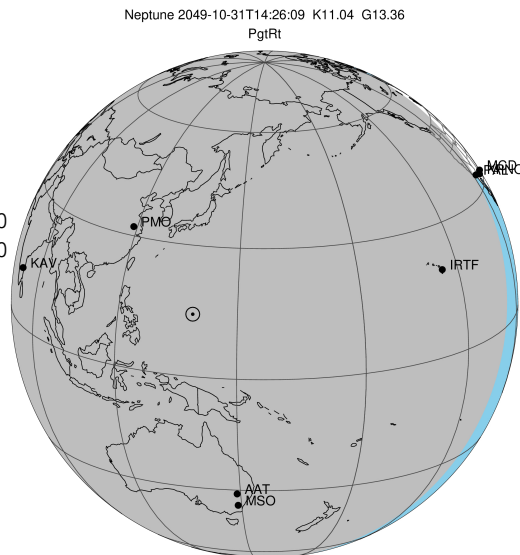


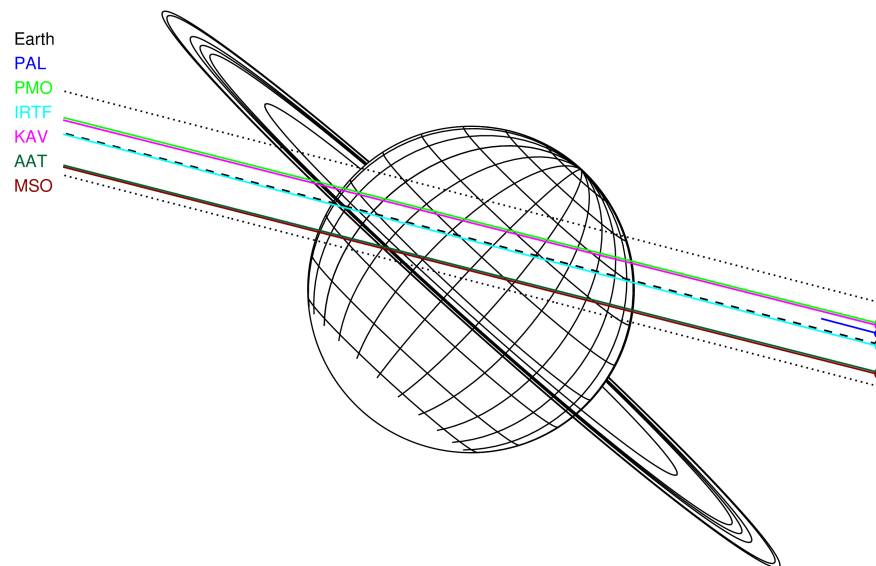
target : Neptune  
 target radius (km) : 24764.00  
 C/A epoch : 2049-10-31T14:26:09.080  
 Event type : PgtRt  
 : Neptune occs: geocentric, topocentric  
 : Ring occs: topocentric, not geocentric  
 Gaia source ID : 54870341808035968  
 2Mass ID (if available) : 03301078+1708582

Neptune 2049-10-31T14:26:09 K11.04 G13.36 PgtRt

ICRS Star Coord at Epoch: 03h 30m 10.79228s +17:08:58.17776s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 11.036  
 G magnitude : 13.363  
 RP magnitude : 12.646  
 BP magnitude : 13.923  
 DUPflag : 0  
 Distance (au) : 28.864  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.41  
 Sun-Target sep (deg) : 163.37  
 Sun-Moon sep (deg) : 133.89  
 B (ring opening deg) : 4.07  
 PA of pole (deg) : -42.49



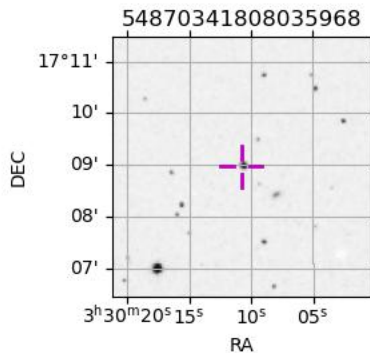
2049-10-31T14:26:09.0800 cc: 03 30 10.7923 s: +17 08 58.178 C/A 0.3577 PA 165.47 deg v\_sky -23.41 km/s D 28.86 AU  
 Credit: Styled after SORA/Lucky Star



#	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

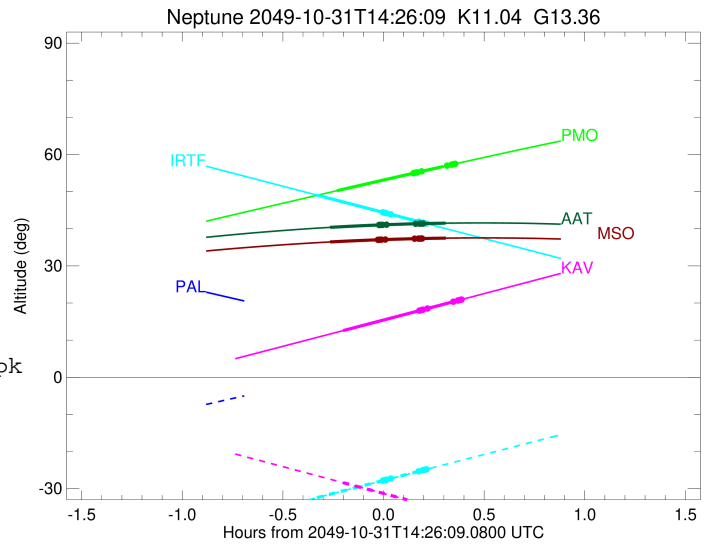
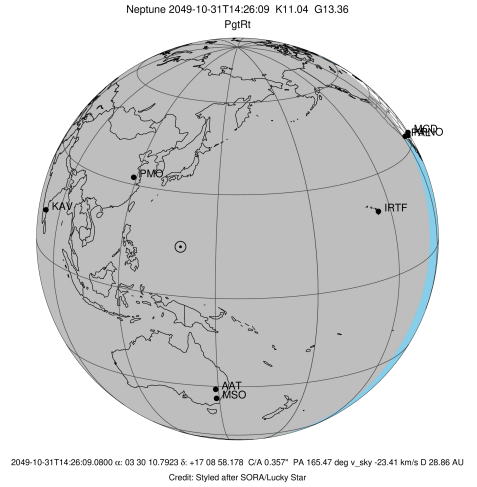
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8		+	+	OCT 31 14:12 - OCT 31 14:47	PieRne
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		+	+	OCT 31 14:06 - OCT 31 14:39	PieRnn
KAV	Kavalur Observatory	12.6	78.8		+	+	OCT 31 14:14 - OCT 31 14:49	PieRne
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		+	+	OCT 31 14:10 - OCT 31 14:44	PieRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0		+	+	OCT 31 14:10 - OCT 31 14:44	PieRnn



```

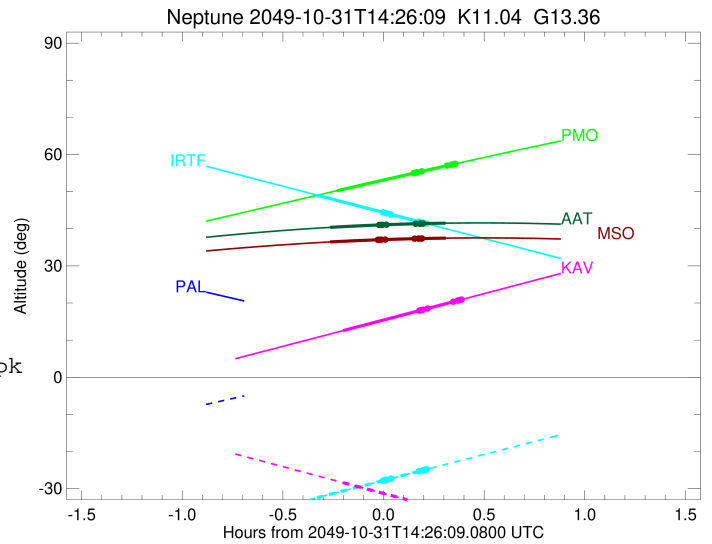
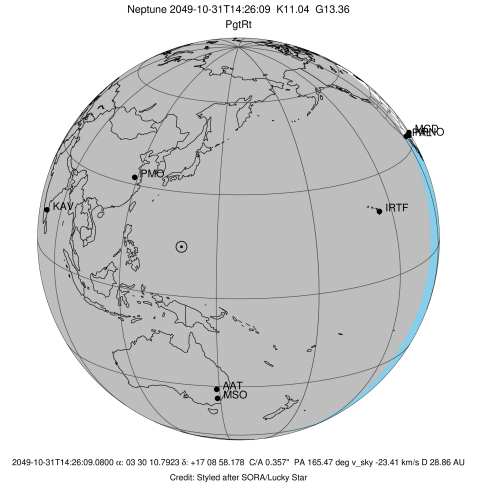
target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2049-10-31T14:28:06.350
Event type            : PgtRt
: Neptune occs: geocentric, topocentric
: Ring occs: topocentric, not geocentric
Observer code         : PMO
Location              : Purple Mtn Obs. Nanking
Latitude (deg)        : 32.06667
E. Longitude (deg)    : 118.82089
Altitude (km)         : 0.364
Gaia source ID        : 54870341808035968
2Mass ID (if available) : 03301078+1708582
ICRS Star Coord at Epoch: 03h 30m 10.79228s +17:08:58.17776s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 11.036
G magnitude           : 13.363
RP magnitude          : 12.646
BP magnitude          : 13.923
DUPflag              : 0
Distance (au)         : 28.864
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -23.41
Sun-Target sep (deg) : 163.37
Sun-Moon sep (deg)   : 134.76
B (ring opening deg) : 4.07
PA of pole (deg)     : -42.49
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.484
C/A sky separation (km) : 10141.0
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.urall11.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	2049-10-31T14:34:55.297	b	54.94	-65.77	62933.00	-152.50		
Galatea	I	2049-10-31T14:35:01.731	b	54.96	-65.79	61952.99	-152.14		
Arago	I	2049-10-31T14:35:33.167	b	55.07	-65.87	57200.00	-150.17		
Lassell	I	2049-10-31T14:35:46.527	b	55.11	-65.91	55200.00	-149.20		
LeVerrier	I	2049-10-31T14:35:59.979	b	55.16	-65.94	53200.01	-148.13		
Galle	I	2049-10-31T14:37:17.721	b	55.42	-66.15	42000.01	-138.99		
Neptune	I	2049-10-31T14:12:12.524		50.24	-61.95	24762.68		52.31	53.25
Neptune	E	2049-10-31T14:43:59.460		56.78	-67.16	24763.99		-4.13	-4.28
Galle	E	2049-10-31T14:44:48.985		56.95	-67.28	42000.00	138.16		
LeVerrier	E	2049-10-31T14:46:07.312		57.21	-67.46	53200.00	146.81		
Lassell	E	2049-10-31T14:46:20.889		57.26	-67.50	55200.01	147.79		
Arago	E	2049-10-31T14:46:34.382		57.30	-67.53	57199.99	148.66		
Galatea	E	2049-10-31T14:47:06.161		57.41	-67.60	61953.00	150.40		
Adams	E	2049-10-31T14:47:12.670		57.43	-67.62	62933.01	150.71		

```

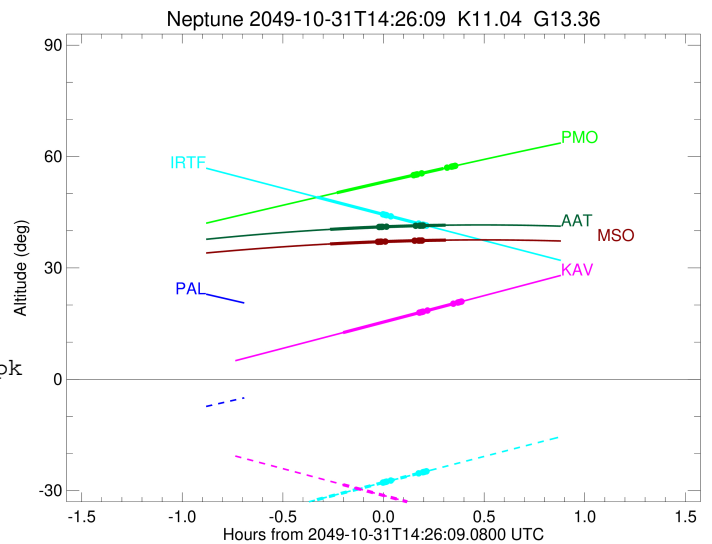
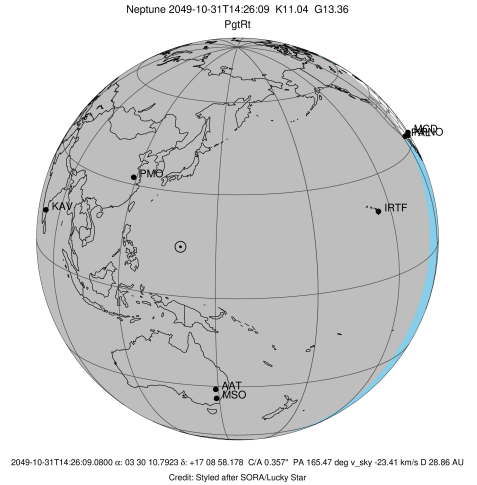
target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2049-10-31T14:22:56.960
Event type            : PgtRt
: Neptune occs: geocentric, topocentric
: Ring occs: topocentric, not geocentric
Observer code        : IRTF
Location              : Mauna Kea/IRTF
Latitude (deg)       : 19.82622
E. Longitude (deg)   : 204.52800
Altitude (km)        : 4.168
Gaia source ID       : 54870341808035968
2Mass ID (if available) : 03301078+1708582
ICRS Star Coord at Epoch: 03h 30m 10.79228s +17:08:58.17776s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 11.036
G magnitude           : 13.363
RP magnitude          : 12.646
BP magnitude          : 13.923
DUPflag              : 0
Distance (au)        : 28.864
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.41
Sun-Target sep (deg) : 163.37
Sun-Moon sep (deg)   : 133.90
B (ring opening deg) : 4.07
PA of pole (deg)     : -42.49
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.344
C/A sky separation (km) : 7192.9
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	2049-10-31T14:25:57.959	b	44.45	-27.84	62933.01	-159.54		
Galatea	I	2049-10-31T14:26:04.106	b	44.42	-27.81	61953.00	-159.29		
Arago	I	2049-10-31T14:26:34.074	b	44.30	-27.69	57200.00	-157.86		
Lassell	I	2049-10-31T14:26:46.772	b	44.25	-27.65	55200.00	-157.15		
LeVerrier	I	2049-10-31T14:26:59.529	b	44.21	-27.60	53200.01	-156.38		
Galle	I	2049-10-31T14:28:12.395	b	43.92	-27.31	41999.99	-150.57		
Neptune	I	2049-10-31T14:06:18.325		49.07	-32.44	24762.95		44.68	45.65
Neptune	E	2049-10-31T14:39:36.457		41.24	-24.65	24763.93		-10.99	-11.37
Galle	E	2049-10-31T14:36:23.823	b	42.00	-25.40	42000.01	147.14		
LeVerrier	E	2049-10-31T14:37:38.776	b	41.70	-25.11	53200.01	151.23		
Lassell	E	2049-10-31T14:37:51.980	b	41.65	-25.05	55200.00	151.70		
Arago	E	2049-10-31T14:38:05.146	b	41.60	-25.00	57200.00	152.12		
Galatea	E	2049-10-31T14:38:36.303	b	41.48	-24.88	61952.99	152.95		
Adams	E	2049-10-31T14:38:42.707	b	41.45	-24.86	62933.00	153.10		

```

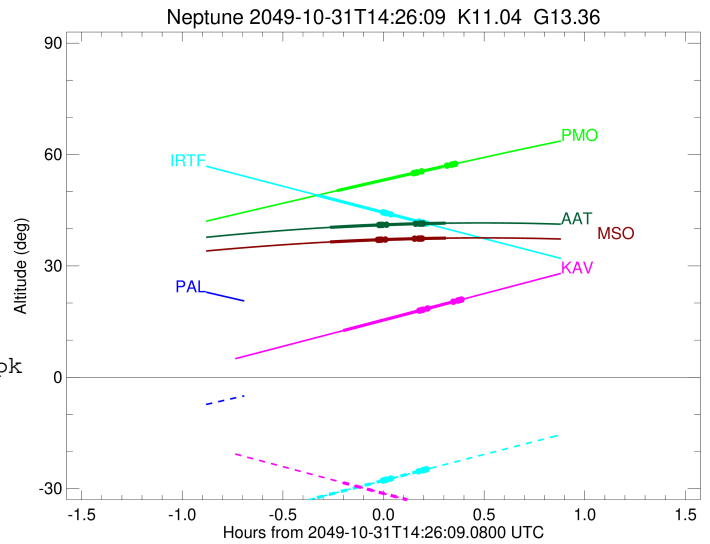
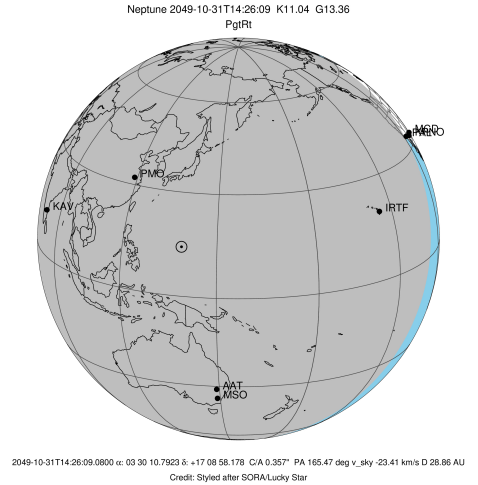
target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2049-10-31T14:30:13.170
Event type           : PgtRt
: Neptune occs: geocentric, topocentric
: Ring occs: topocentric, not geocentric
Observer code        : KAV
Location              : Kavalur Observatory
Latitude (deg)       : 12.57556
E. Longitude (deg)   : 78.83167
Altitude (km)        : 0.722
Gaia source ID       : 54870341808035968
2Mass ID (if available) : 03301078+1708582
ICRS Star Coord at Epoch: 03h 30m 10.79228s +17:08:58.17776s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 11.036
G magnitude           : 13.363
RP magnitude          : 12.646
BP magnitude          : 13.923
DUPflag              : 0
Distance (au)        : 28.864
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.41
Sun-Target sep (deg) : 163.37
Sun-Moon sep (deg)   : 134.71
B (ring opening deg) : 4.07
PA of pole (deg)     : -42.49
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.469
C/A sky separation (km) : 9819.1
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	2049-10-31T14:36:39.306	b	17.90	-33.83	62932.99	-152.13		
Galatea	I	2049-10-31T14:36:45.755	b	17.93	-33.85	61953.00	-151.79		
Arago	I	2049-10-31T14:37:17.255	b	18.05	-33.98	57200.01	-149.93		
Lassell	I	2049-10-31T14:37:30.634	b	18.11	-34.03	55199.99	-149.02		
LeVerrier	I	2049-10-31T14:37:44.100	b	18.16	-34.09	53199.99	-148.01		
Galle	I	2049-10-31T14:39:01.754	b	18.47	-34.40	41999.99	-139.52		
Neptune	I	2049-10-31T14:14:04.144		12.56	-28.39	24762.70		51.51	52.46
Neptune	E	2049-10-31T14:46:20.920		20.20	-36.17	24763.99		-4.97	-5.15
Galle	E	2049-10-31T14:46:41.314		20.28	-36.25	41999.99	138.65		
LeVerrier	E	2049-10-31T14:47:59.579		20.59	-36.56	53199.99	146.63		
Lassell	E	2049-10-31T14:48:13.176		20.65	-36.62	55199.99	147.54		
Arago	E	2049-10-31T14:48:26.695		20.70	-36.67	57200.00	148.35		
Galatea	E	2049-10-31T14:48:58.555		20.83	-36.80	61952.99	149.96		
Adams	E	2049-10-31T14:49:05.084		20.85	-36.83	62933.01	150.24		

```

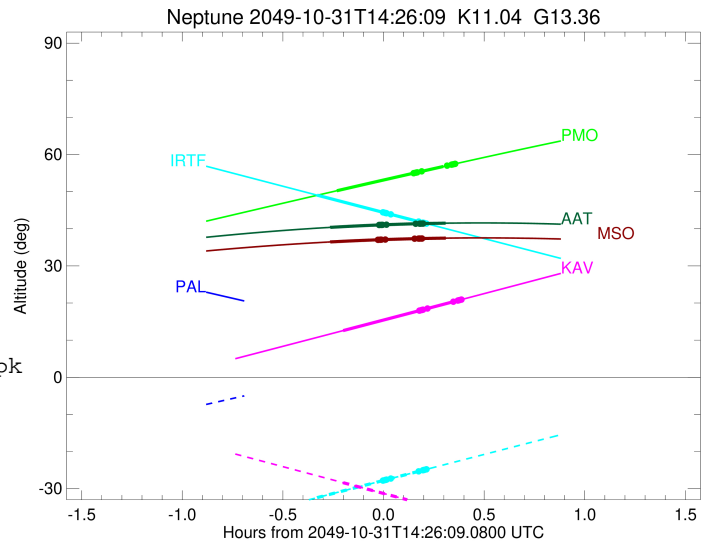
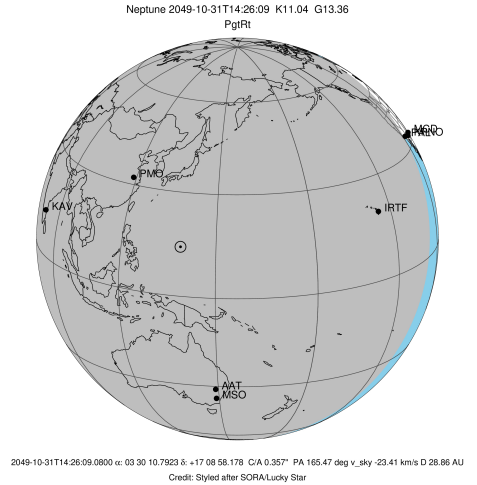
target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2049-10-31T14:27:27.220
Event type            : PgtRt
: Neptune occs: geocentric, topocentric
: Ring occs: topocentric, not geocentric
Observer code         : AAT
Location              : Siding Spring (AAT)
Latitude (deg)       : -31.27703
E. Longitude (deg)   : 149.06608
Altitude (km)        : 1.164
Gaia source ID        : 54870341808035968
2Mass ID (if available) : 03301078+1708582
ICRS Star Coord at Epoch: 03h 30m 10.79228s +17:08:58.17776s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 11.036
G magnitude           : 13.363
RP magnitude          : 12.646
BP magnitude          : 13.923
DUPflag              : 0
Distance (au)        : 28.864
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.41
Sun-Target sep (deg) : 163.37
Sun-Moon sep (deg)   : 134.52
B (ring opening deg) : 4.07
PA of pole (deg)     : -42.49
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.144
C/A sky separation (km) : 3021.6
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	2049-10-31T14:25:10.644	b	41.04	-43.62	62933.00	-145.89		
Galatea	I	2049-10-31T14:25:17.355	b	41.04	-43.62	61953.00	-146.21		
Arago	I	2049-10-31T14:25:49.576	b	41.06	-43.59	57200.01	-149.10		
Lassell	I	2049-10-31T14:26:02.931	b	41.07	-43.58	55199.99	-150.35		
LeVerrier	I	2049-10-31T14:26:16.205	b	41.08	-43.57	53200.01	-150.79		
Galle	I	2049-10-31T14:27:32.869	b	41.12	-43.51	41999.96	-150.16		
Neptune	I	2049-10-31T14:10:13.719		40.38	-44.20	24763.30		35.15	36.08
Neptune	E	2049-10-31T14:44:40.409		41.51	-42.47	24763.72		-21.16	-21.83
Galle	E	2049-10-31T14:35:35.506	b	41.35	-43.06	42000.00	158.11		
LeVerrier	E	2049-10-31T14:36:46.198	b	41.37	-42.99	53200.00	158.69		
Lassell	E	2049-10-31T14:36:58.798	b	41.38	-42.98	55200.00	158.77		
Arago	E	2049-10-31T14:37:11.393	b	41.38	-42.97	57200.00	158.83		
Galatea	E	2049-10-31T14:37:41.305	b	41.39	-42.93	61953.00	158.96		
Adams	E	2049-10-31T14:37:47.470	b	41.40	-42.93	62932.99	158.98		

```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch            : 2049-10-31T14:27:29.090
Event type          : PgtRt
: Neptune occs: geocentric, topocentric
: Ring occs: topocentric, not geocentric
Observer code       : MSO
Location            : Mt. Stromlo Observatory
Latitude (deg)      : -35.32000
E. Longitude (deg)  : 149.00833
Altitude (km)       : 0.770
Gaia source ID      : 54870341808035968
2Mass ID (if available) : 03301078+1708582
ICRS Star Coord at Epoch: 03h 30m 10.79228s +17:08:58.17776s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 11.036
G magnitude          : 13.363
RP magnitude         : 12.646
BP magnitude         : 13.923
DUPflag             : 0
Distance (au)       : 28.864
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.41
Sun-Target sep (deg) : 163.37
Sun-Moon sep (deg)  : 134.48
B (ring opening deg) : 4.07
PA of pole (deg)    : -42.49
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.131
C/A sky separation (km) : 2739.7
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.urall11.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	2049-10-31T14:24:48.951	b	37.04	-39.71	62933.01	-143.79		
Galatea	I	2049-10-31T14:24:55.770	b	37.04	-39.70	61953.00	-143.66		
Arago	I	2049-10-31T14:25:28.767	b	37.06	-39.68	57200.00	-145.10		
Lassell	I	2049-10-31T14:25:42.469	b	37.07	-39.67	55199.99	-146.95		
LeVerrier	I	2049-10-31T14:25:55.975	b	37.08	-39.66	53199.99	-149.27		
Galle	I	2049-10-31T14:27:12.741	b	37.12	-39.60	42000.40	-131.44		
Neptune	I	2049-10-31T14:10:13.453		36.45	-40.20	24763.32		34.48	35.41
Neptune	E	2049-10-31T14:44:44.424		37.48	-38.66	24763.71		-21.80	-22.49
Galle	E	2049-10-31T14:35:16.596	b	37.33	-39.21	42000.00	158.17		
LeVerrier	E	2049-10-31T14:36:27.290	b	37.35	-39.15	53199.99	158.64		
Lassell	E	2049-10-31T14:36:39.895	b	37.35	-39.13	55200.00	158.70		
Arago	E	2049-10-31T14:36:52.495	b	37.36	-39.12	57200.01	158.75		
Galatea	E	2049-10-31T14:37:22.423	b	37.37	-39.10	61952.99	158.86		
Adams	E	2049-10-31T14:37:28.592	b	37.37	-39.09	62933.00	158.89		