

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-06T15:49:35.190
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415397816716507904
 2Mass ID (if available) : 05101068+2302365

Uranus 2031-02-06T15:49:35 K13.94 G17.52 PgtRgt

ICRS Star Coord at Epoch: 05h 10m 10.67380s +23:02:36.31436s

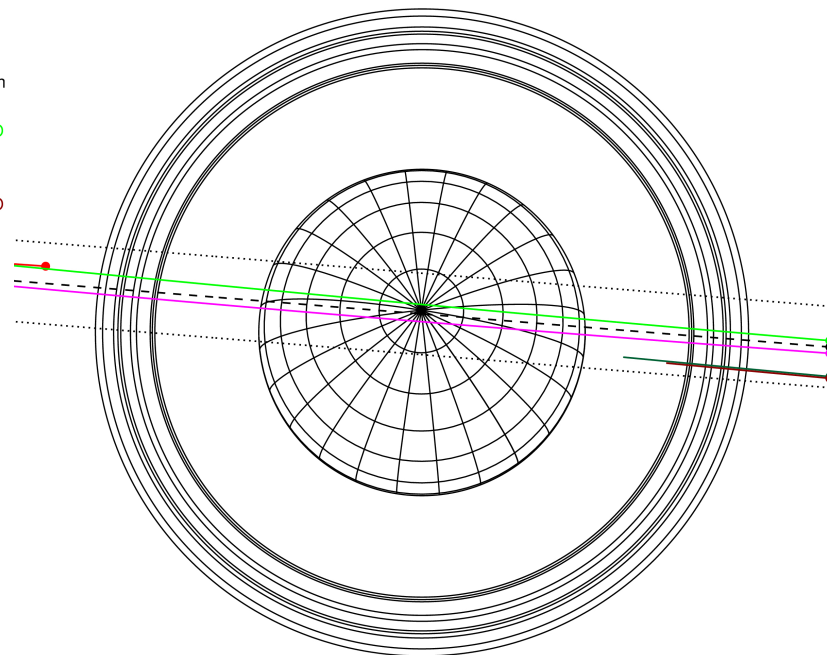
RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.941
 G magnitude : 17.516
 RP magnitude : 16.481
 BP magnitude : 18.612
 DUPflag : 0
 Distance (au) : 18.614
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.16
 Sun-Target sep (deg) : 121.33
 Sun-Moon sep (deg) : 48.93
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.64

Uranus 2031-02-06T15:49:35 K13.94 G17.52
 PgtRgt



2031-02-06T15:49:35.1900 α: 05 10 10.6738 δ: +23 02 36.314 C/A 0.221° PA 175.36 deg v_sky - 9.16 km/s D 18.61 AU
 Credit: Styled after SORA/Lucky Star

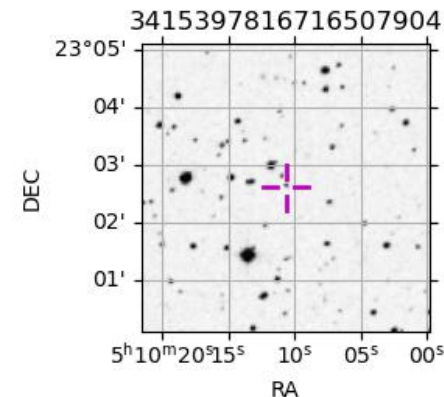
Earth
 PIC
 PMO
 KAV
 AAT
 MSO



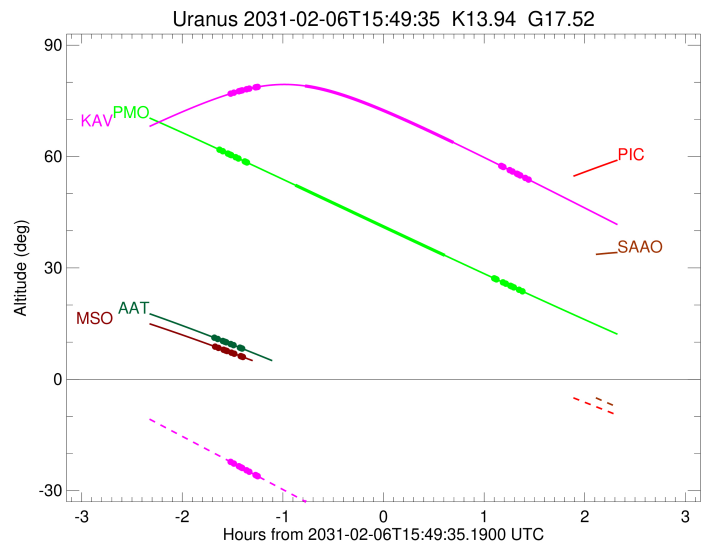
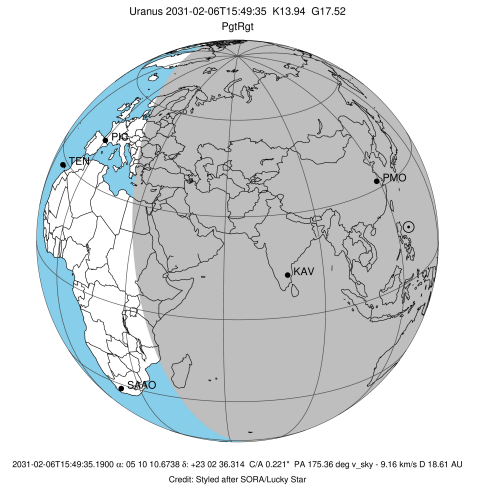
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	FEB 06 14:12 - FEB 06 17:12	PieRie
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	+++++	+ +	+++++	FEB 06 14:18 - FEB 06 17:16	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	+++++			FEB 06 14:09 - FEB 06 14:25	PnnRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++			FEB 06 14:09 - FEB 06 14:25	PnnRin

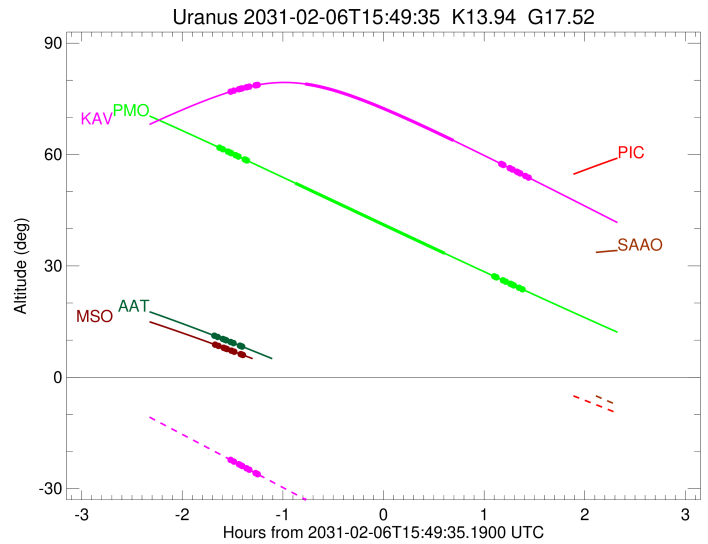
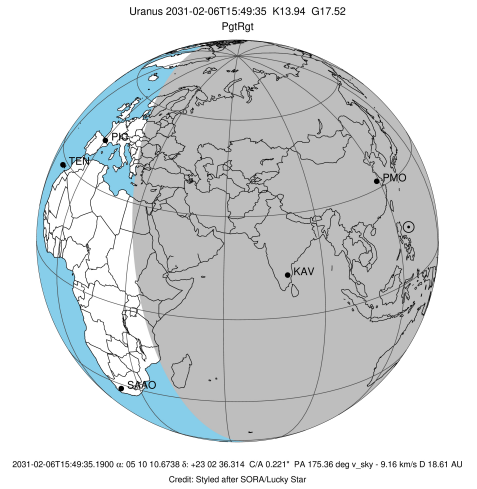


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-06T15:41:25.660
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3415397816716507904
 2Mass ID (if available) : 05101068+2302365
 ICRS Star Coord at Epoch: 05h 10m 10.67380s +23:02:36.31436s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.941
 G magnitude : 17.516
 RP magnitude : 16.481
 BP magnitude : 18.612
 DUPflag : 0
 Distance (au) : 18.613
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.16
 Sun-Target sep (deg) : 121.33
 Sun-Moon sep (deg) : 48.98
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.324
 C/A sky separation (km) : 4369.3
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



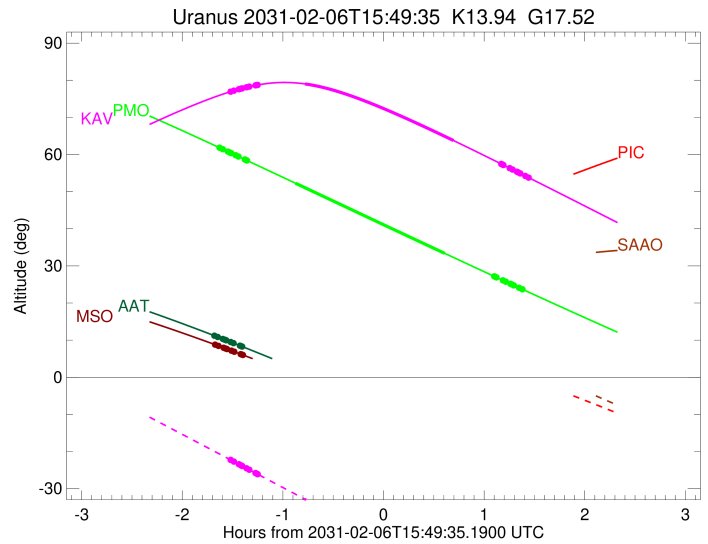
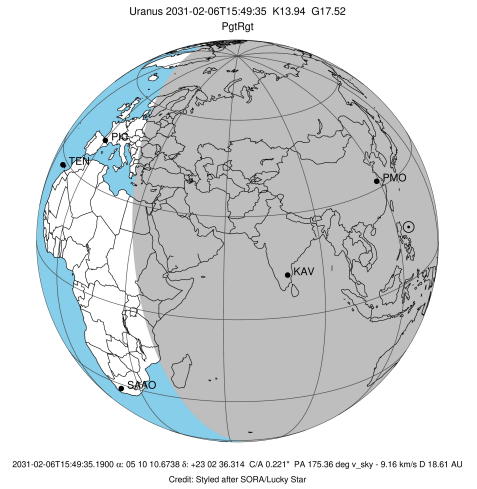
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-06T14:12:09.688		61.77	-56.93	50950.77	-9.49		
lambda	I	2031-02-06T14:13:47.007		61.43	-57.25	50026.71	-9.49		
delta	I	2031-02-06T14:16:48.915		60.79	-57.84	48300.35	-9.49		
gamma	I	2031-02-06T14:18:00.205		60.54	-58.07	47624.10	-9.48		
eta	I	2031-02-06T14:18:47.443		60.38	-58.23	47176.12	-9.48		
beta	I	2031-02-06T14:21:26.616		59.82	-58.74	45667.21	-9.48		
alpha	I	2031-02-06T14:23:03.335		59.48	-59.05	44750.85	-9.47		
4	I	2031-02-06T14:26:48.934		58.69	-59.77	42614.84	-9.46		
5	I	2031-02-06T14:27:22.079		58.57	-59.87	42301.26	-9.46		
6	I	2031-02-06T14:28:10.869		58.40	-60.03	41839.60	-9.46		
Uranus	I	2031-02-06T14:56:59.171		52.29	-65.24	25557.37		0.41	0.43
Uranus	E	2031-02-06T16:26:07.779		33.37	-73.55	25509.18		2.27	2.38
6	E	2031-02-06T16:55:35.676		27.19	-71.61	41844.14	9.22		
5	E	2031-02-06T16:56:11.946		27.07	-71.54	42180.05	9.22		
4	E	2031-02-06T16:56:49.509		26.94	-71.48	42526.01	9.22		
alpha	E	2031-02-06T17:00:43.614		26.12	-71.04	44684.78	9.22		
beta	E	2031-02-06T17:02:29.337		25.76	-70.84	45659.03	9.22		
eta	E	2031-02-06T17:05:13.961		25.19	-70.51	47176.12	9.21		
gamma	E	2031-02-06T17:06:02.945		25.02	-70.41	47627.46	9.21		
delta	E	2031-02-06T17:07:15.983		24.77	-70.25	48300.35	9.21		
lambda	E	2031-02-06T17:10:23.413		24.12	-69.85	50026.71	9.21		
epsilon	E	2031-02-06T17:12:39.041		23.65	-69.54	51275.55	9.20		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-06T15:46:58.580
 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 : 3415397816716507904
 2Mass ID (if available) : 05101068+2302365
 ICRS Star Coord at Epoch: 05h 10m 10.67380s +23:02:36.31436s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.941
 G magnitude : 17.516
 RP magnitude : 16.481
 BP magnitude : 18.612
 DUPflag : 0
 Distance (au) : 18.614
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.16
 Sun-Target sep (deg) : 121.33
 Sun-Moon sep (deg) : 49.45
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.125
 C/A sky separation (km) : 1682.7
 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



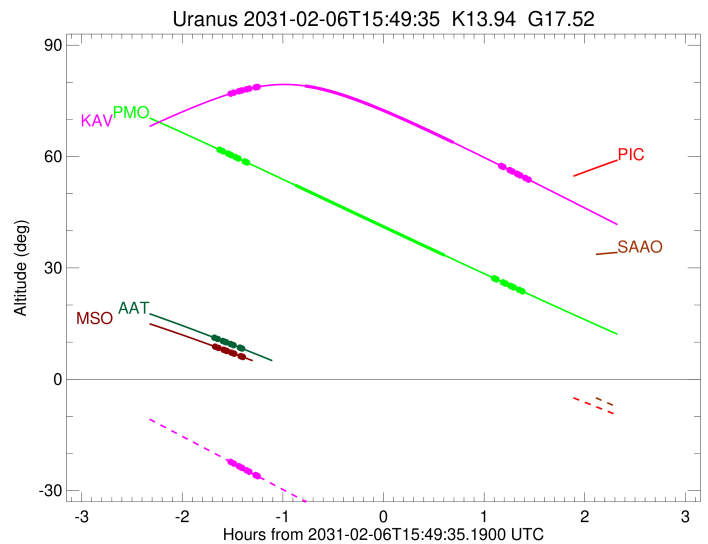
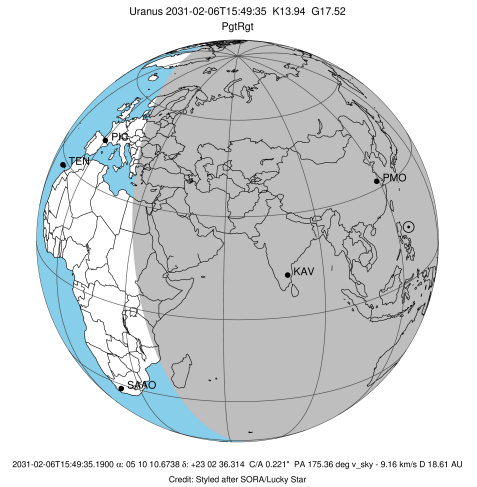
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-02-06T14:18:46.088		76.99	-22.33	50965.89	-9.62		
lambda	I	2031-02-06T14:20:23.671		77.21	-22.72	50026.71	-9.62		
delta	I	2031-02-06T14:23:23.051		77.59	-23.44	48300.35	-9.62		
gamma	I	2031-02-06T14:24:33.297		77.74	-23.72	47624.33	-9.62		
eta	I	2031-02-06T14:25:19.872		77.83	-23.90	47176.12	-9.62		
beta	I	2031-02-06T14:27:56.774		78.12	-24.53	45666.27	-9.62		
alpha	I	2031-02-06T14:29:31.869		78.29	-24.91	44751.32	-9.62		
4	I	2031-02-06T14:33:13.844		78.64	-25.79	42615.44	-9.62		
5	I	2031-02-06T14:33:46.784		78.69	-25.92	42298.74	-9.62		
6	I	2031-02-06T14:34:34.699		78.75	-26.11	41837.29	-9.62		
Uranus	I	2031-02-06T15:02:45.818		79.02	-32.87	25557.91		-0.34	-0.35
Uranus	E	2031-02-06T16:31:18.498		63.78	-54.16	25540.30		1.39	1.46
6	E	2031-02-06T16:59:46.280		57.48	-61.02	41841.02	9.51		
5	E	2031-02-06T17:00:21.367		57.34	-61.16	42175.91	9.51		
4	E	2031-02-06T17:00:58.239		57.21	-61.31	42526.33	9.51		
alpha	E	2031-02-06T17:04:45.170		56.36	-62.22	44685.10	9.51		
beta	E	2031-02-06T17:06:27.475		55.97	-62.63	45657.67	9.51		
eta	E	2031-02-06T17:09:07.215		55.37	-63.27	47176.12	9.50		
gamma	E	2031-02-06T17:09:54.741		55.19	-63.46	47627.79	9.50		
delta	E	2031-02-06T17:11:05.517		54.93	-63.74	48300.35	9.50		
lambda	E	2031-02-06T17:14:07.237		54.24	-64.47	50026.71	9.50		
epsilon	E	2031-02-06T17:16:21.227		53.73	-65.01	51299.20	9.49		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-06T15:40:15.280
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 3415397816716507904
 2Mass ID (if available) : 05101068+2302365
 ICRS Star Coord at Epoch: 05h 10m 10.67380s +23:02:36.31436s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.941
 G magnitude : 17.516
 RP magnitude : 16.481
 BP magnitude : 18.612
 DUPflag : 0
 Distance (au) : 18.613
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.16
 Sun-Target sep (deg) : 121.33
 Sun-Moon sep (deg) : 48.32
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.060
 C/A sky separation (km) : 816.1
 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	2031-02-06T14:09:02.485		11.15	-43.29	50990.39	-9.40		
lambda	I	2031-02-06T14:10:45.077		10.85	-43.31	50026.71	-9.39		
delta	I	2031-02-06T14:13:48.954		10.31	-43.33	48300.35	-9.39		
gamma	I	2031-02-06T14:15:00.951		10.10	-43.33	47624.68	-9.38		
eta	I	2031-02-06T14:15:48.758		9.96	-43.34	47176.12	-9.38		
beta	I	2031-02-06T14:18:29.883		9.49	-43.34	45664.85	-9.38		
alpha	I	2031-02-06T14:20:07.283		9.20	-43.34	44751.86	-9.37		
4	I	2031-02-06T14:23:55.182		8.52	-43.32	42616.07	-9.37		
5	I	2031-02-06T14:24:29.520		8.42	-43.31	42294.82	-9.36		
6	I	2031-02-06T14:25:18.621		8.27	-43.30	41834.02	-9.36		
Uranus	I	2031-02-06T14:54:20.469		2.95x	-42.53	25544.44		-1.23	-1.29
Uranus	E	2031-02-06T16:26:39.017		-15.19x	-34.03	25553.70		0.74	0.78
6	E	2031-02-06T16:56:27.394		-21.32x	-29.79	41839.02	9.06		
5	E	2031-02-06T16:57:04.212		-21.45x	-29.69	42173.45	9.06		
4	E	2031-02-06T16:57:43.225		-21.59x	-29.59	42526.66	9.06		
alpha	E	2031-02-06T17:01:41.547		-22.41x	-28.99	44685.38	9.05		
beta	E	2031-02-06T17:03:28.888		-22.78x	-28.71	45656.84	9.05		
eta	E	2031-02-06T17:06:16.822		-23.37x	-28.27	47176.12	9.04		
gamma	E	2031-02-06T17:07:06.789		-23.54x	-28.14	47628.00	9.04		
delta	E	2031-02-06T17:08:21.152		-23.80x	-27.94	48300.35	9.04		
lambda	E	2031-02-06T17:11:32.178		-24.46x	-27.44	50026.71	9.03		
epsilon	E	2031-02-06T17:13:54.586		-24.96x	-27.06	51312.93	9.03		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-02-06T15:40:45.060
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MSO
 Location : Mt. Stromlo Observatory
 Latitude (deg) : -35.32000
 E. Longitude (deg) : 149.00833
 Altitude (km) : 0.770
 Gaia source ID : 3415397816716507904
 2Mass ID (if available) : 05101068+2302365
 ICRS Star Coord at Epoch: 05h 10m 10.67380s +23:02:36.31436s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 13.941
 G magnitude : 17.516
 RP magnitude : 16.481
 BP magnitude : 18.612
 DUPflag : 0
 Distance (au) : 18.613
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.16
 Sun-Target sep (deg) : 121.33
 Sun-Moon sep (deg) : 48.32
 B (ring opening deg) : 82.13
 PA of pole (deg) : 1.64
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.083
 C/A sky separation (km) : 1126.2
 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	2031-02-06T14:09:28.706		8.73	-39.26	50992.44	-9.39		
lambda	I	2031-02-06T14:11:11.640		8.45	-39.28	50026.71	-9.38		
delta	I	2031-02-06T14:14:15.733		7.94	-39.30	48300.35	-9.37		
gamma	I	2031-02-06T14:15:27.811		7.74	-39.30	47624.71	-9.37		
eta	I	2031-02-06T14:16:15.677		7.61	-39.30	47176.12	-9.37		
beta	I	2031-02-06T14:18:57.003		7.16	-39.31	45664.73	-9.37		
alpha	I	2031-02-06T14:20:34.498		6.88	-39.30	44751.90	-9.36		
4	I	2031-02-06T14:24:22.658		6.24	-39.29	42616.12	-9.36		
5	I	2031-02-06T14:24:57.079		6.14	-39.28	42294.46	-9.35		
6	I	2031-02-06T14:25:46.224		6.00	-39.27	41833.73	-9.35		
Uranus	I	2031-02-06T14:54:50.185		0.92x	-38.57	25542.27		-1.32	-1.38
Uranus	E	2031-02-06T16:27:08.198		-16.46x	-30.80	25555.05		0.64	0.67
6	E	2031-02-06T16:56:56.717		-22.35x	-26.87	41838.67	9.06		
5	E	2031-02-06T16:57:33.530		-22.48x	-26.78	42173.03	9.06		
4	E	2031-02-06T16:58:12.591		-22.61x	-26.69	42526.72	9.06		
alpha	E	2031-02-06T17:02:10.884		-23.40x	-26.12	44685.44	9.05		
beta	E	2031-02-06T17:03:58.183		-23.76x	-25.86	45656.69	9.05		
eta	E	2031-02-06T17:06:46.101		-24.32x	-25.46	47176.12	9.05		
gamma	E	2031-02-06T17:07:36.061		-24.49x	-25.33	47628.03	9.04		
delta	E	2031-02-06T17:08:50.403		-24.74x	-25.15	48300.35	9.04		
lambda	E	2031-02-06T17:12:01.380		-25.37x	-24.68	50026.71	9.04		
epsilon	E	2031-02-06T17:14:24.031		-25.85x	-24.32	51315.49	9.03		