

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-20T05:51:11.280
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3404504370904534912
 2Mass ID (if available) : 05363983+2329013

ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s

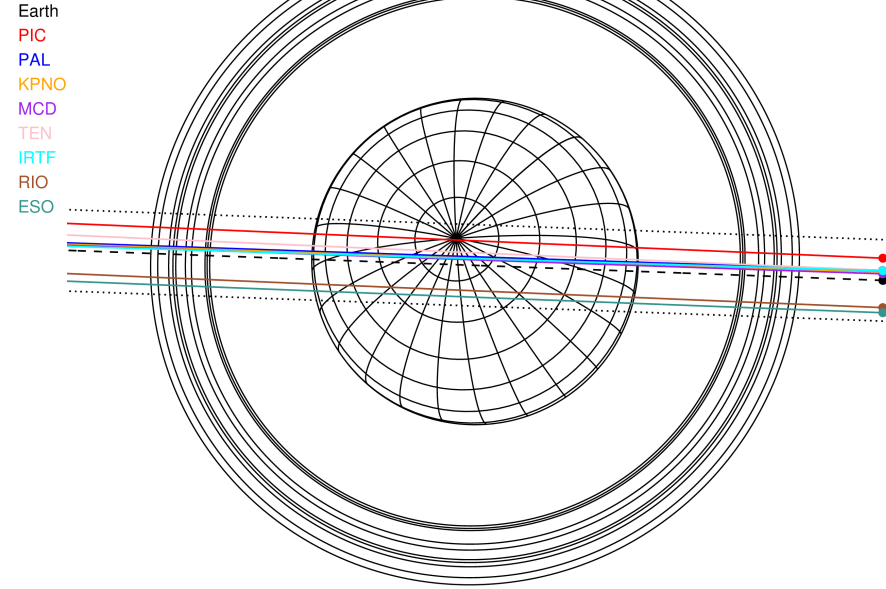
RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.866
 G magnitude : 18.027
 RP magnitude : 17.068
 BP magnitude : 18.981
 DUPflag : 0
 Distance (au) : 18.104
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 176.96
 Sun-Moon sep (deg) : 96.62
 B (ring opening deg) : 79.48
 PA of pole (deg) : 39.10

#	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



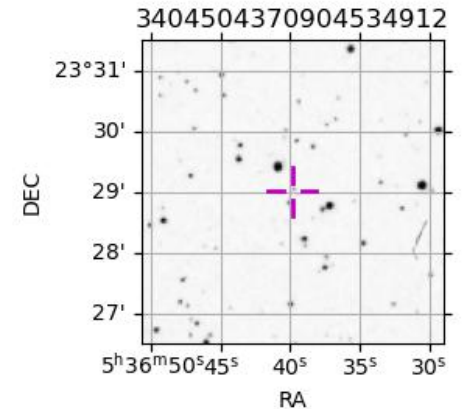
2031-12-20T05:51:11.2800 ra: 05 36 39.8247 s: +23 29 00.874 C/A 0.040° PA 357.92 deg v_sky -23.40 km/s D 18.10 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-12-20T05:51:11 K14.87 G18.03 PgtRgt

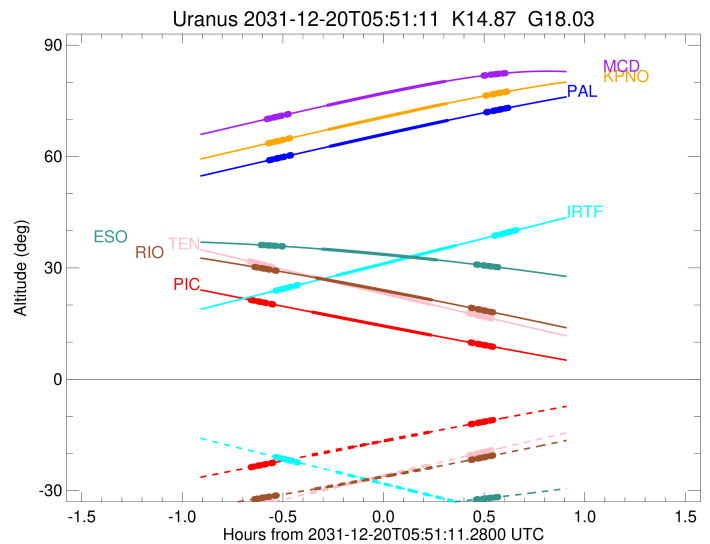
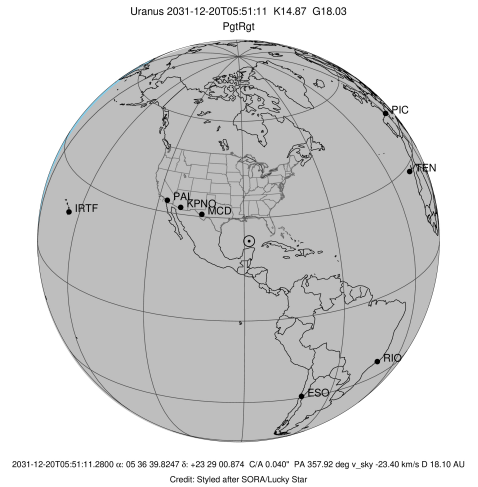


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	DEC 20 05:11 - DEC 20 06:23	PieRie
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	DEC 20 05:16 - DEC 20 06:28	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	DEC 20 05:16 - DEC 20 06:27	PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 20 05:16 - DEC 20 06:27	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 20 05:16 - DEC 20 06:27	PieRie
TENO	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	DEC 20 05:11 - DEC 20 06:23	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	DEC 20 05:18 - DEC 20 06:30	PieRie
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	DEC 20 05:18 - DEC 20 06:30	PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	DEC 20 05:12 - DEC 20 06:23	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	DEC 20 05:14 - DEC 20 06:25	PieRie
AAT	Siding Spring (AAT)	-31.3	149.1	+++++	+ +	+++++	DEC 20 05:14 - DEC 20 06:25	PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +	+++++	DEC 20 05:14 - DEC 20 06:25	PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	DEC 20 05:14 - DEC 20 06:25	PnnRnn

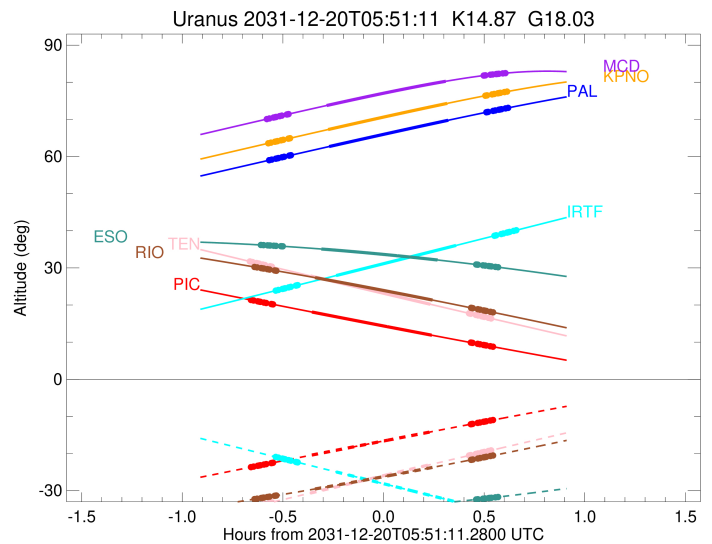
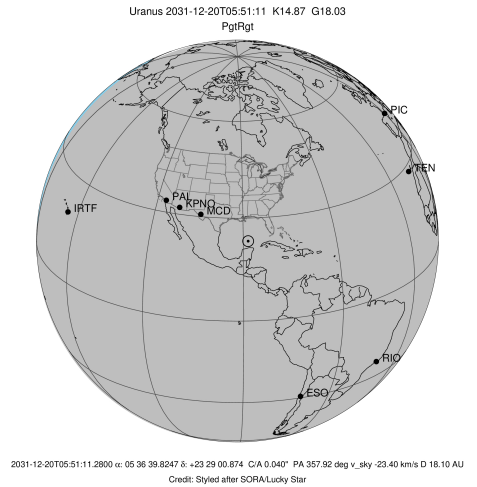


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-20T05:47:44.970
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3404504370904534912
 2Mass ID (if available) : 05363983+2329013
 ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.866
 G magnitude : 18.027
 RP magnitude : 17.068
 BP magnitude : 18.981
 DUPflag : 0
 Distance (au) : 18.104
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 176.96
 Sun-Moon sep (deg) : 96.78
 B (ring opening deg) : 79.48
 PA of pole (deg) : 39.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.246
 C/A sky separation (km) : 3234.6
 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



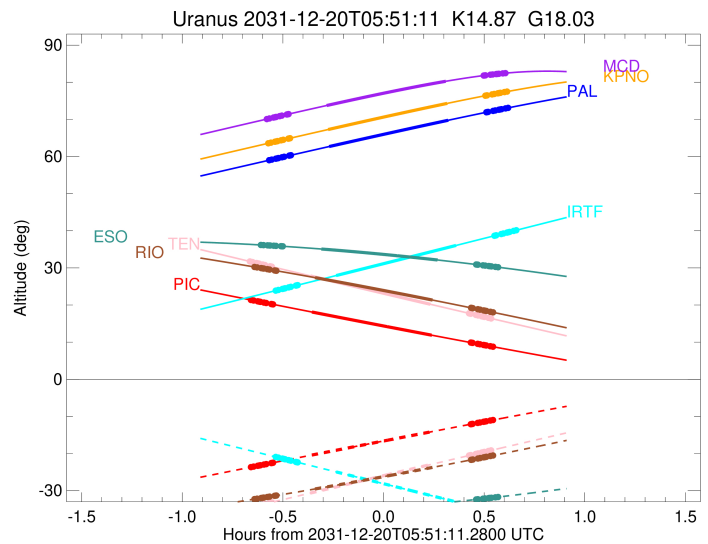
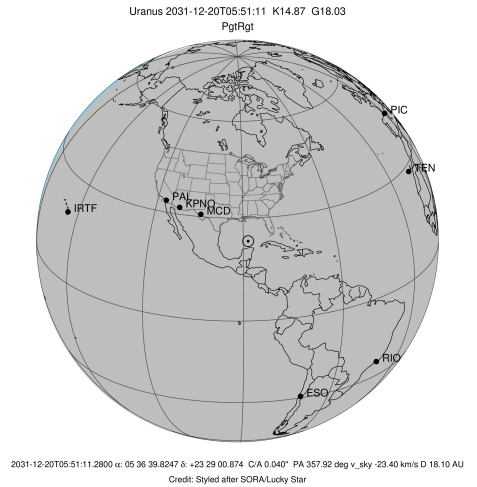
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-20T05:11:28.815		21.39	-23.71	51430.04	-23.57		
lambda	I	2031-12-20T05:12:28.339		21.22	-23.53	50026.71	-23.57		
delta	I	2031-12-20T05:13:41.580		21.00	-23.31	48300.35	-23.57		
gamma	I	2031-12-20T05:14:10.152		20.91	-23.22	47627.02	-23.57		
eta	I	2031-12-20T05:14:29.287		20.85	-23.16	47176.12	-23.56		
beta	I	2031-12-20T05:15:32.719		20.67	-22.97	45681.20	-23.56		
alpha	I	2031-12-20T05:16:12.594		20.55	-22.85	44742.80	-23.55		
4	I	2031-12-20T05:17:44.647		20.27	-22.58	42572.61	-23.54		
5	I	2031-12-20T05:18:02.430		20.22	-22.52	42158.89	-23.54		
6	I	2031-12-20T05:18:16.978		20.18	-22.48	41817.77	-23.54		
Uranus	I	2031-12-20T05:29:50.007		18.12	-20.41	25375.81		-5.90	-6.17
Uranus	E	2031-12-20T06:05:35.007		11.87	-14.12	25232.74		7.91	8.28
6	E	2031-12-20T06:17:13.036		9.89	-12.11	41850.44	23.45		
5	E	2031-12-20T06:17:32.830		9.83	-12.05	42314.18	23.45		
4	E	2031-12-20T06:17:44.319		9.80	-12.02	42576.83	23.45		
alpha	E	2031-12-20T06:19:14.329		9.55	-11.76	44691.00	23.46		
beta	E	2031-12-20T06:19:54.866		9.43	-11.65	45641.13	23.46		
eta	E	2031-12-20T06:21:00.270		9.25	-11.46	47176.12	23.46		
gamma	E	2031-12-20T06:21:19.455		9.19	-11.41	47626.24	23.46		
delta	E	2031-12-20T06:21:48.185		9.11	-11.32	48300.35	23.46		
lambda	E	2031-12-20T06:23:01.755		8.91	-11.11	50026.71	23.47		
epsilon	E	2031-12-20T06:23:36.013		8.81	-11.02	50830.65	23.46		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-20T05:52:44.760
 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 : 3404504370904534912
 2Mass ID (if available) : 05363983+2329013
 ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.866
 G magnitude : 18.027
 RP magnitude : 17.068
 BP magnitude : 18.981
 DUPflag : 0
 Distance (au) : 18.104
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 176.96
 Sun-Moon sep (deg) : 97.55
 B (ring opening deg) : 79.48
 PA of pole (deg) : 39.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.056
 C/A sky separation (km) : 733.0
 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



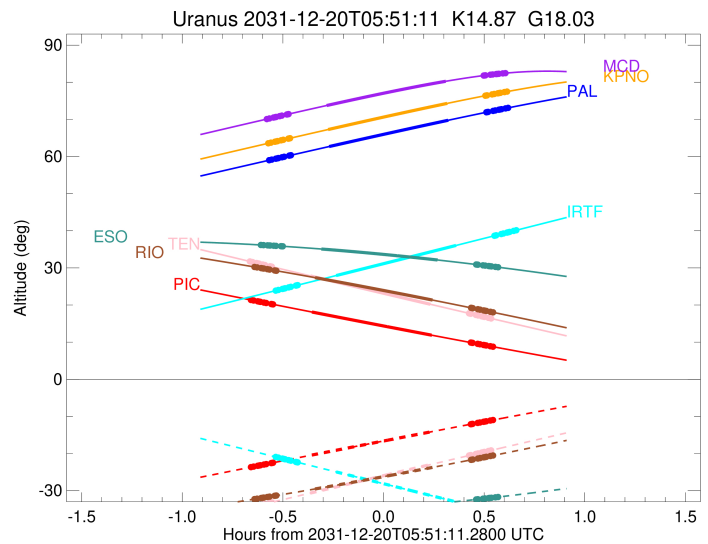
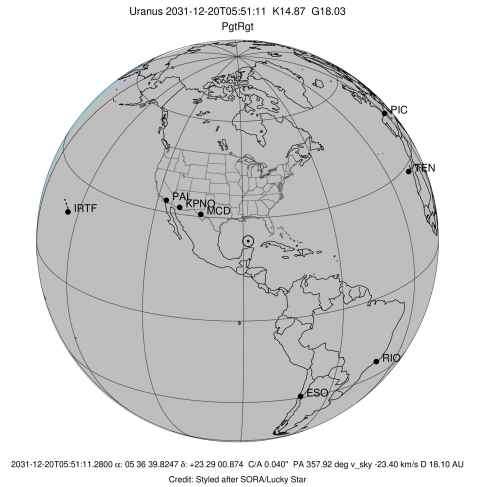
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-20T05:16:53.956		58.97	-56.22	51441.56	-23.89		
lambda	I	2031-12-20T05:17:53.180		59.17	-56.42	50026.71	-23.89		
delta	I	2031-12-20T05:19:05.442		59.42	-56.67	48300.35	-23.89		
gamma	I	2031-12-20T05:19:33.635		59.52	-56.77	47626.79	-23.89		
eta	I	2031-12-20T05:19:52.499		59.59	-56.83	47176.12	-23.89		
beta	I	2031-12-20T05:20:55.052		59.80	-57.05	45681.23	-23.89		
alpha	I	2031-12-20T05:21:34.322		59.94	-57.19	44743.89	-23.89		
4	I	2031-12-20T05:23:05.190		60.25	-57.50	42570.33	-23.89		
5	I	2031-12-20T05:23:22.693		60.31	-57.56	42157.71	-23.89		
6	I	2031-12-20T05:23:36.886		60.36	-57.61	41819.74	-23.89		
Uranus	I	2031-12-20T05:34:58.639		62.69	-59.95	25326.75		-6.65	-6.96
Uranus	E	2031-12-20T06:10:28.939		69.77	-67.14	25293.89		7.12	7.45
6	E	2031-12-20T06:21:51.459		71.92	-69.36	41853.19	23.94		
5	E	2031-12-20T06:22:10.712		71.98	-69.42	42313.10	23.94		
4	E	2031-12-20T06:22:21.853		72.02	-69.45	42573.76	23.93		
alpha	E	2031-12-20T06:23:50.253		72.29	-69.74	44692.35	23.94		
beta	E	2031-12-20T06:24:29.924		72.41	-69.86	45641.06	23.94		
eta	E	2031-12-20T06:25:34.032		72.61	-70.07	47176.12	23.94		
gamma	E	2031-12-20T06:25:52.822		72.66	-70.13	47625.92	23.94		
delta	E	2031-12-20T06:26:20.995		72.75	-70.22	48300.35	23.94		
lambda	E	2031-12-20T06:27:33.109		72.97	-70.45	50026.71	23.94		
epsilon	E	2031-12-20T06:28:07.319		73.07	-70.55	50845.74	23.94		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-20T05:52:27.120
 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 : 3404504370904534912
 2Mass ID (if available) : 05363983+2329013
 ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.866
 G magnitude : 18.027
 RP magnitude : 17.068
 BP magnitude : 18.981
 DUPflag : 0
 Distance (au) : 18.104
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 176.96
 Sun-Moon sep (deg) : 97.57
 B (ring opening deg) : 79.48
 PA of pole (deg) : 39.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.038
 C/A sky separation (km) : 496.1
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



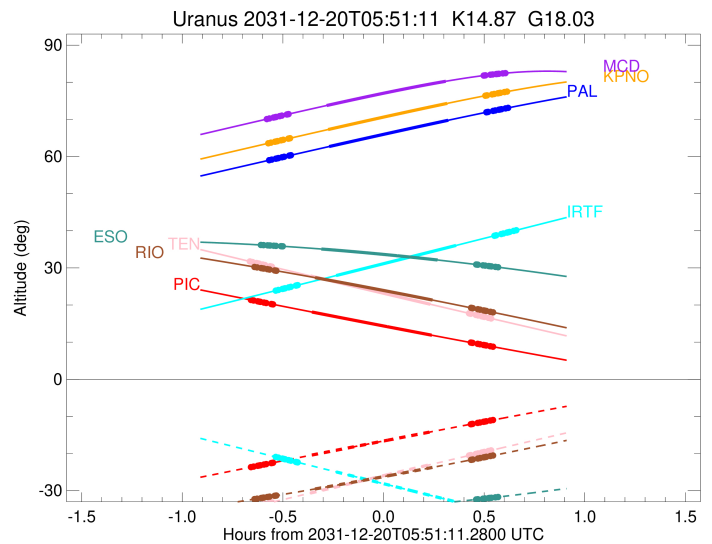
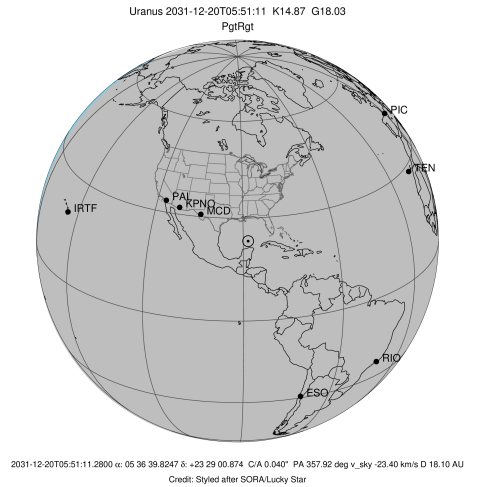
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-20T05:16:38.274		63.53	-60.75	51443.00	-23.91		
lambda	I	2031-12-20T05:17:37.495		63.74	-60.96	50026.71	-23.92		
delta	I	2031-12-20T05:18:49.680		63.99	-61.21	48300.35	-23.92		
gamma	I	2031-12-20T05:19:17.844		64.09	-61.31	47626.76	-23.92		
eta	I	2031-12-20T05:19:36.687		64.15	-61.37	47176.12	-23.92		
beta	I	2031-12-20T05:20:39.173		64.37	-61.59	45681.23	-23.92		
alpha	I	2031-12-20T05:21:18.396		64.51	-61.73	44744.02	-23.92		
4	I	2031-12-20T05:22:49.183		64.82	-62.05	42570.06	-23.92		
5	I	2031-12-20T05:23:06.665		64.88	-62.11	42157.58	-23.92		
6	I	2031-12-20T05:23:20.826		64.93	-62.16	41819.97	-23.92		
Uranus	I	2031-12-20T05:34:41.903		67.28	-64.52	25321.25		-6.73	-7.05
Uranus	E	2031-12-20T06:10:10.935		74.32	-71.72	25298.90		7.05	7.38
6	E	2031-12-20T06:21:32.849		76.39	-73.91	41853.40	23.95		
5	E	2031-12-20T06:21:52.077		76.44	-73.97	42313.00	23.95		
4	E	2031-12-20T06:22:03.202		76.48	-74.00	42573.53	23.95		
alpha	E	2031-12-20T06:23:31.552		76.73	-74.28	44692.45	23.95		
beta	E	2031-12-20T06:24:11.191		76.85	-74.40	45641.06	23.95		
eta	E	2031-12-20T06:25:15.254		77.03	-74.60	47176.12	23.95		
gamma	E	2031-12-20T06:25:34.030		77.08	-74.66	47625.89	23.96		
delta	E	2031-12-20T06:26:02.185		77.16	-74.74	48300.35	23.96		
lambda	E	2031-12-20T06:27:14.249		77.36	-74.96	50026.71	23.96		
epsilon	E	2031-12-20T06:27:48.483		77.46	-75.07	50846.86	23.96		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-20T05:51:59.080
 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 : 3404504370904534912
 2Mass ID (if available) : 05363983+2329013
 ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.866
 G magnitude : 18.027
 RP magnitude : 17.068
 BP magnitude : 18.981
 DUPflag : 0
 Distance (au) : 18.104
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 176.96
 Sun-Moon sep (deg) : 97.59
 B (ring opening deg) : 79.48
 PA of pole (deg) : 39.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.020
 C/A sky separation (km) : 257.0
 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_itrff93_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	2031-12-20T05:16:12.417		70.05	-67.27	51444.53	-23.94		
lambda	I	2031-12-20T05:17:11.632		70.25	-67.48	50026.71	-23.94		
delta	I	2031-12-20T05:18:23.732		70.50	-67.73	48300.35	-23.94		
gamma	I	2031-12-20T05:18:51.865		70.60	-67.83	47626.73	-23.94		
eta	I	2031-12-20T05:19:10.684		70.67	-67.89	47176.12	-23.94		
beta	I	2031-12-20T05:20:13.097		70.88	-68.11	45681.23	-23.94		
alpha	I	2031-12-20T05:20:52.269		71.02	-68.25	44744.16	-23.94		
4	I	2031-12-20T05:22:22.968		71.33	-68.57	42569.77	-23.94		
5	I	2031-12-20T05:22:40.426		71.39	-68.63	42157.45	-23.95		
6	I	2031-12-20T05:22:54.553		71.44	-68.68	41820.23	-23.95		
Uranus	I	2031-12-20T05:34:14.925		73.75	-71.03	25315.50		-6.81	-7.13
Uranus	E	2031-12-20T06:09:42.448		80.26	-77.97	25303.81		6.98	7.31
6	E	2031-12-20T06:21:03.828		81.82	-79.90	41853.60	23.97		
5	E	2031-12-20T06:21:23.033		81.85	-79.95	42312.90	23.97		
4	E	2031-12-20T06:21:34.143		81.87	-79.98	42573.31	23.97		
alpha	E	2031-12-20T06:23:02.452		82.04	-80.21	44692.55	23.97		
beta	E	2031-12-20T06:23:42.063		82.11	-80.31	45641.06	23.97		
eta	E	2031-12-20T06:24:46.087		82.21	-80.47	47176.12	23.97		
gamma	E	2031-12-20T06:25:04.851		82.24	-80.52	47625.87	23.97		
delta	E	2031-12-20T06:25:32.991		82.29	-80.58	48300.35	23.97		
lambda	E	2031-12-20T06:26:45.013		82.40	-80.76	50026.71	23.97		
epsilon	E	2031-12-20T06:27:19.273		82.44	-80.84	50847.93	23.97		

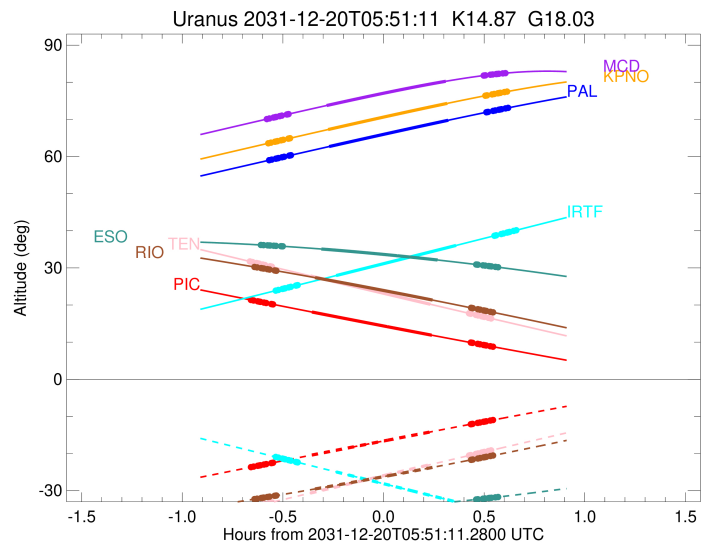
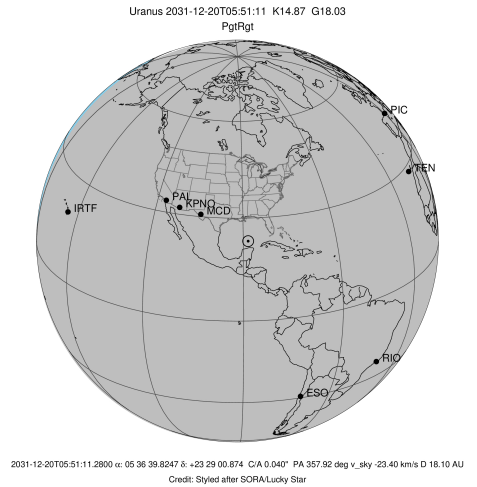
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-20T05:47:16.660
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3404504370904534912
 2Mass ID (if available) : 05363983+2329013
 ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.866
 G magnitude : 18.027
 RP magnitude : 17.068
 BP magnitude : 18.981
 DUPflag : 0
 Distance (au) : 18.104
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 176.96
 Sun-Moon sep (deg) : 96.90
 B (ring opening deg) : 79.48
 PA of pole (deg) : 39.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.104
 C/A sky separation (km) : 1361.1
 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	2031-12-20T05:11:09.082		31.78	-34.60	51440.86	-23.74		
lambda	I	2031-12-20T05:12:08.646		31.57	-34.38	50026.71	-23.74		
delta	I	2031-12-20T05:13:21.369		31.30	-34.12	48300.35	-23.74		
gamma	I	2031-12-20T05:13:49.744		31.20	-34.02	47626.81	-23.74		
eta	I	2031-12-20T05:14:08.732		31.13	-33.95	47176.12	-23.74		
beta	I	2031-12-20T05:15:11.698		30.91	-33.72	45681.23	-23.73		
alpha	I	2031-12-20T05:15:51.237		30.76	-33.58	44743.79	-23.73		
4	I	2031-12-20T05:17:22.716		30.43	-33.25	42570.57	-23.73		
5	I	2031-12-20T05:17:40.344		30.37	-33.18	42157.83	-23.73		
6	I	2031-12-20T05:17:54.651		30.32	-33.13	41819.53	-23.73		
Uranus	I	2031-12-20T05:29:21.664		27.85	-30.66	25335.07		-6.53	-6.84
Uranus	E	2031-12-20T06:05:10.485		20.20	-22.99	25274.35		7.38	7.72
6	E	2031-12-20T06:16:41.972		17.76	-20.54	41852.22	23.62		
5	E	2031-12-20T06:17:01.532		17.69	-20.48	42313.52	23.62		
4	E	2031-12-20T06:17:12.861		17.65	-20.44	42574.86	23.62		
alpha	E	2031-12-20T06:18:42.364		17.34	-20.12	44691.85	23.62		
beta	E	2031-12-20T06:19:22.587		17.20	-19.98	45641.08	23.62		
eta	E	2031-12-20T06:20:27.555		16.97	-19.75	47176.12	23.62		
gamma	E	2031-12-20T06:20:46.603		16.90	-19.68	47626.04	23.62		
delta	E	2031-12-20T06:21:15.152		16.80	-19.58	48300.35	23.62		
lambda	E	2031-12-20T06:22:28.246		16.55	-19.33	50026.71	23.62		
epsilon	E	2031-12-20T06:23:02.679		16.43	-19.20	50839.95	23.61		

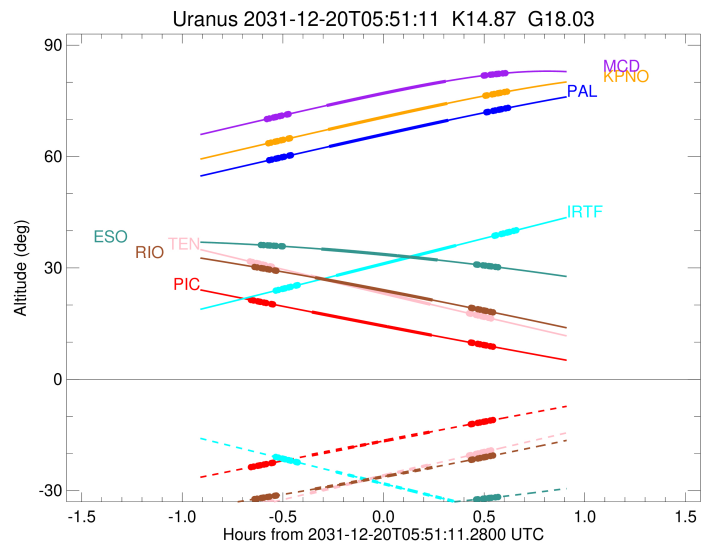
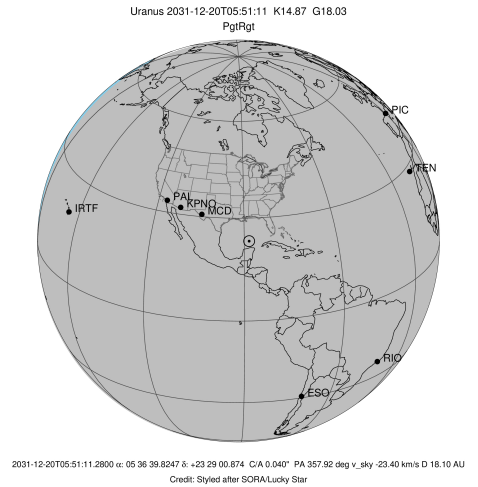
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-20T05:54:58.210
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : IRTF
Location            : Mauna Kea/IRTF
Latitude (deg)      : 19.82622
E. Longitude (deg)  : 204.52800
Altitude (km)       : 4.168
Gaia source ID      : 3404504370904534912
2Mass ID (if available) : 05363983+2329013
ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 14.866
G magnitude          : 18.027
RP magnitude         : 17.068
BP magnitude         : 18.981
DUPflag             : 0
Distance (au)       : 18.104
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.40
Sun-Target sep (deg) : 176.96
Sun-Moon sep (deg)  : 97.23
B (ring opening deg) : 79.48
PA of pole (deg)    : 39.10
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.034
C/A sky separation (km) : 446.8
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



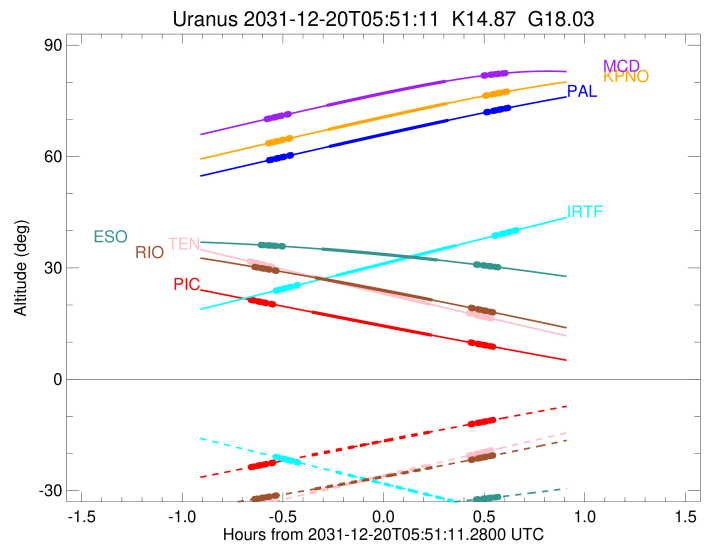
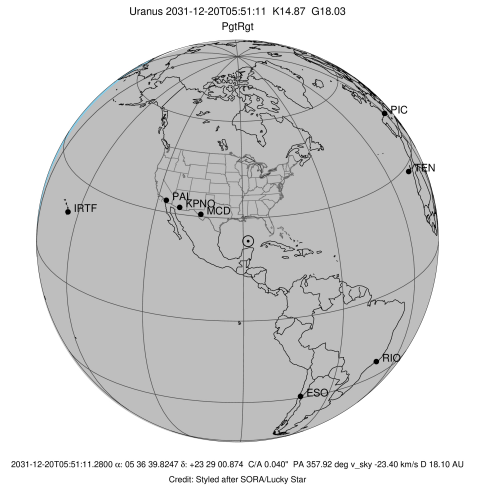
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-20T05:18:51.554		23.83	-20.88	51442.19	-23.70		
lambda	I	2031-12-20T05:19:51.279		24.06	-21.10	50026.71	-23.70		
delta	I	2031-12-20T05:21:04.116		24.33	-21.37	48300.35	-23.70		
gamma	I	2031-12-20T05:21:32.534		24.44	-21.48	47626.78	-23.70		
eta	I	2031-12-20T05:21:51.546		24.51	-21.55	47176.12	-23.70		
beta	I	2031-12-20T05:22:54.591		24.75	-21.78	45681.23	-23.70		
alpha	I	2031-12-20T05:23:34.167		24.89	-21.93	44743.96	-23.71		
4	I	2031-12-20T05:25:05.752		25.24	-22.27	42570.18	-23.71		
5	I	2031-12-20T05:25:23.389		25.30	-22.34	42157.64	-23.71		
6	I	2031-12-20T05:25:37.682		25.36	-22.39	41819.87	-23.71		
Uranus	I	2031-12-20T05:37:04.563		27.94	-24.96	25322.40		-6.71	-7.03
Uranus	E	2031-12-20T06:12:49.632		36.05	-33.02	25302.40		7.00	7.33
6	E	2031-12-20T06:24:15.813		38.66	-35.61	41853.61	23.81		
5	E	2031-12-20T06:24:35.145		38.73	-35.69	42312.90	23.81		
4	E	2031-12-20T06:24:46.328		38.77	-35.73	42573.28	23.81		
alpha	E	2031-12-20T06:26:15.220		39.11	-36.07	44692.57	23.81		
beta	E	2031-12-20T06:26:55.087		39.26	-36.22	45641.06	23.81		
eta	E	2031-12-20T06:27:59.526		39.51	-36.46	47176.12	23.82		
gamma	E	2031-12-20T06:28:18.409		39.58	-36.53	47625.86	23.82		
delta	E	2031-12-20T06:28:46.729		39.69	-36.64	48300.35	23.82		
lambda	E	2031-12-20T06:29:59.208		39.96	-36.91	50026.71	23.82		
epsilon	E	2031-12-20T06:30:33.698		40.10	-37.04	50848.29	23.82		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-20T05:48:11.720
 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 : 3404504370904534912
 2Mass ID (if available) : 05363983+2329013
 ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.866
 G magnitude : 18.027
 RP magnitude : 17.068
 BP magnitude : 18.981
 DUPflag : 0
 Distance (au) : 18.104
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 176.96
 Sun-Moon sep (deg) : 96.93
 B (ring opening deg) : 79.48
 PA of pole (deg) : 39.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.349
 C/A sky separation (km) : 4586.5
 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	2031-12-20T05:12:30.243		30.29	-32.31	51471.53	-23.82		
lambda	I	2031-12-20T05:13:30.923		30.13	-32.16	50026.71	-23.81		
delta	I	2031-12-20T05:14:43.453		29.94	-31.99	48300.35	-23.80		
gamma	I	2031-12-20T05:15:11.786		29.87	-31.92	47626.15	-23.79		
eta	I	2031-12-20T05:15:30.701		29.82	-31.87	47176.12	-23.79		
beta	I	2031-12-20T05:16:33.531		29.66	-31.72	45681.10	-23.78		
alpha	I	2031-12-20T05:17:12.867		29.55	-31.62	44746.56	-23.78		
4	I	2031-12-20T05:18:44.560		29.31	-31.39	42564.27	-23.75		
5	I	2031-12-20T05:19:02.066		29.27	-31.35	42155.54	-23.76		
6	I	2031-12-20T05:19:15.983		29.23	-31.31	41825.18	-23.76		
Uranus	I	2031-12-20T05:30:46.250		27.38	-29.55	25203.28		-8.27	-8.66
Uranus	E	2031-12-20T06:05:46.890		21.34	-23.74	25404.16		5.41	5.67
6	E	2031-12-20T06:17:18.328		19.24	-21.71	41857.82	23.68		
5	E	2031-12-20T06:17:37.505		19.18	-21.65	42310.34	23.68		
4	E	2031-12-20T06:17:48.598		19.15	-21.62	42568.40	23.67		
alpha	E	2031-12-20T06:19:18.290		18.87	-21.35	44694.93	23.69		
beta	E	2031-12-20T06:19:58.265		18.75	-21.23	45641.13	23.69		
eta	E	2031-12-20T06:21:03.023		18.55	-21.04	47176.12	23.70		
gamma	E	2031-12-20T06:21:21.978		18.49	-20.98	47625.36	23.70		
delta	E	2031-12-20T06:21:50.454		18.40	-20.90	48300.35	23.70		
lambda	E	2031-12-20T06:23:03.272		18.18	-20.68	50026.71	23.71		
epsilon	E	2031-12-20T06:23:38.973		18.07	-20.57	50873.28	23.73		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-20T05:49:54.560
 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 : 3404504370904534912
 2Mass ID (if available) : 05363983+2329013
 ICRS Star Coord at Epoch: 05h 36m 39.82474s +23:29:00.87396s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.866
 G magnitude : 18.027
 RP magnitude : 17.068
 BP magnitude : 18.981
 DUPflag : 0
 Distance (au) : 18.104
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.40
 Sun-Target sep (deg) : 176.96
 Sun-Moon sep (deg) : 97.11
 B (ring opening deg) : 79.48
 PA of pole (deg) : 39.10
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.426
 C/A sky separation (km) : 5591.0
 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_itrff93_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	2031-12-20T05:14:24.498		36.19	-36.85	51475.63	-23.84		
lambda	I	2031-12-20T05:15:25.321		36.13	-36.81	50026.71	-23.82		
delta	I	2031-12-20T05:16:37.824		36.07	-36.76	48300.35	-23.80		
gamma	I	2031-12-20T05:17:06.153		36.05	-36.74	47626.05	-23.80		
eta	I	2031-12-20T05:17:25.060		36.03	-36.73	47176.12	-23.80		
beta	I	2031-12-20T05:18:27.881		35.97	-36.69	45681.05	-23.78		
alpha	I	2031-12-20T05:19:07.197		35.94	-36.66	44746.93	-23.78		
4	I	2031-12-20T05:20:38.950		35.85	-36.59	42563.33	-23.75		
5	I	2031-12-20T05:20:56.440		35.83	-36.58	42155.33	-23.75		
6	I	2031-12-20T05:21:10.308		35.82	-36.57	41826.05	-23.75		
Uranus	I	2031-12-20T05:32:42.284		35.08	-35.99	25182.93		-8.51	-8.91
Uranus	E	2031-12-20T06:07:17.772		32.13	-33.46	25425.63		5.02	5.26
6	E	2031-12-20T06:18:49.437		30.92	-32.38	41858.83	23.72		
5	E	2031-12-20T06:19:08.512		30.88	-32.35	42309.56	23.71		
4	E	2031-12-20T06:19:19.554		30.86	-32.33	42567.18	23.71		
alpha	E	2031-12-20T06:20:49.161		30.70	-32.18	44695.56	23.74		
beta	E	2031-12-20T06:21:29.028		30.62	-32.11	45641.18	23.74		
eta	E	2031-12-20T06:22:33.639		30.50	-32.01	47176.12	23.76		
gamma	E	2031-12-20T06:22:52.542		30.47	-31.97	47625.23	23.76		
delta	E	2031-12-20T06:23:20.954		30.41	-31.92	48300.35	23.76		
lambda	E	2031-12-20T06:24:33.584		30.27	-31.80	50026.71	23.77		
epsilon	E	2031-12-20T06:25:09.477		30.21	-31.74	50880.15	23.80		