

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-09-09T03:25:40.910  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427621572816169472  
 2Mass ID (if available) : 05450215+2331198

ICRS Star Coord at Epoch: 05h 45m 02.14618s +23:31:19.54430s

RUWE (>1.4 is poor) : 2.29  
 K magnitude : 10.015  
 G magnitude : 11.532  
 RP magnitude : 10.964  
 BP magnitude : 11.769  
 DUPflag : 0  
 Distance (au) : 19.267  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 11.91  
 Sun-Target sep (deg) : 79.27  
 Sun-Moon sep (deg) : 6.20  
 B (ring opening deg) : 78.14  
 PA of pole (deg) : 46.90

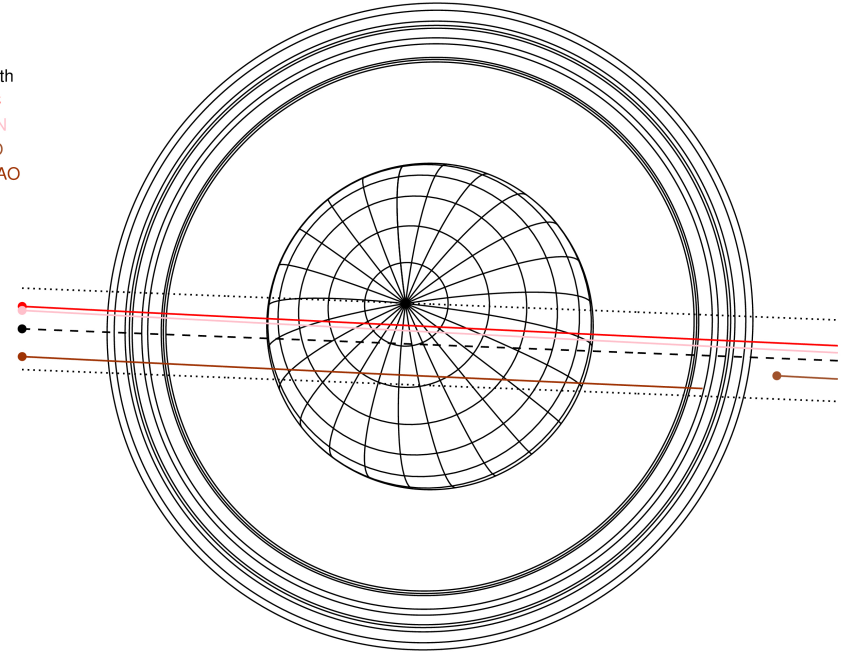
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-09-09T03:25:40.9100 ex: 05 45 02.1462 8: +23 31 19.544 C/A 0.201" PA 357.76 deg v\_sky +11.90 km/s D 19.27 AU  
 Credit: Styled after SORA/Lucky Star

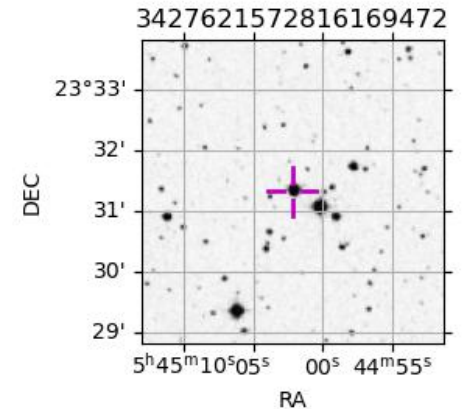
Uranus 2031-09-09T03:25:40 K10.02 G11.53 PgtRgt

Earth  
 PIC  
 TEN  
 RIO  
 SAAO

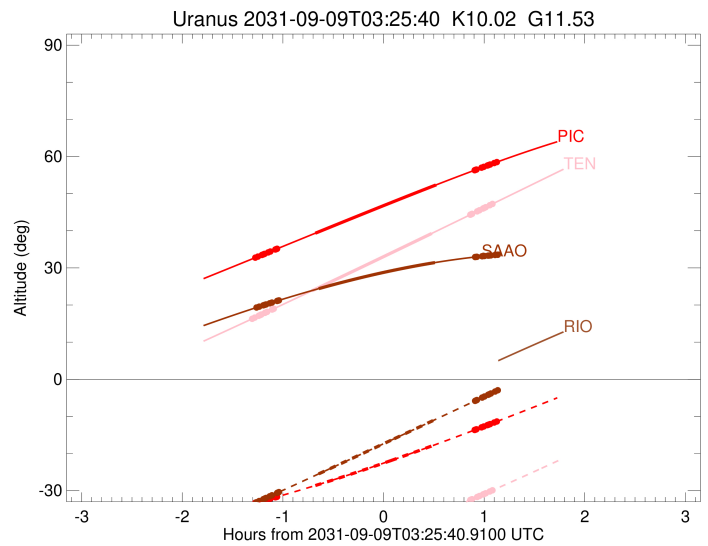
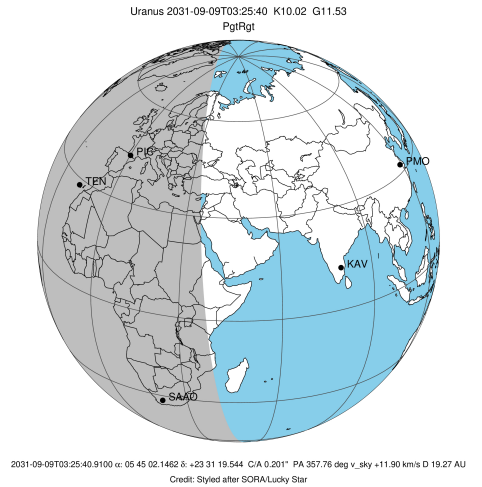


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	SEP 09 02:08 - SEP 09 04:32	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	+++++	+ +	+++++	SEP 09 02:06 - SEP 09 04:30	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					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	+++++	+ +	+++	SEP 09 02:09 - SEP 09 04:21	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

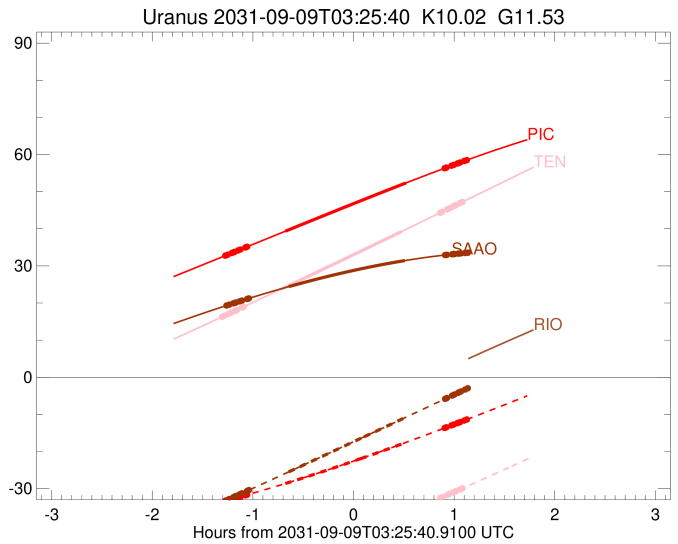
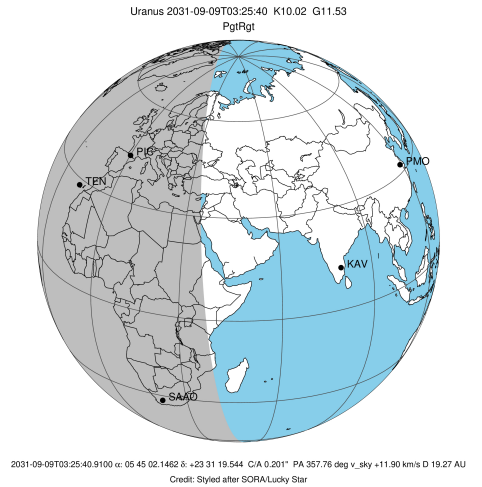


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-09-09T03:20:55.470  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3427621572816169472  
 2Mass ID (if available) : 05450215+2331198  
 ICRS Star Coord at Epoch: 05h 45m 02.14618s +23:31:19.54430s  
 RUWE (>1.4 is poor) : 2.29  
 K magnitude : 10.015  
 G magnitude : 11.532  
 RP magnitude : 10.964  
 BP magnitude : 11.769  
 DUPflag : 0  
 Distance (au) : 19.267  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 11.91  
 Sun-Target sep (deg) : 79.27  
 Sun-Moon sep (deg) : 6.04  
 B (ring opening deg) : 78.14  
 PA of pole (deg) : 46.90  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.001  
 C/A sky separation (km) : 13.6  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



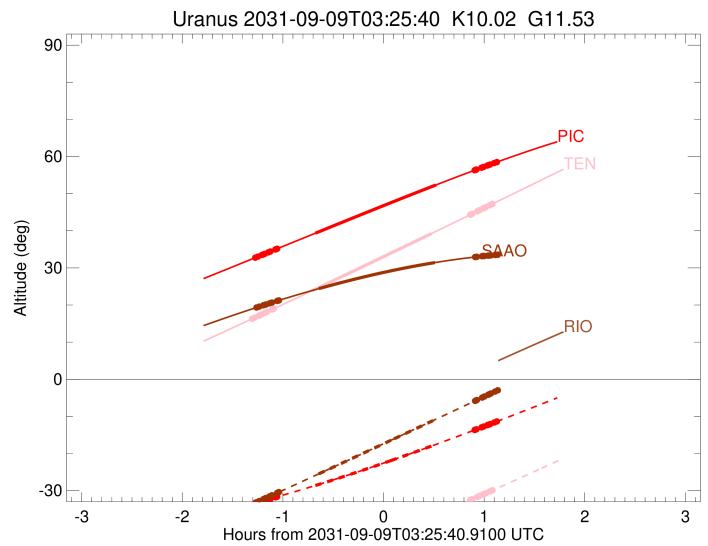
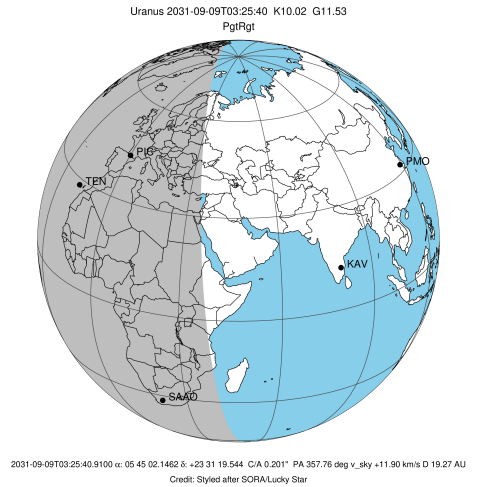
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-09-09T02:08:40.593		32.66	-33.33	51555.29	-11.95		
lambda	I	2031-09-09T02:10:48.547		33.05	-33.07	50026.71	-11.94		
delta	I	2031-09-09T02:13:13.110		33.49	-32.78	48300.35	-11.94		
gamma	I	2031-09-09T02:14:09.555		33.67	-32.67	47626.45	-11.94		
eta	I	2031-09-09T02:14:47.279		33.78	-32.59	47176.12	-11.94		
beta	I	2031-09-09T02:16:52.747		34.17	-32.33	45679.30	-11.93		
alpha	I	2031-09-09T02:18:12.905		34.41	-32.17	44723.19	-11.93		
4	I	2031-09-09T02:21:09.694		34.96	-31.80	42616.07	-11.93		
5	I	2031-09-09T02:21:39.269		35.05	-31.73	42256.45	-11.92		
6	I	2031-09-09T02:22:18.225		35.17	-31.65	41801.85	-11.92		
Uranus	I	2031-09-09T02:45:01.366		39.35	-28.62	25228.47		9.02	9.44
Uranus	E	2031-09-09T03:56:59.376		52.35	-17.55	25228.45		-9.02	-9.44
6	E	2031-09-09T04:20:04.050		56.32	-13.65	41872.68	11.75		
5	E	2031-09-09T04:20:33.907		56.40	-13.57	42213.55	11.75		
4	E	2031-09-09T04:20:59.949		56.47	-13.49	42526.44	11.75		
alpha	E	2031-09-09T04:24:06.318		56.99	-12.96	44713.74	11.74		
beta	E	2031-09-09T04:25:25.476		57.21	-12.73	45642.97	11.74		
eta	E	2031-09-09T04:27:36.113		57.57	-12.36	47176.12	11.74		
gamma	E	2031-09-09T04:28:14.444		57.68	-12.25	47626.09	11.74		
delta	E	2031-09-09T04:29:11.884		57.84	-12.08	48300.35	11.74		
lambda	E	2031-09-09T04:31:38.975		58.24	-11.66	50026.71	11.74		
epsilon	E	2031-09-09T04:32:40.059		58.41	-11.48	50743.52	11.73		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-09-09T03:18:35.660  
 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 : 3427621572816169472  
 2Mass ID (if available) : 05450215+2331198  
 ICRS Star Coord at Epoch: 05h 45m 02.14618s +23:31:19.54430s  
 RUWE (>1.4 is poor) : 2.29  
 K magnitude : 10.015  
 G magnitude : 11.532  
 RP magnitude : 10.964  
 BP magnitude : 11.769  
 DUPflag : 0  
 Distance (au) : 19.267  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 11.91  
 Sun-Target sep (deg) : 79.27  
 Sun-Moon sep (deg) : 5.75  
 B (ring opening deg) : 78.14  
 PA of pole (deg) : 46.90  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.061  
 C/A sky separation (km) : 850.3  
 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	2031-09-09T02:06:48.473		16.17	-53.13	51555.22	-12.04		
lambda	I	2031-09-09T02:08:55.439		16.61	-52.92	50026.71	-12.04		
delta	I	2031-09-09T02:11:18.901		17.12	-52.67	48300.35	-12.03		
gamma	I	2031-09-09T02:12:14.914		17.31	-52.57	47626.52	-12.03		
eta	I	2031-09-09T02:12:52.361		17.44	-52.50	47176.12	-12.03		
beta	I	2031-09-09T02:14:56.902		17.88	-52.28	45679.17	-12.02		
alpha	I	2031-09-09T02:16:16.496		18.16	-52.13	44722.67	-12.02		
4	I	2031-09-09T02:19:11.943		18.78	-51.80	42616.17	-12.01		
5	I	2031-09-09T02:19:41.203		18.88	-51.75	42257.73	-12.01		
6	I	2031-09-09T02:20:19.939		19.02	-51.67	41802.25	-12.01		
Uranus	I	2031-09-09T02:42:53.969		23.81	-48.77	25244.83		8.79	9.20
Uranus	E	2031-09-09T03:54:27.223		39.29	-36.90	25208.16		-9.30	-9.73
6	E	2031-09-09T04:17:28.151		44.33	-32.51	41873.24	11.78		
5	E	2031-09-09T04:17:58.066		44.44	-32.41	42215.40	11.77		
4	E	2031-09-09T04:18:23.910		44.54	-32.33	42526.62	11.77		
alpha	E	2031-09-09T04:21:29.775		45.22	-31.72	44712.97	11.77		
beta	E	2031-09-09T04:22:48.817		45.51	-31.46	45642.78	11.77		
eta	E	2031-09-09T04:24:59.201		45.99	-31.04	47176.12	11.76		
gamma	E	2031-09-09T04:25:37.464		46.13	-30.91	47626.21	11.76		
delta	E	2031-09-09T04:26:34.781		46.34	-30.72	48300.35	11.76		
lambda	E	2031-09-09T04:29:01.593		46.87	-30.24	50026.71	11.76		
epsilon	E	2031-09-09T04:30:02.569		47.10	-30.04	50743.56	11.76		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-09-09T03:21:52.230  
 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 : 3427621572816169472  
 2Mass ID (if available) : 05450215+2331198  
 ICRS Star Coord at Epoch: 05h 45m 02.14618s +23:31:19.54430s  
 RUWE (>1.4 is poor) : 2.29  
 K magnitude : 10.015  
 G magnitude : 11.532  
 RP magnitude : 10.964  
 BP magnitude : 11.769  
 DUPflag : 0  
 Distance (au) : 19.267  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 11.91  
 Sun-Target sep (deg) : 79.27  
 Sun-Moon sep (deg) : 5.64  
 B (ring opening deg) : 78.14  
 PA of pole (deg) : 46.90  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.558  
 C/A sky separation (km) : 7793.7  
 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	2031-09-09T02:09:24.034		19.25	-33.24	51550.02	-11.66		
lambda	I	2031-09-09T02:11:34.679		19.57	-32.80	50026.71	-11.65		
delta	I	2031-09-09T02:14:02.910		19.93	-32.30	48300.35	-11.64		
gamma	I	2031-09-09T02:15:00.751		20.07	-32.10	47627.33	-11.63		
eta	I	2031-09-09T02:15:39.546		20.16	-31.97	47176.12	-11.63		
beta	I	2031-09-09T02:17:48.546		20.47	-31.53	45677.53	-11.61		
alpha	I	2031-09-09T02:19:11.272		20.66	-31.25	44717.17	-11.60		
4	I	2031-09-09T02:22:12.656		21.09	-30.63	42616.53	-11.58		
5	I	2031-09-09T02:22:41.948		21.16	-30.52	42270.55	-11.58		
6	I	2031-09-09T02:23:22.702		21.26	-30.39	41806.93	-11.57		
Uranus	I	2031-09-09T02:47:04.441		24.41	-25.48	25400.05		6.21	6.50
Uranus	E	2031-09-09T03:56:17.931		31.43	-10.90	25077.14		-10.96	-11.47
6	E	2031-09-09T04:20:18.820		32.93	-5.82	41876.42	11.44		
5	E	2031-09-09T04:20:50.537		32.96	-5.71	42228.08	11.44		
4	E	2031-09-09T04:21:16.253		32.98	-5.61	42528.42	11.44		
alpha	E	2031-09-09T04:24:26.705		33.14	-4.94x	44708.00	11.46		
beta	E	2031-09-09T04:25:48.243		33.20	-4.66x	45641.78	11.46		
eta	E	2031-09-09T04:28:02.085		33.30	-4.19x	47176.12	11.47		
gamma	E	2031-09-09T04:28:41.374		33.33	-4.05x	47626.96	11.48		
delta	E	2031-09-09T04:29:40.041		33.37	-3.84x	48300.35	11.48		
lambda	E	2031-09-09T04:32:10.356		33.47	-3.31x	50026.71	11.49		
epsilon	E	2031-09-09T04:33:13.112		33.52	-3.09x	50747.85	11.49		