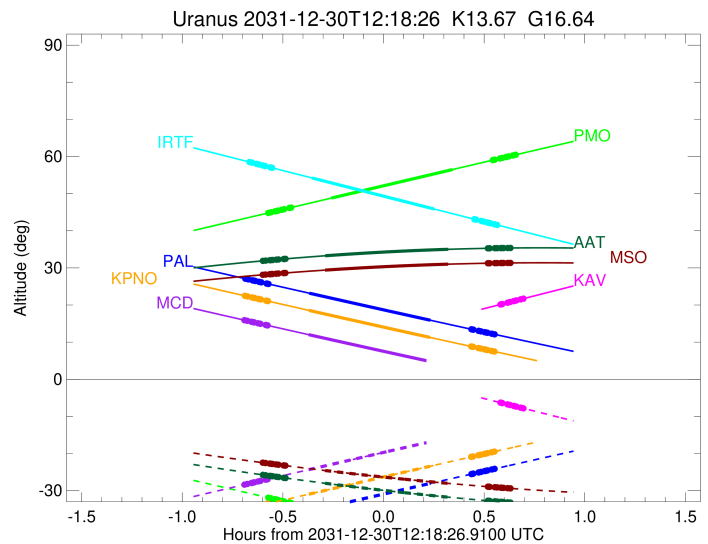
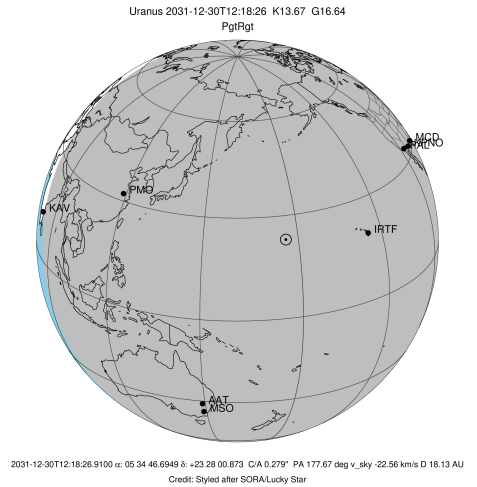


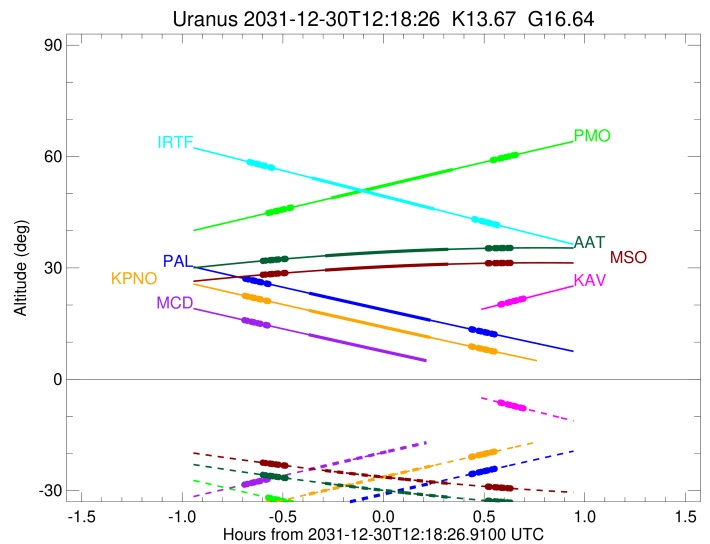
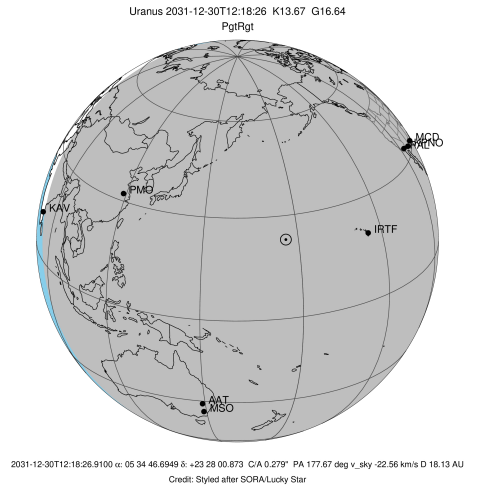


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-30T12:14:26.710  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3404548969844905088  
 2Mass ID (if available) : 05344670+2328016  
 ICRS Star Coord at Epoch: 05h 34m 46.69486s +23:28:00.87282s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 13.668  
 G magnitude : 16.644  
 RP magnitude : 15.739  
 BP magnitude : 17.504  
 DUPflag : 0  
 Distance (au) : 18.128  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.56  
 Sun-Target sep (deg) : 166.07  
 Sun-Moon sep (deg) : 33.31  
 B (ring opening deg) : 79.76  
 PA of pole (deg) : 37.11  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.476  
 C/A sky separation (km) : 6261.2  
 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\_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	2031-12-30T11:37:02.777		27.13	-39.54	51479.70	-22.65		
lambda	I	2031-12-30T11:38:06.915		26.91	-39.31	50026.71	-22.65		
delta	I	2031-12-30T11:39:23.168		26.65	-39.05	48300.35	-22.63		
gamma	I	2031-12-30T11:39:52.983		26.55	-38.94	47625.70	-22.63		
eta	I	2031-12-30T11:40:12.856		26.48	-38.87	47176.12	-22.62		
beta	I	2031-12-30T11:41:18.979		26.26	-38.64	45680.65	-22.60		
alpha	I	2031-12-30T11:42:00.249		26.11	-38.50	44749.08	-22.59		
4	I	2031-12-30T11:43:37.348		25.78	-38.16	42555.09	-22.57		
5	I	2031-12-30T11:43:55.130		25.72	-38.10	42155.12	-22.56		
6	I	2031-12-30T11:44:09.486		25.67	-38.05	41834.98	-22.55		
Uranus	I	2031-12-30T11:56:17.057		23.19	-35.53	25450.37		-4.40	-4.61
Uranus	E	2031-12-30T12:32:25.615		15.90	-28.05	25181.38		8.30	8.68
6	E	2031-12-30T12:44:38.974		13.47	-25.54	41826.55	22.45		
5	E	2031-12-30T12:45:00.627		13.40	-25.47	42309.23	22.45		
4	E	2031-12-30T12:45:13.724		13.36	-25.43	42599.14	22.46		
alpha	E	2031-12-30T12:46:46.444		13.05	-25.11	44685.06	22.48		
beta	E	2031-12-30T12:47:29.139		12.91	-24.96	45643.72	22.49		
eta	E	2031-12-30T12:48:37.243		12.69	-24.73	47176.12	22.50		
gamma	E	2031-12-30T12:48:57.334		12.62	-24.66	47628.21	22.50		
delta	E	2031-12-30T12:49:27.198		12.52	-24.56	48300.35	22.51		
lambda	E	2031-12-30T12:50:43.876		12.27	-24.30	50026.71	22.52		
epsilon	E	2031-12-30T12:51:16.879		12.16	-24.19	50770.01	22.52		

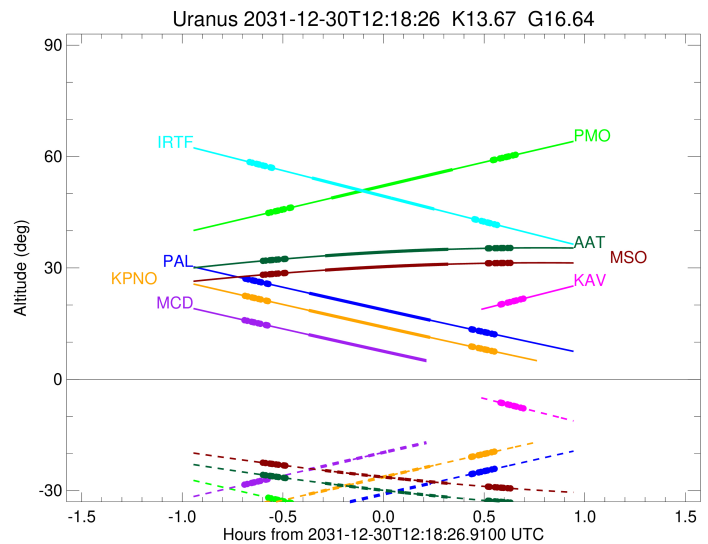
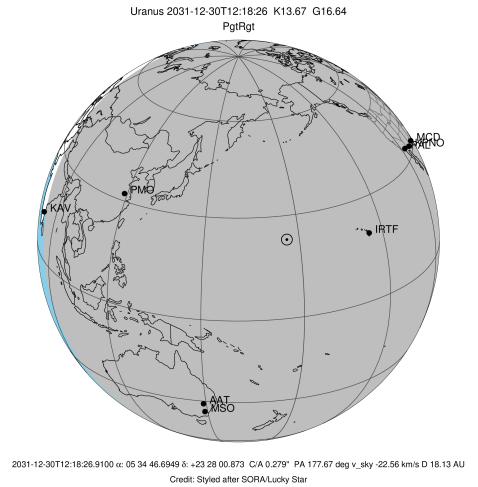
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-30T12:21:03.960  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3404548969844905088  
 2Mass ID (if available) : 05344670+2328016  
 ICRS Star Coord at Epoch: 05h 34m 46.69486s +23:28:00.87282s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 13.668  
 G magnitude : 16.644  
 RP magnitude : 15.739  
 BP magnitude : 17.504  
 DUPflag : 0  
 Distance (au) : 18.128  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.56  
 Sun-Target sep (deg) : 166.07  
 Sun-Moon sep (deg) : 34.57  
 B (ring opening deg) : 79.76  
 PA of pole (deg) : 37.11  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.394  
 C/A sky separation (km) : 5182.3  
 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	2031-12-30T11:43:51.995		44.76	-31.85	51481.93	-22.82		
lambda	I	2031-12-30T11:44:55.747		44.99	-32.07	50026.71	-22.82		
delta	I	2031-12-30T11:46:11.400		45.25	-32.34	48300.35	-22.82		
gamma	I	2031-12-30T11:46:40.975		45.36	-32.44	47625.64	-22.81		
eta	I	2031-12-30T11:47:00.682		45.43	-32.51	47176.12	-22.81		
beta	I	2031-12-30T11:48:06.248		45.66	-32.74	45680.59	-22.80		
alpha	I	2031-12-30T11:48:47.148		45.81	-32.88	44749.26	-22.79		
4	I	2031-12-30T11:50:23.395		46.15	-33.22	42554.50	-22.78		
5	I	2031-12-30T11:50:40.983		46.21	-33.28	42155.23	-22.78		
6	I	2031-12-30T11:50:55.181		46.26	-33.33	41835.60	-22.77		
Uranus	I	2031-12-30T12:02:53.674		48.81	-35.85	25435.78		-4.69	-4.91
Uranus	E	2031-12-30T12:39:03.310		56.50	-43.49	25211.64		7.95	8.32
6	E	2031-12-30T12:51:02.630		59.03	-46.03	41828.10	22.84		
5	E	2031-12-30T12:51:23.900		59.11	-46.11	42310.31	22.84		
4	E	2031-12-30T12:51:36.650		59.15	-46.15	42597.80	22.85		
alpha	E	2031-12-30T12:53:07.879		59.47	-46.47	44685.28	22.86		
beta	E	2031-12-30T12:53:49.833		59.62	-46.62	45643.38	22.87		
eta	E	2031-12-30T12:54:56.813		59.86	-46.86	47176.12	22.88		
gamma	E	2031-12-30T12:55:16.562		59.93	-46.93	47628.04	22.89		
delta	E	2031-12-30T12:55:45.936		60.03	-47.03	48300.35	22.89		
lambda	E	2031-12-30T12:57:01.338		60.29	-47.30	50026.71	22.90		
epsilon	E	2031-12-30T12:57:34.006		60.41	-47.42	50774.92	22.90		

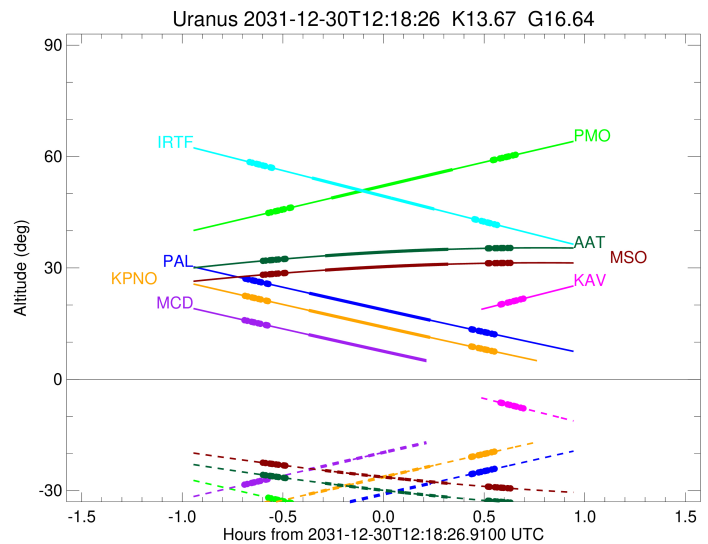
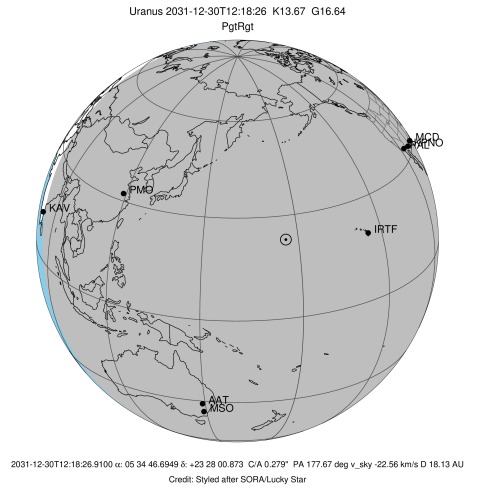
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-30T12:14:20.520
Event type           : PgtRgt
: Uranus occs: geocentric, topocentric
: 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       : 3404548969844905088
2Mass ID (if available) : 05344670+2328016
ICRS Star Coord at Epoch: 05h 34m 46.69486s +23:28:00.87282s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 13.668
G magnitude           : 16.644
RP magnitude         : 15.739
BP magnitude         : 17.504
DUPflag              : 0
Distance (au)        : 18.128
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.56
Sun-Target sep (deg) : 166.07
Sun-Moon sep (deg)   : 33.26
B (ring opening deg) : 79.76
PA of pole (deg)     : 37.11
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.481
C/A sky separation (km) : 6328.2
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_itrff93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



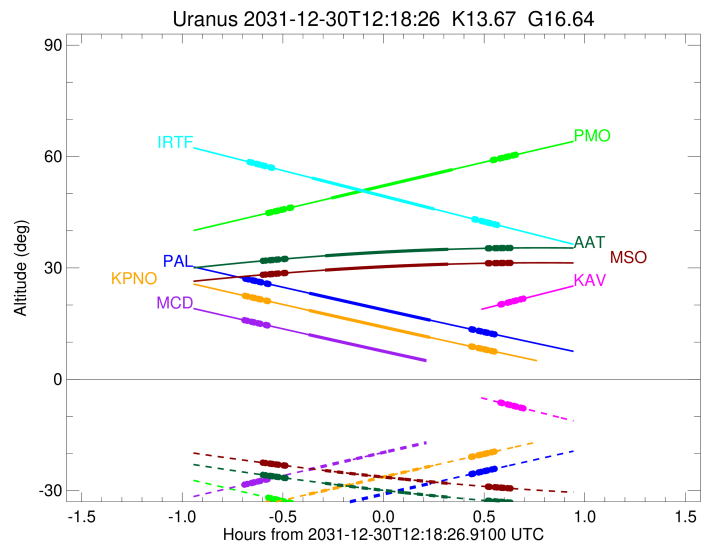
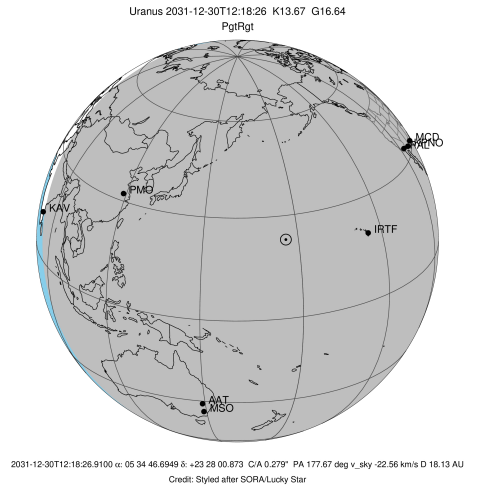
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-30T11:36:53.572		22.53	-35.01	51479.45	-22.61		
lambda	I	2031-12-30T11:37:57.802		22.30	-34.79	50026.71	-22.61		
delta	I	2031-12-30T11:39:14.180		22.04	-34.52	48300.35	-22.59		
gamma	I	2031-12-30T11:39:44.042		21.94	-34.41	47625.70	-22.59		
eta	I	2031-12-30T11:40:03.948		21.87	-34.34	47176.12	-22.58		
beta	I	2031-12-30T11:41:10.180		21.64	-34.11	45680.65	-22.57		
alpha	I	2031-12-30T11:41:51.520		21.50	-33.97	44749.06	-22.56		
4	I	2031-12-30T11:43:28.780		21.17	-33.62	42555.15	-22.53		
5	I	2031-12-30T11:43:46.594		21.11	-33.56	42155.11	-22.52		
6	I	2031-12-30T11:44:00.976		21.06	-33.51	41834.92	-22.52		
Uranus	I	2031-12-30T11:56:09.912		18.57	-30.96	25451.47		-4.38	-4.59
Uranus	E	2031-12-30T12:32:20.272		11.27	-23.44	25179.80		8.31	8.70
6	E	2031-12-30T12:44:35.122		8.84	-20.92	41826.47	22.41		
5	E	2031-12-30T12:44:56.816		8.77	-20.84	42309.17	22.41		
4	E	2031-12-30T12:45:09.943		8.73	-20.80	42599.20	22.42		
alpha	E	2031-12-30T12:46:42.829		8.42	-20.48	44685.05	22.44		
beta	E	2031-12-30T12:47:25.603		8.28	-20.33	45643.74	22.45		
eta	E	2031-12-30T12:48:33.829		8.06	-20.10	47176.12	22.46		
gamma	E	2031-12-30T12:48:53.957		7.99	-20.03	47628.22	22.46		
delta	E	2031-12-30T12:49:23.874		7.89	-19.93	48300.35	22.47		
lambda	E	2031-12-30T12:50:40.689		7.64	-19.67	50026.71	22.48		
epsilon	E	2031-12-30T12:51:13.740		7.53	-19.56	50769.79	22.48		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-30T12:14:17.020  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : 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 : 3404548969844905088  
 2Mass ID (if available) : 05344670+2328016  
 ICRS Star Coord at Epoch: 05h 34m 46.69486s +23:28:00.87282s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 13.668  
 G magnitude : 16.644  
 RP magnitude : 15.739  
 BP magnitude : 17.504  
 DUPflag : 0  
 Distance (au) : 18.128  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.56  
 Sun-Target sep (deg) : 166.07  
 Sun-Moon sep (deg) : 33.20  
 B (ring opening deg) : 79.76  
 PA of pole (deg) : 37.11  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.494  
 C/A sky separation (km) : 6500.2  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



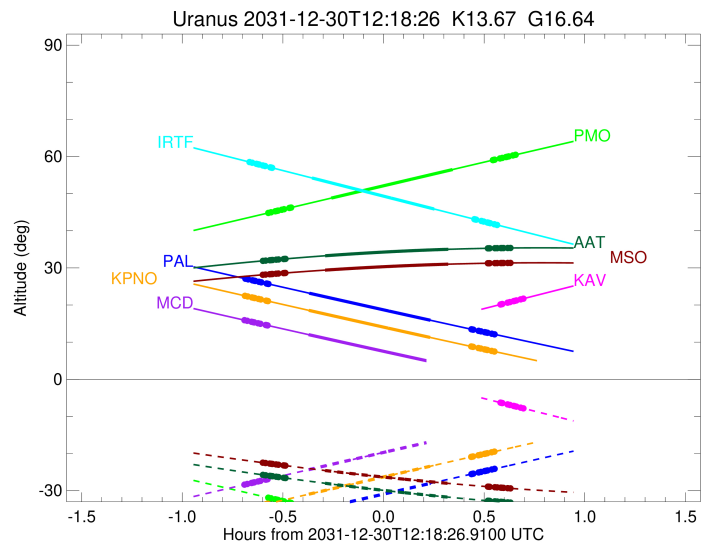
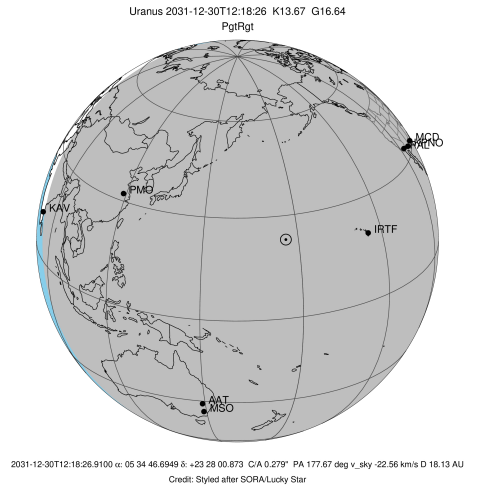
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-30T11:36:45.808		15.97	-28.43	51478.71	-22.55		
lambda	I	2031-12-30T11:37:50.178		15.75	-28.20	50026.71	-22.55		
delta	I	2031-12-30T11:39:06.763		15.49	-27.93	48300.35	-22.53		
gamma	I	2031-12-30T11:39:36.707		15.38	-27.83	47625.72	-22.53		
eta	I	2031-12-30T11:39:56.669		15.32	-27.76	47176.12	-22.52		
beta	I	2031-12-30T11:41:03.084		15.09	-27.53	45680.67	-22.50		
alpha	I	2031-12-30T11:41:44.544		14.95	-27.38	44749.01	-22.49		
4	I	2031-12-30T11:43:22.073		14.62	-27.04	42555.31	-22.47		
5	I	2031-12-30T11:43:39.946		14.55	-26.98	42155.09	-22.46		
6	I	2031-12-30T11:43:54.376		14.51	-26.93	41834.76	-22.45		
Uranus	I	2031-12-30T11:56:05.733		12.03	-24.37	25454.48		-4.32	-4.52
Uranus	E	2031-12-30T12:32:17.114		4.80x	-16.86	25175.95		8.36	8.75
6	E	2031-12-30T12:44:34.550		2.40x	-14.34	41826.30	22.34		
5	E	2031-12-30T12:44:56.310		2.33x	-14.27	42309.04	22.34		
4	E	2031-12-30T12:45:09.492		2.28x	-14.22	42599.35	22.35		
alpha	E	2031-12-30T12:46:42.645		1.98x	-13.90	44685.03	22.37		
beta	E	2031-12-30T12:47:25.546		1.84x	-13.76	45643.78	22.38		
eta	E	2031-12-30T12:48:33.967		1.62x	-13.53	47176.12	22.40		
gamma	E	2031-12-30T12:48:54.154		1.56x	-13.46	47628.24	22.40		
delta	E	2031-12-30T12:49:24.156		1.46x	-13.36	48300.35	22.40		
lambda	E	2031-12-30T12:50:41.188		1.21x	-13.10	50026.71	22.42		
epsilon	E	2031-12-30T12:51:14.310		1.11x	-12.98	50769.28	22.41		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-30T12:15:24.490  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : 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 : 3404548969844905088  
 2Mass ID (if available) : 05344670+2328016  
 ICRS Star Coord at Epoch: 05h 34m 46.69486s +23:28:00.87282s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 13.668  
 G magnitude : 16.644  
 RP magnitude : 15.739  
 BP magnitude : 17.504  
 DUPflag : 0  
 Distance (au) : 18.128  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.56  
 Sun-Target sep (deg) : 166.07  
 Sun-Moon sep (deg) : 33.63  
 B (ring opening deg) : 79.76  
 PA of pole (deg) : 37.11  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.278  
 C/A sky separation (km) : 3649.7  
 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



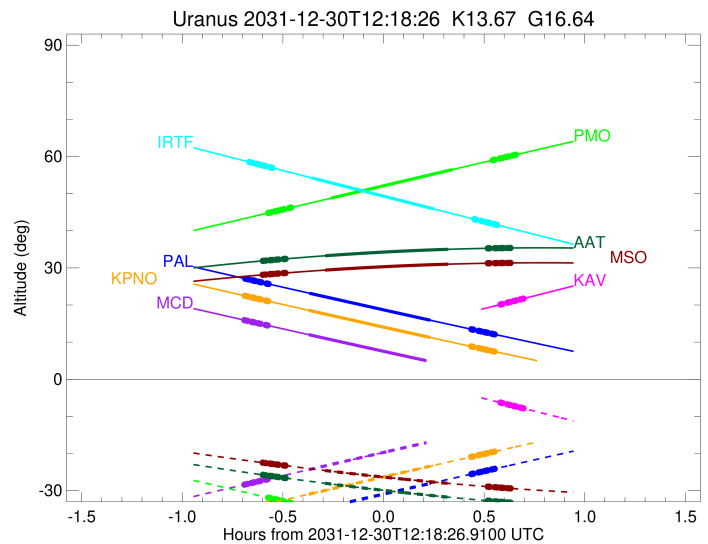
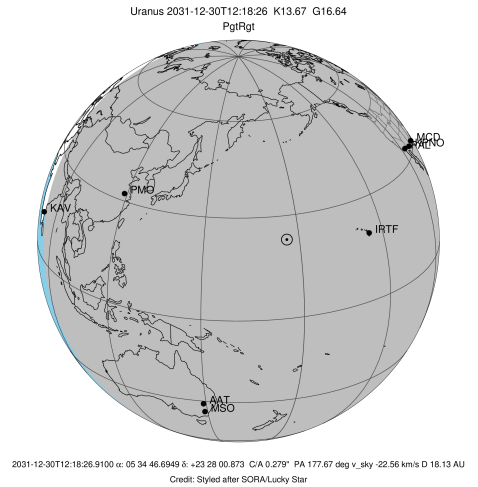
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-30T11:38:15.291		58.57	-72.45	51490.97	-23.01		
lambda	I	2031-12-30T11:39:18.917		58.32	-72.21	50026.71	-23.01		
delta	I	2031-12-30T11:40:33.950		58.04	-71.93	48300.35	-23.00		
gamma	I	2031-12-30T11:41:03.291		57.92	-71.81	47625.42	-23.00		
eta	I	2031-12-30T11:41:22.824		57.85	-71.74	47176.12	-23.00		
beta	I	2031-12-30T11:42:27.853		57.60	-71.49	45680.35	-22.99		
alpha	I	2031-12-30T11:43:08.374		57.44	-71.34	44749.87	-22.99		
4	I	2031-12-30T11:44:43.899		57.08	-70.98	42552.58	-22.98		
5	I	2031-12-30T11:45:01.248		57.01	-70.91	42155.69	-22.98		
6	I	2031-12-30T11:45:15.259		56.96	-70.86	41837.58	-22.98		
Uranus	I	2031-12-30T11:57:06.563		54.23	-68.15	25400.95		-5.32	-5.57
Uranus	E	2031-12-30T12:33:36.537		45.85	-59.77	25240.70		7.60	7.95
6	E	2031-12-30T12:45:31.495		43.12	-57.03	41829.25	22.89		
5	E	2031-12-30T12:45:52.700		43.04	-56.95	42311.04	22.89		
4	E	2031-12-30T12:46:05.334		42.99	-56.90	42596.80	22.90		
alpha	E	2031-12-30T12:47:36.445		42.65	-56.55	44685.45	22.90		
beta	E	2031-12-30T12:48:18.316		42.49	-56.39	45643.16	22.90		
eta	E	2031-12-30T12:49:25.222		42.23	-56.14	47176.12	22.91		
gamma	E	2031-12-30T12:49:44.945		42.16	-56.06	47627.93	22.91		
delta	E	2031-12-30T12:50:14.296		42.05	-55.95	48300.35	22.91		
lambda	E	2031-12-30T12:51:29.646		41.76	-55.66	50026.71	22.91		
epsilon	E	2031-12-30T12:52:02.445		41.63	-55.53	50778.25	22.91		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-30T12:22:59.480  
 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 : 3404548969844905088  
 2Mass ID (if available) : 05344670+2328016  
 ICRS Star Coord at Epoch: 05h 34m 46.69486s +23:28:00.87282s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 13.668  
 G magnitude : 16.644  
 RP magnitude : 15.739  
 BP magnitude : 17.504  
 DUPflag : 0  
 Distance (au) : 18.128  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.56  
 Sun-Target sep (deg) : 166.07  
 Sun-Moon sep (deg) : 34.56  
 B (ring opening deg) : 79.76  
 PA of pole (deg) : 37.11  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.356  
 C/A sky separation (km) : 4680.0  
 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	2031-12-30T11:45:21.663		4.69x	8.84x	51483.63	-22.59		
lambda	I	2031-12-30T11:46:26.148		4.94x	8.60x	50026.71	-22.59		
delta	I	2031-12-30T11:47:42.575		5.22	8.32x	48300.35	-22.59		
gamma	I	2031-12-30T11:48:12.452		5.34	8.21x	47625.59	-22.58		
eta	I	2031-12-30T11:48:32.355		5.41	8.14x	47176.12	-22.58		
beta	I	2031-12-30T11:49:38.581		5.66	7.90x	45680.54	-22.58		
alpha	I	2031-12-30T11:50:19.881		5.82	7.75x	44749.39	-22.57		
4	I	2031-12-30T11:51:57.093		6.18	7.39x	42554.11	-22.56		
5	I	2031-12-30T11:52:14.834		6.25	7.33x	42155.31	-22.56		
6	I	2031-12-30T11:52:29.155		6.30	7.27x	41836.01	-22.56		
Uranus	I	2031-12-30T12:04:33.864		9.03	4.61x	25427.54		-4.85	-5.08
Uranus	E	2031-12-30T12:41:14.299		17.38	-3.57x	25224.68		7.79	8.16
6	E	2031-12-30T12:53:18.293		20.14	-6.29	41828.74	22.67		
5	E	2031-12-30T12:53:39.713		20.22	-6.37	42310.73	22.67		
4	E	2031-12-30T12:53:52.508		20.27	-6.42	42597.23	22.68		
alpha	E	2031-12-30T12:55:24.451		20.62	-6.76	44685.38	22.69		
beta	E	2031-12-30T12:56:06.710		20.79	-6.92	45643.25	22.70		
eta	E	2031-12-30T12:57:14.202		21.04	-7.17	47176.12	22.71		
gamma	E	2031-12-30T12:57:34.097		21.12	-7.25	47627.97	22.71		
delta	E	2031-12-30T12:58:03.697		21.23	-7.36	48300.35	22.72		
lambda	E	2031-12-30T12:59:19.672		21.52	-7.65	50026.71	22.73		
epsilon	E	2031-12-30T12:59:52.682		21.65	-7.77	50777.02	22.73		

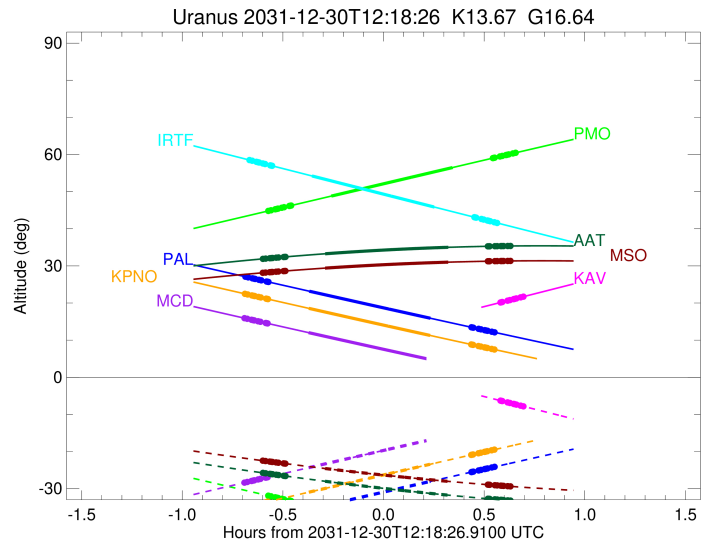
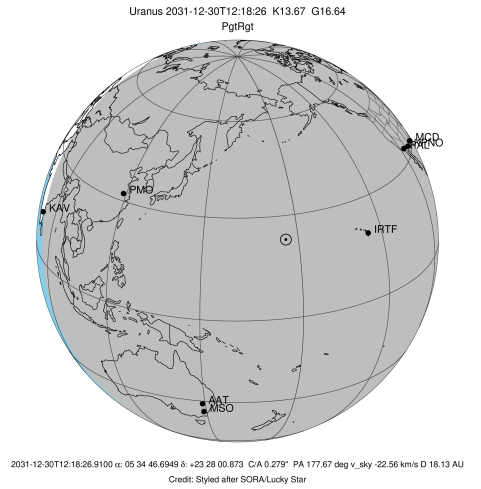
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-30T12:19:23.520  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 3404548969844905088  
 2Mass ID (if available) : 05344670+2328016  
 ICRS Star Coord at Epoch: 05h 34m 46.69486s +23:28:00.87282s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 13.668  
 G magnitude : 16.644  
 RP magnitude : 15.739  
 BP magnitude : 17.504  
 DUPflag : 0  
 Distance (au) : 18.128  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.56  
 Sun-Target sep (deg) : 166.07  
 Sun-Moon sep (deg) : 34.08  
 B (ring opening deg) : 79.76  
 PA of pole (deg) : 37.11  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.116  
 C/A sky separation (km) : 1525.8  
 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	2031-12-30T11:42:15.118		31.88	-25.72	51510.33	-23.07		
lambda	I	2031-12-30T11:43:19.449		31.97	-25.86	50026.71	-23.06		
delta	I	2031-12-30T11:44:34.307		32.07	-26.02	48300.35	-23.06		
gamma	I	2031-12-30T11:45:03.597		32.11	-26.08	47624.88	-23.06		
eta	I	2031-12-30T11:45:23.056		32.13	-26.12	47176.12	-23.06		
beta	I	2031-12-30T11:46:27.934		32.22	-26.26	45679.60	-23.06		
alpha	I	2031-12-30T11:47:08.252		32.27	-26.34	44751.10	-23.06		
4	I	2031-12-30T11:48:43.703		32.39	-26.54	42547.91	-23.06		
5	I	2031-12-30T11:49:00.755		32.42	-26.58	42157.61	-23.06		
6	I	2031-12-30T11:49:14.580		32.43	-26.61	41842.60	-23.06		
Uranus	I	2031-12-30T12:01:03.070		33.27	-28.02	25292.72		-6.94	-7.26
Uranus	E	2031-12-30T12:37:46.653		35.01	-31.76	25359.74		5.98	6.27
6	E	2031-12-30T12:49:33.551		35.28	-32.72	41834.80	23.08		
5	E	2031-12-30T12:49:54.472		35.28	-32.75	42313.73	23.08		
4	E	2031-12-30T12:50:06.613		35.29	-32.77	42591.75	23.08		
alpha	E	2031-12-30T12:51:37.306		35.31	-32.88	44686.63	23.08		
beta	E	2031-12-30T12:52:18.762		35.32	-32.93	45642.21	23.08		
eta	E	2031-12-30T12:53:25.206		35.33	-33.01	47176.12	23.08		
gamma	E	2031-12-30T12:53:44.755		35.34	-33.04	47627.33	23.08		
delta	E	2031-12-30T12:54:13.913		35.34	-33.07	48300.35	23.08		
lambda	E	2031-12-30T12:55:28.703		35.36	-33.16	50026.71	23.08		
epsilon	E	2031-12-30T12:56:02.128		35.36	-33.20	50798.28	23.09		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-30T12:19:21.990  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : 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 : 3404548969844905088  
 2Mass ID (if available) : 05344670+2328016  
 ICRS Star Coord at Epoch: 05h 34m 46.69486s +23:28:00.87282s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 13.668  
 G magnitude : 16.644  
 RP magnitude : 15.739  
 BP magnitude : 17.504  
 DUPflag : 0  
 Distance (au) : 18.128  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.56  
 Sun-Target sep (deg) : 166.07  
 Sun-Moon sep (deg) : 34.04  
 B (ring opening deg) : 79.76  
 PA of pole (deg) : 37.11  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.135  
 C/A sky separation (km) : 1774.1  
 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	2031-12-30T11:42:12.385		28.12	-22.44	51511.25	-23.04		
lambda	I	2031-12-30T11:43:16.813		28.20	-22.57	50026.71	-23.04		
delta	I	2031-12-30T11:44:31.739		28.30	-22.72	48300.35	-23.04		
gamma	I	2031-12-30T11:45:01.057		28.33	-22.77	47624.85	-23.04		
eta	I	2031-12-30T11:45:20.534		28.36	-22.81	47176.12	-23.04		
beta	I	2031-12-30T11:46:25.474		28.44	-22.94	45679.56	-23.04		
alpha	I	2031-12-30T11:47:05.826		28.48	-23.02	44751.15	-23.04		
4	I	2031-12-30T11:48:41.381		28.60	-23.20	42547.68	-23.03		
5	I	2031-12-30T11:48:58.436		28.62	-23.24	42157.74	-23.04		
6	I	2031-12-30T11:49:12.269		28.63	-23.26	41842.86	-23.04		
Uranus	I	2031-12-30T12:01:01.648		29.41	-24.58	25287.08		-7.01	-7.34
Uranus	E	2031-12-30T12:37:45.499		31.01	-28.04	25365.02		5.90	6.18
6	E	2031-12-30T12:49:33.174		31.25	-28.93	41835.05	23.06		
5	E	2031-12-30T12:49:54.109		31.26	-28.96	42313.82	23.05		
4	E	2031-12-30T12:50:06.246		31.26	-28.97	42591.51	23.05		
alpha	E	2031-12-30T12:51:37.044		31.28	-29.08	44686.70	23.06		
beta	E	2031-12-30T12:52:18.537		31.29	-29.12	45642.17	23.06		
eta	E	2031-12-30T12:53:25.048		31.31	-29.20	47176.12	23.06		
gamma	E	2031-12-30T12:53:44.614		31.31	-29.22	47627.30	23.06		
delta	E	2031-12-30T12:54:13.802		31.32	-29.25	48300.35	23.06		
lambda	E	2031-12-30T12:55:28.663		31.33	-29.34	50026.71	23.06		
epsilon	E	2031-12-30T12:56:02.163		31.33	-29.37	50799.27	23.07		