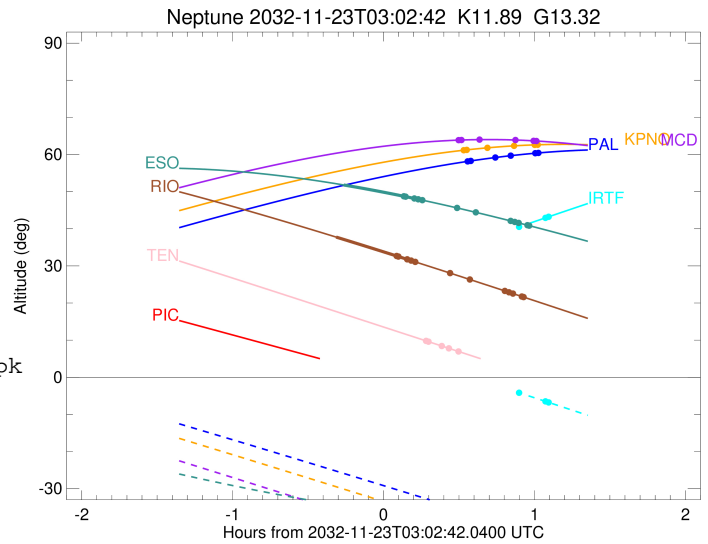
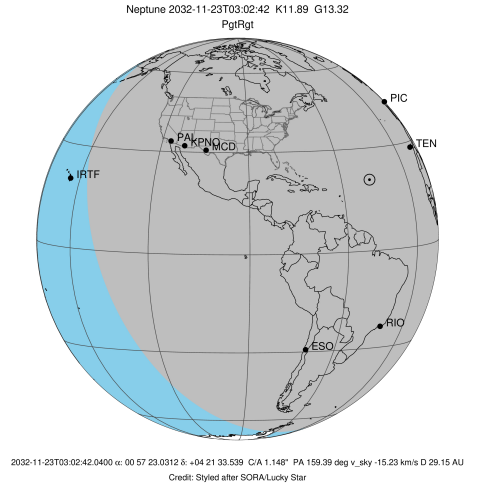



```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2032-11-23T03:03:55.090
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       : 2551779163070218880
2Mass ID (if available) : 00572299+0421336
ICRS Star Coord at Epoch: 00h 57m 23.03121s +04:21:33.53876s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 11.890
G magnitude           : 13.316
RP magnitude          : 12.803
BP magnitude          : 13.665
DUPflag              : 0
Distance (au)        : 29.152
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -15.23
Sun-Target sep (deg) : 133.96
Sun-Moon sep (deg)   : 116.34
B (ring opening deg) : -14.07
PA of pole (deg)     : -46.72
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 1.320
C/A sky separation (km) : 27898.9
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
    
```



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

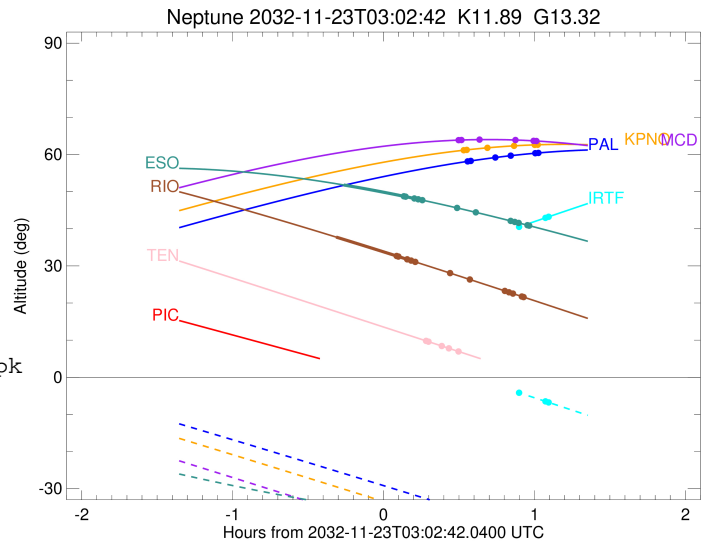
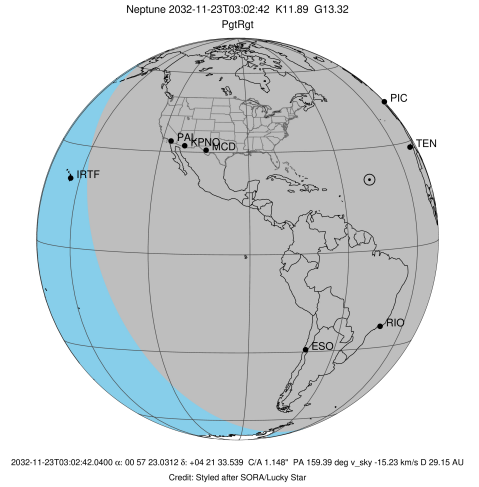
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2032-11-23T03:34:23.146		57.97	-35.79	62933.21	-14.54		
Galatea	I	2032-11-23T03:35:32.722		58.09	-36.03	61953.35	-13.62		
Arago	I	2032-11-23T03:43:19.762		58.85	-37.66	57419.92	-6.95		

No planet occultations

Arago	E	2032-11-23T03:55:16.711		59.84	-40.16	57206.79	6.40		
Galatea	E	2032-11-23T04:03:05.364		60.36	-41.79	61953.00	13.61		
Adams	E	2032-11-23T04:04:15.003		60.43	-42.04	62933.00	14.53		

```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2032-11-23T03:03:32.670
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       : 2551779163070218880
2Mass ID (if available) : 00572299+0421336
ICRS Star Coord at Epoch: 00h 57m 23.03121s +04:21:33.53876s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 11.890
G magnitude           : 13.316
RP magnitude          : 12.803
BP magnitude          : 13.665
DUPflag              : 0
Distance (au)        : 29.152
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -15.23
Sun-Target sep (deg) : 133.96
Sun-Moon sep (deg)   : 116.40
B (ring opening deg) : -14.07
PA of pole (deg)     : -46.72
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 1.306
C/A sky separation (km) : 27610.0
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.urall1.tpc.Neptune
naif0012.tls
IAU_NEPTUNE_for_RINGFIT.tpc.BECAREFUL
earth_flat_IAU.spk
    
```



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

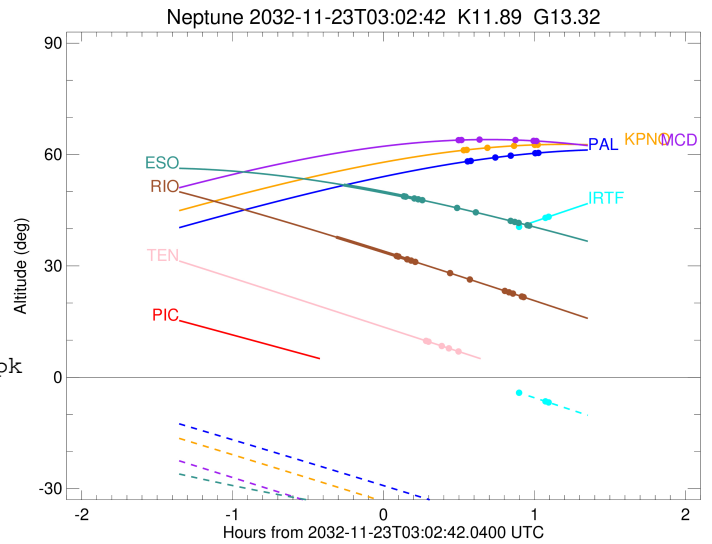
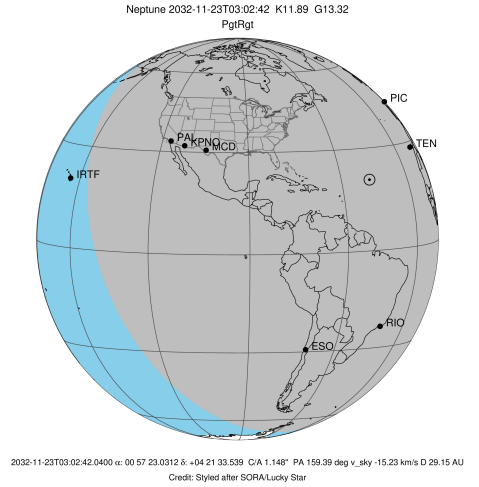
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2032-11-23T03:32:54.510		61.03	-39.88	62933.15	-15.14		
Galatea	I	2032-11-23T03:34:01.141		61.12	-40.11	61953.24	-14.27		
Arago	I	2032-11-23T03:41:05.969		61.62	-41.62	57222.93	-7.90		

No planet occultations

Arago	E	2032-11-23T03:55:43.567		62.38	-44.72	57200.28	7.84		
Galatea	E	2032-11-23T04:02:48.833		62.60	-46.23	61953.00	14.25		
Adams	E	2032-11-23T04:03:55.558		62.63	-46.46	62933.00	15.11		

```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2032-11-23T03:02:55.020
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       : 2551779163070218880
2Mass ID (if available) : 00572299+0421336
ICRS Star Coord at Epoch: 00h 57m 23.03121s +04:21:33.53876s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 11.890
G magnitude           : 13.316
RP magnitude          : 12.803
BP magnitude          : 13.665
DUPflag              : 0
Distance (au)        : 29.152
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -15.23
Sun-Target sep (deg) : 133.96
Sun-Moon sep (deg)   : 116.47
B (ring opening deg) : -14.07
PA of pole (deg)     : -46.72
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 1.289
C/A sky separation (km) : 27243.6
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
    
```



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

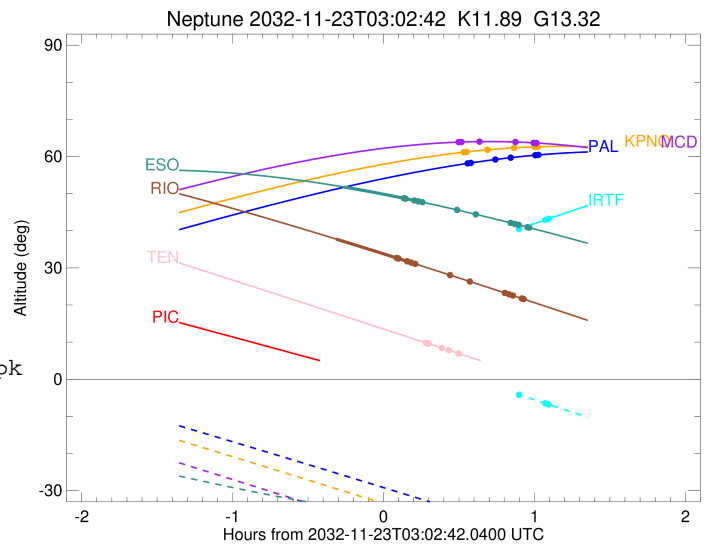
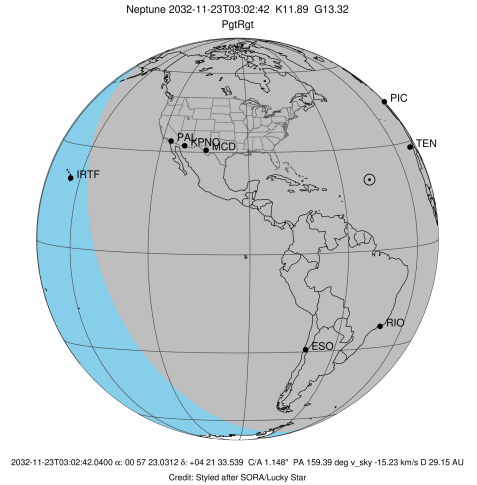
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2032-11-23T03:30:57.207		63.84	-45.95	62933.11	-15.83		
Galatea	I	2032-11-23T03:32:00.702		63.87	-46.18	61953.16	-15.03		
Arago	I	2032-11-23T03:38:27.230		63.99	-47.56	57205.49	-9.35		

No planet occultations

Arago	E	2032-11-23T03:55:49.957		63.89	-51.30	57200.02	9.33		
Galatea	E	2032-11-23T04:02:17.123		63.69	-52.68	61953.00	15.00		
Adams	E	2032-11-23T04:03:20.758		63.65	-52.91	62933.00	15.80		

```

target                : Neptune
target radius (km)    : 24764.00
C/A epoch              : 2032-11-23T02:56:01.920
Event type             : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : TEN
Location               : Teide Obs./Tenerife
Latitude (deg)        : 28.30050
E. Longitude (deg)    : 343.48909
Altitude (km)         : 2.395
Gaia source ID        : 2551779163070218880
2Mass ID (if available) : 00572299+0421336
ICRS Star Coord at Epoch: 00h 57m 23.03121s +04:21:33.53876s
RUWE (>1.4 is poor)  : 1.05
K magnitude           : 11.890
G magnitude           : 13.316
RP magnitude          : 12.803
BP magnitude          : 13.665
DUPflag               : 0
Distance (au)         : 29.152
f0 (km)                : 0.000
g0 (km)                : 0.000
skyplane vel. (km/s)  : -15.23
Sun-Target sep (deg)  : 133.96
Sun-Moon sep (deg)    : 116.33
B (ring opening deg)  : -14.07
PA of pole (deg)      : -46.72
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 1.185
C/A sky separation (km) : 25064.3
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
    
```



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

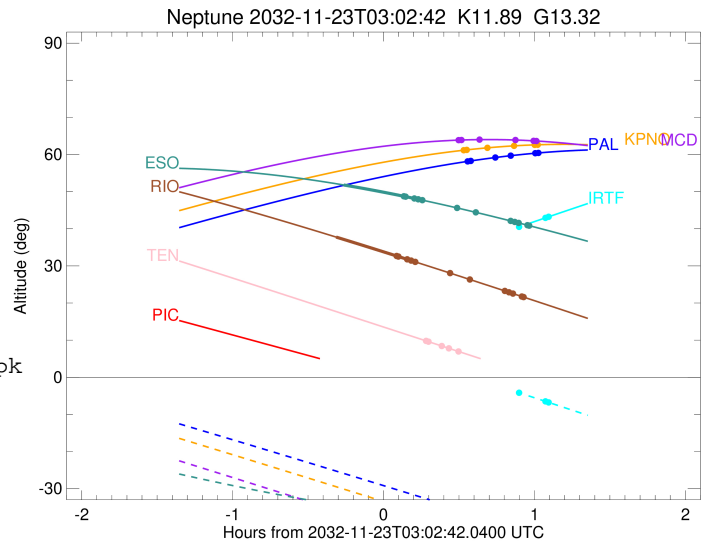
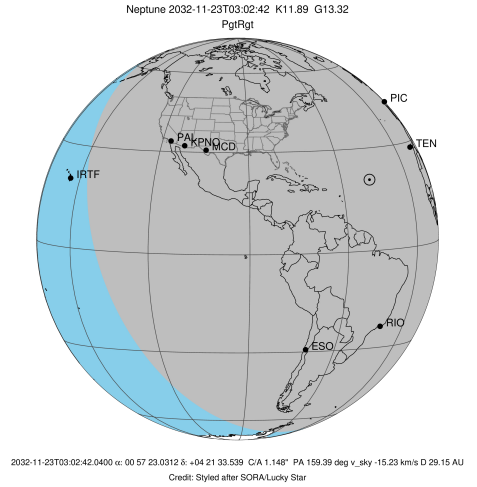
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2032-11-23T03:18:16.465		10.10	-56.01	62933.02	-18.11		
Galatea	I	2032-11-23T03:19:11.441		9.90	-55.81	61953.03	-17.54		
Arago	I	2032-11-23T03:24:12.227		8.79	-54.71	57200.21	-13.92		
Lassell	I	2032-11-23T03:26:47.978		8.21	-54.14	55200.75	-11.72		
LeVerrier	I	2032-11-23T03:30:04.048		7.49	-53.42	53207.32	-8.64		

No planet occultations

LeVerrier	E	2032-11-23T03:46:07.126		3.95x	-49.88	53200.05	8.59		
Lassell	E	2032-11-23T03:49:24.123		3.22x	-49.16	55200.00	11.65		
Arago	E	2032-11-23T03:52:00.840		2.64x	-48.59	57200.00	13.83		
Galatea	E	2032-11-23T03:57:04.074		1.53x	-47.47	61953.00	17.37		
Adams	E	2032-11-23T03:57:59.581		1.33x	-47.27	62933.00	17.93		

```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2032-11-23T03:07:32.230
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       : 2551779163070218880
2Mass ID (if available) : 00572299+0421336
ICRS Star Coord at Epoch: 00h 57m 23.03121s +04:21:33.53876s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 11.890
G magnitude           : 13.316
RP magnitude         : 12.803
BP magnitude         : 13.665
DUPflag              : 0
Distance (au)        : 29.152
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -15.23
Sun-Target sep (deg) : 133.96
Sun-Moon sep (deg)   : 115.85
B (ring opening deg) : -14.07
PA of pole (deg)     : -46.72
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 1.320
C/A sky separation (km) : 27903.8
NAIF SPICE kernels   : RAJobs_U111+rgf16.spk
URKALLv1.spk
nep097.bsp
nep101.bsp
sat4401.bsp
de440.bsp
earth_720101_070426.bpc
earthstns_itrfr93_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
    
```



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

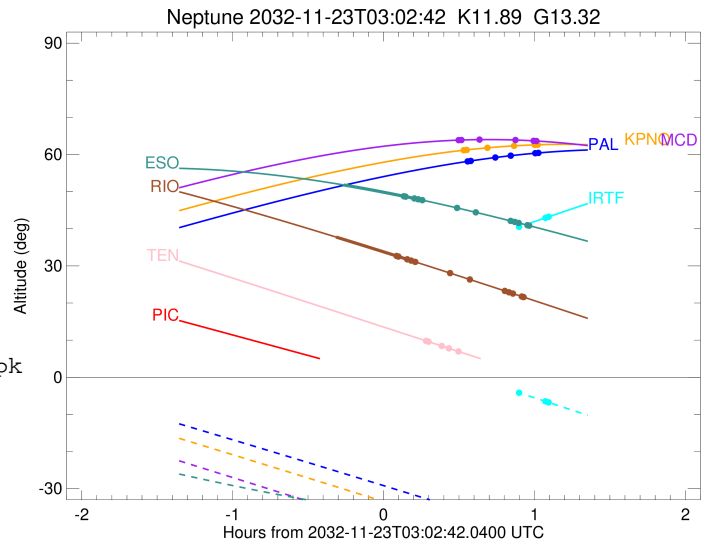
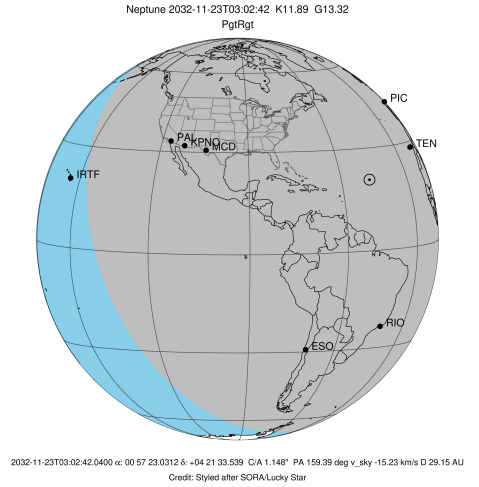
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
Adams	I	2032-11-23T03:38:30.963		36.32	-0.20x	62933.23	-14.27		
Galatea	I	2032-11-23T03:39:41.926		36.60	-0.46x	61953.38	-13.35		
Arago	I	2032-11-23T03:47:35.824		38.43	-2.19x	57896.78	-7.65		

No planet occultations

Arago	E	2032-11-23T03:59:04.908		41.10	-4.72x	57223.52	6.02		
Galatea	E	2032-11-23T04:07:09.378		42.96	-6.51	61953.00	13.37		
Adams	E	2032-11-23T04:08:20.187		43.23	-6.77	62933.00	14.30		

```

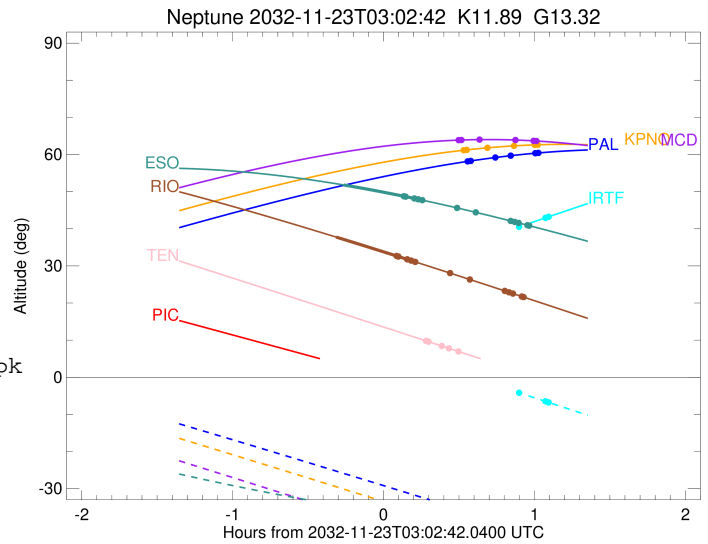
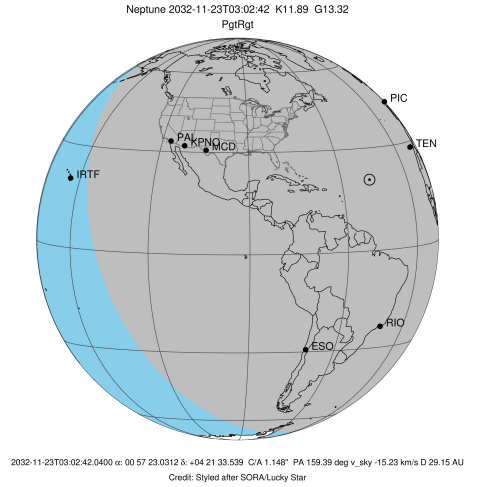
target                : Neptune
target radius (km)   : 24764.00
C/A epoch            : 2032-11-23T02:59:17.290
Event type          : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : RIO
Location            : Rio de Janeiro
Latitude (deg)      : -22.89506
E. Longitude (deg)  : 316.77708
Altitude (km)       : 0.033
Gaia source ID      : 2551779163070218880
2Mass ID (if available) : 00572299+0421336
ICRS Star Coord at Epoch: 00h 57m 23.03121s +04:21:33.53876s
RUWE (>1.4 is poor) : 1.05
K magnitude         : 11.890
G magnitude         : 13.316
RP magnitude        : 12.803
BP magnitude        : 13.665
DUPflag            : 0
Distance (au)       : 29.152
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -15.23
Sun-Target sep (deg) : 133.96
Sun-Moon sep (deg)  : 116.44
B (ring opening deg) : -14.07
PA of pole (deg)    : -46.72
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.952
C/A sky separation (km) : 20120.4
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	2032-11-23T03:07:08.475	b	32.84	-46.28	62933.00	-24.17		
Galatea	I	2032-11-23T03:07:49.257	b	32.70	-46.26	61953.00	-23.89		
Arago	I	2032-11-23T03:11:15.021	b	31.96	-46.11	57200.00	-22.24		
Lassell	I	2032-11-23T03:12:46.698	b	31.63	-46.05	55200.00	-21.37		
LeVerrier	I	2032-11-23T03:14:22.507	b	31.28	-45.97	53200.00	-20.36		
Galle	I	2032-11-23T03:27:02.221		28.53	-45.27	42016.03	-7.72		
Neptune	I	2032-11-23T02:43:49.939		37.77	-46.80	24739.86		73.25	73.78
Neptune	E	2032-11-23T03:14:48.147		31.19	-45.95	24758.55		27.08	27.88
Galle	E	2032-11-23T03:37:52.236		26.15	-44.51	42000.21	7.65		
LeVerrier	E	2032-11-23T03:50:37.041		23.33	-43.44	53200.00	20.15		
Lassell	E	2032-11-23T03:52:13.892		22.97	-43.29	55200.00	21.13		
Arago	E	2032-11-23T03:53:46.644		22.63	-43.14	57200.00	21.98		
Galatea	E	2032-11-23T03:57:15.050		21.85	-42.81	61953.00	23.57		
Adams	E	2032-11-23T03:57:56.386		21.70	-42.74	62933.00	23.84		

```

target                : Neptune
target radius (km)   : 24764.00
C/A epoch             : 2032-11-23T03:02:01.010
Event type            : PgtRgt
: Neptune occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : ESO
Location               : European Southern Obs. (3.6m)
Latitude (deg)        : -29.26097
E. Longitude (deg)    : 289.26831
Altitude (km)         : 2.400
Gaia source ID        : 2551779163070218880
2Mass ID (if available) : 00572299+0421336
ICRS Star Coord at Epoch: 00h 57m 23.03121s +04:21:33.53876s
RUWE (>1.4 is poor) : 1.05
K magnitude           : 11.890
G magnitude           : 13.316
RP magnitude          : 12.803
BP magnitude          : 13.665
DUPflag               : 0
Distance (au)         : 29.152
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -15.23
Sun-Target sep (deg)  : 133.96
Sun-Moon sep (deg)   : 116.45
B (ring opening deg) : -14.07
PA of pole (deg)     : -46.72
Pole direction: RA (deg): 299.33374
Dec (deg): 42.95036
C/A sky separation (") : 0.958
C/A sky separation (km) : 20246.5
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.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	2032-11-23T03:10:01.377	b	48.86	-36.91	62933.00	-24.39		
Galatea	I	2032-11-23T03:10:41.783	b	48.77	-36.97	61953.00	-24.11		
Arago	I	2032-11-23T03:14:05.663	b	48.29	-37.26	57200.00	-22.45		
Lassell	I	2032-11-23T03:15:36.514	b	48.08	-37.38	55200.00	-21.56		
LeVerrier	I	2032-11-23T03:17:11.475	b	47.85	-37.51	53200.00	-20.54		
Galle	I	2032-11-23T03:29:47.715		45.95	-38.43	42019.17	-7.65		
Neptune	I	2032-11-23T02:46:49.650		51.80	-34.65	24739.77		73.60	74.12
Neptune	E	2032-11-23T03:17:15.194		47.84	-37.51	24758.42		27.40	28.21
Galle	E	2032-11-23T03:40:15.819		44.29	-39.08	42000.26	7.57		
LeVerrier	E	2032-11-23T03:52:55.912		42.18	-39.70	53200.00	20.38		
Lassell	E	2032-11-23T03:54:31.665		41.90	-39.76	55200.00	21.38		
Arago	E	2032-11-23T03:56:03.330		41.64	-39.82	57200.00	22.24		
Galatea	E	2032-11-23T03:59:29.202		41.04	-39.95	61953.00	23.87		
Adams	E	2032-11-23T04:00:10.022		40.92	-39.97	62933.00	24.15		