

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-01-22T14:58:19.840  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415723894930471808  
 2Mass ID (if available) : 05113739+2304094

ICRS Star Coord at Epoch: 05h 11m 37.39614s +23:04:09.50761s

RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.534  
 G magnitude : 14.370  
 RP magnitude : 13.522  
 BP magnitude : 15.117  
 DUPflag : 0  
 Distance (au) : 18.417  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -15.44  
 Sun-Target sep (deg) : 136.94  
 Sun-Moon sep (deg) : 144.64  
 B of ring opening (deg) : 82.09  
 PA of pole (deg) : 4.17

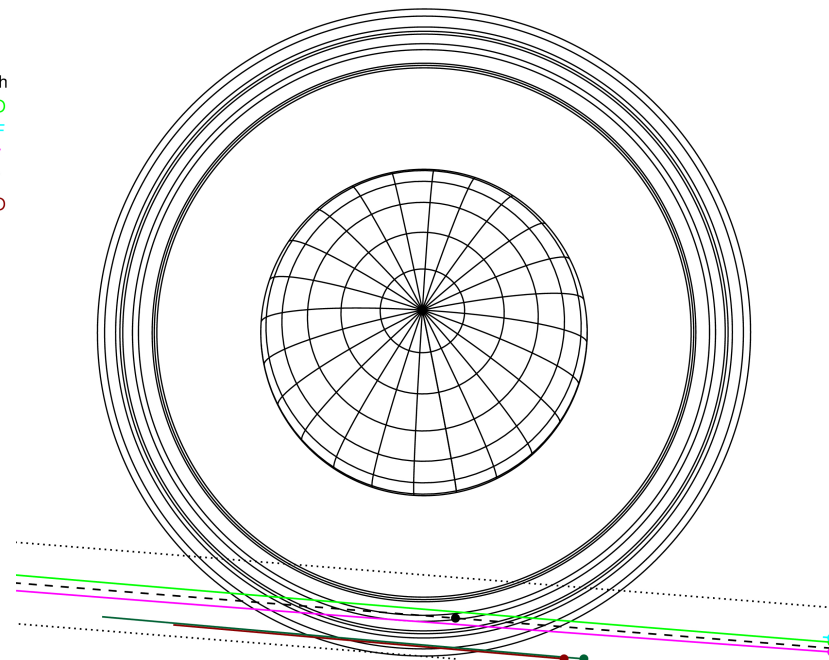
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-01-22T14:58:19.8400 ex: 05 11 37.39614 s: +23 04 09.508 C/A 3.303" PA 355.43 deg v\_sky -15.44 km/s D 18.42 AU  
 Credit: Styled after SORA/Lucky Star

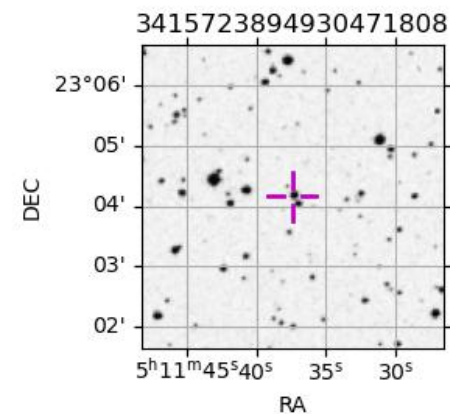
Uranus 2031-01-22T14:58:19 K11.53 G14.37 XRgt

Earth  
 PMO  
 IRTF  
 KAV  
 AAT  
 MSO

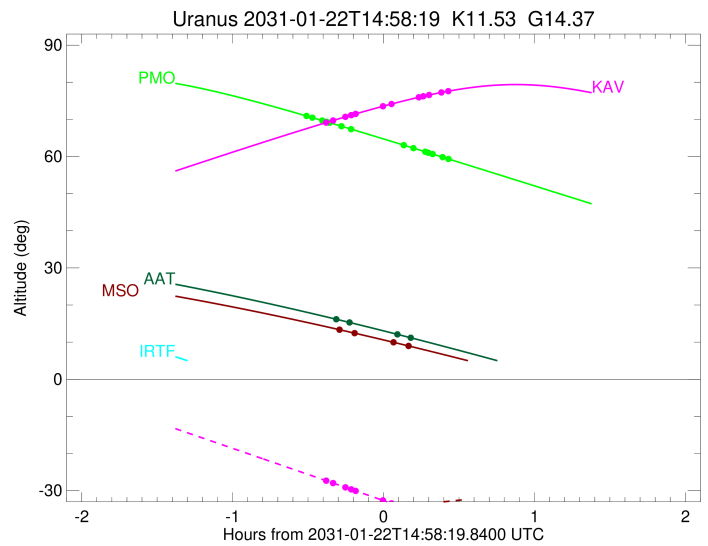
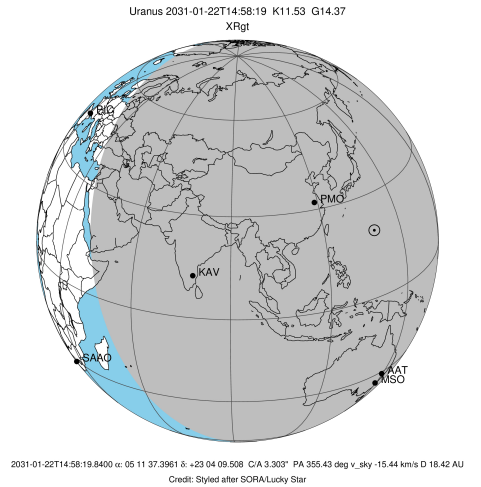


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	++++++		++++++	JAN 22 14:27 - JAN 22 15:24	PnnRie
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					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	++++++		++++++	JAN 22 14:35 - JAN 22 15:24	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	++		++	JAN 22 14:38 - JAN 22 15:10	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	++		++	JAN 22 14:40 - JAN 22 15:09	PnnRie



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-01-22T14:55:47.200  
 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 : 3415723894930471808  
 2Mass ID (if available) : 05113739+2304094  
 ICRS Star Coord at Epoch: 05h 11m 37.39614s +23:04:09.50761s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.534  
 G magnitude : 14.370  
 RP magnitude : 13.522  
 BP magnitude : 15.117  
 DUPflag : 0  
 Distance (au) : 18.417  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -15.44  
 Sun-Target sep (deg) : 136.94  
 Sun-Moon sep (deg) : 144.86  
 B (ring opening deg) : 82.09  
 PA of pole (deg) : 4.17  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.234  
 C/A sky separation (km) : 43197.3  
 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



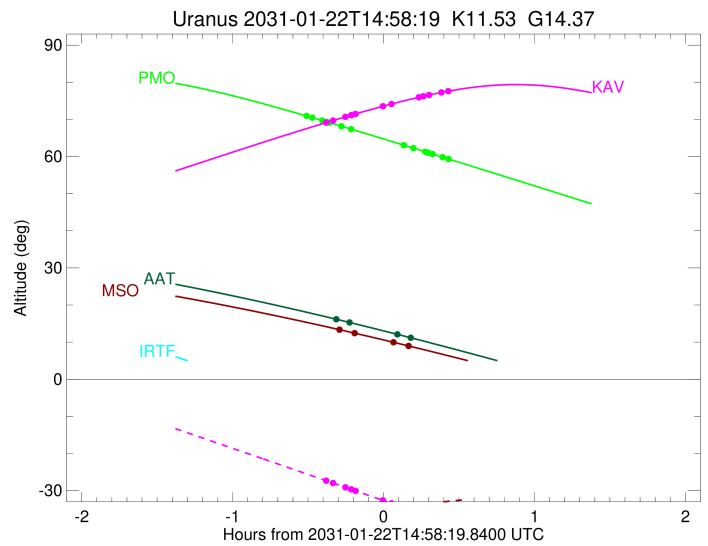
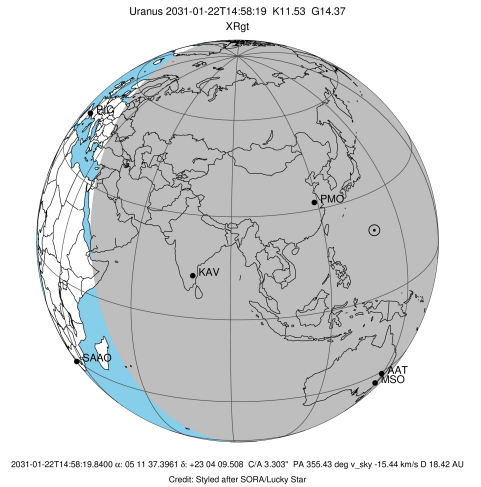
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T14:27:33.745		70.97	-62.74	51242.33	-8.40		
lambda	I	2031-01-22T14:30:05.226		70.47	-63.24	50026.71	-7.74		
delta	I	2031-01-22T14:34:02.526		69.69	-64.02	48300.35	-6.79		
gamma	I	2031-01-22T14:35:44.821		69.34	-64.36	47628.17	-6.35		
eta	I	2031-01-22T14:36:57.898		69.10	-64.60	47176.12	-6.02		
beta	I	2031-01-22T14:41:42.660		68.14	-65.52	45651.07	-4.66		
alpha	I	2031-01-22T14:45:22.813		67.40	-66.22	44747.22	-3.52		

No planet occultations

alpha	E	2031-01-22T15:06:25.132		63.06	-70.11	44736.49	3.52		
beta	E	2031-01-22T15:10:06.885		62.29	-70.75	45643.02	4.65		
eta	E	2031-01-22T15:14:53.985		61.29	-71.56	47176.12	6.01		
gamma	E	2031-01-22T15:16:07.713		61.03	-71.77	47631.21	6.33		
delta	E	2031-01-22T15:17:49.788		60.67	-72.05	48300.35	6.77		
lambda	E	2031-01-22T15:21:47.770		59.84	-72.68	50026.71	7.72		
epsilon	E	2031-01-22T15:24:56.152		59.18	-73.17	51545.79	8.38		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-01-22T14:59:41.240  
 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 : 3415723894930471808  
 2Mass ID (if available) : 05113739+2304094  
 ICRS Star Coord at Epoch: 05h 11m 37.39614s +23:04:09.50761s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.534  
 G magnitude : 14.370  
 RP magnitude : 13.522  
 BP magnitude : 15.117  
 DUPflag : 0  
 Distance (au) : 18.417  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -15.44  
 Sun-Target sep (deg) : 136.94  
 Sun-Moon sep (deg) : 145.38  
 B (ring opening deg) : 82.09  
 PA of pole (deg) : 4.17  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.384  
 C/A sky separation (km) : 45207.0  
 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

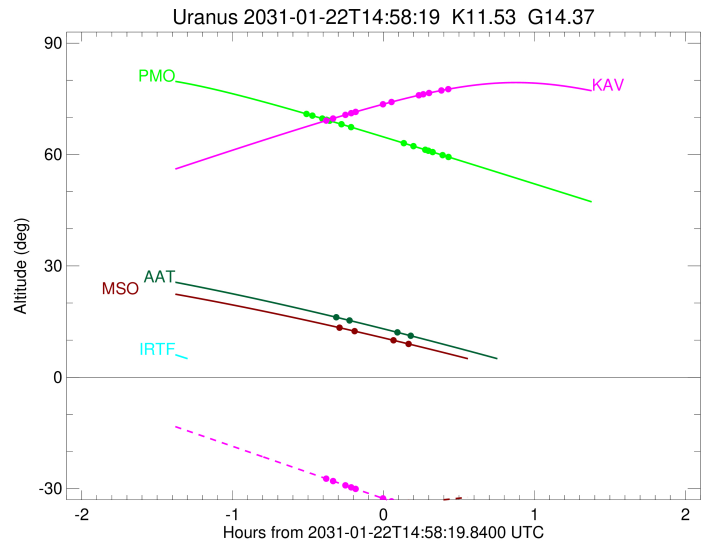
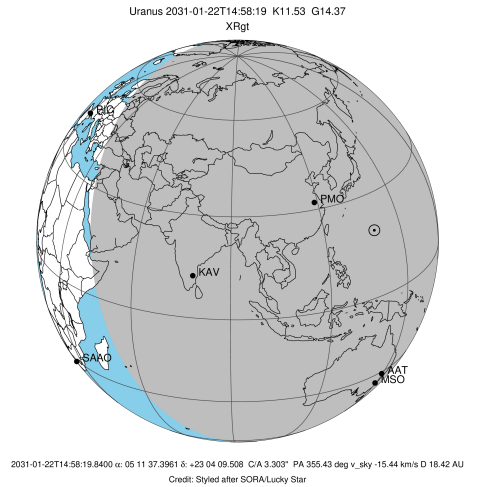


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T14:35:17.842		69.09	-27.26	51270.83	-7.33		
lambda	I	2031-01-22T14:38:19.198		69.71	-27.97	50026.71	-6.49		
delta	I	2031-01-22T14:43:14.371		70.70	-29.13	48300.35	-5.18		
gamma	I	2031-01-22T14:45:32.610		71.15	-29.67	47628.74	-4.53		
eta	I	2031-01-22T14:47:18.669		71.50	-30.08	47176.12	-4.00		
beta	I	2031-01-22T14:59:47.181		73.84	-33.02	45648.76	-0.11		

No planet occultations

beta	E	2031-01-22T14:59:50.278		73.85	-33.03	45648.63	0.12		
eta	E	2031-01-22T15:12:19.772		75.96	-35.97	47176.12	4.01		
gamma	E	2031-01-22T15:14:06.271		76.23	-36.39	47630.91	4.53		
delta	E	2031-01-22T15:16:23.970		76.57	-36.93	48300.35	5.19		
lambda	E	2031-01-22T15:21:18.986		77.26	-38.08	50026.71	6.49		
epsilon	E	2031-01-22T15:24:56.655		77.71	-38.94	51536.67	7.33		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-01-22T14:54:11.240  
 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 : 3415723894930471808  
 2Mass ID (if available) : 05113739+2304094  
 ICRS Star Coord at Epoch: 05h 11m 37.39614s +23:04:09.50761s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.534  
 G magnitude : 14.370  
 RP magnitude : 13.522  
 BP magnitude : 15.117  
 DUPflag : 0  
 Distance (au) : 18.417  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -15.44  
 Sun-Target sep (deg) : 136.94  
 Sun-Moon sep (deg) : 144.16  
 B (ring opening deg) : 82.09  
 PA of pole (deg) : 4.17  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.651  
 C/A sky separation (km) : 48763.2  
 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

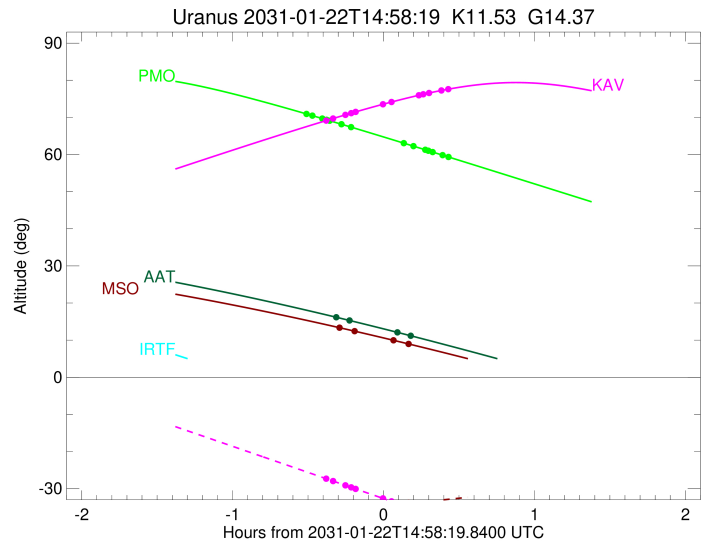
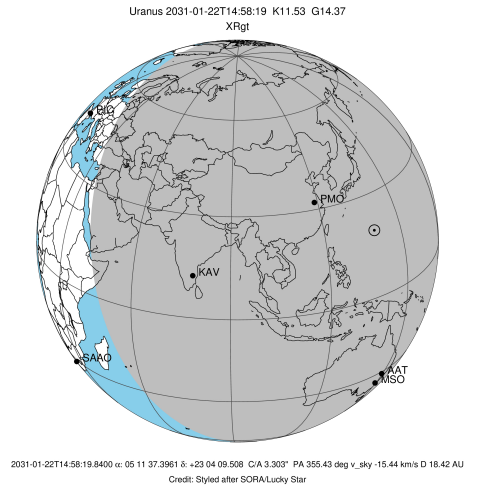


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T14:38:51.690		16.28	-38.95	51344.64	-4.56		
lambda	I	2031-01-22T14:44:55.114		15.29	-38.77	50026.71	-2.78		

No planet occultations

lambda	E	2031-01-22T15:03:46.847		12.11	-37.95	50026.71	2.77		
epsilon	E	2031-01-22T15:10:27.748		10.95	-37.57	51509.73	4.54		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-01-22T14:54:25.000  
 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 : 3415723894930471808  
 2Mass ID (if available) : 05113739+2304094  
 ICRS Star Coord at Epoch: 05h 11m 37.39614s +23:04:09.50761s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 11.534  
 G magnitude : 14.370  
 RP magnitude : 13.522  
 BP magnitude : 15.117  
 DUPflag : 0  
 Distance (au) : 18.417  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -15.44  
 Sun-Target sep (deg) : 136.94  
 Sun-Moon sep (deg) : 144.16  
 B (ring opening deg) : 82.09  
 PA of pole (deg) : 4.17  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.671  
 C/A sky separation (km) : 49037.1  
 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	2031-01-22T14:40:05.036		13.47	-34.93	51351.35	-4.26		
lambda	I	2031-01-22T14:46:57.180		12.41	-34.73	50026.71	-2.24		

No planet occultations

lambda	E	2031-01-22T15:02:12.150		9.97	-34.13	50026.71	2.24		
epsilon	E	2031-01-22T15:09:41.771		8.75	-33.75	51506.01	4.25		