

target : Neptune  
 target radius (km) : 24764.00  
 C/A epoch : 2038-11-14T12:13:38.810  
 Event type : PgtRgt  
 : Neptune occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 2572287180936494976  
 2Mass ID (if available) : 01493881+0922504

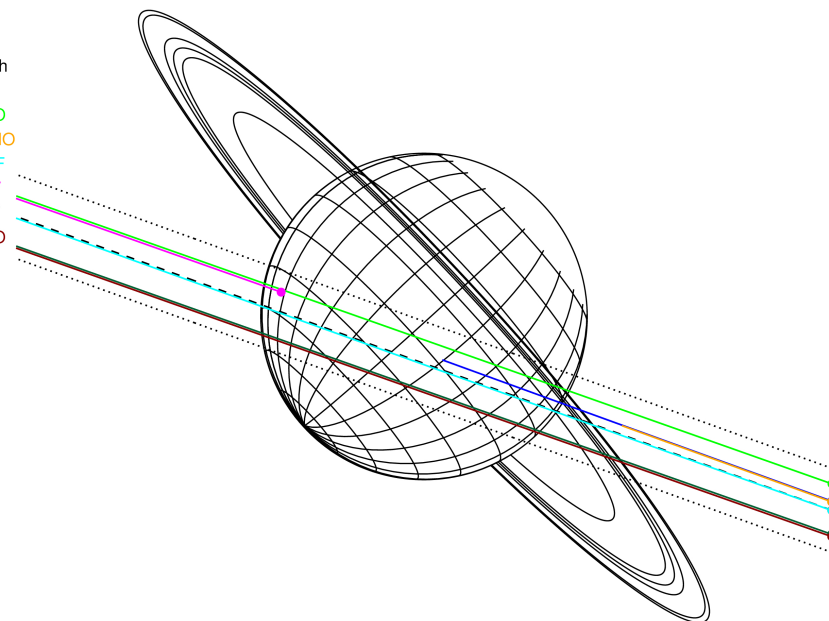
Neptune 2038-11-14T12:13:38 K14.39 G17.60 PgtRgt

ICRS Star Coord at Epoch: 01h 49m 38.86412s +09:22:50.11114s  
 RUWE (>1.4 is poor) : 0.95  
 K magnitude : 14.388  
 G magnitude : 17.599  
 RP magnitude : 16.589  
 BP magnitude : 18.726  
 DUPflag : 0  
 Distance (au) : 28.904  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.10  
 Sun-Target sep (deg) : 157.06  
 Sun-Moon sep (deg) : 50.83  
 B (ring opening deg) : -7.96  
 PA of pole (deg) : -47.58



2038-11-14T12:13:38.8100 α: 01 49 38.8641 s: +09 22 50.1111 C/A 0.520° PA 340.19 deg v\_sky -22.10 km/s D 28.90 AU  
 Credit: Styled after SORA/Lucky Star

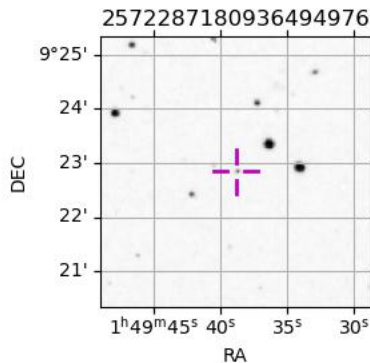
Earth  
 PAL  
 PMO  
 KPNO  
 IRTF  
 KAV  
 AAT  
 MSO



#	a(km)	ring
1	42000.0	Galle
2	53200.0	LeVerrier
3	55200.0	Lassell
4	57200.0	Arago
5	61953.0	Galatea
6	62933.0	Adams

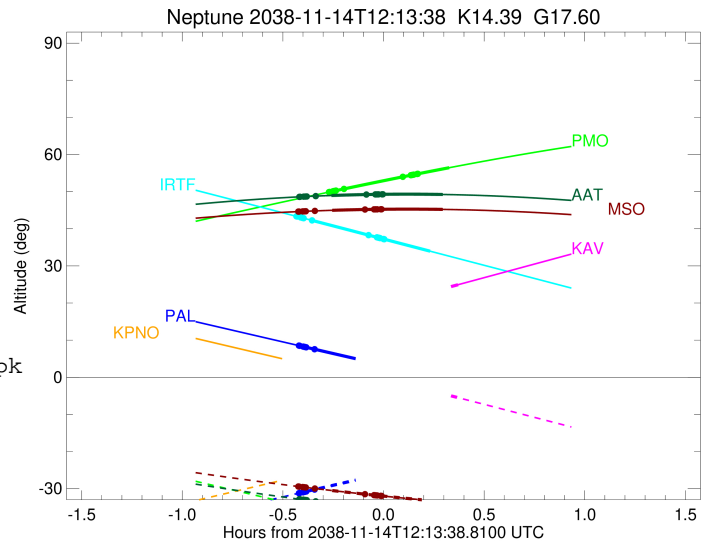
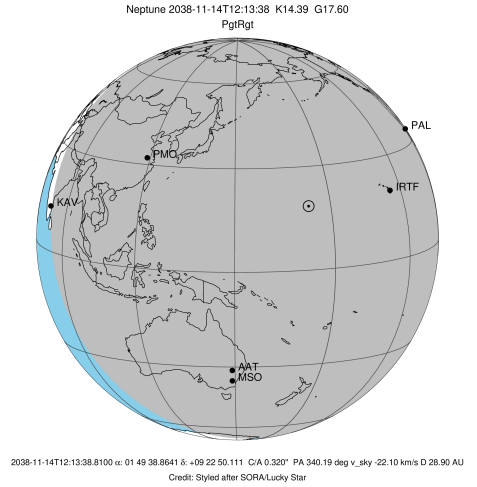
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+ + + +	+		NOV 14 11:48 - NOV 14 11:50	PinRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8		+ +		NOV 14 11:56 - NOV 14 12:33	PieRnn
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 14 11:47 - NOV 14 12:27	PieRin
KAV	Kavalur Observatory	12.6	78.8			+	NOV 14 12:35 - NOV 14 12:35	PneRnn
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 14 11:48 - NOV 14 12:31	PieRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+ + + + +	+ +		NOV 14 11:48 - NOV 14 12:31	PieRin



```

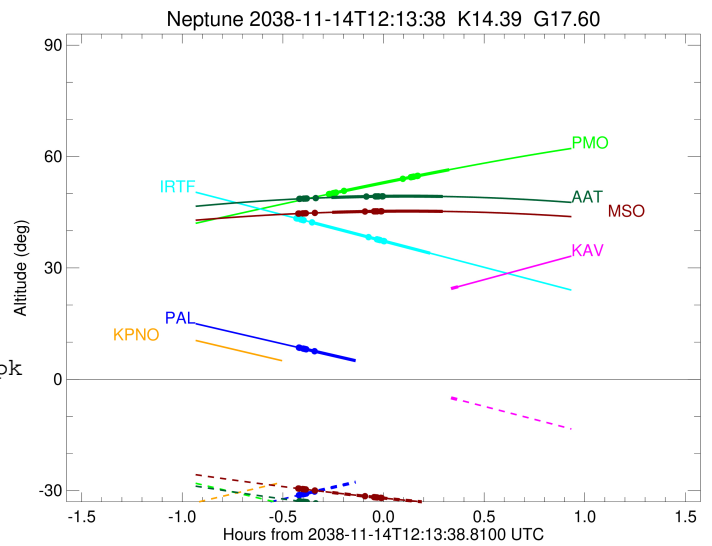
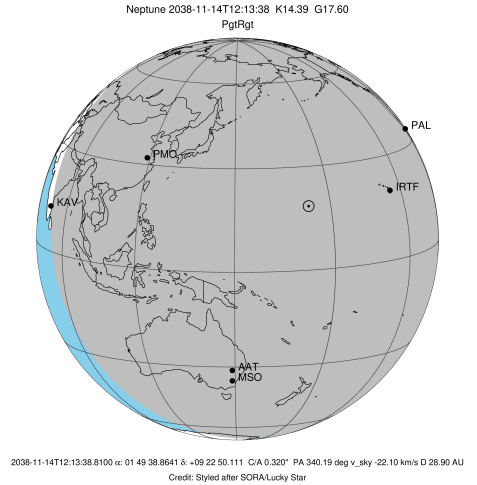
target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2038-11-14T12:08:59.550
Event type            : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : PAL
Location              : Palomar Mt (200")
Latitude (deg)        : 33.35622
E. Longitude (deg)    : 243.13601
Altitude (km)         : 1.706
Gaia source ID        : 2572287180936494976
2Mass ID (if available) : 01493881+0922504
ICRS Star Coord at Epoch: 01h 49m 38.86412s +09:22:50.11114s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 14.388
G magnitude           : 17.599
RP magnitude          : 16.589
BP magnitude          : 18.726
DUPflag              : 0
Distance (au)         : 28.904
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.10
Sun-Target sep (deg) : 157.06
Sun-Moon sep (deg)   : 50.31
B (ring opening deg) : -7.96
PA of pole (deg)     : -47.58
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.250
C/A sky separation (km) : 5243.3
NAIF SPICE kernels   : RAJobs_U111+rgf16.spk
URKALLv1.spk
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
earthstns_itr93_040916.bsp
earth_200101_990628_predict.bpc
pck00010.tpc
pck.urall1.tpc.Neptune
naif0012.tls
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
earth_flat_IAU.spk
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2038-11-14T11:48:37.843		8.48	-31.19	62933.00	-75.58		
Galatea	I	2038-11-14T11:48:50.813		8.44	-31.14	61953.00	-75.54		
Arago	I	2038-11-14T11:49:53.824		8.22	-30.92	57200.00	-75.32		
Lassell	I	2038-11-14T11:50:20.397		8.13	-30.83	55200.00	-75.21		
LeVerrier	I	2038-11-14T11:50:47.012	b	8.03	-30.74	53200.00	-75.08		
Galle	I	2038-11-14T11:53:17.087	b	7.51	-30.21	42000.00	-74.05		
Neptune	I	2038-11-14T11:50:45.931		8.04	-30.74	24763.43		15.24	15.75
Neptune	E	2038-11-14T12:27:14.622		0.47x	-23.14	24760.71		-39.36	-40.32
Galle	E	2038-11-14T12:10:32.055	b	3.93x	-26.62	42000.01	72.06		
LeVerrier	E	2038-11-14T12:13:08.201	b	3.39x	-26.07	53200.00	71.95		
Lassell	E	2038-11-14T12:13:35.948	b	3.29x	-25.98	55200.00	72.21		
Arago	E	2038-11-14T12:14:03.591	b	3.20x	-25.88	57200.00	72.50		
Galatea	E	2038-11-14T12:15:08.847	b	2.97x	-25.66	61953.00	73.17		
Adams	E	2038-11-14T12:15:22.229	b	2.93x	-25.61	62933.01	73.30		

```

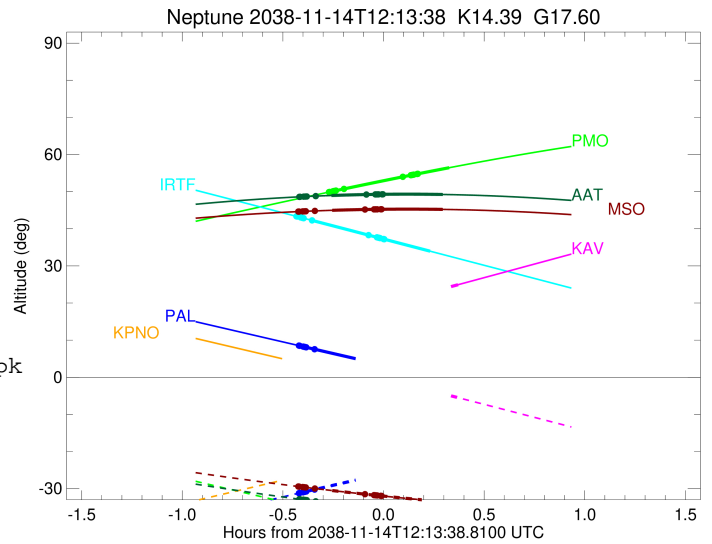
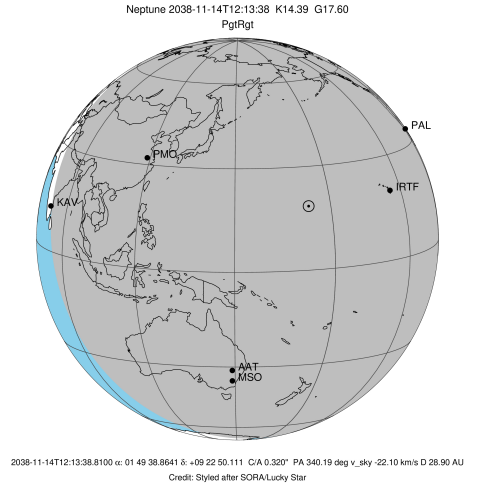
target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2038-11-14T12:14:59.740
Event type           : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : PMO
Location              : Purple Mtn Obs. Nanking
Latitude (deg)       : 32.06667
E. Longitude (deg)   : 118.82089
Altitude (km)        : 0.364
Gaia source ID       : 2572287180936494976
2Mass ID (if available) : 01493881+0922504
ICRS Star Coord at Epoch: 01h 49m 38.86412s +09:22:50.11114s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 14.388
G magnitude           : 17.599
RP magnitude          : 16.589
BP magnitude          : 18.726
DUPflag              : 0
Distance (au)        : 28.904
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.10
Sun-Target sep (deg) : 157.06
Sun-Moon sep (deg)   : 51.56
B (ring opening deg) : -7.96
PA of pole (deg)     : -47.58
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.159
C/A sky separation (km) : 3338.4
NAIF SPICE kernels   : RAJobs_U111+rgf16.spk
URKALLv1.spk
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
earthstns_itr93_040916.bsp
earth_200101_990628_predict.bpc
pck00010.tpc
pck.urall1.tpc.Neptune
naif0012.tls
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
earth_flat_IAU.spk
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2038-11-14T11:57:32.050	b	49.91	-36.48	62933.00	-78.25		
Galatea	I	2038-11-14T11:57:44.575	b	49.95	-36.52	61953.00	-78.23		
Arago	I	2038-11-14T11:58:45.361	b	50.15	-36.74	57200.01	-78.15		
Lassell	I	2038-11-14T11:59:10.960	b	50.23	-36.83	55200.00	-78.10		
LeVerrier	I	2038-11-14T11:59:36.575	b	50.31	-36.92	53200.00	-78.06		
Galle	I	2038-11-14T12:02:00.390	b	50.77	-37.43	42000.00	-77.65		
Neptune	I	2038-11-14T11:56:44.227		49.76	-36.31	24763.03		20.19	20.83
Neptune	E	2038-11-14T12:33:14.459		56.45	-44.05	24761.24		-35.50	-36.43
Galle	E	2038-11-14T12:19:13.022	b	53.96	-41.08	42000.00	73.20		
LeVerrier	E	2038-11-14T12:21:42.775	b	54.42	-41.61	53200.00	76.05		
Lassell	E	2038-11-14T12:22:09.020	b	54.49	-41.70	55200.00	76.35		
Arago	E	2038-11-14T12:22:35.168	b	54.57	-41.79	57200.00	76.62		
Galatea	E	2038-11-14T12:23:36.995	b	54.76	-42.01	61953.00	77.11		
Adams	E	2038-11-14T12:23:49.697	b	54.79	-42.06	62933.00	77.19		

```

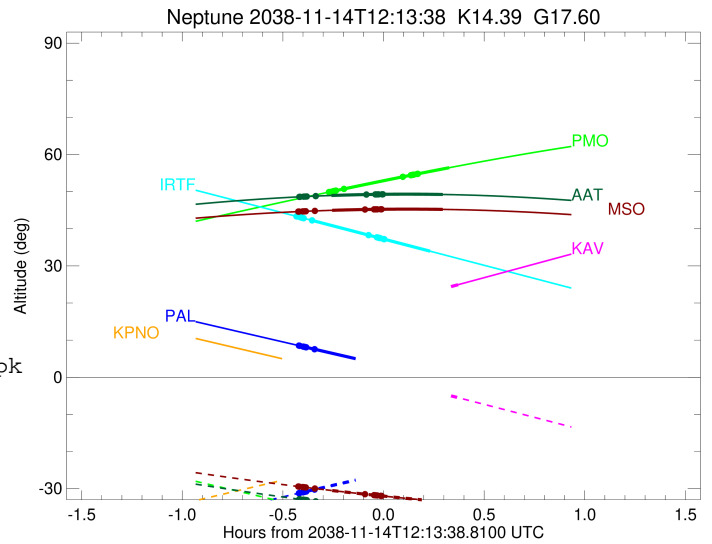
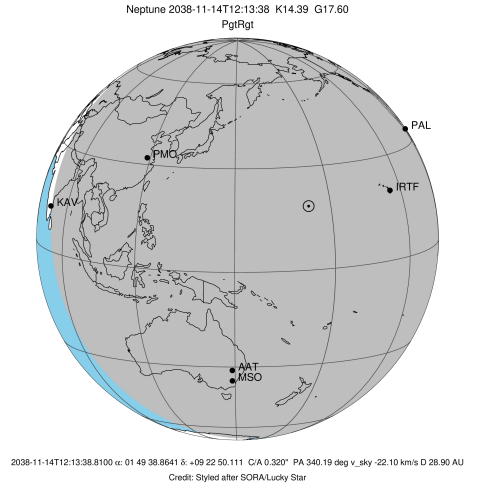
target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2038-11-14T12:09:51.430
Event type            : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : IRTF
Location              : Mauna Kea/IRTF
Latitude (deg)       : 19.82622
E. Longitude (deg)   : 204.52800
Altitude (km)        : 4.168
Gaia source ID       : 2572287180936494976
2Mass ID (if available) : 01493881+0922504
ICRS Star Coord at Epoch: 01h 49m 38.86412s +09:22:50.11114s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 14.388
G magnitude           : 17.599
RP magnitude          : 16.589
BP magnitude          : 18.726
DUPflag              : 0
Distance (au)        : 28.904
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.10
Sun-Target sep (deg) : 157.06
Sun-Moon sep (deg)   : 50.80
B (ring opening deg) : -7.96
PA of pole (deg)     : -47.58
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.328
C/A sky separation (km) : 6884.7
NAIF SPICE kernels   : RAJobs_U111+rgf16.spk
URKALLv1.spk
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
earthstns_itr93_040916.bsp
earth_200101_990628_predict.bpc
pck00010.tpc
pck.urall1.tpc.Neptune
naif0012.tls
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
earth_flat_IAU.spk
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2038-11-14T11:47:54.762		43.30	-65.96	62933.00	-76.22		
Galatea	I	2038-11-14T11:48:07.625		43.25	-65.90	61953.00	-76.15		
Arago	I	2038-11-14T11:49:10.186		43.00	-65.66	57200.00	-75.78		
Lassell	I	2038-11-14T11:49:36.612		42.90	-65.56	55200.00	-75.59		
LeVerrier	I	2038-11-14T11:50:03.108		42.80	-65.45	53200.01	-75.38		
Galle	I	2038-11-14T11:52:33.279	b	42.21	-64.86	42000.01	-73.57		
Neptune	I	2038-11-14T11:52:08.597		42.31	-64.96	24763.67		11.62	12.01
Neptune	E	2038-11-14T12:27:35.367		33.95	-56.63	24760.12		-43.46	-44.44
Galle	E	2038-11-14T12:09:07.526	b	38.31	-60.97	42000.01	75.67		
LeVerrier	E	2038-11-14T12:11:36.839	b	37.72	-60.38	53200.00	74.30		
Lassell	E	2038-11-14T12:12:03.786	b	37.62	-60.28	55200.00	74.15		
Arago	E	2038-11-14T12:12:30.779	b	37.51	-60.17	57200.00	74.05		
Galatea	E	2038-11-14T12:13:34.980	b	37.26	-59.92	61953.00	74.06		
Adams	E	2038-11-14T12:13:48.208	b	37.21	-59.87	62933.00	74.10		

```

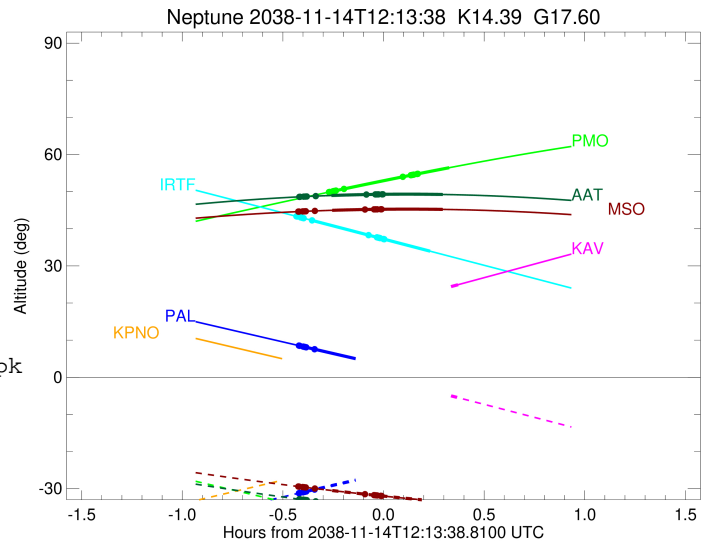
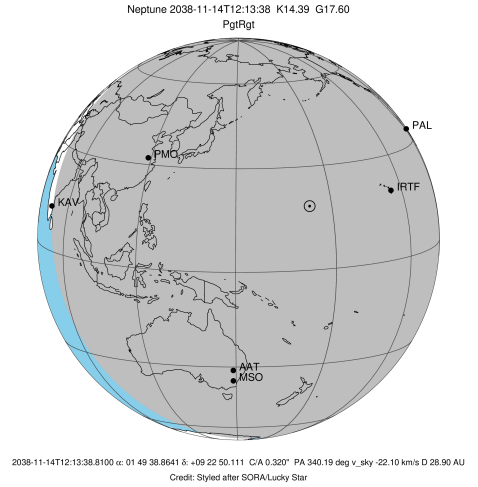
target                : Neptune
target radius (km)   : 24764.00
C/A epoch            : 2038-11-14T12:17:33.070
Event type          : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : KAV
Location            : Kavalur Observatory
Latitude (deg)      : 12.57556
E. Longitude (deg)  : 78.83167
Altitude (km)       : 0.722
Gaia source ID      : 2572287180936494976
2Mass ID (if available) : 01493881+0922504
ICRS Star Coord at Epoch: 01h 49m 38.86412s +09:22:50.11114s
RUWE (>1.4 is poor) : 0.95
K magnitude          : 14.388
G magnitude          : 17.599
RP magnitude         : 16.589
BP magnitude         : 18.726
DUPflag             : 0
Distance (au)       : 28.904
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -22.10
Sun-Target sep (deg) : 157.06
Sun-Moon sep (deg)  : 51.53
B (ring opening deg) : -7.96
PA of pole (deg)    : -47.58
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.179
C/A sky separation (km) : 3751.4
NAIF SPICE kernels  : RAJobs_U111+rgf16.spk
URKALLv1.spk
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
earthstns_itr93_040916.bsp
earth_200101_990628_predict.bpc
pck00010.tpc
pck.urall1.tpc.Neptune
naif0012.tls
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
earth_flat_IAU.spk
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2038-11-14T11:59:22.469	b	16.04	2.96x	62933.00	-77.21		
Galatea	I	2038-11-14T11:59:35.163	b	16.10	2.91x	61952.99	-77.19		
Arago	I	2038-11-14T12:00:36.778	b	16.34	2.67x	57200.00	-77.09		
Lassell	I	2038-11-14T12:01:02.730	b	16.45	2.57x	55200.00	-77.04		
LeVerrier	I	2038-11-14T12:01:28.701	b	16.56	2.47x	53200.00	-76.98		
Galle	I	2038-11-14T12:03:54.596	b	17.15	1.91x	42000.00	-76.49		
Neptune	I	2038-11-14T11:59:10.523		16.00	3.00x	24763.12		19.15	19.77
Neptune	E	2038-11-14T12:35:54.020		24.94	-5.50	24761.12		-36.39	-37.33
Galle	E	2038-11-14T12:21:13.043	b	21.36	-2.09x	42000.00	72.02		
LeVerrier	E	2038-11-14T12:23:45.505	b	21.98	-2.67x	53200.00	74.77		
Lassell	E	2038-11-14T12:24:12.189	b	22.09	-2.78x	55200.00	75.12		
Arago	E	2038-11-14T12:24:38.758	b	22.20	-2.88x	57200.00	75.43		
Galatea	E	2038-11-14T12:25:41.517	b	22.45	-3.12x	61953.00	76.01		
Adams	E	2038-11-14T12:25:54.402	b	22.50	-3.17x	62933.00	76.11		

```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2038-11-14T12:14:45.200
Event type            : PgtRgt
: Neptune 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       : 2572287180936494976
2Mass ID (if available) : 01493881+0922504
ICRS Star Coord at Epoch: 01h 49m 38.86412s +09:22:50.11114s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 14.388
G magnitude           : 17.599
RP magnitude          : 16.589
BP magnitude          : 18.726
DUPflag              : 0
Distance (au)        : 28.904
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.10
Sun-Target sep (deg) : 157.06
Sun-Moon sep (deg)   : 51.52
B (ring opening deg) : -7.96
PA of pole (deg)     : -47.58
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.504
C/A sky separation (km) : 10564.1
NAIF SPICE kernels   : RAJobs_U111+rgf16.spk
URKALLv1.spk
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
earthstns_itr93_040916.bsp
earth_200101_990628_predict.bpc
pck00010.tpc
pck.urall1.tpc.Neptune
naif0012.tls
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
earth_flat_IAU.spk
    
```

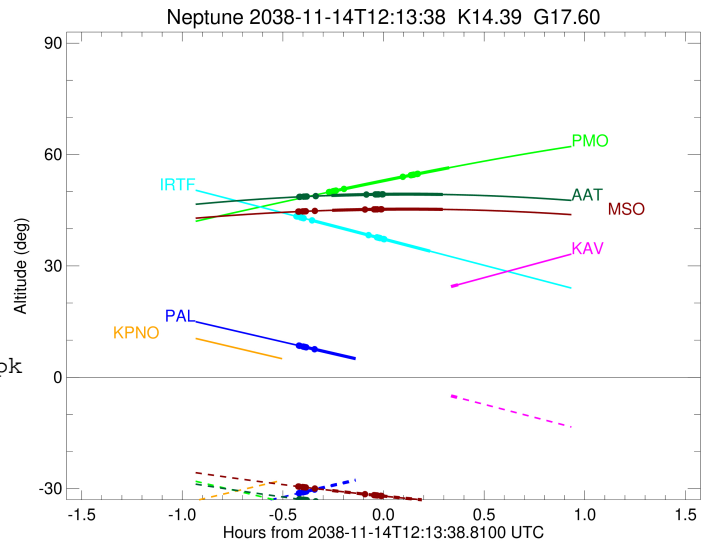
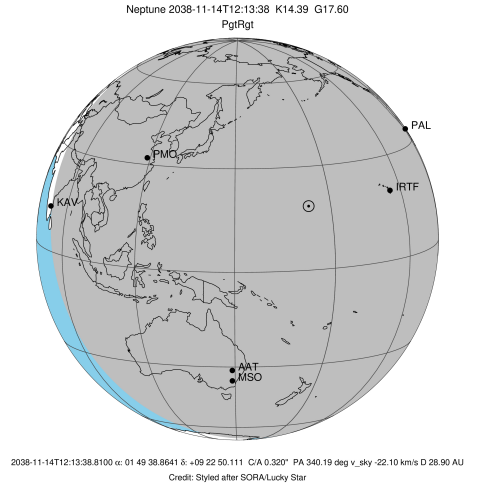


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2038-11-14T11:48:50.473		48.62	-32.88	62933.01	-74.22		
Galatea	I	2038-11-14T11:49:03.690		48.63	-32.91	61953.00	-74.06		
Arago	I	2038-11-14T11:50:08.241		48.67	-33.04	57200.00	-73.16		
Lassell	I	2038-11-14T11:50:35.661		48.69	-33.09	55200.00	-72.71		
LeVerrier	I	2038-11-14T11:51:03.264		48.71	-33.15	53200.00	-72.19		
Galle	I	2038-11-14T11:53:42.791		48.81	-33.46	42000.00	-67.69		
Neptune	I	2038-11-14T11:58:08.560		48.97	-33.97	24763.97		2.84	2.94
Neptune	E	2038-11-14T12:31:21.582		49.24	-37.25	24758.83		-52.63	-53.57
Galle	E	2038-11-14T12:08:46.739	b	49.22	-35.12	42000.00	68.69		
LeVerrier	E	2038-11-14T12:11:23.547	b	49.26	-35.39	53199.99	73.56		
Lassell	E	2038-11-14T12:11:50.638	b	49.27	-35.44	55200.00	74.08		
Arago	E	2038-11-14T12:12:17.558	b	49.27	-35.48	57200.00	74.50		
Galatea	E	2038-11-14T12:13:21.026	b	49.29	-35.59	61953.00	75.21		
Adams	E	2038-11-14T12:13:34.047	b	49.29	-35.61	62933.00	75.31		



```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2038-11-14T12:14:50.130
Event type            : PgtRgt
: Neptune 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        : 2572287180936494976
2Mass ID (if available) : 01493881+0922504
ICRS Star Coord at Epoch: 01h 49m 38.86412s +09:22:50.11114s
RUWE (>1.4 is poor) : 0.95
K magnitude           : 14.388
G magnitude           : 17.599
RP magnitude          : 16.589
BP magnitude          : 18.726
DUPflag               : 0
Distance (au)         : 28.904
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.10
Sun-Target sep (deg)  : 157.06
Sun-Moon sep (deg)    : 51.49
B (ring opening deg) : -7.96
PA of pole (deg)      : -47.58
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.519
C/A sky separation (km) : 10874.1
NAIF SPICE kernels    : RAJobs_U111+rgf16.spk
URKALLv1.spk
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
earthstns_itr93_040916.bsp
earth_200101_990628_predict.bpc
pck00010.tpc
pck.urall1.tpc.Neptune
naif0012.tls
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
earth_flat_IAU.spk
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2038-11-14T11:48:32.708		44.64	-29.46	62933.00	-73.83		
Galatea	I	2038-11-14T11:48:45.997		44.65	-29.49	61953.00	-73.66		
Arago	I	2038-11-14T11:49:50.929		44.69	-29.61	57200.00	-72.70		
Lassell	I	2038-11-14T11:50:18.529		44.71	-29.66	55200.00	-72.21		
LeVerrier	I	2038-11-14T11:50:46.327		44.73	-29.71	53199.99	-71.67		
Galle	I	2038-11-14T11:53:27.370		44.82	-30.00	42000.00	-66.85		
Neptune	I	2038-11-14T11:58:19.375		44.98	-30.51	24763.99		2.04	2.11
Neptune	E	2038-11-14T12:31:20.633		45.22	-33.50	24758.73		-53.39	-54.32
Galle	E	2038-11-14T12:08:22.727	b	45.19	-31.52	42000.00	67.74		
LeVerrier	E	2038-11-14T12:11:01.261	b	45.23	-31.77	53200.00	72.94		
Lassell	E	2038-11-14T12:11:28.571	b	45.24	-31.81	55200.00	73.51		
Arago	E	2038-11-14T12:11:55.689	b	45.24	-31.85	57200.00	73.99		
Galatea	E	2038-11-14T12:12:59.538	b	45.25	-31.95	61953.00	74.83		
Adams	E	2038-11-14T12:13:12.623	b	45.25	-31.97	62933.00	74.96		