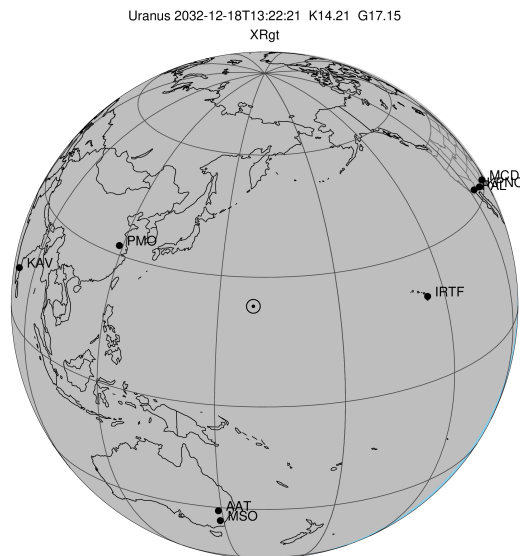


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-18T13:22:21.030  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3424832657276774400  
 2Mass ID (if available) : 05564708+2339019

ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s

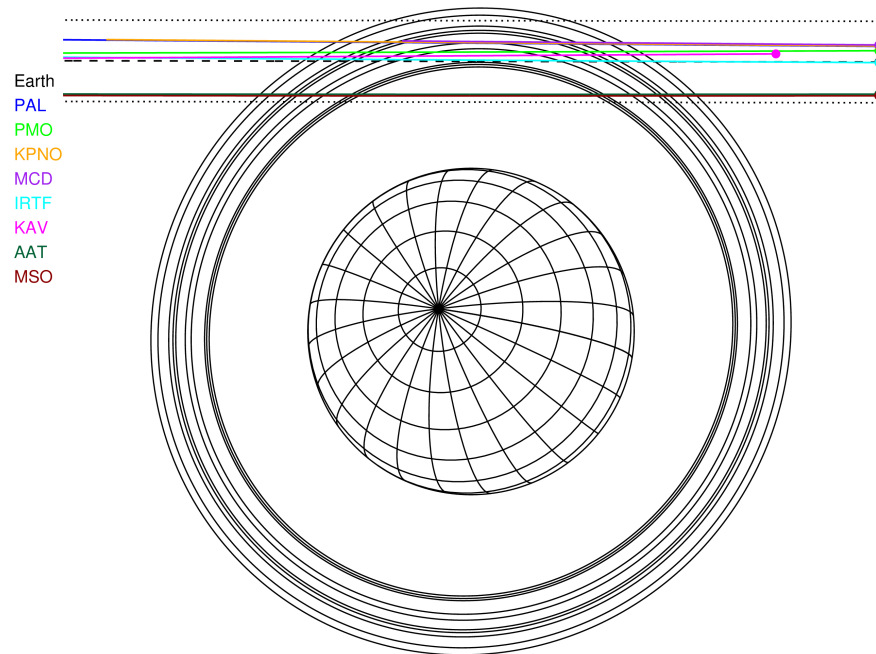
RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.215  
 G magnitude : 17.149  
 RP magnitude : 16.246  
 BP magnitude : 18.012  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.38  
 Sun-Target sep (deg) : 177.45  
 Sun-Moon sep (deg) : 18.34  
 B (ring opening deg) : 75.96  
 PA of pole (deg) : 55.02

#	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



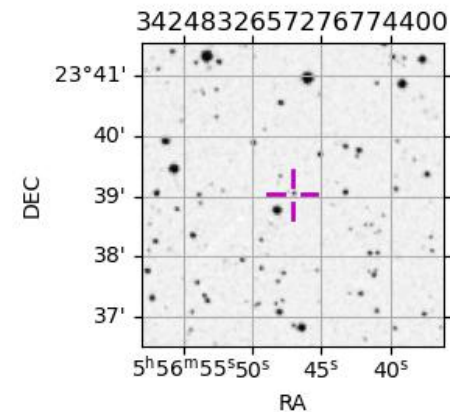
2032-12-18T13:22:21.0300 ex: 05 56 47.0853 ex: +23 39 01.877 C/A 3.241" PA 179.91 deg v\_sky -23.38 km/s D 18.04 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2032-12-18T13:22:21 K14.21 G17.15 XRgt

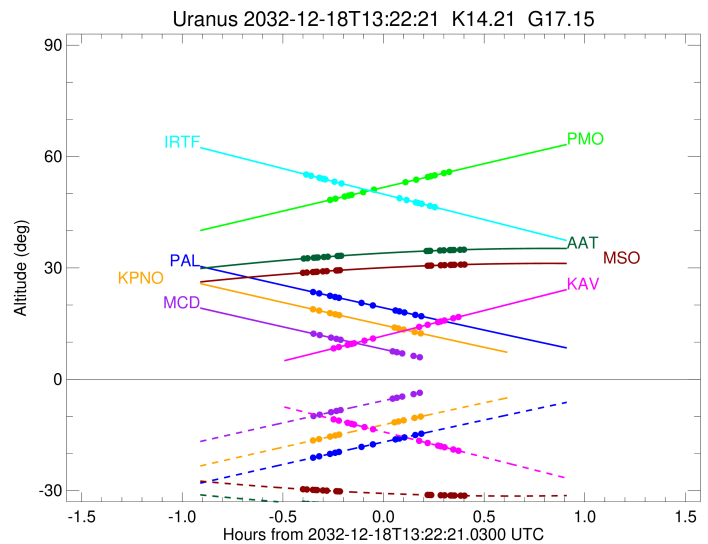
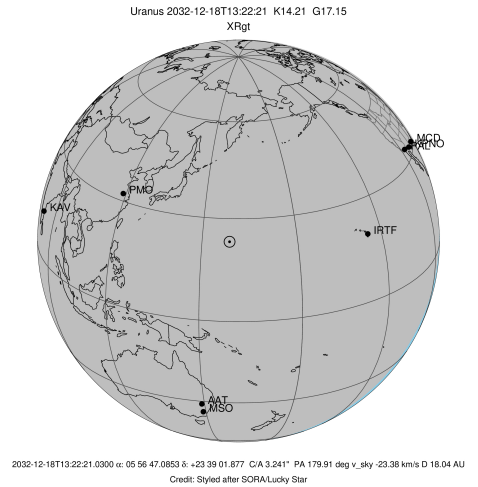


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	DEC 18 13:00 - DEC 18 13:34	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	DEC 18 13:06 - DEC 18 13:42	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	++++		++++	DEC 18 13:00 - DEC 18 13:34	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	++++		+	DEC 18 13:00 - DEC 18 13:25	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 18 12:58 - DEC 18 13:38	PnnRie
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	DEC 18 13:07 - DEC 18 13:45	PnnRie
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	+++++		+++++	DEC 18 12:58 - DEC 18 13:46	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	DEC 18 12:58 - DEC 18 13:46	PnnRie



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-18T13:18:23.400  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3424832657276774400  
 2Mass ID (if available) : 05564708+2339019  
 ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.215  
 G magnitude : 17.149  
 RP magnitude : 16.246  
 BP magnitude : 18.012  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.38  
 Sun-Target sep (deg) : 177.45  
 Sun-Moon sep (deg) : 17.85  
 B (ring opening deg) : 75.96  
 PA of pole (deg) : 55.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.452  
 C/A sky separation (km) : 45163.6  
 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



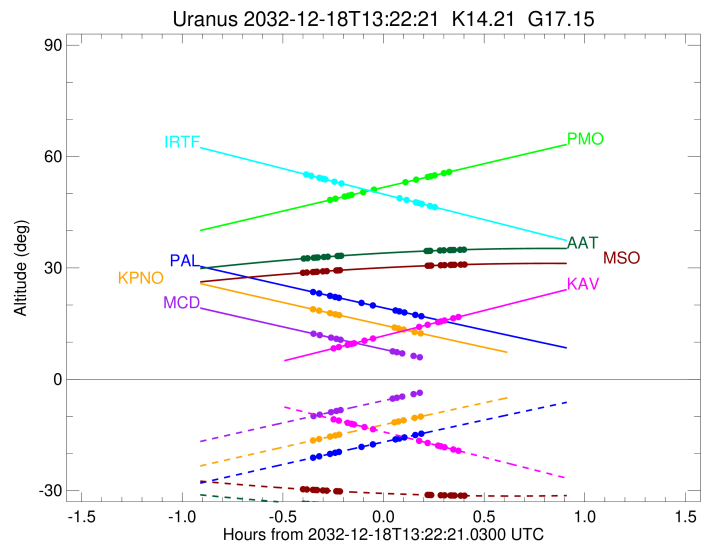
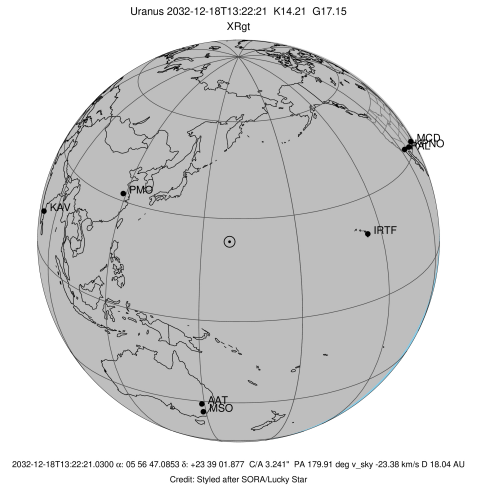
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-18T13:00:51.911		23.60	-21.23	51492.15	-11.21		
lambda	I	2032-12-18T13:03:11.574		23.13	-20.76	50026.71	-9.84		
delta	I	2032-12-18T13:06:25.982		22.47	-20.10	48300.35	-7.88		
gamma	I	2032-12-18T13:07:56.909		22.16	-19.80	47628.13	-6.89		
eta	I	2032-12-18T13:09:06.353		21.92	-19.56	47176.12	-6.12		
beta	I	2032-12-18T13:15:53.654		20.55	-18.20	45669.21	-1.19		

No planet occultations

beta	E	2032-12-18T13:19:03.697		19.91	-17.57	45667.34	1.19		
eta	E	2032-12-18T13:25:52.785		18.54	-16.20	47176.12	6.11		
gamma	E	2032-12-18T13:27:01.878		18.30	-15.97	47625.09	6.89		
delta	E	2032-12-18T13:28:33.383		18.00	-15.67	48300.35	7.87		
lambda	E	2032-12-18T13:31:48.151		17.35	-15.03	50026.71	9.82		
epsilon	E	2032-12-18T13:34:10.814		16.87	-14.55	51521.99	11.19		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-12-18T13:25:03.970
Event type           : XRgt
: No Uranus occs
: 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       : 3424832657276774400
2Mass ID (if available) : 05564708+2339019
ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s
RUWE (>1.4 is poor) : 1.06
K magnitude          : 14.215
G magnitude          : 17.149
RP magnitude         : 16.246
BP magnitude         : 18.012
DUPflag             : 0
Distance (au)        : 18.037
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.38
Sun-Target sep (deg) : 177.45
Sun-Moon sep (deg)   : 19.12
B (ring opening deg) : 75.96
PA of pole (deg)     : 55.02
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.345
C/A sky separation (km) : 43763.4
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
  
```

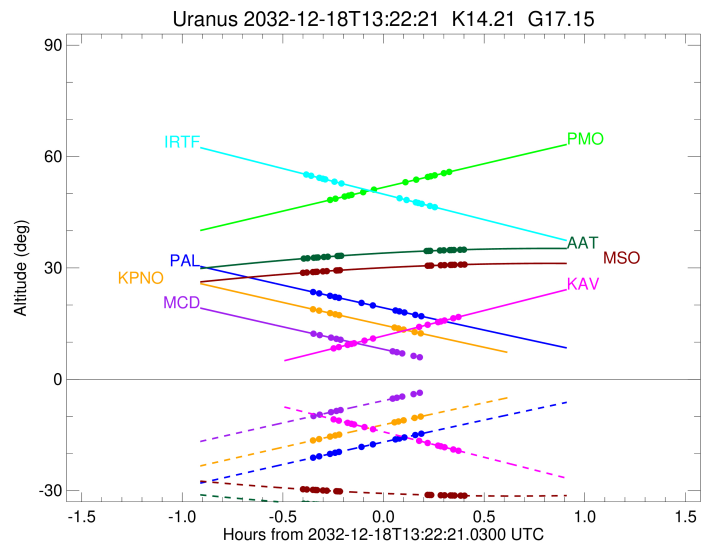
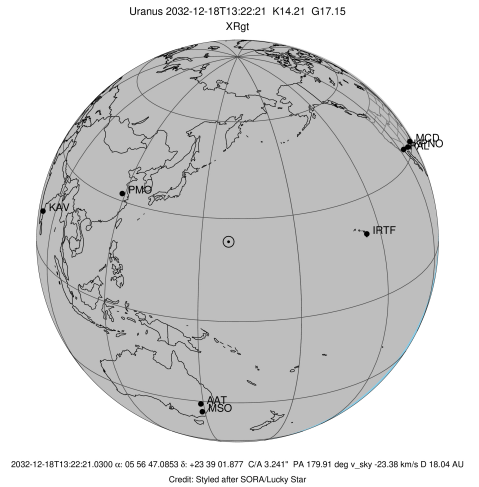


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-18T13:06:00.129		48.21	-50.48	51482.10	-12.47		
lambda	I	2032-12-18T13:08:03.002		48.65	-50.92	50026.71	-11.30		
delta	I	2032-12-18T13:10:46.987		49.23	-51.50	48300.35	-9.73		
gamma	I	2032-12-18T13:11:58.782		49.48	-51.75	47628.52	-8.98		
eta	I	2032-12-18T13:12:50.738		49.67	-51.94	47176.12	-8.43		
beta	I	2032-12-18T13:16:17.712		50.40	-52.67	45672.58	-6.05		
alpha	I	2032-12-18T13:19:27.683		51.08	-53.34	44742.22	-3.69		

No planet occultations

alpha	E	2032-12-18T13:28:53.302		53.08	-55.33	44733.79	3.70		
beta	E	2032-12-18T13:32:04.093		53.76	-56.01	45663.14	6.06		
eta	E	2032-12-18T13:35:32.351		54.50	-56.74	47176.12	8.44		
gamma	E	2032-12-18T13:36:23.808		54.68	-56.92	47624.58	8.99		
delta	E	2032-12-18T13:37:35.949		54.93	-57.17	48300.35	9.74		
lambda	E	2032-12-18T13:40:19.693		55.51	-57.75	50026.71	11.32		
epsilon	E	2032-12-18T13:42:24.644		55.95	-58.19	51510.51	12.49		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-18T13:18:17.050  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3424832657276774400  
 2Mass ID (if available) : 05564708+2339019  
 ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.215  
 G magnitude : 17.149  
 RP magnitude : 16.246  
 BP magnitude : 18.012  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.38  
 Sun-Target sep (deg) : 177.45  
 Sun-Moon sep (deg) : 17.81  
 B (ring opening deg) : 75.96  
 PA of pole (deg) : 55.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.458  
 C/A sky separation (km) : 45236.8  
 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



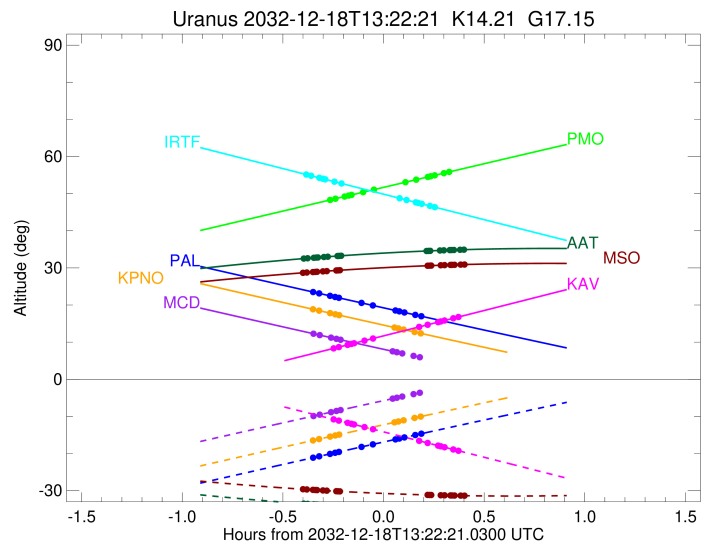
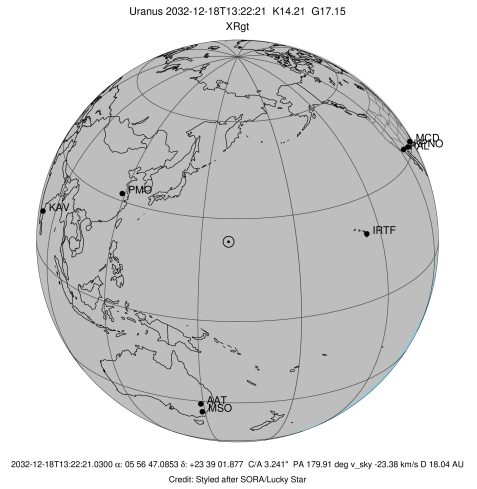
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-18T13:00:49.745		18.96	-16.58	51492.78	-11.13		
lambda	I	2032-12-18T13:03:10.641		18.48	-16.11	50026.71	-9.75		
delta	I	2032-12-18T13:06:27.380		17.81	-15.45	48300.35	-7.76		
gamma	I	2032-12-18T13:07:59.887		17.50	-15.14	47628.11	-6.76		
eta	I	2032-12-18T13:09:10.894		17.26	-14.90	47176.12	-5.96		

No planet occultations

eta	E	2032-12-18T13:25:35.219		13.94	-11.61	47176.12	5.96		
gamma	E	2032-12-18T13:26:45.876		13.71	-11.38	47625.12	6.75		
delta	E	2032-12-18T13:28:18.968		13.40	-11.07	48300.35	7.75		
lambda	E	2032-12-18T13:31:36.078		12.74	-10.42	50026.71	9.73		
epsilon	E	2032-12-18T13:33:59.995		12.26	-9.94	51522.51	11.10		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-18T13:18:13.500  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3424832657276774400  
 2Mass ID (if available) : 05564708+2339019  
 ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.215  
 G magnitude : 17.149  
 RP magnitude : 16.246  
 BP magnitude : 18.012  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.38  
 Sun-Target sep (deg) : 177.45  
 Sun-Moon sep (deg) : 17.78  
 B (ring opening deg) : 75.96  
 PA of pole (deg) : 55.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.472  
 C/A sky separation (km) : 45413.4  
 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

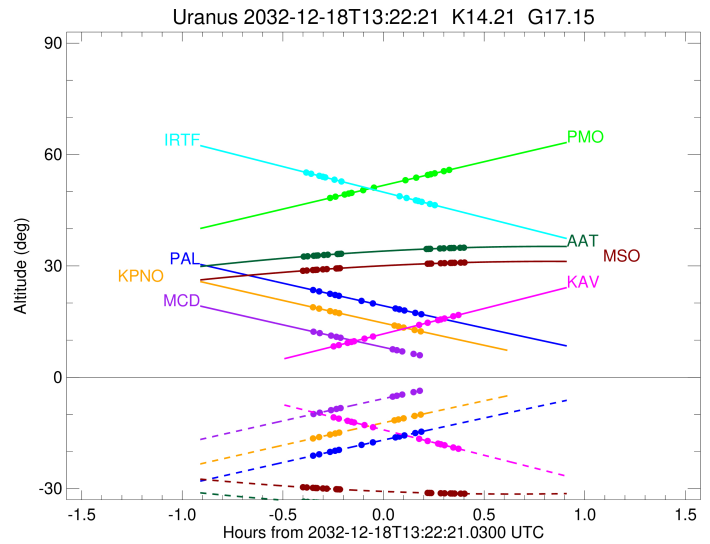
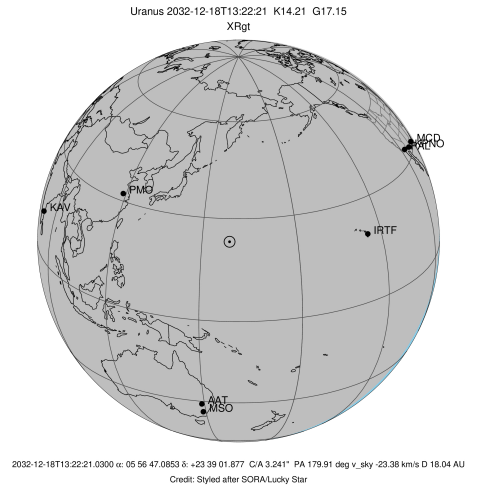


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-18T13:00:57.922		12.37	-10.01	51494.37	-10.95		
lambda	I	2032-12-18T13:03:21.727		11.89	-9.53	50026.71	-9.53		
delta	I	2032-12-18T13:06:44.156		11.21	-8.86	48300.35	-7.49		
gamma	I	2032-12-18T13:08:20.693		10.88	-8.54	47628.04	-6.43		
eta	I	2032-12-18T13:09:35.829		10.63	-8.29	47176.12	-5.59		

No planet occultations

eta	E	2032-12-18T13:25:02.492		7.54	-5.23	47176.12	5.58		
gamma	E	2032-12-18T13:26:17.280		7.29	-4.99x	47625.19	6.43		
delta	E	2032-12-18T13:27:54.406		6.97	-4.67x	48300.35	7.47		
lambda	E	2032-12-18T13:31:17.215		6.30	-4.01x	50026.71	9.52		
epsilon	E	2032-12-18T13:33:44.060		5.82	-3.53x	51523.71	10.92		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-18T13:19:18.790  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3424832657276774400  
 2Mass ID (if available) : 05564708+2339019  
 ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.215  
 G magnitude : 17.149  
 RP magnitude : 16.246  
 BP magnitude : 18.012  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.38  
 Sun-Target sep (deg) : 177.45  
 Sun-Moon sep (deg) : 18.02  
 B (ring opening deg) : 75.96  
 PA of pole (deg) : 55.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.249  
 C/A sky separation (km) : 42500.1  
 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



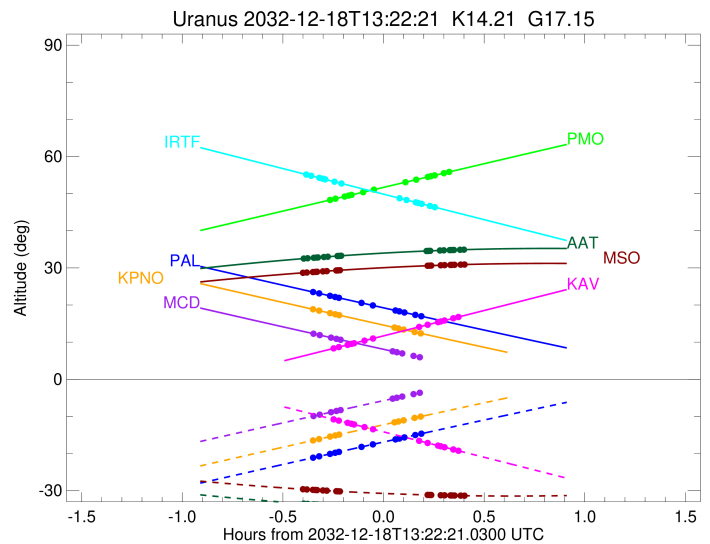
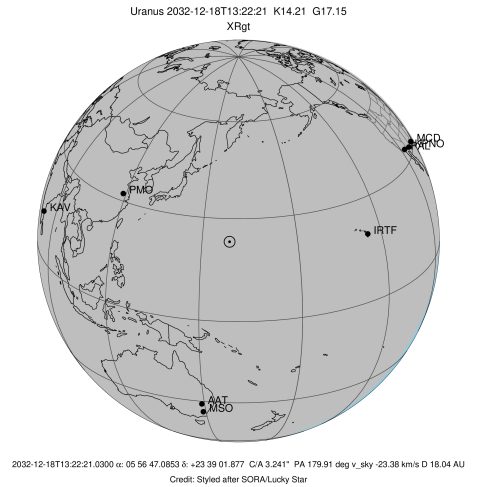
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-18T12:58:56.293		55.24	-52.68	51468.54	-13.47		
lambda	I	2032-12-18T13:00:47.928		54.81	-52.25	50026.71	-12.45		
delta	I	2032-12-18T13:03:14.367		54.25	-51.69	48300.35	-11.11		
gamma	I	2032-12-18T13:04:16.506		54.02	-51.46	47628.88	-10.50		
eta	I	2032-12-18T13:05:00.566		53.85	-51.29	47176.12	-10.05		
beta	I	2032-12-18T13:07:44.193		53.22	-50.66	45674.24	-8.27		
alpha	I	2032-12-18T13:09:46.948		52.75	-50.20	44745.40	-6.83		

No planet occultations

alpha	E	2032-12-18T13:27:07.935		48.77	-46.23	44729.97	6.82		
beta	E	2032-12-18T13:29:11.739		48.30	-45.75	45661.42	8.26		
eta	E	2032-12-18T13:31:57.062		47.67	-45.12	47176.12	10.04		
gamma	E	2032-12-18T13:32:40.751		47.50	-44.96	47624.29	10.48		
delta	E	2032-12-18T13:33:43.428		47.26	-44.72	48300.35	11.09		
lambda	E	2032-12-18T13:36:10.130		46.70	-44.16	50026.71	12.42		
epsilon	E	2032-12-18T13:38:04.592		46.26	-43.72	51503.28	13.44		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-18T13:26:58.590  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3424832657276774400  
 2Mass ID (if available) : 05564708+2339019  
 ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.215  
 G magnitude : 17.149  
 RP magnitude : 16.246  
 BP magnitude : 18.012  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.38  
 Sun-Target sep (deg) : 177.45  
 Sun-Moon sep (deg) : 19.25  
 B (ring opening deg) : 75.96  
 PA of pole (deg) : 55.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.301  
 C/A sky separation (km) : 43181.3  
 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

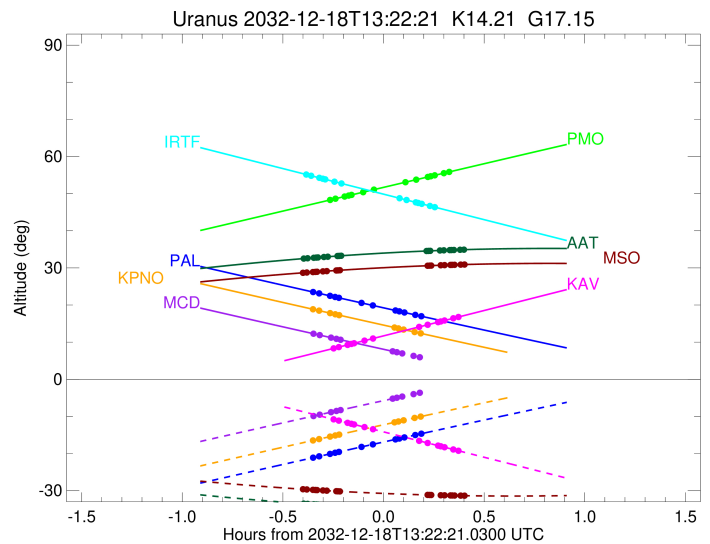
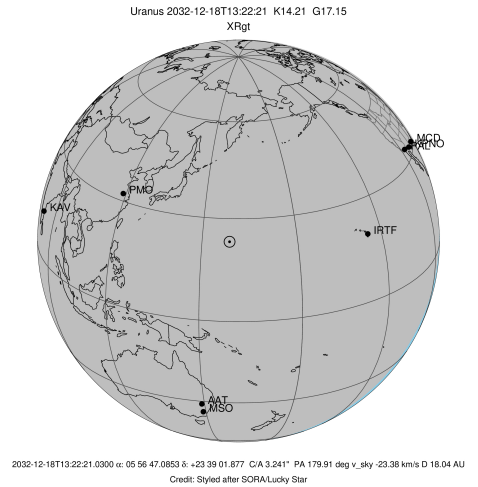


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-18T13:07:03.958		8.22	-10.70	51477.70	-12.78		
lambda	I	2032-12-18T13:09:02.935		8.67	-11.15	50026.71	-11.69		
delta	I	2032-12-18T13:11:40.049		9.26	-11.74	48300.35	-10.26		
gamma	I	2032-12-18T13:12:47.723		9.52	-12.00	47628.65	-9.59		
eta	I	2032-12-18T13:13:36.153		9.70	-12.18	47176.12	-9.10		
beta	I	2032-12-18T13:16:41.630		10.40	-12.88	45673.29	-7.07		
alpha	I	2032-12-18T13:19:11.520		10.97	-13.45	44743.78	-5.29		

No planet occultations

alpha	E	2032-12-18T13:32:58.588		14.10	-16.59	44731.55	5.30		
beta	E	2032-12-18T13:35:29.222		14.67	-17.16	45662.14	7.08		
eta	E	2032-12-18T13:38:35.853		15.38	-17.87	47176.12	9.12		
gamma	E	2032-12-18T13:39:23.735		15.56	-18.05	47624.40	9.61		
delta	E	2032-12-18T13:40:31.692		15.82	-18.31	48300.35	10.28		
lambda	E	2032-12-18T13:43:08.385		16.42	-18.90	50026.71	11.73		
epsilon	E	2032-12-18T13:45:09.201		16.88	-19.36	51505.76	12.82		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-18T13:23:11.780  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3424832657276774400  
 2Mass ID (if available) : 05564708+2339019  
 ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.215  
 G magnitude : 17.149  
 RP magnitude : 16.246  
 BP magnitude : 18.012  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.38  
 Sun-Target sep (deg) : 177.45  
 Sun-Moon sep (deg) : 18.47  
 B (ring opening deg) : 75.96  
 PA of pole (deg) : 55.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.839  
 C/A sky separation (km) : 37142.7  
 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\_itrff93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



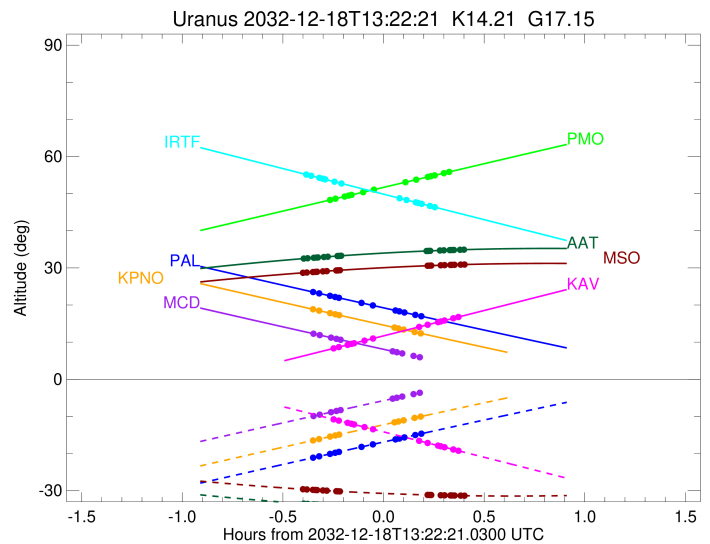
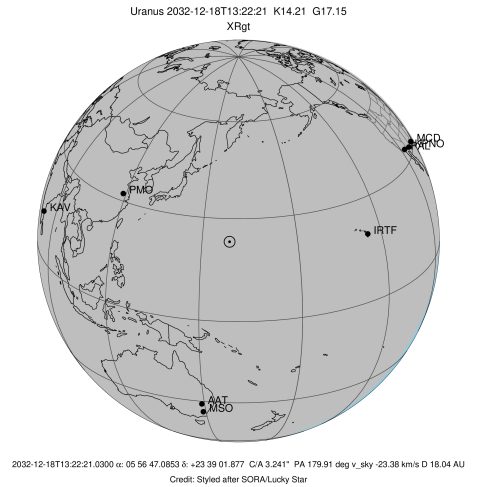
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-18T12:58:18.950		32.49	-33.49	51423.61	-16.69		
lambda	I	2032-12-18T12:59:44.541		32.60	-33.58	50026.71	-16.04		
delta	I	2032-12-18T13:01:34.730		32.73	-33.69	48300.35	-15.28		
gamma	I	2032-12-18T13:02:19.106		32.78	-33.74	47629.78	-14.94		
eta	I	2032-12-18T13:02:49.708		32.81	-33.77	47176.12	-14.70		
beta	I	2032-12-18T13:04:34.666		32.93	-33.87	45677.62	-13.83		
alpha	I	2032-12-18T13:05:43.212		33.01	-33.93	44750.11	-13.21		
4	I	2032-12-18T13:08:40.413		33.20	-34.09	42560.95	-11.42		
5	I	2032-12-18T13:09:01.959		33.23	-34.11	42315.11	-11.22		
6	I	2032-12-18T13:09:46.829		33.27	-34.15	41823.13	-10.74		

No planet occultations

6	E	2032-12-18T13:35:12.746		34.55	-35.15	41860.46	10.75		
5	E	2032-12-18T13:35:50.273		34.58	-35.17	42276.98	11.22		
4	E	2032-12-18T13:36:11.670		34.59	-35.18	42528.87	11.43		
alpha	E	2032-12-18T13:39:09.585		34.70	-35.25	44720.15	13.22		
beta	E	2032-12-18T13:40:18.990		34.73	-35.28	45656.17	13.84		
eta	E	2032-12-18T13:42:05.371		34.79	-35.31	47176.12	14.71		
gamma	E	2032-12-18T13:42:35.516		34.81	-35.32	47623.25	14.95		
delta	E	2032-12-18T13:43:20.300		34.83	-35.34	48300.35	15.29		
lambda	E	2032-12-18T13:45:10.409		34.88	-35.37	50026.71	16.06		
epsilon	E	2032-12-18T13:46:38.314		34.92	-35.39	51463.14	16.71		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-18T13:23:09.700  
 Event type : XRgt  
 : No Uranus occs  
 : 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 : 3424832657276774400  
 2Mass ID (if available) : 05564708+2339019  
 ICRS Star Coord at Epoch: 05h 56m 47.08528s +23:39:01.87740s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 14.215  
 G magnitude : 17.149  
 RP magnitude : 16.246  
 BP magnitude : 18.012  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.38  
 Sun-Target sep (deg) : 177.45  
 Sun-Moon sep (deg) : 18.44  
 B (ring opening deg) : 75.96  
 PA of pole (deg) : 55.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.821  
 C/A sky separation (km) : 36896.9  
 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	2032-12-18T12:58:05.320		28.66	-29.60	51421.48	-16.80		
lambda	I	2032-12-18T12:59:30.172		28.76	-29.69	50026.71	-16.17		
delta	I	2032-12-18T13:01:19.439		28.88	-29.79	48300.35	-15.42		
gamma	I	2032-12-18T13:02:03.392		28.92	-29.83	47629.81	-15.09		
eta	I	2032-12-18T13:02:33.686		28.96	-29.86	47176.12	-14.86		
beta	I	2032-12-18T13:04:17.430		29.07	-29.95	45677.73	-14.01		
alpha	I	2032-12-18T13:05:25.045		29.14	-30.01	44750.24	-13.41		
4	I	2032-12-18T13:08:19.068		29.31	-30.15	42561.49	-11.68		
5	I	2032-12-18T13:08:40.196		29.33	-30.17	42315.16	-11.48		
6	I	2032-12-18T13:09:24.041		29.37	-30.21	41822.60	-11.02		

No planet occultations

6	E	2032-12-18T13:35:31.888		30.59	-31.15	41860.92	11.02		
5	E	2032-12-18T13:36:08.388		30.61	-31.17	42276.12	11.48		
4	E	2032-12-18T13:36:29.372		30.62	-31.18	42528.68	11.68		
alpha	E	2032-12-18T13:39:24.111		30.71	-31.24	44719.81	13.42		
beta	E	2032-12-18T13:40:32.587		30.75	-31.26	45655.99	14.02		
eta	E	2032-12-18T13:42:17.758		30.80	-31.30	47176.12	14.87		
gamma	E	2032-12-18T13:42:47.595		30.81	-31.30	47623.22	15.10		
delta	E	2032-12-18T13:43:31.956		30.83	-31.32	48300.35	15.43		
lambda	E	2032-12-18T13:45:21.147		30.88	-31.35	50026.71	16.18		
epsilon	E	2032-12-18T13:46:48.319		30.91	-31.37	51461.33	16.82		