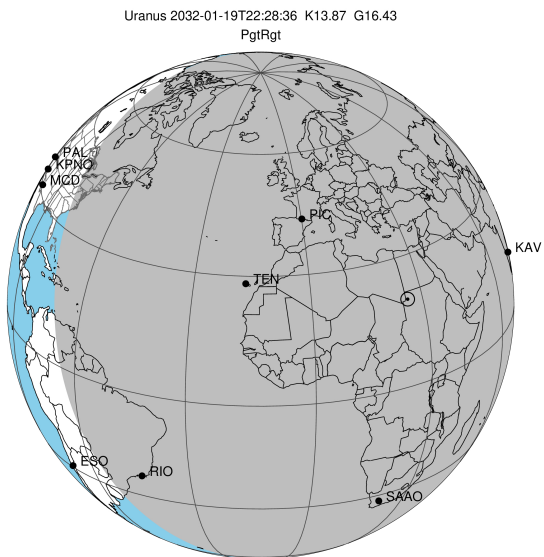


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-19T22:28:36.410
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3416547944535579520
 2Mass ID (if available) : 05312704+2326016

ICRS Star Coord at Epoch: 05h 31m 27.04261s +23:26:01.54681s

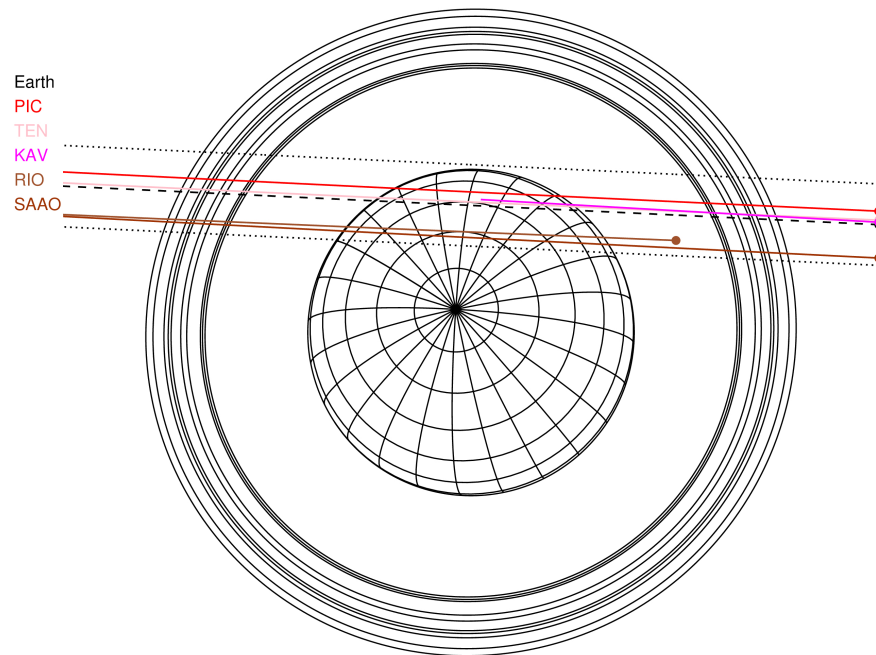
RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.868
 G magnitude : 16.427
 RP magnitude : 15.591
 BP magnitude : 17.125
 DUPflag : 0
 Distance (au) : 18.271
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.90
 Sun-Target sep (deg) : 144.50
 Sun-Moon sep (deg) : 49.37
 B (ring opening deg) : 80.22
 PA of pole (deg) : 33.36

#	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



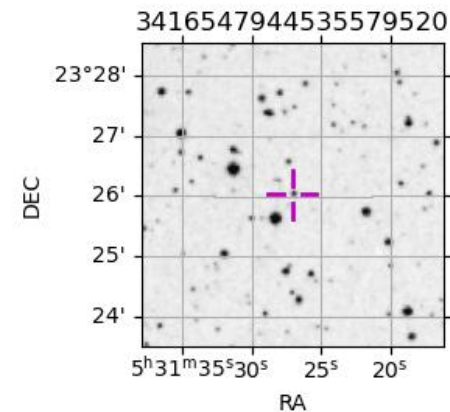
2032-01-19T22:28:36.4100 ex: 05 31 27.0426 s: +23 26 01.547 C/A 1.5077 PA 177.30 deg v_sky -17.90 km/s D 18.27 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2032-01-19T22:28:36 K13.87 G16.43 PgtRgt



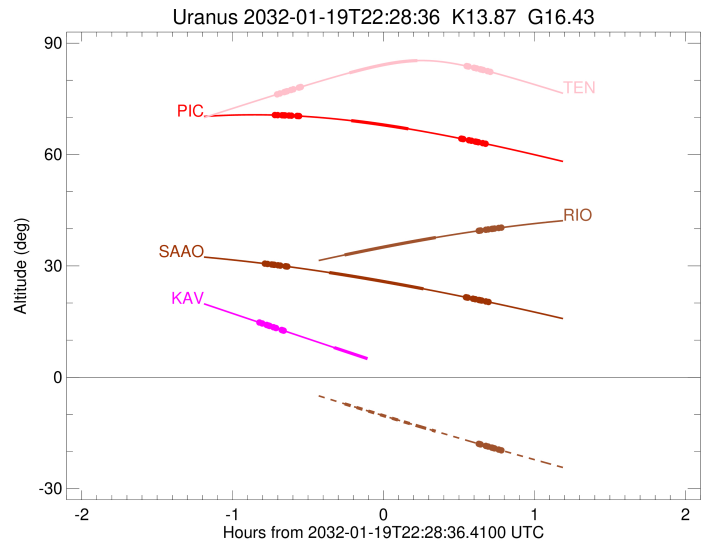
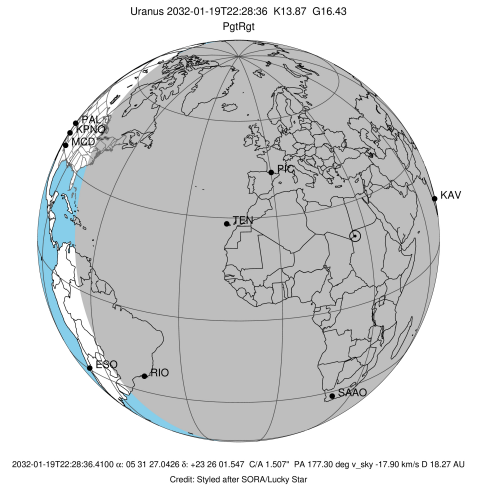
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	JAN 19 21:45 - JAN 19 23:08	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	+++++	+ +	+++++	JAN 19 21:45 - JAN 19 23:10	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+		JAN 19 21:38 - JAN 19 22:08	PinRin
RIO	Rio de Janeiro	-22.9	316.8		+ +	+++++	JAN 19 22:13 - JAN 19 23:15	PieRne
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	+++++	+ +	+++++	JAN 19 21:41 - JAN 19 23:09	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



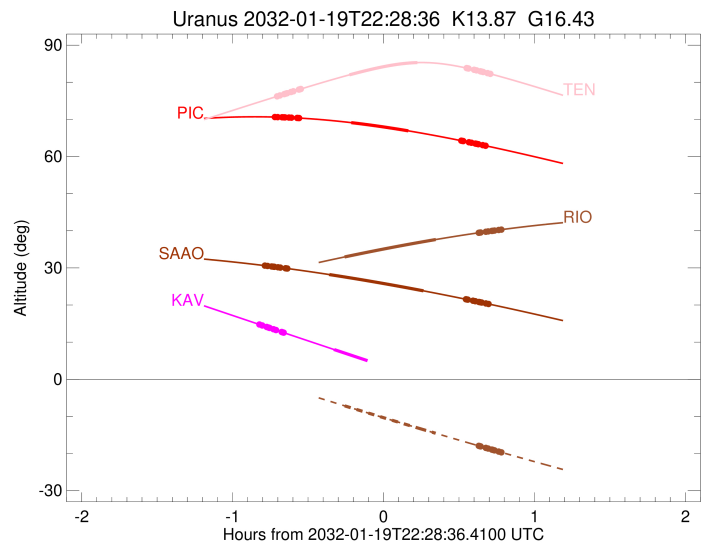
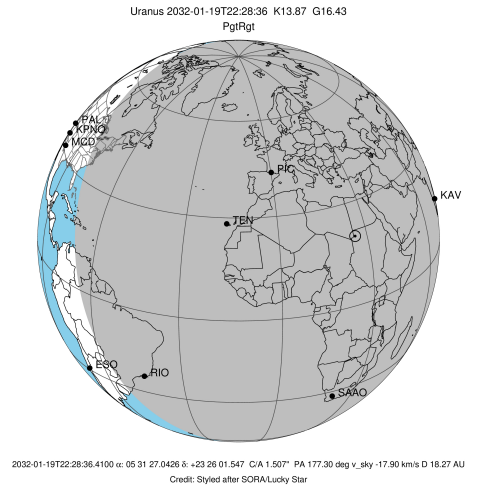
3416547944535579520

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-19T22:27:33.350
 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 : 3416547944535579520
 2Mass ID (if available) : 05312704+2326016
 ICRS Star Coord at Epoch: 05h 31m 27.04261s +23:26:01.54681s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.868
 G magnitude : 16.427
 RP magnitude : 15.591
 BP magnitude : 17.125
 DUPflag : 0
 Distance (au) : 18.271
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.90
 Sun-Target sep (deg) : 144.50
 Sun-Moon sep (deg) : 50.15
 B (ring opening deg) : 80.22
 PA of pole (deg) : 33.36
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.659
 C/A sky separation (km) : 21984.7
 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



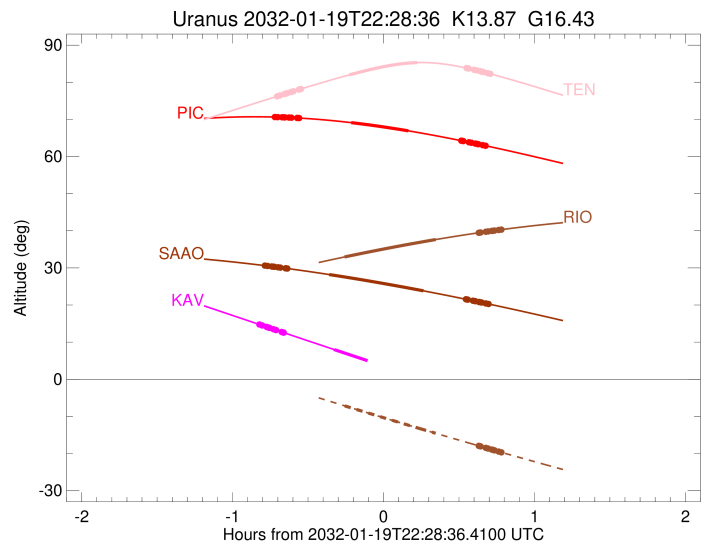
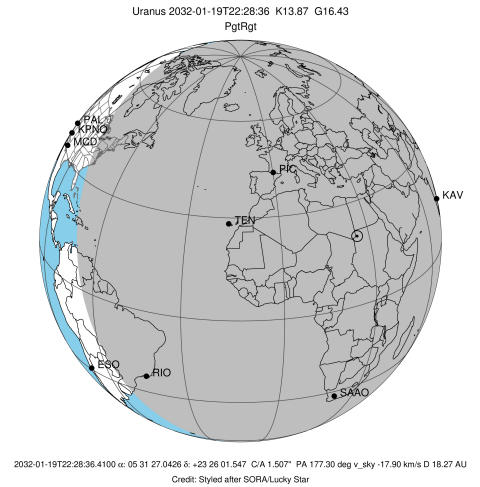
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-19T21:45:03.286		70.64	-52.24	51512.88	-16.53		
lambda	I	2032-01-19T21:46:33.363		70.62	-52.49	50026.71	-16.44		
delta	I	2032-01-19T21:48:18.836		70.58	-52.78	48300.35	-16.29		
gamma	I	2032-01-19T21:49:00.409		70.56	-52.90	47624.33	-16.23		
eta	I	2032-01-19T21:49:28.062		70.55	-52.97	47176.12	-16.19		
beta	I	2032-01-19T21:51:01.068		70.50	-53.23	45677.82	-16.03		
alpha	I	2032-01-19T21:51:58.994		70.47	-53.39	44752.38	-15.93		
4	I	2032-01-19T21:54:19.359		70.39	-53.77	42536.18	-15.65		
5	I	2032-01-19T21:54:42.742		70.38	-53.83	42170.13	-15.58		
6	I	2032-01-19T21:55:02.808		70.36	-53.89	41858.30	-15.54		
Uranus	I	2032-01-19T22:15:48.984		69.13	-57.15	25465.23		3.90	4.08
Uranus	E	2032-01-19T22:38:25.945		66.93	-60.41	24999.94		9.69	10.14
6	E	2032-01-19T22:59:27.354		64.28	-63.06	41794.85	15.51		
5	E	2032-01-19T22:59:55.283		64.22	-63.12	42221.32	15.55		
4	E	2032-01-19T23:00:20.346		64.16	-63.17	42612.74	15.62		
alpha	E	2032-01-19T23:02:32.658		63.85	-63.41	44699.90	15.90		
beta	E	2032-01-19T23:03:33.116		63.71	-63.53	45661.92	16.00		
eta	E	2032-01-19T23:05:07.281		63.49	-63.70	47176.12	16.15		
gamma	E	2032-01-19T23:05:35.433		63.42	-63.75	47631.45	16.20		
delta	E	2032-01-19T23:06:16.655		63.33	-63.82	48300.35	16.26		
lambda	E	2032-01-19T23:08:02.362		63.07	-64.01	50026.71	16.40		
epsilon	E	2032-01-19T23:08:48.330		62.96	-64.09	50782.11	16.49		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-19T22:28:57.290
 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 : 3416547944535579520
 2Mass ID (if available) : 05312704+2326016
 ICRS Star Coord at Epoch: 05h 31m 27.04261s +23:26:01.54681s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.868
 G magnitude : 16.427
 RP magnitude : 15.591
 BP magnitude : 17.125
 DUPflag : 0
 Distance (au) : 18.271
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.90
 Sun-Target sep (deg) : 144.50
 Sun-Moon sep (deg) : 50.06
 B (ring opening deg) : 80.22
 PA of pole (deg) : 33.36
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.541
 C/A sky separation (km) : 20422.0
 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



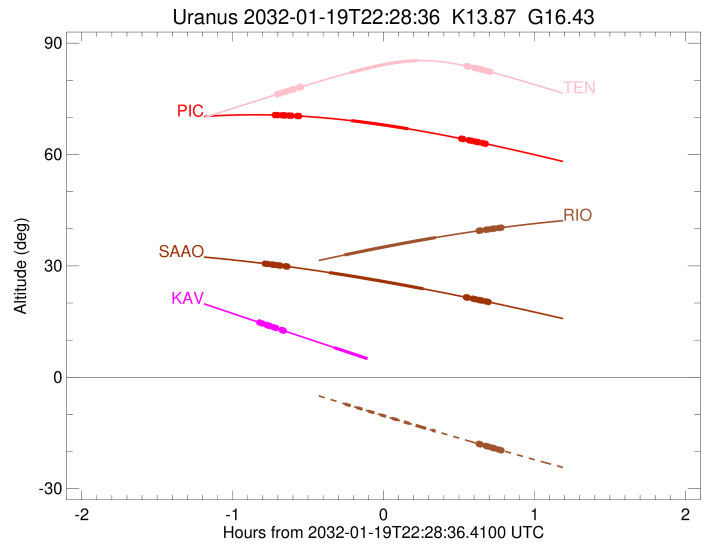
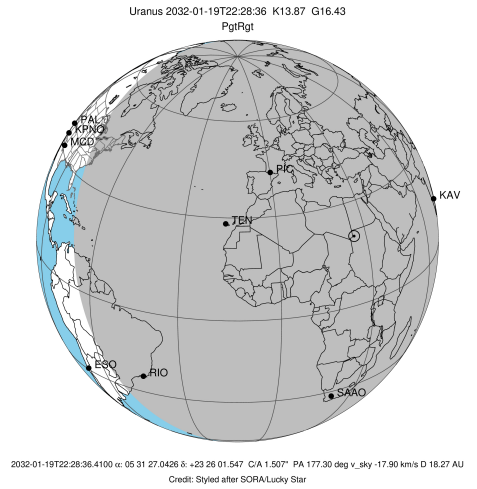
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-19T21:45:57.955		76.14	-41.68	51518.37	-16.84		
lambda	I	2032-01-19T21:47:26.672		76.46	-42.00	50026.71	-16.76		
delta	I	2032-01-19T21:49:10.032		76.82	-42.38	48300.35	-16.64		
gamma	I	2032-01-19T21:49:50.736		76.96	-42.53	47624.15	-16.59		
eta	I	2032-01-19T21:50:17.780		77.06	-42.63	47176.12	-16.55		
beta	I	2032-01-19T21:51:48.699		77.37	-42.96	45677.40	-16.42		
alpha	I	2032-01-19T21:52:45.205		77.57	-43.17	44752.43	-16.33		
4	I	2032-01-19T21:55:01.971		78.05	-43.67	42535.05	-16.10		
5	I	2032-01-19T21:55:24.479		78.12	-43.76	42172.11	-16.04		
6	I	2032-01-19T21:55:44.021		78.19	-43.83	41859.81	-16.00		
Uranus	I	2032-01-19T22:15:02.908		82.00	-48.08	25507.49		2.88	3.02
Uranus	E	2032-01-19T22:42:03.665		85.31	-54.03	24990.20		9.78	10.23
6	E	2032-01-19T23:01:35.246		83.84	-58.32	41794.76	16.00		
5	E	2032-01-19T23:02:02.565		83.77	-58.41	42224.94	16.03		
4	E	2032-01-19T23:02:26.682		83.71	-58.50	42613.52	16.10		
alpha	E	2032-01-19T23:04:35.204		83.38	-58.97	44698.71	16.33		
beta	E	2032-01-19T23:05:34.120		83.22	-59.19	45661.09	16.42		
eta	E	2032-01-19T23:07:06.029		82.96	-59.52	47176.12	16.55		
gamma	E	2032-01-19T23:07:33.515		82.89	-59.62	47631.40	16.58		
delta	E	2032-01-19T23:08:13.793		82.77	-59.77	48300.35	16.63		
lambda	E	2032-01-19T23:09:57.178		82.47	-60.14	50026.71	16.76		
epsilon	E	2032-01-19T23:10:41.825		82.34	-60.31	50776.11	16.83		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-19T22:22:34.080
 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 : 3416547944535579520
 2Mass ID (if available) : 05312704+2326016
 ICRS Star Coord at Epoch: 05h 31m 27.04261s +23:26:01.54681s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.868
 G magnitude : 16.427
 RP magnitude : 15.591
 BP magnitude : 17.125
 DUPflag : 0
 Distance (au) : 18.271
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.90
 Sun-Target sep (deg) : 144.50
 Sun-Moon sep (deg) : 50.02
 B (ring opening deg) : 80.22
 PA of pole (deg) : 33.36
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.575
 C/A sky separation (km) : 20875.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



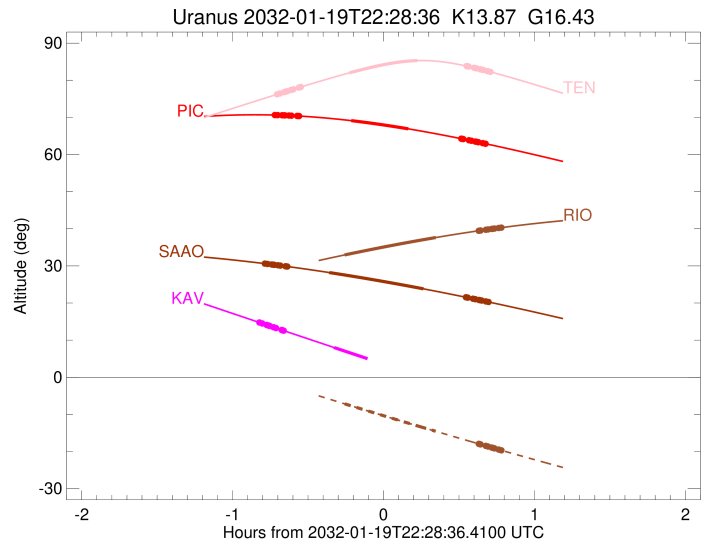
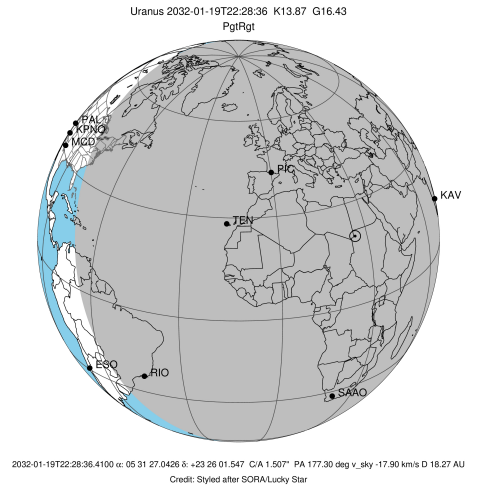
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-19T21:38:54.842		14.84	-50.12	51518.81	-16.49		
lambda	I	2032-01-19T21:40:25.470		14.49	-49.76	50026.71	-16.41		
delta	I	2032-01-19T21:42:11.087		14.09	-49.35	48300.35	-16.28		
gamma	I	2032-01-19T21:42:52.699		13.93	-49.19	47624.15	-16.22		
eta	I	2032-01-19T21:43:20.352		13.83	-49.08	47176.12	-16.18		
beta	I	2032-01-19T21:44:53.359		13.48	-48.72	45677.38	-16.05		
alpha	I	2032-01-19T21:45:51.194		13.26	-48.50	44752.43	-15.95		
4	I	2032-01-19T21:48:11.285		12.72	-47.95	42535.06	-15.71		
5	I	2032-01-19T21:48:34.359		12.64	-47.86	42172.09	-15.64		
6	I	2032-01-19T21:48:54.394		12.56	-47.78	41859.79	-15.61		
Uranus	I	2032-01-19T22:08:57.097		8.01	-43.09	25501.11		3.06	3.20
Uranus	E	2032-01-19T22:35:21.797		2.06x	-36.89	24991.90		9.76	10.21
6	E	2032-01-19T22:55:44.625		-2.49x	-32.12	41794.80	15.48		
5	E	2032-01-19T22:56:12.739		-2.60x	-32.01	42223.09	15.51		
4	E	2032-01-19T22:56:37.773		-2.69x	-31.91	42613.13	15.57		
alpha	E	2032-01-19T22:58:50.606		-3.18x	-31.39	44699.34	15.81		
beta	E	2032-01-19T22:59:51.438		-3.41x	-31.15	45661.53	15.90		
eta	E	2032-01-19T23:01:26.300		-3.76x	-30.78	47176.12	16.03		
gamma	E	2032-01-19T23:01:54.675		-3.86x	-30.67	47631.42	16.06		
delta	E	2032-01-19T23:02:36.247		-4.02x	-30.51	48300.35	16.12		
lambda	E	2032-01-19T23:04:22.940		-4.41x	-30.09	50026.71	16.24		
epsilon	E	2032-01-19T23:05:09.214		-4.58x	-29.91	50779.45	16.32		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-19T22:31:34.760
 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 : 3416547944535579520
 2Mass ID (if available) : 05312704+2326016
 ICRS Star Coord at Epoch: 05h 31m 27.04261s +23:26:01.54681s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.868
 G magnitude : 16.427
 RP magnitude : 15.591
 BP magnitude : 17.125
 DUPflag : 0
 Distance (au) : 18.271
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.90
 Sun-Target sep (deg) : 144.50
 Sun-Moon sep (deg) : 49.49
 B (ring opening deg) : 80.22
 PA of pole (deg) : 33.36
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.186
 C/A sky separation (km) : 15721.1
 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_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	2032-01-19T21:46:51.286		28.98	-1.62x	51532.82	-17.41		
lambda	I	2032-01-19T21:48:17.833		29.21	-1.93x	50026.71	-17.37		
delta	I	2032-01-19T21:49:57.391		29.47	-2.28x	48300.35	-17.30		
gamma	I	2032-01-19T21:50:36.529		29.57	-2.42x	47623.66	-17.28		
eta	I	2032-01-19T21:51:02.450		29.64	-2.51x	47176.12	-17.25		
beta	I	2032-01-19T21:52:29.571		29.86	-2.82x	45676.01	-17.18		
alpha	I	2032-01-19T21:53:23.438		30.00	-3.01x	44752.27	-17.13		
4	I	2032-01-19T21:55:33.521		30.34	-3.47x	42532.06	-17.01		
5	I	2032-01-19T21:55:54.194		30.39	-3.54x	42178.58	-16.97		
6	I	2032-01-19T21:56:12.852		30.44	-3.61x	41864.04	-16.95		
Uranus	I	2032-01-19T22:13:11.591		32.96	-7.16	25558.11		0.38	0.40
Uranus	E	2032-01-19T22:49:20.137		37.63	-14.54	25028.62		9.43	9.86
6	E	2032-01-19T23:06:25.227		39.46	-17.93	41794.98	17.00		
5	E	2032-01-19T23:06:51.542		39.50	-18.01	42235.24	17.02		
4	E	2032-01-19T23:07:13.718		39.54	-18.08	42615.25	17.06		
alpha	E	2032-01-19T23:09:15.145		39.73	-18.48	44695.55	17.19		
beta	E	2032-01-19T23:10:11.217		39.82	-18.66	45658.73	17.24		
eta	E	2032-01-19T23:11:39.037		39.96	-18.94	47176.12	17.31		
gamma	E	2032-01-19T23:12:05.308		40.00	-19.03	47631.21	17.33		
delta	E	2032-01-19T23:12:43.878		40.06	-19.15	48300.35	17.36		
lambda	E	2032-01-19T23:14:23.091		40.21	-19.47	50026.71	17.44		
epsilon	E	2032-01-19T23:15:05.207		40.28	-19.61	50761.66	17.48		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-19T22:26:01.970
 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 : 3416547944535579520
 2Mass ID (if available) : 05312704+2326016
 ICRS Star Coord at Epoch: 05h 31m 27.04261s +23:26:01.54681s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.868
 G magnitude : 16.427
 RP magnitude : 15.591
 BP magnitude : 17.125
 DUPflag : 0
 Distance (au) : 18.271
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.90
 Sun-Target sep (deg) : 144.50
 Sun-Moon sep (deg) : 49.96
 B (ring opening deg) : 80.22
 PA of pole (deg) : 33.36
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.120
 C/A sky separation (km) : 14839.1
 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_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	2032-01-19T21:41:05.288		30.64	-35.17	51536.36	-17.57		
lambda	I	2032-01-19T21:42:31.284		30.52	-35.27	50026.71	-17.53		
delta	I	2032-01-19T21:44:09.949		30.38	-35.38	48300.35	-17.46		
gamma	I	2032-01-19T21:44:48.734		30.33	-35.42	47623.53	-17.44		
eta	I	2032-01-19T21:45:14.406		30.29	-35.45	47176.12	-17.42		
beta	I	2032-01-19T21:46:40.718		30.16	-35.54	45675.60	-17.35		
alpha	I	2032-01-19T21:47:34.040		30.09	-35.60	44752.15	-17.31		
4	I	2032-01-19T21:49:42.809		29.89	-35.73	42531.36	-17.19		
5	I	2032-01-19T21:50:03.098		29.86	-35.75	42180.42	-17.16		
6	I	2032-01-19T21:50:21.615		29.84	-35.77	41865.09	-17.14		
Uranus	I	2032-01-19T22:07:01.741		28.21	-36.64	25558.90		-0.13	-0.14
Uranus	E	2032-01-19T22:44:28.316		23.82	-37.52	25039.20		9.33	9.76
6	E	2032-01-19T23:01:19.725		21.56	-37.43	41795.05	17.07		
5	E	2032-01-19T23:01:45.999		21.50	-37.42	42236.33	17.08		
4	E	2032-01-19T23:02:08.037		21.45	-37.41	42615.39	17.11		
alpha	E	2032-01-19T23:04:09.100		21.16	-37.38	44695.26	17.23		
beta	E	2032-01-19T23:05:05.062		21.03	-37.36	45658.51	17.27		
eta	E	2032-01-19T23:06:32.767		20.82	-37.33	47176.12	17.33		
gamma	E	2032-01-19T23:06:59.009		20.76	-37.33	47631.19	17.35		
delta	E	2032-01-19T23:07:37.549		20.67	-37.31	48300.35	17.38		
lambda	E	2032-01-19T23:09:16.728		20.43	-37.27	50026.71	17.44		
epsilon	E	2032-01-19T23:09:58.788		20.33	-37.26	50760.59	17.47		