

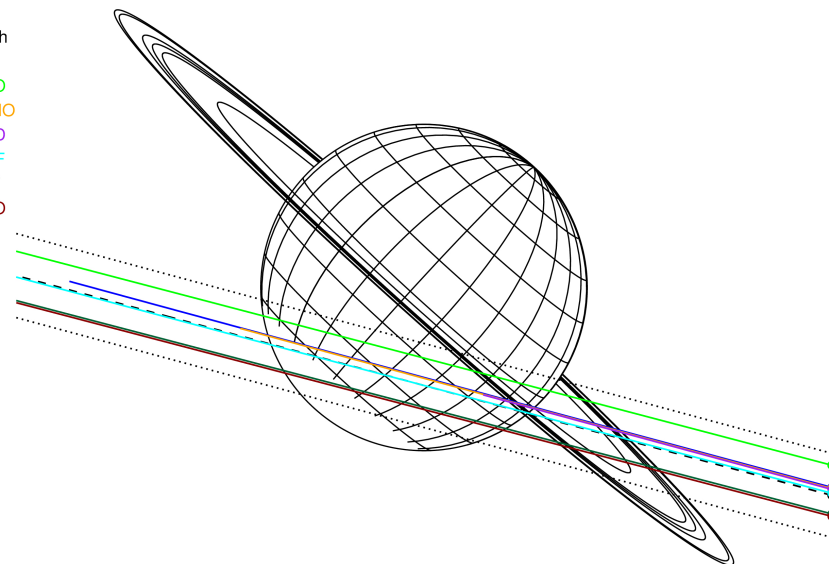
target : Neptune
 target radius (km) : 24764.00
 C/A epoch : 2049-10-17T12:55:04.140
 Event type : PgtRgt
 : Neptune occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 54863298061632384
 2Mass ID (if available) : 03313700+1714237

Neptune 2049-10-17T12:55:04 K14.76 G18.28 PgtRgt

ICRS Star Coord at Epoch: 03h 31m 37.03486s +17:14:23.15114s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 14.756
 G magnitude : 18.277
 RP magnitude : 17.204
 BP magnitude : 19.448
 DUPflag : 0
 Distance (au) : 28.958
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.40
 Sun-Target sep (deg) : 149.05
 Sun-Moon sep (deg) : 45.84
 B (ring opening deg) : 4.23
 PA of pole (deg) : -42.36



Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 AAT
 MSO

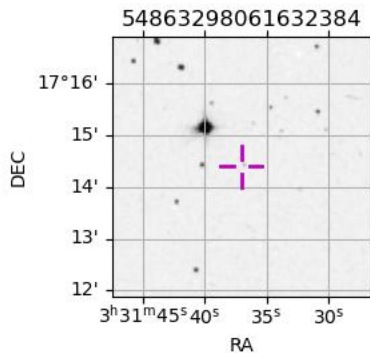


2049-10-17T12:55:04.1400 cc: 03 31 37.0349 s: +17 14 23.1511 C/A 0.683° PA 344.92 deg v_sky -20.40 km/s D 28.96 AU
 Credit: Styled after SORA/Lucky Star

#	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

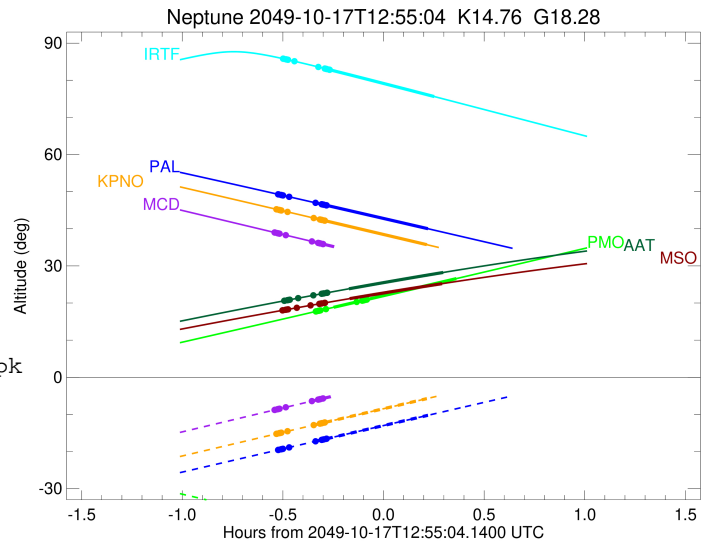
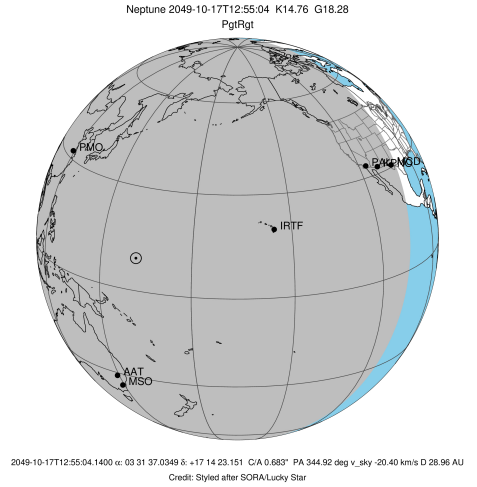
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+	+		OCT 17 12:24 - OCT 17 13:08	PieRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+	+		OCT 17 12:35 - OCT 17 13:16	PieRin
KPNO	Kitt Peak Natl Obs	32.0	248.4	+	+		OCT 17 12:23 - OCT 17 13:08	PieRin
MCD	McDonald Obs. 2.7m	30.7	256.0	+	+		OCT 17 12:23 - OCT 17 12:33	PinRin
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+	+	OCT 17 12:25 - OCT 17 13:10	PieRie
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	+	+	+	OCT 17 12:26 - OCT 17 13:12	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+	+	+	OCT 17 12:25 - OCT 17 13:12	PieRie



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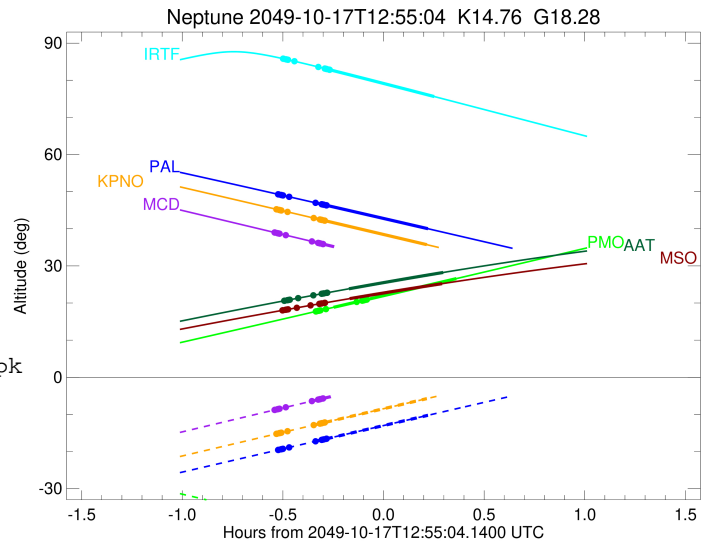
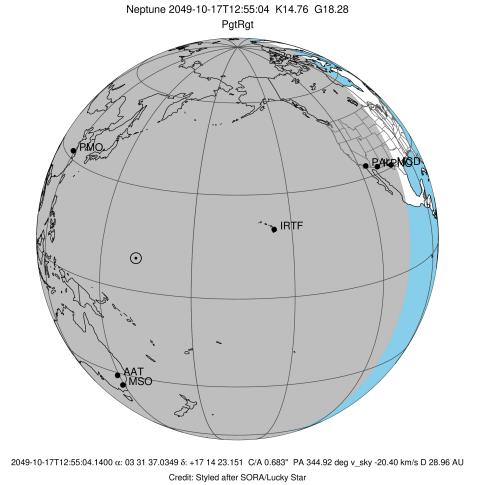
target                : Neptune
target radius (km)   : 24764.00
C/A epoch            : 2049-10-17T12:51:25.700
Event type           : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : PAL
Location             : Palomar Mt (200")
Latitude (deg)       : 33.35622
E. Longitude (deg)   : 243.13601
Altitude (km)        : 1.706
Gaia source ID       : 54863298061632384
2Mass ID (if available) : 03313700+1714237
ICRS Star Coord at Epoch: 03h 31m 37.03486s +17:14:23.15114s
RUWE (>1.4 is poor) : 1.05
K magnitude          : 14.756
G magnitude          : 18.277
RP magnitude         : 17.204
BP magnitude         : 19.448
DUPflag             : 0
Distance (au)        : 28.958
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.40
Sun-Target sep (deg) : 149.05
Sun-Moon sep (deg)   : 45.84
B (ring opening deg) : 4.23
PA of pole (deg)     : -42.36
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.628
C/A sky separation (km) : 13182.4
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.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	2049-10-17T12:24:07.062		49.19	-19.48	62933.00	-115.76		
Galatea	I	2049-10-17T12:24:15.545		49.16	-19.45	61952.99	-115.28		
Arago	I	2049-10-17T12:24:57.246		49.02	-19.31	57200.00	-112.56		
Lassell	I	2049-10-17T12:25:15.122		48.96	-19.25	55200.00	-111.17		
LeVerrier	I	2049-10-17T12:25:33.237		48.90	-19.18	53200.00	-109.60		
Galle	I	2049-10-17T12:27:21.675		48.53	-18.80	42000.02	-95.26		
Neptune	I	2049-10-17T12:34:31.605		47.05	-17.31	24763.99		-4.91	-5.08
Neptune	E	2049-10-17T13:08:20.495		40.02	-10.24	24762.31		-59.11	-59.97
Galle	E	2049-10-17T12:35:15.641	b	46.90	-17.15	42000.07	95.42		
LeVerrier	E	2049-10-17T12:37:03.872	b	46.52	-16.78	53200.01	109.88		
Lassell	E	2049-10-17T12:37:21.942	b	46.46	-16.71	55200.01	111.46		
Arago	E	2049-10-17T12:37:39.771	b	46.40	-16.65	57200.00	112.87		
Galatea	E	2049-10-17T12:38:21.349	b	46.26	-16.51	61953.01	115.66		
Adams	E	2049-10-17T12:38:29.804	b	46.23	-16.48	62933.00	116.15		

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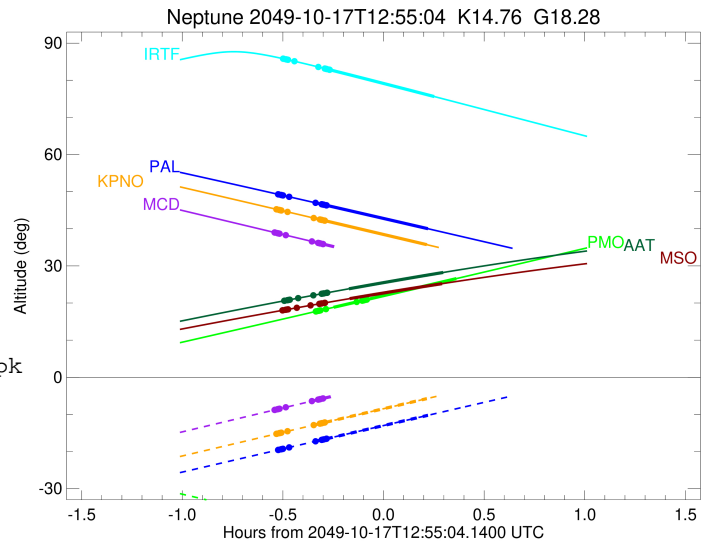
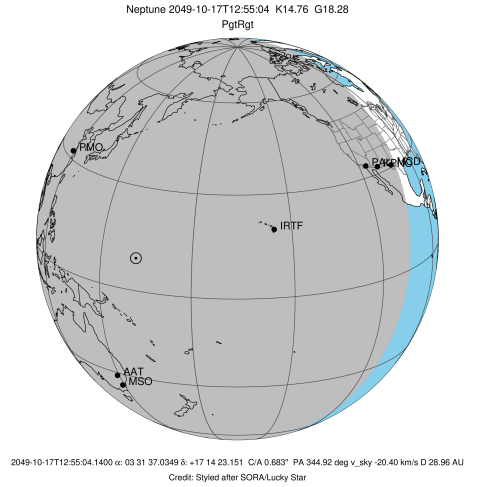
target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2049-10-17T12:58:32.100
Event type           : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : PMO
Location              : Purple Mtn Obs. Nanking
Latitude (deg)       : 32.06667
E. Longitude (deg)   : 118.82089
Altitude (km)        : 0.364
Gaia source ID       : 54863298061632384
2Mass ID (if available) : 03313700+1714237
ICRS Star Coord at Epoch: 03h 31m 37.03486s +17:14:23.15114s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 14.756
G magnitude           : 18.277
RP magnitude          : 17.204
BP magnitude          : 19.448
DUPflag              : 0
Distance (au)         : 28.958
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -20.40
Sun-Target sep (deg) : 149.05
Sun-Moon sep (deg)   : 46.54
B (ring opening deg) : 4.23
PA of pole (deg)     : -42.36
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.493
C/A sky separation (km) : 10360.2
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
    
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Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2049-10-17T12:35:17.039		17.81	-39.85	62932.99	-121.55		
Galatea	I	2049-10-17T12:35:25.110		17.84	-39.87	61953.00	-121.28		
Arago	I	2049-10-17T12:36:04.539		17.98	-40.01	57200.01	-119.75		
Lassell	I	2049-10-17T12:36:21.293		18.04	-40.07	55200.00	-118.98		
LeVerrier	I	2049-10-17T12:36:38.164		18.10	-40.12	53199.99	-118.11		
Galle	I	2049-10-17T12:38:15.793		18.44	-40.46	42000.01	-110.41		
Neptune	I	2049-10-17T12:40:12.894		18.85	-40.85	24763.99		2.92	3.02
Neptune	E	2049-10-17T13:16:49.439		26.58	-48.16	24762.57		-52.20	-53.14
Galle	E	2049-10-17T12:47:23.268	b	20.36	-42.31	42000.00	111.21		
LeVerrier	E	2049-10-17T12:49:00.052	b	20.70	-42.64	53200.00	119.35		
Lassell	E	2049-10-17T12:49:16.742	b	20.76	-42.69	55200.00	120.30		
Arago	E	2049-10-17T12:49:33.306	b	20.81	-42.75	57200.00	121.17		
Galatea	E	2049-10-17T12:50:12.244	b	20.95	-42.88	61953.00	122.91		
Adams	E	2049-10-17T12:50:20.207	b	20.98	-42.91	62932.99	123.23		

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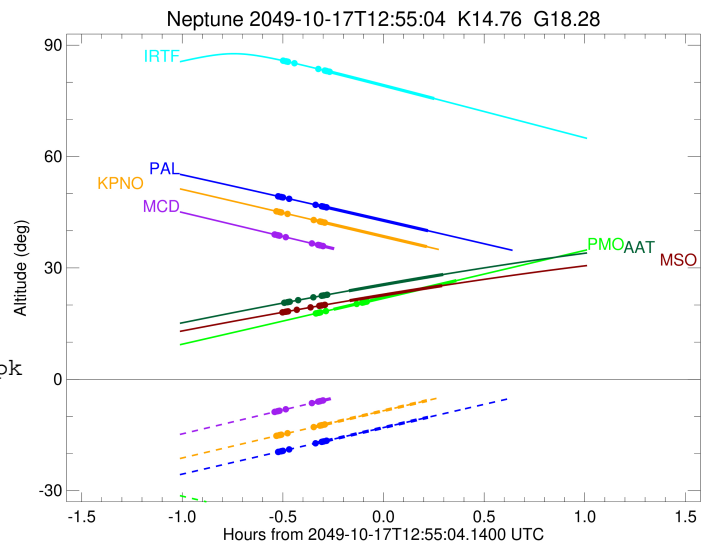
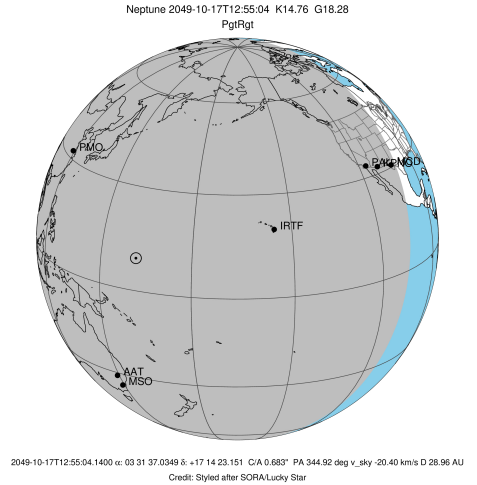
target                : Neptune
target radius (km)   : 24764.00
C/A epoch            : 2049-10-17T12:51:08.980
Event type           : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : KPNO
Location             : Kitt Peak Natl Obs
Latitude (deg)       : 31.96333
E. Longitude (deg)   : 248.40000
Altitude (km)        : 2.120
Gaia source ID       : 54863298061632384
2Mass ID (if available) : 03313700+1714237
ICRS Star Coord at Epoch: 03h 31m 37.03486s +17:14:23.15114s
RUWE (>1.4 is poor) : 1.05
K magnitude          : 14.756
G magnitude          : 18.277
RP magnitude         : 17.204
BP magnitude         : 19.448
DUPflag             : 0
Distance (au)        : 28.958
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.40
Sun-Target sep (deg) : 149.05
Sun-Moon sep (deg)   : 45.77
B (ring opening deg) : 4.23
PA of pole (deg)     : -42.36
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.633
C/A sky separation (km) : 13301.6
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.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	2049-10-17T12:23:36.574		45.15	-15.14	62933.01	-115.21		
Galatea	I	2049-10-17T12:23:45.099		45.12	-15.11	61953.00	-114.72		
Arago	I	2049-10-17T12:24:27.018		44.97	-14.96	57200.00	-111.93		
Lassell	I	2049-10-17T12:24:44.996		44.91	-14.90	55200.01	-110.52		
LeVerrier	I	2049-10-17T12:25:03.222		44.85	-14.83	53200.00	-108.91		
Galle	I	2049-10-17T12:26:52.560		44.46	-14.45	42000.03	-94.21		
Neptune	I	2049-10-17T12:34:17.551		42.89	-12.87	24763.99		-5.27	-5.46
Neptune	E	2049-10-17T13:08:01.215		35.71	-5.75	24762.31		-59.40	-60.25
Galle	E	2049-10-17T12:34:43.326	b	42.80	-12.78	42000.08	94.36		
LeVerrier	E	2049-10-17T12:36:32.473	b	42.41	-12.40	53200.01	109.16		
Lassell	E	2049-10-17T12:36:50.658	b	42.35	-12.33	55200.01	110.78		
Arago	E	2049-10-17T12:37:08.593	b	42.28	-12.27	57200.00	112.22		
Galatea	E	2049-10-17T12:37:50.398	b	42.14	-12.12	61952.99	115.06		
Adams	E	2049-10-17T12:37:58.897	b	42.11	-12.09	62932.99	115.56		

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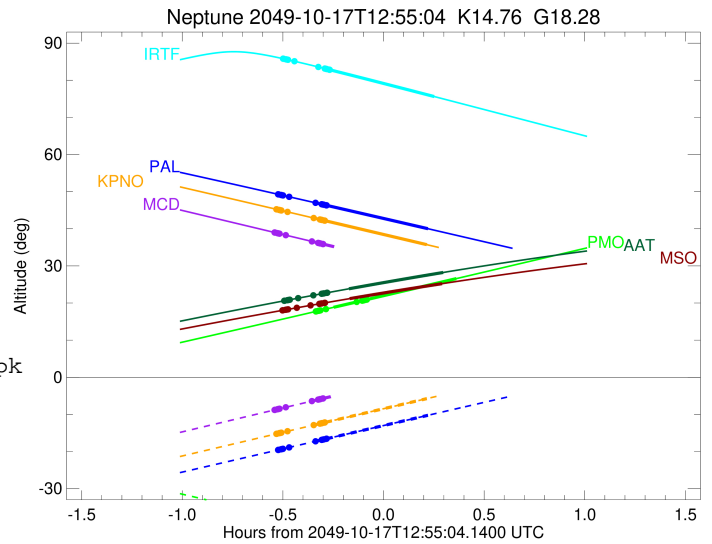
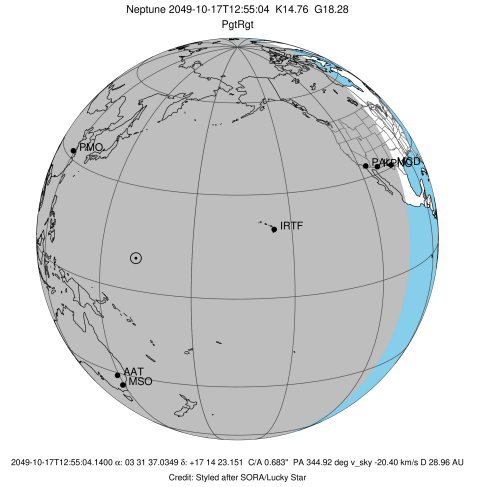
target                : Neptune
target radius (km)   : 24764.00
C/A epoch            : 2049-10-17T12:50:48.010
Event type           : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : MCD
Location             : McDonald Obs. 2.7m
Latitude (deg)       : 30.67158
E. Longitude (deg)   : 255.97844
Altitude (km)        : 2.075
Gaia source ID       : 54863298061632384
2Mass ID (if available) : 03313700+1714237
ICRS Star Coord at Epoch: 03h 31m 37.03486s +17:14:23.15114s
RUWE (>1.4 is poor) : 1.05
K magnitude          : 14.756
G magnitude          : 18.277
RP magnitude         : 17.204
BP magnitude         : 19.448
DUPflag             : 0
Distance (au)        : 28.958
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.40
Sun-Target sep (deg) : 149.05
Sun-Moon sep (deg)   : 45.66
B (ring opening deg) : 4.23
PA of pole (deg)     : -42.36
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.636
C/A sky separation (km) : 13364.9
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.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	2049-10-17T12:23:04.116		38.90	-8.70	62933.00	-114.61		
Galatea	I	2049-10-17T12:23:12.685		38.87	-8.67	61953.00	-114.12		
Arago	I	2049-10-17T12:23:54.834		38.72	-8.52	57200.00	-111.30		
Lassell	I	2049-10-17T12:24:12.918		38.65	-8.45	55200.00	-109.86		
LeVerrier	I	2049-10-17T12:24:31.254		38.59	-8.39	53200.00	-108.24		
Galle	I	2049-10-17T12:26:21.415		38.19	-7.99	42000.02	-93.33		
Neptune	I	2049-10-17T12:33:56.771		36.55	-6.37	24763.98		-5.50	-5.69
Neptune	E	2049-10-17T13:07:40.161		29.27	0.79x	24762.30		-59.52	-60.36
Galle	E	2049-10-17T12:34:11.038	b	36.50	-6.32	42000.10	93.47		
LeVerrier	E	2049-10-17T12:36:01.022	b	36.10	-5.93	53200.01	108.47		
Lassell	E	2049-10-17T12:36:19.320	b	36.04	-5.87	55200.00	110.11		
Arago	E	2049-10-17T12:36:37.363	b	35.97	-5.80	57200.00	111.57		
Galatea	E	2049-10-17T12:37:19.405	b	35.82	-5.65	61953.00	114.43		
Adams	E	2049-10-17T12:37:27.950	b	35.79	-5.62	62933.01	114.94		

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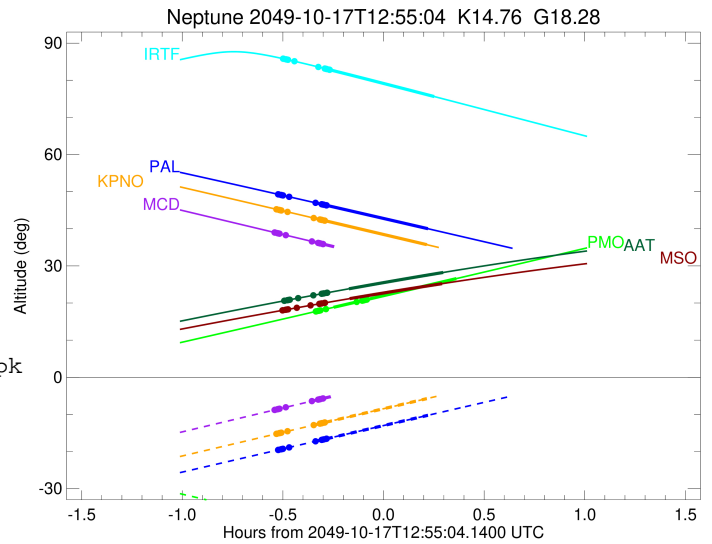
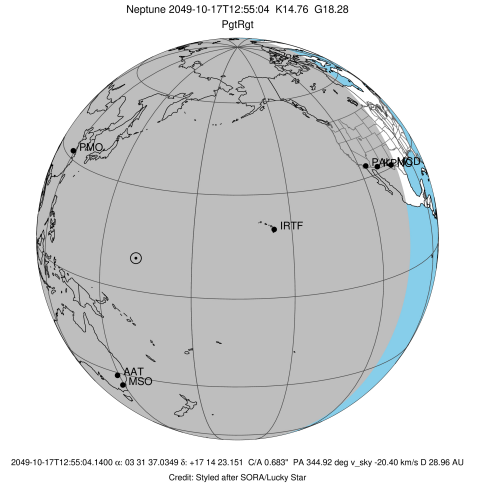
target                : Neptune
target radius (km)   : 24764.00
C/A epoch            : 2049-10-17T12:54:03.630
Event type           : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : IRTF
Location              : Mauna Kea/IRTF
Latitude (deg)       : 19.82622
E. Longitude (deg)   : 204.52800
Altitude (km)        : 4.168
Gaia source ID       : 54863298061632384
2Mass ID (if available) : 03313700+1714237
ICRS Star Coord at Epoch: 03h 31m 37.03486s +17:14:23.15114s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 14.756
G magnitude           : 18.277
RP magnitude         : 17.204
BP magnitude         : 19.448
DUPflag              : 0
Distance (au)        : 28.958
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.40
Sun-Target sep (deg) : 149.05
Sun-Moon sep (deg)   : 46.37
B (ring opening deg) : 4.23
PA of pole (deg)     : -42.36
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.684
C/A sky separation (km) : 14368.7
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	2049-10-17T12:25:36.826		85.73	-55.05	62933.01	-115.03		
Galatea	I	2049-10-17T12:25:45.366		85.70	-55.01	61953.00	-114.45		
Arago	I	2049-10-17T12:26:27.478		85.56	-54.85	57200.01	-111.15		
Lassell	I	2049-10-17T12:26:45.607		85.50	-54.78	55200.00	-109.46		
LeVerrier	I	2049-10-17T12:27:04.036		85.43	-54.71	53200.00	-107.54		
Galle	I	2049-10-17T12:28:56.425		85.04	-54.28	42000.05	-89.64		
Neptune	I	2049-10-17T12:37:54.764		83.08	-52.20	24763.96		-7.91	-8.19
Neptune	E	2049-10-17T13:10:12.421		75.62	-44.68	24762.19		-62.67	-63.45
Galle	E	2049-10-17T12:36:08.677		83.48	-52.61	42000.22	89.78		
LeVerrier	E	2049-10-17T12:38:00.877	b	83.06	-52.18	53200.02	107.78		
Lassell	E	2049-10-17T12:38:19.266	b	82.99	-52.11	55200.01	109.71		
Arago	E	2049-10-17T12:38:37.353	b	82.92	-52.04	57200.00	111.42		
Galatea	E	2049-10-17T12:39:19.355	b	82.77	-51.88	61953.01	114.77		
Adams	E	2049-10-17T12:39:27.872	b	82.73	-51.85	62933.01	115.36		


```

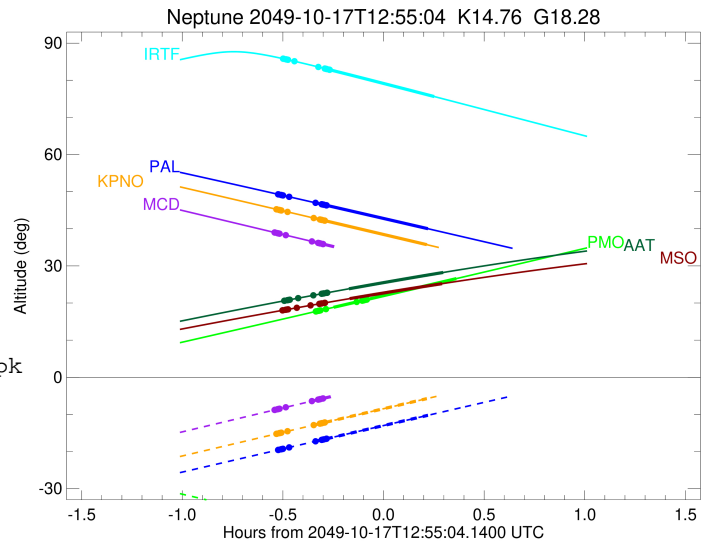
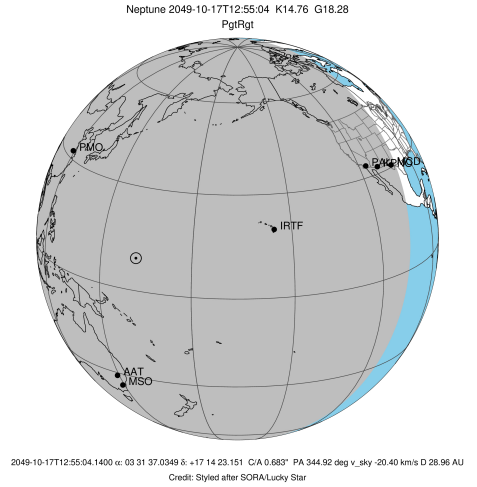
target                : Neptune
target radius (km)   : 24764.00
C/A epoch            : 2049-10-17T12:58:49.590
Event type           : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : AAT
Location             : Siding Spring (AAT)
Latitude (deg)       : -31.27703
E. Longitude (deg)   : 149.06608
Altitude (km)        : 1.164
Gaia source ID       : 54863298061632384
2Mass ID (if available) : 03313700+1714237
ICRS Star Coord at Epoch: 03h 31m 37.03486s +17:14:23.15114s
RUWE (>1.4 is poor) : 1.05
K magnitude          : 14.756
G magnitude          : 18.277
RP magnitude         : 17.204
BP magnitude         : 19.448
DUPflag             : 0
Distance (au)        : 28.958
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.40
Sun-Target sep (deg) : 149.05
Sun-Moon sep (deg)   : 46.57
B (ring opening deg) : 4.23
PA of pole (deg)     : -42.36
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.837
C/A sky separation (km) : 17581.1
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.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	2049-10-17T12:26:02.360		20.70	-44.78	62933.01	-105.39		
Galatea	I	2049-10-17T12:26:11.700		20.72	-44.80	61953.01	-104.46		
Arago	I	2049-10-17T12:26:58.342		20.86	-44.88	57200.02	-99.12		
Lassell	I	2049-10-17T12:27:18.802		20.92	-44.92	55200.02	-96.33		
LeVerrier	I	2049-10-17T12:27:39.908		20.98	-44.95	53200.04	-93.12		
Galle	I	2049-10-17T12:30:03.170		21.38	-45.20	42000.33	-59.21		
Neptune	I	2049-10-17T12:44:44.981		23.83	-46.56	24763.78		-17.48	-18.05
Neptune	E	2049-10-17T13:12:53.260		28.23	-48.46	24761.93		-72.44	-72.99
Galle	E	2049-10-17T12:34:51.710		22.19	-45.67	42008.71	59.35		
LeVerrier	E	2049-10-17T12:37:14.768		22.59	-45.89	53200.17	93.32		
Lassell	E	2049-10-17T12:37:35.832		22.65	-45.93	55200.11	96.54		
Arago	E	2049-10-17T12:37:56.247		22.71	-45.96	57200.07	99.35		
Galatea	E	2049-10-17T12:38:42.779		22.84	-46.03	61953.03	104.74		
Adams	E	2049-10-17T12:38:52.094		22.86	-46.04	62933.02	105.68		

```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2049-10-17T12:58:45.770
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        : 54863298061632384
2Mass ID (if available) : 03313700+1714237
ICRS Star Coord at Epoch: 03h 31m 37.03486s +17:14:23.15114s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 14.756
G magnitude           : 18.277
RP magnitude          : 17.204
BP magnitude          : 19.448
DUPflag              : 0
Distance (au)         : 28.958
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -20.40
Sun-Target sep (deg) : 149.05
Sun-Moon sep (deg)   : 46.53
B (ring opening deg) : 4.23
PA of pole (deg)     : -42.36
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.853
C/A sky separation (km) : 17915.5
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	2049-10-17T12:25:30.054		18.12	-41.17	62933.01	-104.11		
Galatea	I	2049-10-17T12:25:39.510		18.14	-41.18	61953.02	-103.14		
Arago	I	2049-10-17T12:26:26.829		18.27	-41.26	57200.02	-97.51		
Lassell	I	2049-10-17T12:26:47.646		18.32	-41.29	55200.03	-94.57		
LeVerrier	I	2049-10-17T12:27:09.171		18.38	-41.32	53200.05	-91.18		
Galle	I	2049-10-17T12:29:38.593		18.78	-41.55	42000.39	-54.37		
Neptune	I	2049-10-17T12:44:57.346		21.18	-42.83	24763.78		-18.60	-19.21
Neptune	E	2049-10-17T13:12:33.316		25.21	-44.50	24761.91		-73.49	-74.01
Galle	E	2049-10-17T12:34:04.158		19.49	-41.95	42015.43	54.54		
LeVerrier	E	2049-10-17T12:36:33.385		19.88	-42.16	53200.22	91.36		
Lassell	E	2049-10-17T12:36:54.870		19.93	-42.19	55200.14	94.77		
Arago	E	2049-10-17T12:37:15.645		19.99	-42.22	57200.08	97.73		
Galatea	E	2049-10-17T12:38:02.858		20.11	-42.29	61953.03	103.40		
Adams	E	2049-10-17T12:38:12.291		20.14	-42.30	62933.03	104.38		