

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-11-09T14:34:58.000  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3377572353276508928  
 2Mass ID (if available) : 06225883+2335394

ICRS Star Coord at Epoch: 06h 22m 58.82356s +23:35:39.29165s

RUWE (>1.4 is poor) : 1.87  
 K magnitude : 13.439  
 G magnitude : 15.520  
 RP magnitude : 14.826  
 BP magnitude : 16.002  
 DUPflag : 0  
 Distance (au) : 18.287  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.44  
 Sun-Target sep (deg) : 131.77  
 Sun-Moon sep (deg) : 11.57  
 B (ring opening deg) : 70.71  
 PA of pole (deg) : 67.47

# 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

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

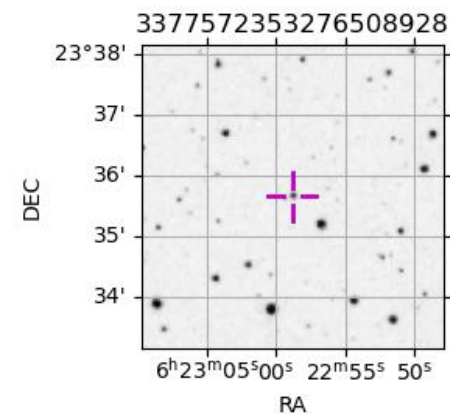
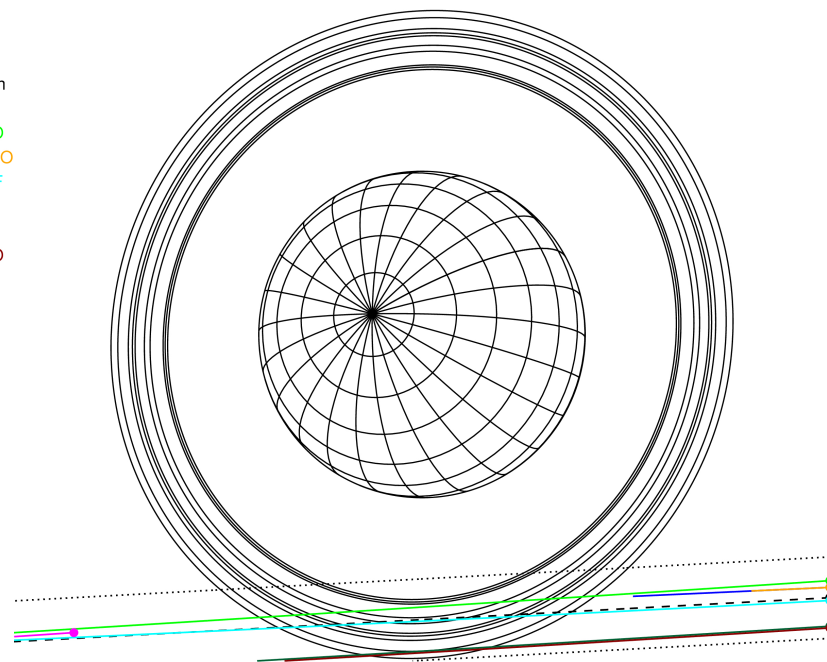
Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	++++++		++++++	NOV 09 14:11 - NOV 09 15:15	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald 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	++++++		++++++	NOV 09 14:08 - NOV 09 15:03	PnnRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
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	+		+	NOV 09 14:29 - NOV 09 14:53	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+		+	NOV 09 14:30 - NOV 09 14:52	PnnRie



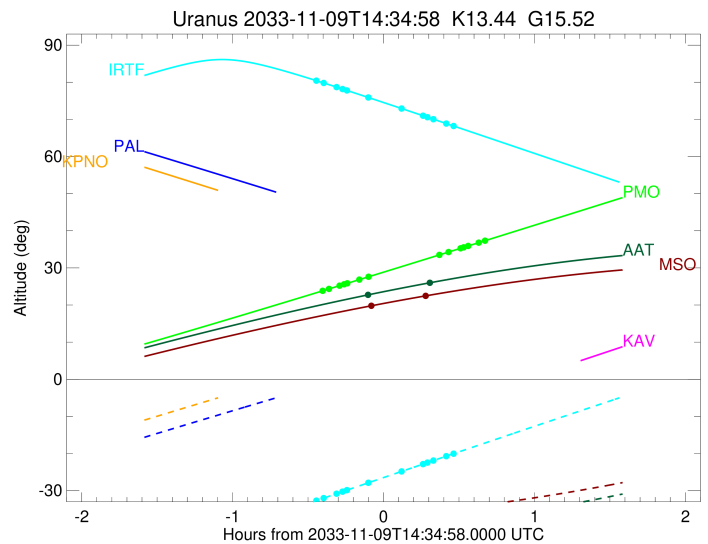
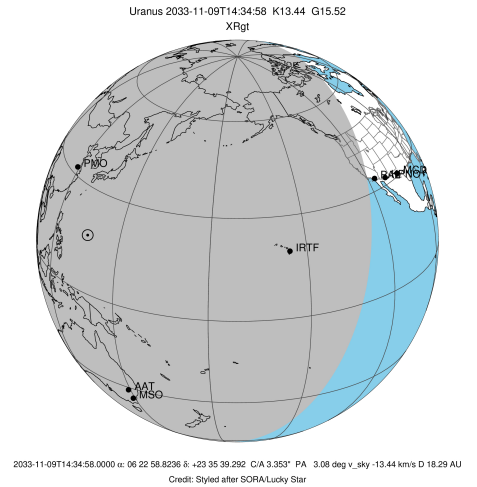
2033-11-09T14:34:58.0000 a: 06 22 58.8236 l: +23 35 39.292 C/A 3.353° PA 3.08 deg v\_sky -13.44 km/s D 18.29 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2033-11-09T14:34:58 K13.44 G15.52 XRgt

Earth  
 PAL  
 PMO  
 KPNO  
 IRTF  
 KAV  
 AAT  
 MSO



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-11-09T14:40:48.540  
 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 : 3377572353276508928  
 2Mass ID (if available) : 06225883+2335394  
 ICRS Star Coord at Epoch: 06h 22m 58.82356s +23:35:39.29165s  
 RUWE (>1.4 is poor) : 1.87  
 K magnitude : 13.439  
 G magnitude : 15.520  
 RP magnitude : 14.826  
 BP magnitude : 16.002  
 DUPflag : 0  
 Distance (au) : 18.287  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.44  
 Sun-Target sep (deg) : 131.77  
 Sun-Moon sep (deg) : 11.13  
 B (ring opening deg) : 70.71  
 PA of pole (deg) : 67.47  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.212  
 C/A sky separation (km) : 42608.0  
 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



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

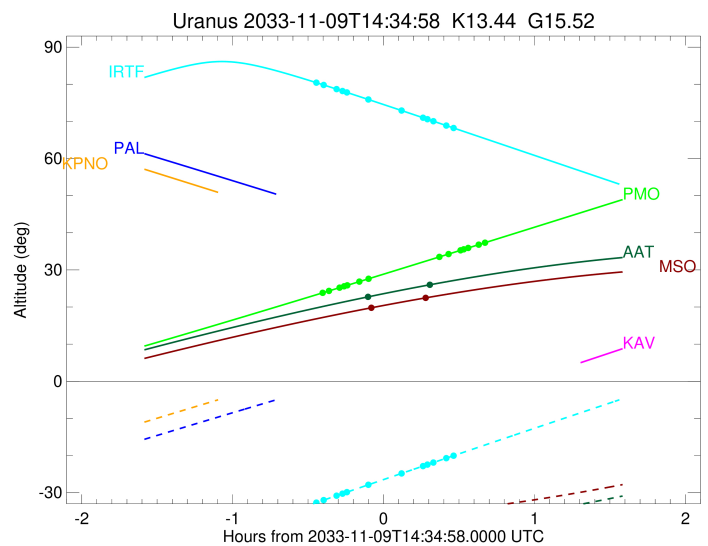
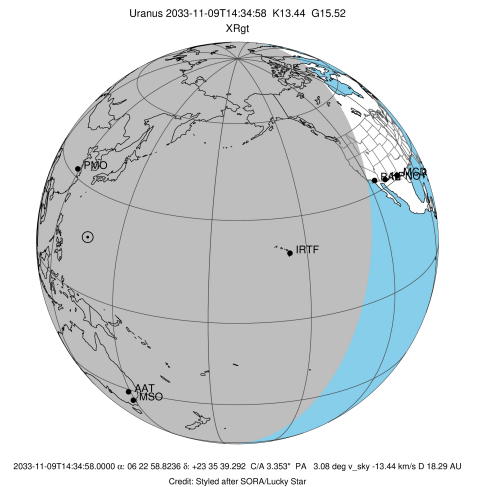
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-11-09T14:11:19.165		23.93	-63.47	50916.54	-7.64		
lambda	I	2033-11-09T14:13:19.603		24.35	-63.84	50026.71	-7.21		
delta	I	2033-11-09T14:17:32.632		25.22	-64.62	48300.35	-6.42		
gamma	I	2033-11-09T14:19:20.579		25.59	-64.95	47627.02	-6.06		
eta	I	2033-11-09T14:20:36.732		25.86	-65.18	47176.12	-5.79		
beta	I	2033-11-09T14:25:21.353		26.84	-66.03	45678.16	-4.72		
alpha	I	2033-11-09T14:29:07.975		27.63	-66.69	44711.61	-3.79		

No planet occultations

alpha	E	2033-11-09T14:57:00.787		33.47	-71.13	44695.50	3.81		
beta	E	2033-11-09T15:00:48.284		34.26	-71.64	45667.69	4.74		
eta	E	2033-11-09T15:05:33.585		35.27	-72.26	47176.12	5.82		
gamma	E	2033-11-09T15:06:49.887		35.53	-72.41	47630.81	6.09		
delta	E	2033-11-09T15:08:36.501		35.91	-72.63	48300.35	6.46		
lambda	E	2033-11-09T15:12:47.658		36.79	-73.10	50026.71	7.27		
epsilon	E	2033-11-09T15:15:43.868		37.41	-73.41	51354.00	7.71		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-11-09T14:33:13.320
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      : 3377572353276508928
2Mass ID (if available) : 06225883+2335394
ICRS Star Coord at Epoch: 06h 22m 58.82356s +23:35:39.29165s
RUWE (>1.4 is poor) : 1.87
K magnitude          : 13.439
G magnitude          : 15.520
RP magnitude         : 14.826
BP magnitude         : 16.002
DUPflag             : 0
Distance (au)       : 18.287
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -13.44
Sun-Target sep (deg) : 131.77
Sun-Moon sep (deg)  : 11.98
B (ring opening deg) : 70.71
PA of pole (deg)    : 67.47
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.381
C/A sky separation (km) : 44842.9
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.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

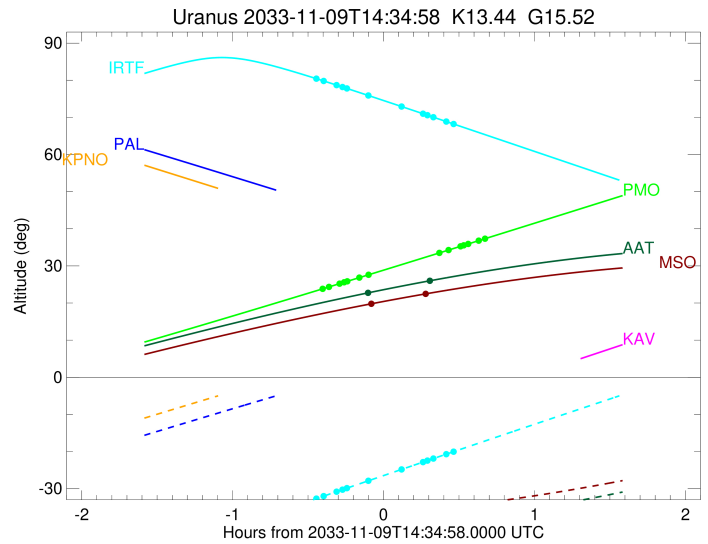
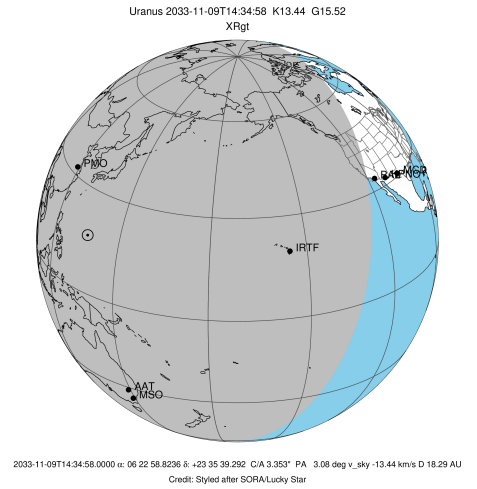
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-11-09T14:08:48.817		80.33	-32.57	50951.31	-6.73		
lambda	I	2033-11-09T14:11:13.289		79.81	-32.01	50026.71	-6.15		
delta	I	2033-11-09T14:16:21.499		78.69	-30.81	48300.35	-5.03		
gamma	I	2033-11-09T14:18:43.026		78.18	-30.26	47627.76	-4.47		
eta	I	2033-11-09T14:20:29.100		77.79	-29.85	47176.12	-4.04		
beta	I	2033-11-09T14:28:57.769		75.90	-27.88	45675.31	-1.82		

No planet occultations

beta	E	2033-11-09T14:42:06.215		72.94	-24.84	45671.31	1.82		
eta	E	2033-11-09T14:50:37.275		71.01	-22.87	47176.12	4.04		
gamma	E	2033-11-09T14:52:24.014		70.60	-22.46	47630.47	4.47		
delta	E	2033-11-09T14:54:45.023		70.07	-21.91	48300.35	5.03		
lambda	E	2033-11-09T14:59:53.466		68.89	-20.73	50026.71	6.15		
epsilon	E	2033-11-09T15:03:14.117		68.13	-19.95	51328.28	6.72		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-11-09T14:38:28.360
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        : 3377572353276508928
2Mass ID (if available) : 06225883+2335394
ICRS Star Coord at Epoch: 06h 22m 58.82356s +23:35:39.29165s
RUWE (>1.4 is poor)  : 1.87
K magnitude           : 13.439
G magnitude           : 15.520
RP magnitude          : 14.826
BP magnitude          : 16.002
DUPflag              : 0
Distance (au)         : 18.287
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -13.44
Sun-Target sep (deg)  : 131.77
Sun-Moon sep (deg)    : 10.88
B (ring opening deg)  : 70.71
PA of pole (deg)      : 67.47
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.733
C/A sky separation (km) : 49508.7
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.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
  
```



```

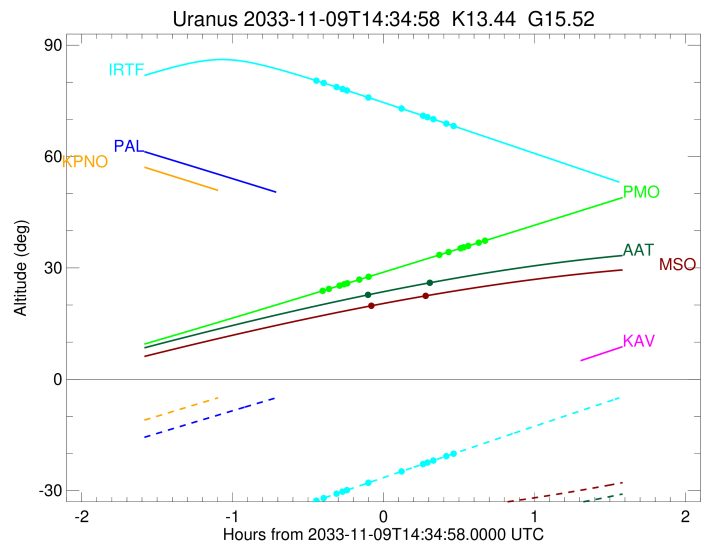
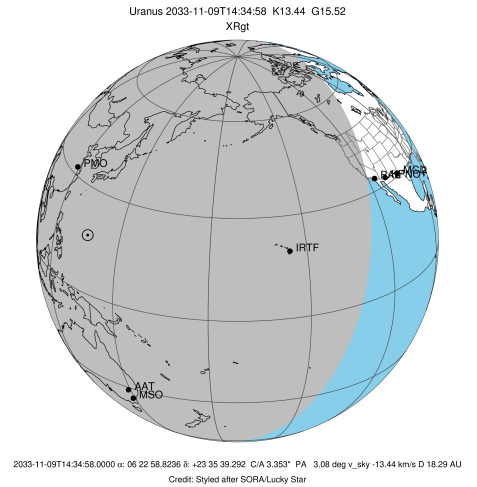
b: ring blocked by planet  x: target alt < 5.0 deg or sun > -5.0 deg
Ring      I/E      UTC      b? alt  alt-sun  radius  r-dot  lat-geo lat-geodetic
-----
epsilon   I  2033-11-09T14:29:27.670  22.83 -40.80  51051.34  -2.95
  
```

No planet occultations

```

epsilon   E  2033-11-09T14:53:41.218  26.03 -39.29  51217.88  2.96
  
```

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-11-09T14:38:17.180  
 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 : 3377572353276508928  
 2Mass ID (if available) : 06225883+2335394  
 ICRS Star Coord at Epoch: 06h 22m 58.82356s +23:35:39.29165s  
 RUWE (>1.4 is poor) : 1.87  
 K magnitude : 13.439  
 G magnitude : 15.520  
 RP magnitude : 14.826  
 BP magnitude : 16.002  
 DUPflag : 0  
 Distance (au) : 18.287  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.44  
 Sun-Target sep (deg) : 131.77  
 Sun-Moon sep (deg) : 10.87  
 B (ring opening deg) : 70.71  
 PA of pole (deg) : 67.47  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.752  
 C/A sky separation (km) : 49763.6  
 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\_itrf93\_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	2033-11-09T14:30:48.011		19.88	-36.82	51061.80	-2.58		

No planet occultations

epsilon	E	2033-11-09T14:52:00.603		22.50	-35.63	51207.45	2.58		
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