

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-09-13T22:09:02.120
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427644486464199680
 2Mass ID (if available) : 05452524+2331327

ICRS Star Coord at Epoch: 05h 45m 25.24372s +23:31:32.53565s

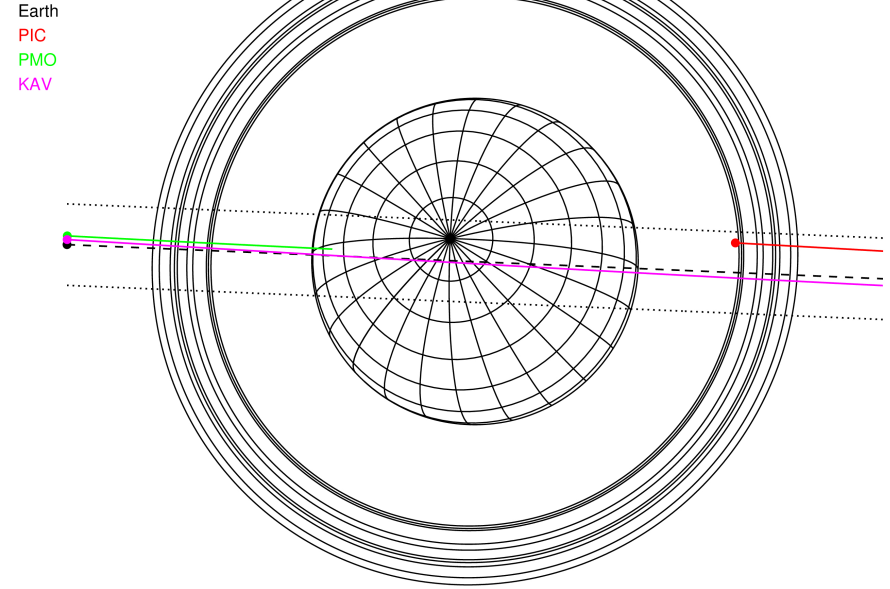
RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.257
 G magnitude : 16.747
 RP magnitude : 15.959
 BP magnitude : 17.410
 DUPflag : 0
 Distance (au) : 19.186
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.56
 Sun-Target sep (deg) : 83.83
 Sun-Moon sep (deg) : 51.44
 B (ring opening deg) : 78.07
 PA of pole (deg) : 47.21

#	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



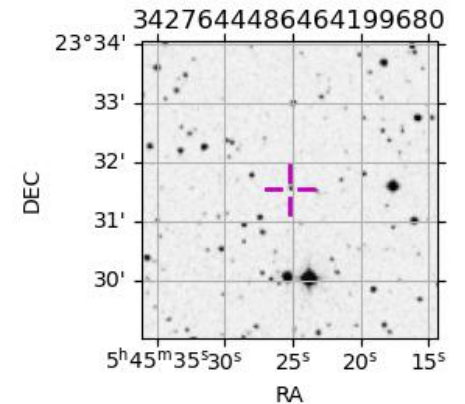
2031-09-13T22:09:02.1200 ra: 05 45 25.2437 s: +23 31 32.536 C/A 0.001 PA 177.59 deg v_sky + 9.56 km/s D 19.19 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-09-13T22:09:02 K14.26 G16.75 PgtRgt

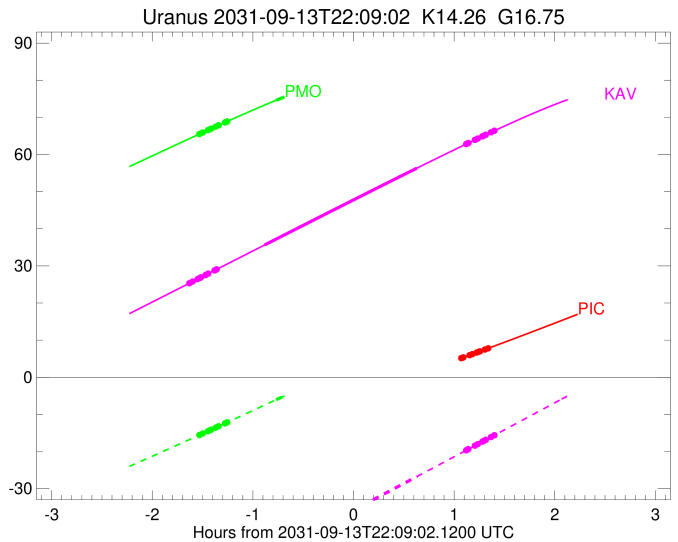
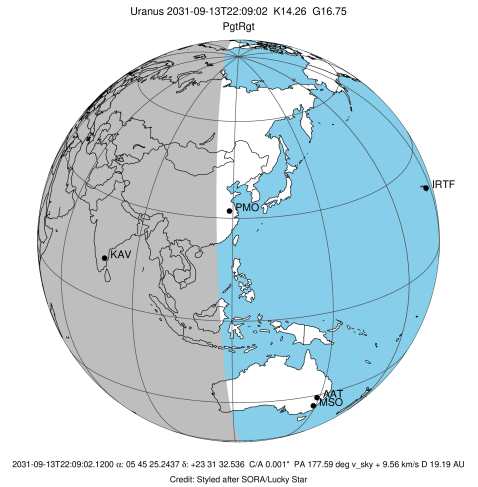


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1			+++++	SEP 13 23:13 - SEP 13 23:28	PnnRne
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+		SEP 13 20:36 - SEP 13 21:22	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					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+	+++++	SEP 13 20:30 - SEP 13 23:32	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					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

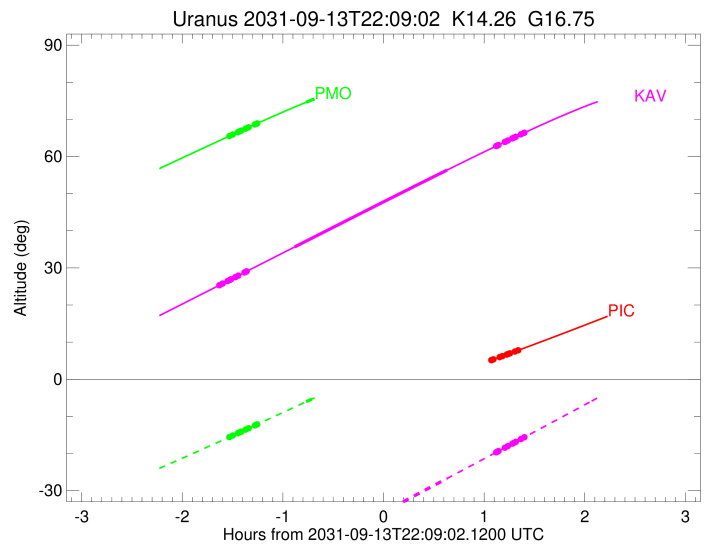
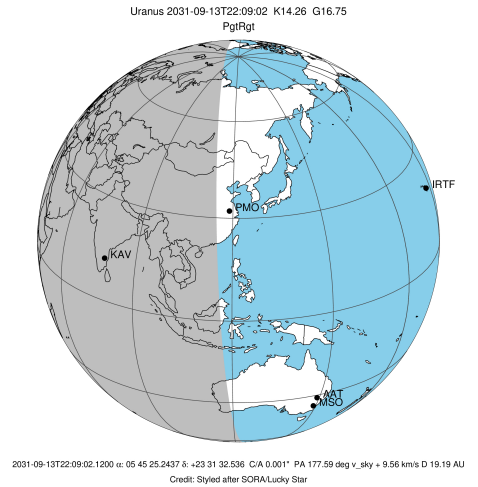


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-09-13T22:02:39.320
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3427644486464199680
 2Mass ID (if available) : 05452524+2331327
 ICRS Star Coord at Epoch: 05h 45m 25.24372s +23:31:32.53565s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.257
 G magnitude : 16.747
 RP magnitude : 15.959
 BP magnitude : 17.410
 DUPflag : 0
 Distance (au) : 19.186
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.56
 Sun-Target sep (deg) : 83.83
 Sun-Moon sep (deg) : 51.77
 B (ring opening deg) : 78.07
 PA of pole (deg) : 47.21
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.367
 C/A sky separation (km) : 5108.4
 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	2031-09-13T20:36:52.413	-16.22x	-25.61	51546.23	-9.94			
lambda	I	2031-09-13T20:39:25.260	-15.96x	-26.00	50026.71	-9.94			
delta	I	2031-09-13T20:42:19.035	-15.66x	-26.45	48300.35	-9.93			
gamma	I	2031-09-13T20:43:27.042	-15.54x	-26.62	47625.09	-9.93			
eta	I	2031-09-13T20:44:12.272	-15.47x	-26.73	47176.12	-9.93			
beta	I	2031-09-13T20:46:43.034	-15.20x	-27.12	45680.98	-9.92			
alpha	I	2031-09-13T20:48:18.668	-15.03x	-27.36	44732.91	-9.91			
4	I	2031-09-13T20:51:53.030	-14.64x	-27.89	42611.26	-9.90			
5	I	2031-09-13T20:52:30.804	-14.57x	-27.98	42228.82	-9.90			
6	I	2031-09-13T20:53:15.640	-14.49x	-28.10	41795.87	-9.90			
Uranus	I	2031-09-13T21:20:44.951	-11.26x	-32.00	25119.42			10.51	11.00
Uranus	E	2031-09-13T22:45:13.623	0.67x	-41.04	25335.88			-7.42	-7.77
6	E	2031-09-13T23:13:20.841	5.16	-42.72	41875.13	9.68			
5	E	2031-09-13T23:13:57.545	5.26	-42.75	42221.98	9.68			
4	E	2031-09-13T23:14:28.241	5.34	-42.77	42527.37	9.68			
alpha	E	2031-09-13T23:18:14.127	5.96	-42.93	44711.27	9.68			
beta	E	2031-09-13T23:19:50.303	6.22	-42.99	45642.46	9.68			
eta	E	2031-09-13T23:22:28.804	6.66	-43.09	47176.12	9.68			
gamma	E	2031-09-13T23:23:15.318	6.79	-43.12	47626.33	9.68			
delta	E	2031-09-13T23:24:24.955	6.98	-43.16	48300.35	9.68			
lambda	E	2031-09-13T23:27:23.333	7.47	-43.26	50026.71	9.68			
epsilon	E	2031-09-13T23:28:37.410	7.68	-43.29	50743.56	9.68			

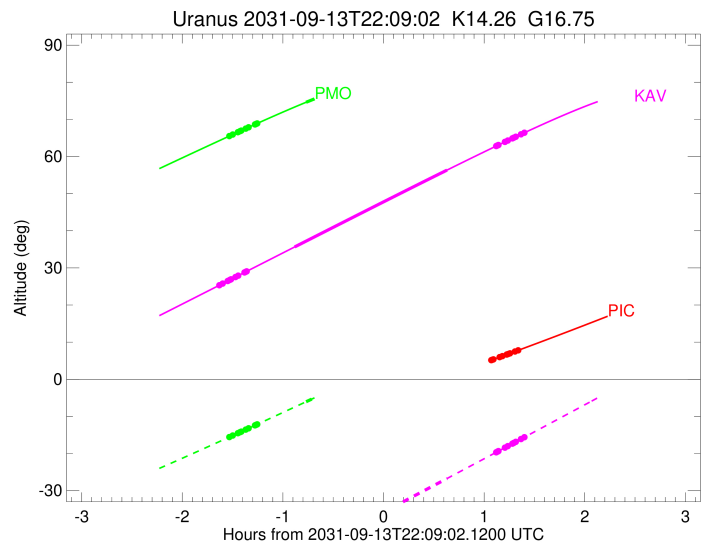
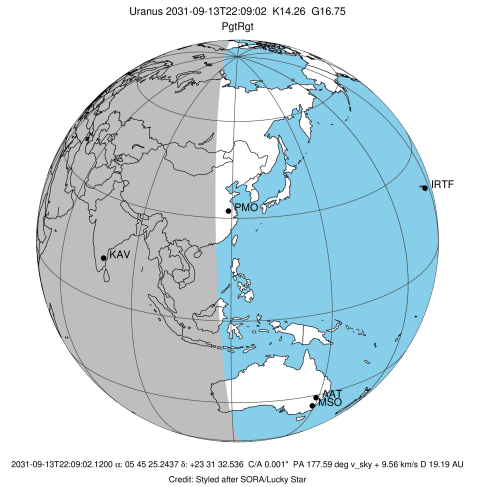
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-09-13T22:08:34.870
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3427644486464199680
 2Mass ID (if available) : 05452524+2331327
 ICRS Star Coord at Epoch: 05h 45m 25.24372s +23:31:32.53565s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.257
 G magnitude : 16.747
 RP magnitude : 15.959
 BP magnitude : 17.410
 DUPflag : 0
 Distance (au) : 19.186
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.56
 Sun-Target sep (deg) : 83.83
 Sun-Moon sep (deg) : 52.18
 B (ring opening deg) : 78.07
 PA of pole (deg) : 47.21
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.065
 C/A sky separation (km) : 910.9
 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_itrf93_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	2031-09-13T20:36:25.912		65.37	-15.71	51552.10	-9.36		
lambda	I	2031-09-13T20:39:08.981		65.93	-15.15	50026.71	-9.35		
delta	I	2031-09-13T20:42:13.606		66.57	-14.52	48300.35	-9.35		
gamma	I	2031-09-13T20:43:25.790		66.81	-14.27	47625.58	-9.35		
eta	I	2031-09-13T20:44:13.877		66.98	-14.11	47176.12	-9.35		
beta	I	2031-09-13T20:46:53.990		67.53	-13.56	45680.59	-9.34		
alpha	I	2031-09-13T20:48:35.766		67.87	-13.21	44729.82	-9.34		
4	I	2031-09-13T20:52:22.675		68.64	-12.42	42613.25	-9.34		
5	I	2031-09-13T20:53:02.037		68.78	-12.29	42237.20	-9.33		
6	I	2031-09-13T20:53:50.243		68.94	-12.12	41797.12	-9.34		
Uranus	I	2031-09-13T21:22:50.133		74.61	-6.06	25207.22		9.37	9.80
Uranus	E	2031-09-13T22:54:30.639		78.85	13.34x	25248.74		-8.78	-9.19
6	E	2031-09-13T23:23:50.267		73.81	19.52x	41876.70	9.26		
5	E	2031-09-13T23:24:29.327		73.68	19.66x	42229.03	9.26		
4	E	2031-09-13T23:25:00.744		73.59	19.77x	42528.53	9.26		
alpha	E	2031-09-13T23:28:56.397		72.83	20.59x	44708.56	9.26		
beta	E	2031-09-13T23:30:37.157		72.51	20.95x	45641.93	9.26		
eta	E	2031-09-13T23:33:22.851		71.97	21.52x	47176.12	9.26		
gamma	E	2031-09-13T23:34:11.495		71.81	21.69x	47626.74	9.26		
delta	E	2031-09-13T23:35:24.209		71.57	21.95x	48300.35	9.26		
lambda	E	2031-09-13T23:38:30.554		70.96	22.60x	50026.71	9.26		
epsilon	E	2031-09-13T23:39:48.076		70.70	22.87x	50744.96	9.27		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-09-13T22:01:19.470
 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 : 3427644486464199680
 2Mass ID (if available) : 05452524+2331327
 ICRS Star Coord at Epoch: 05h 45m 25.24372s +23:31:32.53565s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 14.257
 G magnitude : 16.747
 RP magnitude : 15.959
 BP magnitude : 17.410
 DUPflag : 0
 Distance (au) : 19.186
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 9.56
 Sun-Target sep (deg) : 83.83
 Sun-Moon sep (deg) : 52.34
 B (ring opening deg) : 78.07
 PA of pole (deg) : 47.21
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.025
 C/A sky separation (km) : 354.2
 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_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	2031-09-13T20:30:28.755		25.18	-58.29	51552.76	-9.55		
lambda	I	2031-09-13T20:33:08.606		25.79	-57.72	50026.71	-9.54		
delta	I	2031-09-13T20:36:09.562		26.48	-57.07	48300.35	-9.54		
gamma	I	2031-09-13T20:37:20.319		26.75	-56.81	47625.66	-9.53		
eta	I	2031-09-13T20:38:07.475		26.93	-56.64	47176.12	-9.53		
beta	I	2031-09-13T20:40:44.494		27.53	-56.07	45680.50	-9.53		
alpha	I	2031-09-13T20:42:24.367		27.91	-55.71	44729.26	-9.52		
4	I	2031-09-13T20:46:06.908		28.77	-54.89	42613.56	-9.51		
5	I	2031-09-13T20:46:45.410		28.91	-54.75	42238.73	-9.51		
6	I	2031-09-13T20:47:32.833		29.09	-54.57	41797.40	-9.51		
Uranus	I	2031-09-13T21:16:03.198		35.64	-48.15	25228.05		9.08	9.50
Uranus	E	2031-09-13T22:46:58.064		56.36	-26.72	25213.96		-9.27	-9.70
6	E	2031-09-13T23:16:16.803		62.83	-19.67	41877.35	9.25		
5	E	2031-09-13T23:16:56.286		62.97	-19.51	42232.49	9.24		
4	E	2031-09-13T23:17:27.458		63.08	-19.38	42529.22	9.24		
alpha	E	2031-09-13T23:21:23.410		63.93	-18.43	44707.22	9.24		
beta	E	2031-09-13T23:23:04.568		64.29	-18.02	45641.70	9.24		
eta	E	2031-09-13T23:25:50.786		64.89	-17.36	47176.12	9.23		
gamma	E	2031-09-13T23:26:39.613		65.06	-17.16	47626.95	9.23		
delta	E	2031-09-13T23:27:52.555		65.32	-16.86	48300.35	9.23		
lambda	E	2031-09-13T23:30:59.600		65.98	-16.11	50026.71	9.23		
epsilon	E	2031-09-13T23:32:17.613		66.25	-15.80	50746.55	9.23		