

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-04-28T23:18:06.060  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 866091150355202176  
 2Mass ID (if available) : 07265170+2225187

ICRS Star Coord at Epoch: 07h 26m 51.74085s +22:25:18.59430s

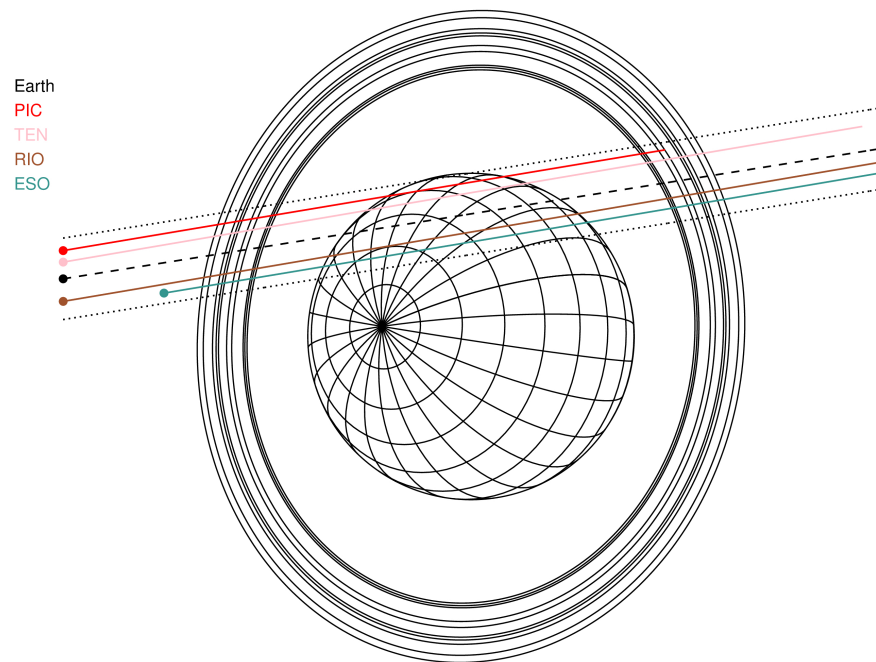
RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.800  
 G magnitude : 18.345  
 RP magnitude : 17.268  
 BP magnitude : 19.622  
 DUPflag : 0  
 Distance (au) : 18.977  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.79  
 Sun-Target sep (deg) : 71.77  
 Sun-Moon sep (deg) : 130.88  
 B (ring opening deg) : 56.71  
 PA of pole (deg) : 83.54

#	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



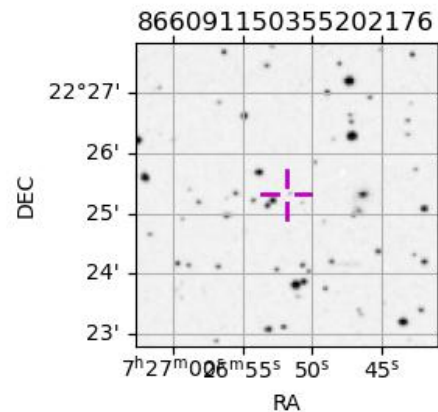
2038-04-28T23:18:06.0600 ex: 07 26 51.7408 s : +22 25 18.594 C/A 1.388° PA 189.05 deg v\_sky +15.79 km/s D 18.98 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2038-04-28T23:18:06 K14.80 G18.35 PgtRgt

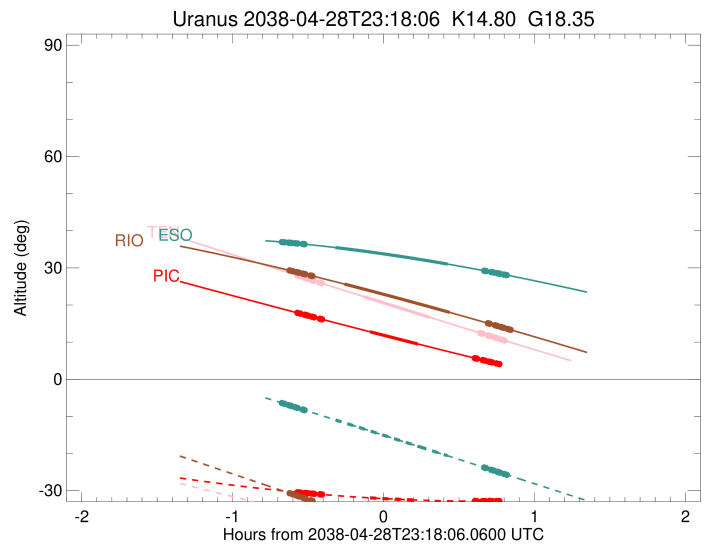
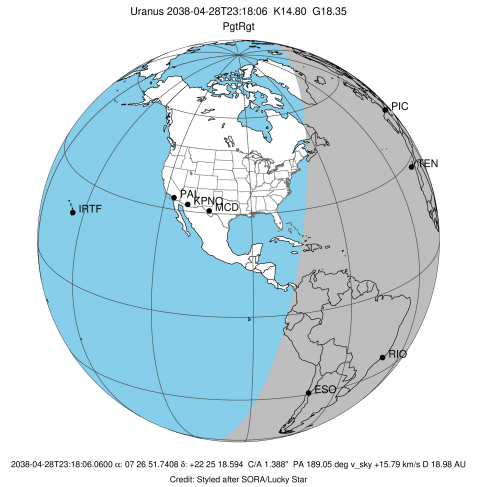


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	++++	APR 28 22:43 - APR 28 23:58	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	+++++	+ +	+++++	APR 28 22:43 - APR 29 00:05	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	APR 28 22:40 - APR 29 00:08	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	APR 28 22:37 - APR 29 00:06	PieRie
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

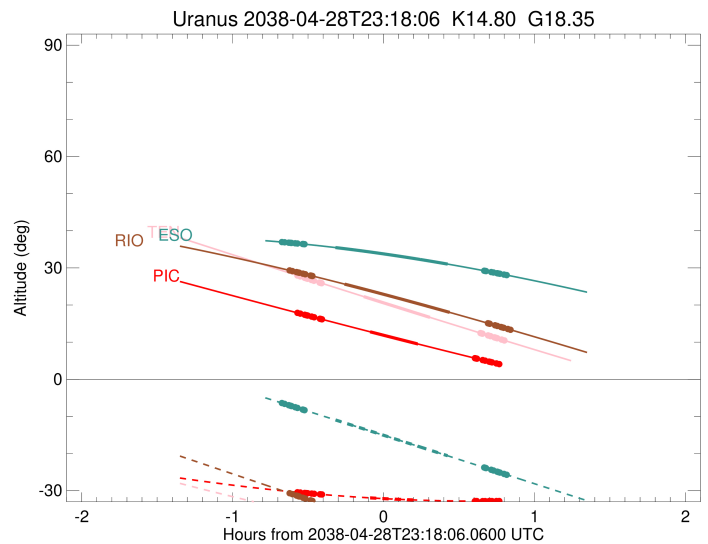
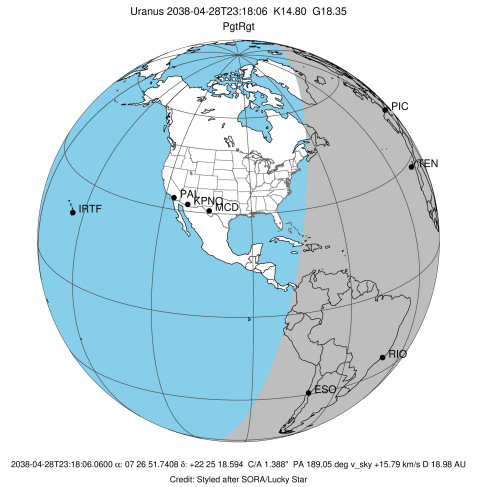


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-04-28T23:22:03.020  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 866091150355202176  
 2Mass ID (if available) : 07265170+2225187  
 ICRS Star Coord at Epoch: 07h 26m 51.74085s +22:25:18.59430s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.800  
 G magnitude : 18.345  
 RP magnitude : 17.268  
 BP magnitude : 19.622  
 DUPflag : 0  
 Distance (au) : 18.977  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.79  
 Sun-Target sep (deg) : 71.77  
 Sun-Moon sep (deg) : 130.61  
 B (ring opening deg) : 56.71  
 PA of pole (deg) : 83.54  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.731  
 C/A sky separation (km) : 23830.3  
 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



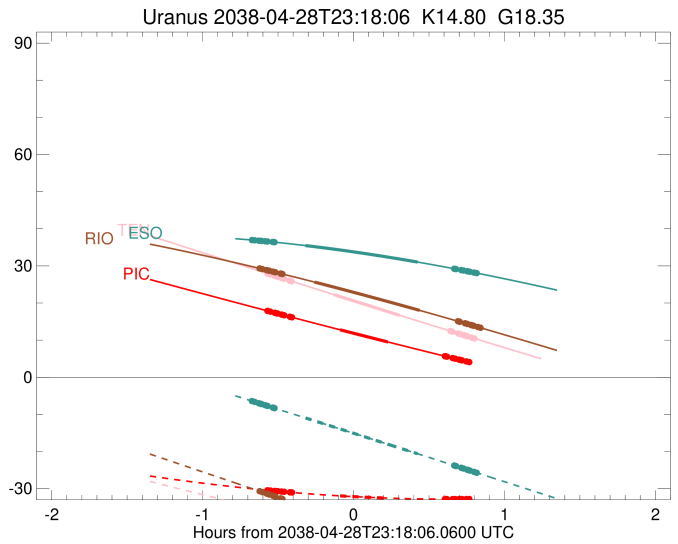
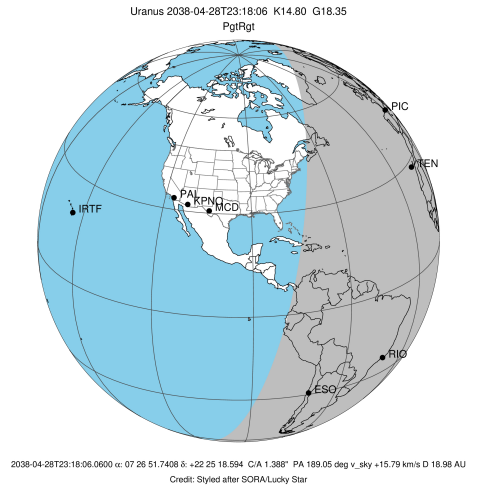
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-04-28T22:43:54.697		17.88	-30.44	51142.14	-16.38		
lambda	I	2038-04-28T22:45:02.732		17.68	-30.52	50026.71	-16.34		
delta	I	2038-04-28T22:46:48.939		17.37	-30.63	48300.35	-16.16		
gamma	I	2038-04-28T22:47:30.491		17.24	-30.67	47630.24	-16.09		
eta	I	2038-04-28T22:47:58.763		17.16	-30.70	47176.12	-16.04		
beta	I	2038-04-28T22:49:34.135		16.88	-30.80	45653.27	-15.85		
alpha	I	2038-04-28T22:50:35.537		16.69	-30.86	44687.91	-15.72		
4	I	2038-04-28T22:52:53.981		16.28	-30.99	42535.74	-15.38		
5	I	2038-04-28T22:53:14.866		16.22	-31.01	42217.08	-15.30		
6	I	2038-04-28T22:53:35.635		16.16	-31.03	41872.36	-15.25		
Uranus	I	2038-04-28T23:12:45.410		12.79	-31.95	25413.82		18.95	19.78
Uranus	E	2038-04-28T23:31:45.280		9.51	-32.55	25555.54		-2.87	-3.00
6	E	2038-04-28T23:54:23.031		5.69	-32.83	41802.85	15.36		
5	E	2038-04-28T23:54:47.994		5.62	-32.83	42167.90	15.41		
4	E	2038-04-28T23:55:16.182		5.55	-32.83	42610.31	15.49		
alpha	E	2038-04-28T23:57:31.412		5.17	-32.83	44744.61	15.84		
beta	E	2038-04-28T23:58:30.646		5.01	-32.83	45681.20	15.97		
eta	E	2038-04-29T00:00:03.626		4.75x	-32.82	47176.12	16.17		
gamma	E	2038-04-29T00:00:31.109		4.68x	-32.82	47621.25	16.22		
delta	E	2038-04-29T00:01:12.867		4.56x	-32.82	48300.35	16.30		
lambda	E	2038-04-29T00:02:58.152		4.27x	-32.81	50026.71	16.49		
epsilon	E	2038-04-29T00:03:45.712		4.14x	-32.81	50812.77	16.53		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-04-28T23:23:12.220  
 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 : 866091150355202176  
 2Mass ID (if available) : 07265170+2225187  
 ICRS Star Coord at Epoch: 07h 26m 51.74085s +22:25:18.59430s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.800  
 G magnitude : 18.345  
 RP magnitude : 17.268  
 BP magnitude : 19.622  
 DUPflag : 0  
 Distance (au) : 18.977  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.79  
 Sun-Target sep (deg) : 71.77  
 Sun-Moon sep (deg) : 130.63  
 B (ring opening deg) : 56.71  
 PA of pole (deg) : 83.54  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.613  
 C/A sky separation (km) : 22200.5  
 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



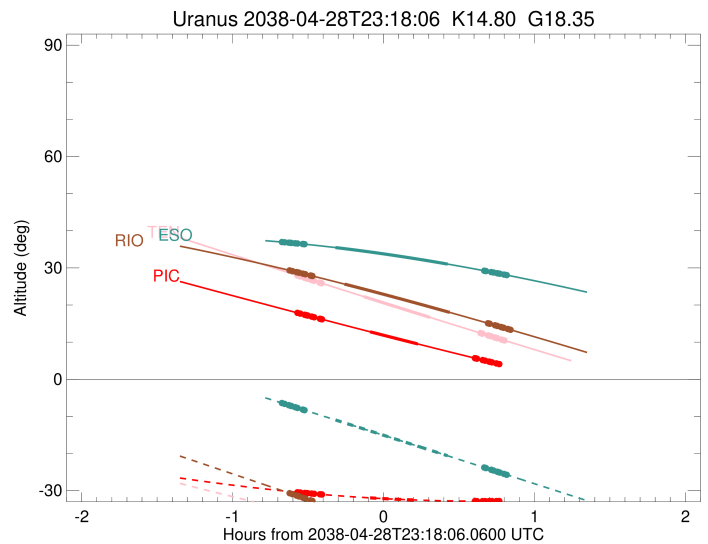
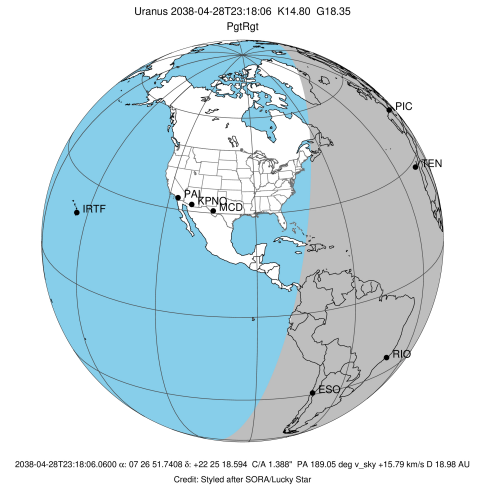
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-04-28T22:43:53.786		27.95	-35.70	51157.73	-16.56		
lambda	I	2038-04-28T22:45:01.981		27.70	-35.87	50026.71	-16.54		
delta	I	2038-04-28T22:46:46.819		27.33	-36.13	48300.35	-16.39		
gamma	I	2038-04-28T22:47:27.772		27.18	-36.23	47630.38	-16.33		
eta	I	2038-04-28T22:47:55.632		27.08	-36.29	47176.12	-16.28		
beta	I	2038-04-28T22:49:29.508		26.74	-36.52	45652.47	-16.13		
alpha	I	2038-04-28T22:50:29.817		26.52	-36.67	44687.28	-16.02		
4	I	2038-04-28T22:52:45.387		26.04	-37.00	42534.42	-15.73		
5	I	2038-04-28T22:53:05.433		25.96	-37.05	42220.93	-15.66		
6	I	2038-04-28T22:53:25.977		25.89	-37.10	41873.51	-15.63		
Uranus	I	2038-04-28T23:10:13.831		22.28	-39.40	25352.63		22.83	23.79
Uranus	E	2038-04-28T23:36:33.117		16.67	-42.54	25536.20		-7.37	-7.71
6	E	2038-04-28T23:56:36.192		12.46	-44.48	41801.76	15.76		
5	E	2038-04-28T23:57:00.699		12.37	-44.51	42169.91	15.80		
4	E	2038-04-28T23:57:28.126		12.27	-44.55	42611.28	15.87		
alpha	E	2038-04-28T23:59:40.351		11.81	-44.74	44745.47	16.17		
beta	E	2038-04-29T00:00:38.387		11.61	-44.81	45681.14	16.28		
eta	E	2038-04-29T00:02:09.711		11.29	-44.94	47176.12	16.45		
gamma	E	2038-04-29T00:02:36.736		11.20	-44.97	47621.19	16.49		
delta	E	2038-04-29T00:03:17.834		11.06	-45.03	48300.35	16.56		
lambda	E	2038-04-29T00:05:01.583		10.70	-45.16	50026.71	16.72		
epsilon	E	2038-04-29T00:05:48.977		10.53	-45.22	50820.64	16.75		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-04-28T23:23:23.060  
 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 : 866091150355202176  
 2Mass ID (if available) : 07265170+2225187  
 ICRS Star Coord at Epoch: 07h 26m 51.74085s +22:25:18.59430s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.800  
 G magnitude : 18.345  
 RP magnitude : 17.268  
 BP magnitude : 19.622  
 DUPflag : 0  
 Distance (au) : 18.977  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.79  
 Sun-Target sep (deg) : 71.77  
 Sun-Moon sep (deg) : 130.70  
 B (ring opening deg) : 56.71  
 PA of pole (deg) : 83.54  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.171  
 C/A sky separation (km) : 16119.8  
 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	2038-04-28T22:40:44.514		29.33	-30.69	51210.54	-17.30		
lambda	I	2038-04-28T22:41:52.843		29.14	-30.95	50026.71	-17.30		
delta	I	2038-04-28T22:43:32.824		28.87	-31.33	48300.35	-17.23		
gamma	I	2038-04-28T22:44:11.717		28.76	-31.48	47630.82	-17.20		
eta	I	2038-04-28T22:44:38.170		28.69	-31.58	47176.12	-17.18		
beta	I	2038-04-28T22:46:07.078		28.44	-31.92	45649.87	-17.10		
alpha	I	2038-04-28T22:47:03.845		28.29	-32.14	44685.63	-17.05		
4	I	2038-04-28T22:49:10.491		27.93	-32.63	42530.62	-16.91		
5	I	2038-04-28T22:49:28.010		27.88	-32.70	42234.08	-16.87		
6	I	2038-04-28T22:49:48.028		27.83	-32.77	41876.68	-16.86		
Uranus	I	2038-04-28T23:02:35.465		25.64	-35.72	25215.10		30.19	31.35
Uranus	E	2038-04-28T23:44:25.091		18.01	-45.36	25425.82		-18.12	-18.92
6	E	2038-04-28T23:59:34.281		15.10	-48.85	41798.39	17.00		
5	E	2038-04-28T23:59:57.536		15.02	-48.94	42178.43	17.02		
4	E	2038-04-29T00:00:22.693		14.94	-49.04	42614.18	17.06		
alpha	E	2038-04-29T00:02:26.318		14.54	-49.51	44748.28	17.21		
beta	E	2038-04-29T00:03:20.806		14.36	-49.72	45680.63	17.26		
eta	E	2038-04-29T00:04:47.184		14.08	-50.05	47176.12	17.34		
gamma	E	2038-04-29T00:05:12.819		14.00	-50.15	47621.02	17.37		
delta	E	2038-04-29T00:05:51.898		13.87	-50.30	48300.35	17.40		
lambda	E	2038-04-29T00:07:30.882		13.55	-50.68	50026.71	17.48		
epsilon	E	2038-04-29T00:08:18.172		13.39	-50.86	50854.21	17.48		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-04-28T23:21:11.000  
 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 : 866091150355202176  
 2Mass ID (if available) : 07265170+2225187  
 ICRS Star Coord at Epoch: 07h 26m 51.74085s +22:25:18.59430s  
 RUWE (>1.4 is poor) : 0.99  
 K magnitude : 14.800  
 G magnitude : 18.345  
 RP magnitude : 17.268  
 BP magnitude : 19.622  
 DUPflag : 0  
 Distance (au) : 18.977  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.79  
 Sun-Target sep (deg) : 71.77  
 Sun-Moon sep (deg) : 131.03  
 B (ring opening deg) : 56.71  
 PA of pole (deg) : 83.54  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.061  
 C/A sky separation (km) : 14601.8  
 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	2038-04-28T22:37:39.857		36.96	-6.39	51222.08	-17.39		
lambda	I	2038-04-28T22:38:48.504		36.89	-6.64	50026.71	-17.39		
delta	I	2038-04-28T22:40:27.920		36.79	-6.99	48300.35	-17.33		
gamma	I	2038-04-28T22:41:06.567		36.75	-7.13	47630.90	-17.31		
eta	I	2038-04-28T22:41:32.854		36.73	-7.22	47176.12	-17.29		
beta	I	2038-04-28T22:43:01.171		36.63	-7.53	45649.33	-17.23		
alpha	I	2038-04-28T22:43:57.496		36.57	-7.73	44685.37	-17.19		
4	I	2038-04-28T22:46:03.011		36.43	-8.18	42529.93	-17.08		
5	I	2038-04-28T22:46:20.122		36.41	-8.24	42237.01	-17.04		
6	I	2038-04-28T22:46:40.174		36.39	-8.31	41877.24	-17.03		
Uranus	I	2038-04-28T22:59:00.454		35.48	-10.96	25195.34		31.16	32.34
Uranus	E	2038-04-28T23:43:35.215		31.03	-20.60	25395.58		-20.17	-21.04
6	E	2038-04-28T23:58:04.771		29.24	-23.76	41797.71	17.12		
5	E	2038-04-28T23:58:27.979		29.19	-23.85	42180.83	17.13		
4	E	2038-04-28T23:58:52.869		29.14	-23.94	42614.74	17.17		
alpha	E	2038-04-29T00:00:55.823		28.87	-24.38	44748.89	17.29		
beta	E	2038-04-29T00:01:50.037		28.76	-24.58	45680.43	17.33		
eta	E	2038-04-29T00:03:16.119		28.57	-24.89	47176.12	17.40		
gamma	E	2038-04-29T00:03:41.679		28.51	-24.99	47621.00	17.41		
delta	E	2038-04-29T00:04:20.660		28.43	-25.13	48300.35	17.44		
lambda	E	2038-04-29T00:05:59.456		28.21	-25.49	50026.71	17.51		
epsilon	E	2038-04-29T00:06:47.234		28.10	-25.66	50863.78	17.50		