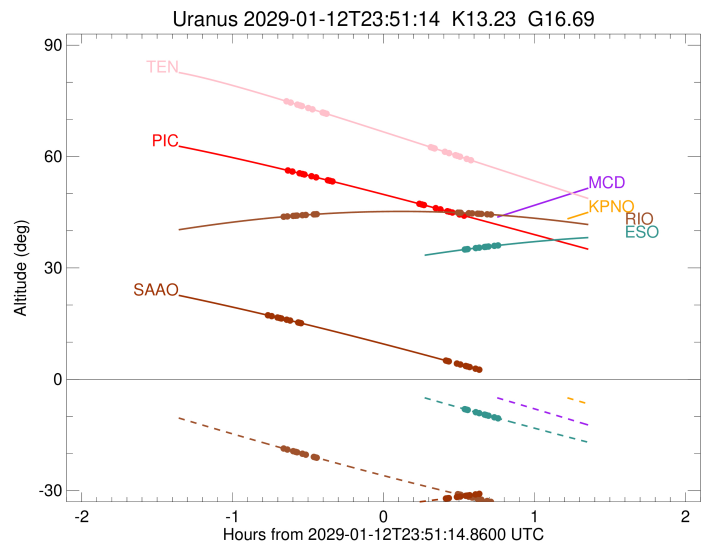
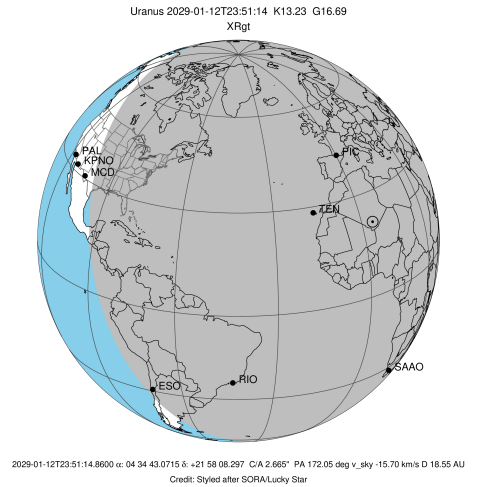


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-12T23:47:32.060
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 145005178316293888
 2Mass ID (if available) : 04344310+2158088
 ICRS Star Coord at Epoch: 04h 34m 43.07147s +21:58:08.29683s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 13.230
 G magnitude : 16.695
 RP magnitude : 15.675
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.548
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.70
 Sun-Target sep (deg) : 137.62
 Sun-Moon sep (deg) : 158.19
 B (ring opening deg) : 79.37
 PA of pole (deg) : -51.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.826
 C/A sky separation (km) : 38017.1
 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

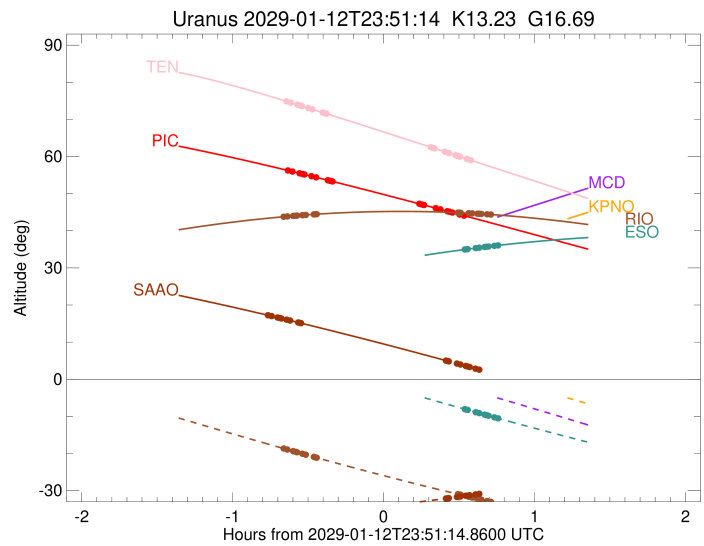
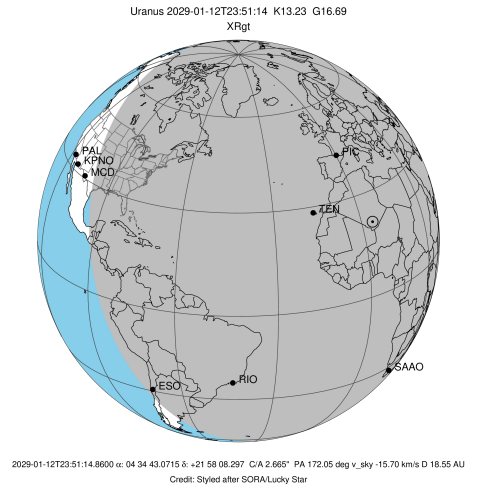


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-01-12T23:13:31.151		56.20	-65.87	50994.39	-10.54		
lambda	I	2029-01-12T23:15:03.362		55.95	-66.02	50026.71	-10.35		
delta	I	2029-01-12T23:17:54.593		55.48	-66.28	48300.35	-9.80		
gamma	I	2029-01-12T23:19:03.841		55.29	-66.39	47630.06	-9.56		
eta	I	2029-01-12T23:19:51.767		55.16	-66.46	47176.12	-9.38		
beta	I	2029-01-12T23:22:38.160		54.70	-66.70	45667.30	-8.74		
alpha	I	2029-01-12T23:24:29.065		54.39	-66.86	44724.68	-8.29		
4	I	2029-01-12T23:29:13.555		53.59	-67.23	42545.44	-6.97		
5	I	2029-01-12T23:30:05.894		53.44	-67.29	42196.81	-6.72		
6	I	2029-01-12T23:31:00.353		53.29	-67.36	41828.67	-6.43		

No planet occultations

6	E	2029-01-13T00:05:32.177		47.26	-68.71	41861.79	6.42		
5	E	2029-01-13T00:06:32.310		47.08	-68.71	42263.43	6.71		
4	E	2029-01-13T00:07:19.570		46.94	-68.72	42584.08	6.96		
alpha	E	2029-01-13T00:12:03.269		46.09	-68.70	44750.81	8.26		
beta	E	2029-01-13T00:13:48.834		45.78	-68.68	45646.30	8.71		
eta	E	2029-01-13T00:16:38.247		45.27	-68.64	47176.12	9.35		
gamma	E	2029-01-13T00:17:25.724		45.13	-68.63	47623.86	9.52		
delta	E	2029-01-13T00:18:35.926		44.92	-68.60	48300.35	9.76		
lambda	E	2029-01-13T00:21:27.955		44.40	-68.53	50026.71	10.30		
epsilon	E	2029-01-13T00:22:37.956		44.19	-68.50	50755.35	10.49		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-12T23:48:39.550
 Event type : XRgt
 : No Uranus occs
 : 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 : 145005178316293888
 2Mass ID (if available) : 04344310+2158088
 ICRS Star Coord at Epoch: 04h 34m 43.07147s +21:58:08.29683s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 13.230
 G magnitude : 16.695
 RP magnitude : 15.675
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.548
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.70
 Sun-Target sep (deg) : 137.62
 Sun-Moon sep (deg) : 158.39
 B (ring opening deg) : 79.37
 PA of pole (deg) : -51.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.700
 C/A sky separation (km) : 36320.5
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

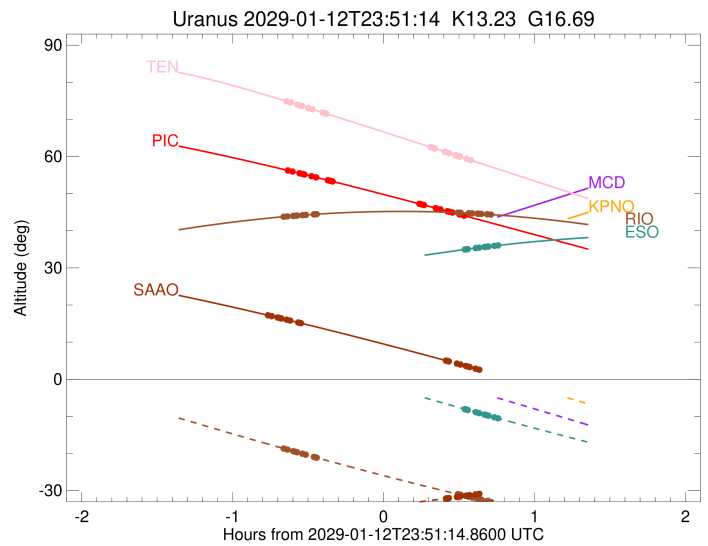
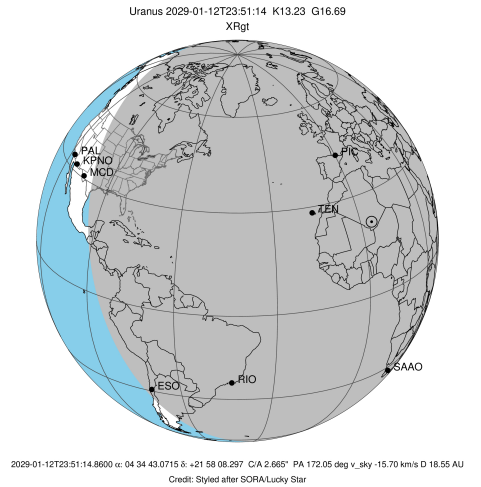


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-01-12T23:12:54.563		74.84	-61.68	51012.35	-11.21		
lambda	I	2029-01-12T23:14:22.747		74.53	-62.00	50026.71	-11.05		
delta	I	2029-01-12T23:17:02.315		73.98	-62.58	48300.35	-10.58		
gamma	I	2029-01-12T23:18:06.296		73.75	-62.81	47630.26	-10.37		
eta	I	2029-01-12T23:18:50.405		73.60	-62.97	47176.12	-10.22		
beta	I	2029-01-12T23:21:21.856		73.07	-63.52	45668.50	-9.68		
alpha	I	2029-01-12T23:23:01.707		72.71	-63.89	44722.39	-9.31		
4	I	2029-01-12T23:27:09.263		71.84	-64.78	42542.44	-8.25		
5	I	2029-01-12T23:27:53.569		71.68	-64.94	42190.87	-8.05		
6	I	2029-01-12T23:28:38.457		71.52	-65.11	41824.94	-7.83		

No planet occultations

6	E	2029-01-13T00:10:05.119		62.51	-73.93	41864.97	7.81		
5	E	2029-01-13T00:10:55.583		62.32	-74.10	42270.11	8.03		
4	E	2029-01-13T00:11:34.850		62.18	-74.24	42587.82	8.23		
alpha	E	2029-01-13T00:15:41.373		61.28	-75.07	44751.48	9.28		
beta	E	2029-01-13T00:17:15.846		60.93	-75.39	45645.42	9.65		
eta	E	2029-01-13T00:19:50.142		60.36	-75.91	47176.12	10.19		
gamma	E	2029-01-13T00:20:33.758		60.20	-76.05	47623.58	10.33		
delta	E	2029-01-13T00:21:38.615		59.96	-76.27	48300.35	10.54		
lambda	E	2029-01-13T00:24:18.790		59.37	-76.79	50026.71	11.01		
epsilon	E	2029-01-13T00:25:24.925		59.13	-77.01	50760.92	11.16		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-12T23:52:11.280
 Event type : XRgt
 : No Uranus occs
 : 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 : 145005178316293888
 2Mass ID (if available) : 04344310+2158088
 ICRS Star Coord at Epoch: 04h 34m 43.07147s +21:58:08.29683s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 13.230
 G magnitude : 16.695
 RP magnitude : 15.675
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.548
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.70
 Sun-Target sep (deg) : 137.62
 Sun-Moon sep (deg) : 158.80
 B (ring opening deg) : 79.37
 PA of pole (deg) : -51.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.330
 C/A sky separation (km) : 31350.1
 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

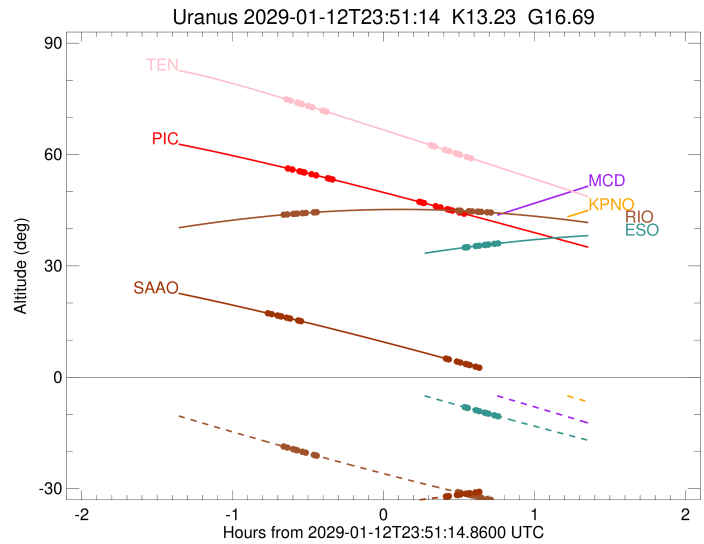
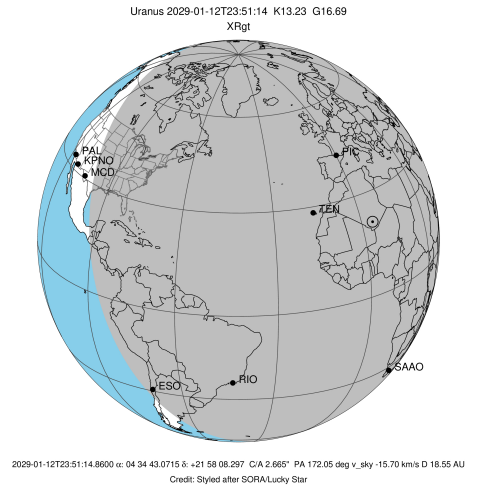


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-01-12T23:11:41.663		43.79	-18.68	51062.48	-12.68		
lambda	I	2029-01-12T23:13:03.351		43.87	-18.94	50026.71	-12.59		
delta	I	2029-01-12T23:15:22.093		44.00	-19.37	48300.35	-12.29		
gamma	I	2029-01-12T23:16:16.889		44.05	-19.55	47630.73	-12.15		
eta	I	2029-01-12T23:16:54.436		44.09	-19.67	47176.12	-12.06		
beta	I	2029-01-12T23:19:00.968		44.20	-20.06	45671.42	-11.72		
alpha	I	2029-01-12T23:20:23.350		44.27	-20.32	44716.64	-11.50		
4	I	2029-01-12T23:23:37.702		44.42	-20.93	42536.21	-10.87		
5	I	2029-01-12T23:24:11.543		44.45	-21.04	42178.46	-10.76		
6	I	2029-01-12T23:24:44.615		44.47	-21.14	41816.90	-10.64		

No planet occultations

6	E	2029-01-13T00:20:50.282		44.88	-30.95	41871.19	10.64		
5	E	2029-01-13T00:21:28.738		44.86	-31.06	42284.30	10.76		
4	E	2029-01-13T00:21:57.564		44.84	-31.13	42596.02	10.87		
alpha	E	2029-01-13T00:25:10.180		44.74	-31.65	44752.37	11.49		
beta	E	2029-01-13T00:26:26.970		44.69	-31.85	45643.52	11.72		
eta	E	2029-01-13T00:28:35.899		44.61	-32.19	47176.12	12.06		
gamma	E	2029-01-13T00:29:12.819		44.58	-32.29	47622.90	12.15		
delta	E	2029-01-13T00:30:08.287		44.55	-32.43	48300.35	12.28		
lambda	E	2029-01-13T00:32:27.099		44.45	-32.79	50026.71	12.59		
epsilon	E	2029-01-13T00:33:26.705		44.40	-32.94	50780.73	12.68		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-01-12T23:54:57.540
 Event type : XRgt
 : No Uranus occs
 : 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 : 145005178316293888
 2Mass ID (if available) : 04344310+2158088
 ICRS Star Coord at Epoch: 04h 34m 43.07147s +21:58:08.29683s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 13.230
 G magnitude : 16.695
 RP magnitude : 15.675
 BP magnitude : 17.792
 DUPflag : 0
 Distance (au) : 18.549
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.70
 Sun-Target sep (deg) : 137.62
 Sun-Moon sep (deg) : 159.08
 B (ring opening deg) : 79.37
 PA of pole (deg) : -51.75
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.339
 C/A sky separation (km) : 31467.1
 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



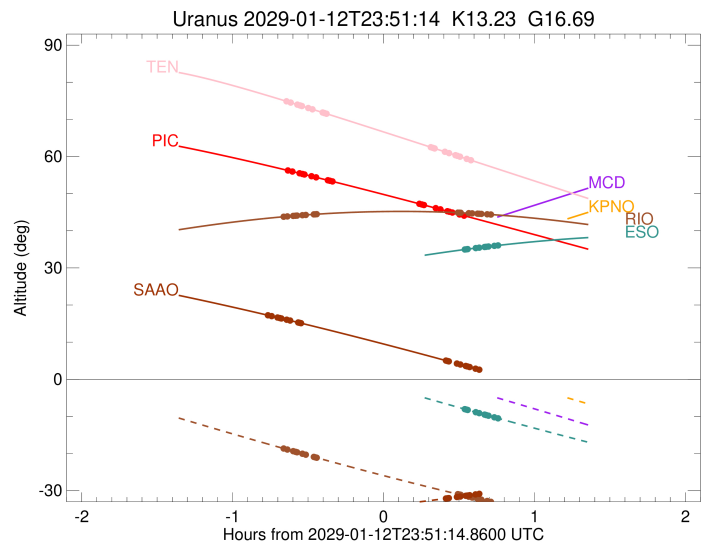
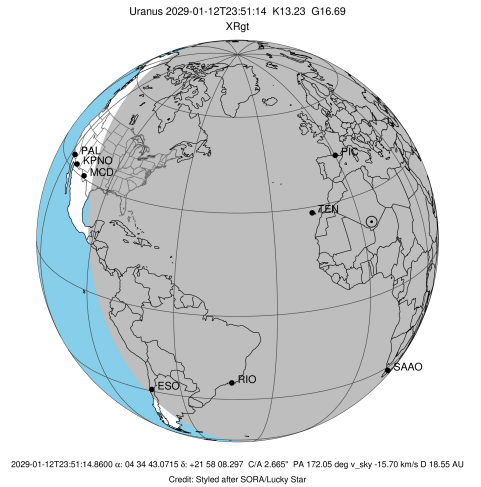
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-01-12T23:14:19.113		26.82	5.58x	51060.01	-12.57		
lambda	I	2029-01-12T23:15:41.376		27.02	5.30x	50026.71	-12.48		
delta	I	2029-01-12T23:18:01.445		27.34	4.83x	48300.35	-12.17		
gamma	I	2029-01-12T23:18:56.775		27.47	4.64x	47630.71	-12.04		
eta	I	2029-01-12T23:19:34.690		27.56	4.51x	47176.12	-11.94		
beta	I	2029-01-12T23:21:42.496		27.85	4.08x	45671.30	-11.60		
alpha	I	2029-01-12T23:23:05.694		28.04	3.80x	44716.87	-11.38		
4	I	2029-01-12T23:26:22.131		28.49	3.14x	42536.42	-10.75		
5	I	2029-01-12T23:26:56.334		28.56	3.03x	42178.89	-10.65		
6	I	2029-01-12T23:27:29.786		28.64	2.91x	41817.19	-10.52		

No planet occultations

6	E	2029-01-13T00:23:35.977		34.96	-8.05	41871.17	10.55		
5	E	2029-01-13T00:24:14.759		35.02	-8.17	42284.27	10.67		
4	E	2029-01-13T00:24:43.825		35.06	-8.27	42596.01	10.78		
alpha	E	2029-01-13T00:27:57.920		35.34	-8.87	44752.37	11.41		
beta	E	2029-01-13T00:29:15.248		35.45	-9.12	45643.52	11.64		
eta	E	2029-01-13T00:31:25.024		35.63	-9.52	47176.12	11.98		
gamma	E	2029-01-13T00:32:02.176		35.68	-9.64	47622.90	12.07		
delta	E	2029-01-13T00:32:57.981		35.76	-9.81	48300.35	12.21		
lambda	E	2029-01-13T00:35:17.595		35.94	-10.24	50026.71	12.52		
epsilon	E	2029-01-13T00:36:17.539		36.02	-10.43	50780.89	12.61		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2029-01-12T23:46:39.670
Event type            : XRgt
: No Uranus occs
: 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        : 145005178316293888
2Mass ID (if available) : 04344310+2158088
ICRS Star Coord at Epoch: 04h 34m 43.07147s +21:58:08.29683s
RUWE (>1.4 is poor)  : 1.08
K magnitude           : 13.230
G magnitude           : 16.695
RP magnitude          : 15.675
BP magnitude          : 17.792
DUPflag              : 0
Distance (au)         : 18.548
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -15.70
Sun-Target sep (deg)  : 137.62
Sun-Moon sep (deg)    : 157.92
B (ring opening deg) : 79.37
PA of pole (deg)     : -51.75
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.308
C/A sky separation (km) : 31049.9
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_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	2029-01-12T23:05:26.064		17.22	-36.11	51069.55	-12.64		
lambda	I	2029-01-12T23:06:48.601		17.00	-36.08	50026.71	-12.55		
delta	I	2029-01-12T23:09:07.787		16.63	-36.03	48300.35	-12.25		
gamma	I	2029-01-12T23:10:02.731		16.48	-36.01	47630.78	-12.12		
eta	I	2029-01-12T23:10:40.380		16.38	-35.99	47176.12	-12.03		
beta	I	2029-01-12T23:12:47.152		16.04	-35.93	45671.75	-11.70		
alpha	I	2029-01-12T23:14:09.738		15.81	-35.89	44715.97	-11.48		
4	I	2029-01-12T23:17:24.146		15.28	-35.79	42535.62	-10.88		
5	I	2029-01-12T23:17:58.000		15.19	-35.77	42177.29	-10.78		
6	I	2029-01-12T23:18:31.024		15.10	-35.75	41816.12	-10.66		

No planet occultations

6	E	2029-01-13T00:16:06.087		5.03	-32.12	41871.21	10.59		
5	E	2029-01-13T00:16:44.729		4.91x	-32.06	42284.34	10.71		
4	E	2029-01-13T00:17:13.705		4.82x	-32.01	42596.04	10.81		
alpha	E	2029-01-13T00:20:27.626		4.22x	-31.72	44752.37	11.40		
beta	E	2029-01-13T00:21:45.059		3.99x	-31.60	45643.53	11.61		
eta	E	2029-01-13T00:23:55.195		3.58x	-31.39	47176.12	11.94		
gamma	E	2029-01-13T00:24:32.490		3.47x	-31.33	47622.90	12.02		
delta	E	2029-01-13T00:25:28.539		3.29x	-31.24	48300.35	12.15		
lambda	E	2029-01-13T00:27:48.911		2.86x	-31.01	50026.71	12.44		
epsilon	E	2029-01-13T00:28:49.194		2.67x	-30.91	50780.31	12.53		