opening deg) : 70.93
 PA of pole (deg) : -78.57
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.201
 C/A sky separation (km) : 17495.5
 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	2025-07-17T08:45:55.442		12.55	-36.35	50772.91	-23.06		
lambda	I	2025-07-17T08:46:27.872		12.65	-36.23	50026.71	-22.99		
delta	I	2025-07-17T08:47:43.176		12.88	-35.96	48300.35	-22.86		
gamma	I	2025-07-17T08:48:12.709		12.97	-35.85	47625.89	-22.81		
eta	I	2025-07-17T08:48:32.442		13.03	-35.78	47176.12	-22.78		
beta	I	2025-07-17T08:49:38.923		13.24	-35.54	45667.20	-22.65		
alpha	I	2025-07-17T08:50:19.645		13.36	-35.39	44748.34	-22.57		
4	I	2025-07-17T08:51:56.405		13.66	-35.04	42572.03	-22.33		
5	I	2025-07-17T08:52:14.858		13.72	-34.98	42155.64	-22.30		
6	I	2025-07-17T08:52:27.252		13.76	-34.93	41869.50	-22.26		
Uranus	I	2025-07-17T09:04:54.733		16.03	-32.23	25096.74		-17.85	-18.64
Uranus	E	2025-07-17T09:30:56.772		20.60	-26.62	25479.57		7.22	7.56
6	E	2025-07-17T09:44:02.478		22.79	-23.81	41837.65	22.18		
5	E	2025-07-17T09:44:22.599		22.85	-23.74	42295.22	22.21		
4	E	2025-07-17T09:44:33.473		22.88	-23.70	42536.42	22.24		
alpha	E	2025-07-17T09:46:10.707		23.14	-23.35	44709.73	22.48		
beta	E	2025-07-17T09:46:53.519		23.26	-23.20	45670.57	22.56		
eta	E	2025-07-17T09:48:00.098		23.44	-22.96	47176.12	22.67		
gamma	E	2025-07-17T09:48:20.109		23.50	-22.89	47630.19	22.71		
delta	E	2025-07-17T09:48:49.587		23.58	-22.79	48300.35	22.76		
lambda	E	2025-07-17T09:50:05.244		23.78	-22.52	50026.71	22.88		
epsilon	E	2025-07-17T09:51:11.015		23.96	-22.28	51534.37	22.95		