

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-01-28T01:52:58.890
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3412081590864663552
 2Mass ID (if available) : 04593751+2115248

Saturn 2032-01-28T01:52:58 K9.66 G12.36 PgtRgt

ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s

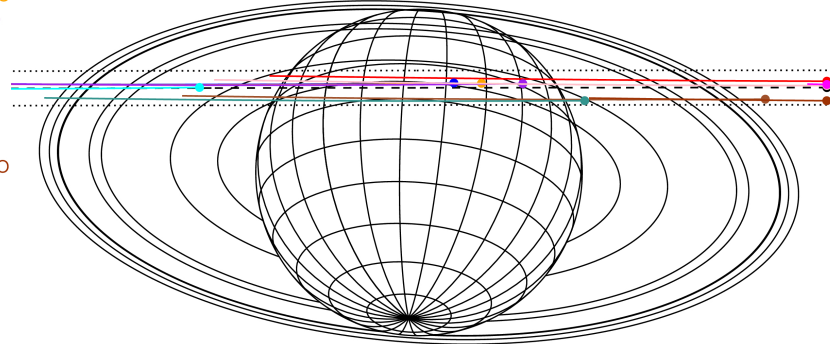
RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.657
 G magnitude : 12.361
 RP magnitude : 11.541
 BP magnitude : 13.073
 DUPflag : 0
 Distance (au) : 8.376
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.00
 Sun-Target sep (deg) : 128.70
 Sun-Moon sep (deg) : 57.17
 B (ring opening deg) : -26.58
 PA of pole (deg) : -4.09

| # | a(km) | ring |
|---|----------|-------------|
| 1 | 74490.6 | C (IER) |
| 2 | 91984.7 | B (IER) |
| 3 | 117571.2 | B (OER) |
| 4 | 122050.4 | A (IER) |
| 5 | 133423.3 | Encke (IEG) |
| 6 | 133744.9 | Encke (OEG) |
| 7 | 136774.4 | A (OER) |
| 8 | 140461.0 | F ring |



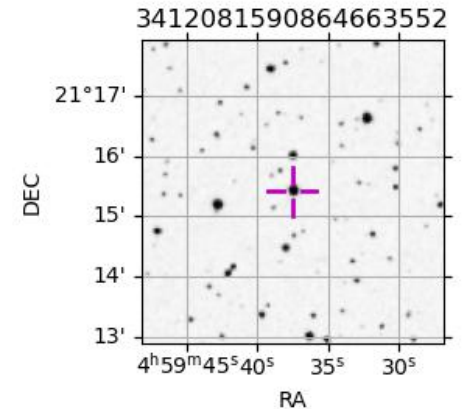
2032-01-28T01:52:58.8900 α: 04 59 37.51511 s; +21 15 24.731 C/A 5.147° PA 180.06 deg v_sky - 9.00 km/s D 08.38 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 KAV
 RIO
 ESO
 SAAO

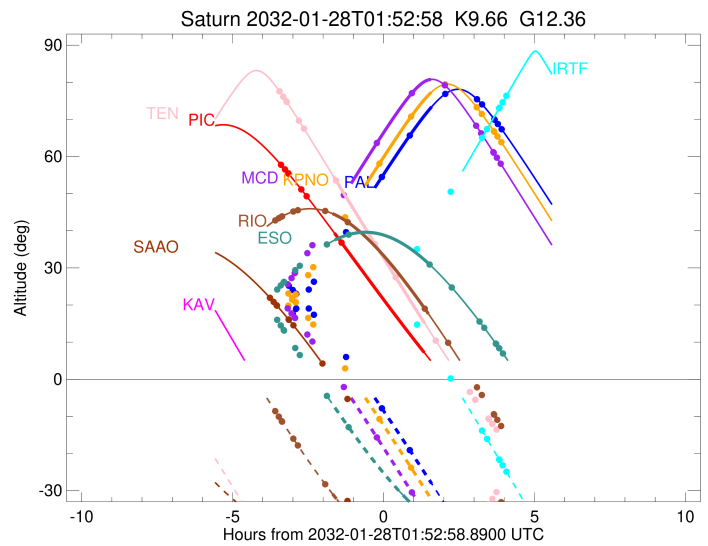
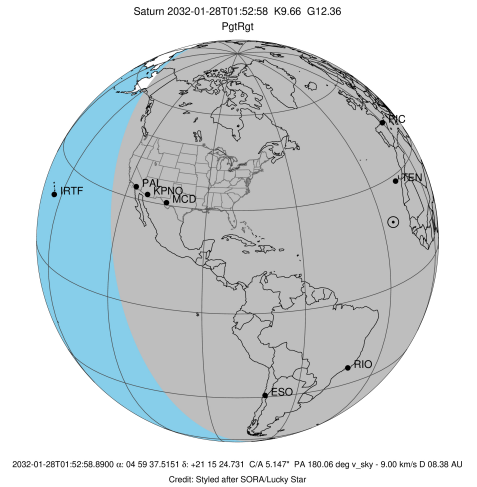


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

| Obs | Location | lat | Elon | Rings I | Planet | Rings E | Observed Events Interval | OEcode |
|------|----------------|-------|-------|---------------|--------|---------------|-----------------------------|--------|
| PIC | Pic du Midi | 42.9 | 0.1 | + + + + + | + + | | JAN 27 22:29 - JAN 28 03:13 | PieRin |
| PAL | Palomar Mt (20 | 33.4 | 243.1 | | + | + + + + + + + | JAN 28 03:28 - JAN 28 05:47 | PneRne |
| PMO | Purple Mtn Obs | 32.1 | 118.8 | | | | | PnnRnn |
| KPNO | Kitt Peak Natl | 32.0 | 248.4 | | + | + + + + + + + | JAN 28 03:27 - JAN 28 05:47 | PneRne |
| MCD | McDonald Obs. | 30.7 | 256.0 | | + | + + + + + + + | JAN 28 03:26 - JAN 28 05:46 | PneRne |
| TEN | Teide Obs./Ten | 28.3 | 343.5 | + + + + + | + + | + | JAN 27 22:26 - JAN 28 03:37 | PieRie |
| IRTF | Mauna Kea/IRTF | 19.8 | 204.5 | | | + + + + + + + | JAN 28 05:09 - JAN 28 05:57 | PnnRne |
| KAV | Kavalur Observ | 12.6 | 78.8 | | | | | PnnRnn |
| RIO | Rio de Janeiro | -22.9 | 316.8 | + + + + + + + | + + | + | JAN 27 22:17 - JAN 28 04:01 | PieRie |
| ESO | European South | -29.3 | 289.3 | | + + | + + + + + + + | JAN 28 00:16 - JAN 28 05:50 | PieRne |
| AAT | Siding Spring | -31.3 | 149.1 | | | | | PnnRnn |
| SAAO | So. Afr. Astro | -32.4 | 20.8 | + + + + + + + | | | JAN 27 22:07 - JAN 27 22:53 | PnnRin |
| MSO | Mt. Stromlo Ob | -35.3 | 149.0 | | | | | PnnRnn |



target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-01-28T01:43:41.000
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3412081590864663552
 2Mass ID (if available) : 04593751+2115248
 ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.657
 G magnitude : 12.361
 RP magnitude : 11.541
 BP magnitude : 13.073
 DUPflag : 0
 Distance (au) : 8.376
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.00
 Sun-Target sep (deg) : 128.70
 Sun-Moon sep (deg) : 57.09
 B (ring opening deg) : -26.58
 PA of pole (deg) : -4.09
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.756
 C/A sky separation (km) : 34968.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk

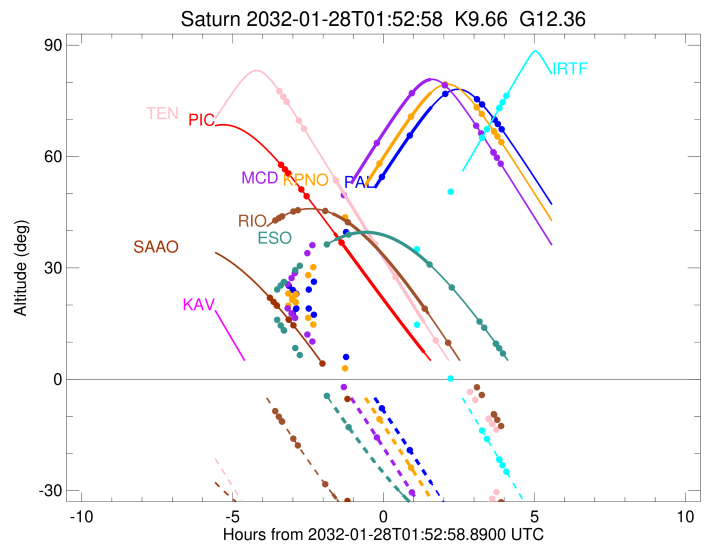
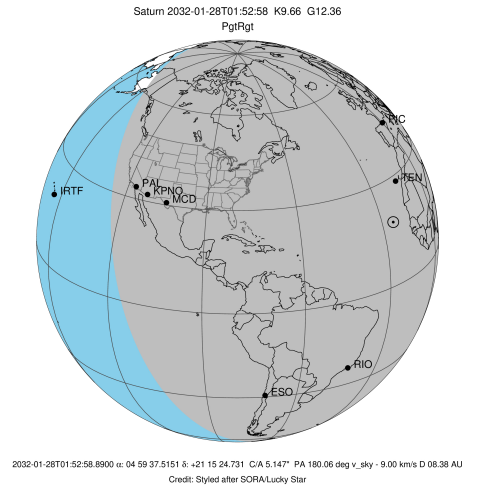


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|---------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:29:17.867 | | 57.76 | -57.35 | 140461.00 | -7.90 | | |
| A (OER) | I | 2032-01-27T22:37:07.300 | | 56.53 | -58.42 | 136774.40 | -7.80 | | |
| Encke (OEG) | I | 2032-01-27T22:43:37.972 | | 55.49 | -59.27 | 133744.89 | -7.71 | | |
| Encke (IEG) | I | 2032-01-27T22:44:19.720 | | 55.37 | -59.36 | 133423.31 | -7.70 | | |
| A (IER) | I | 2032-01-27T23:09:37.282 | | 51.13 | -62.26 | 122050.38 | -7.27 | | |
| B (OER) | I | 2032-01-27T23:20:01.857 | | 49.33 | -63.24 | 117571.16 | -7.07 | | |
| B (IER) | I | 2032-01-28T00:29:32.919 | b | 36.80 | -65.34 | 91984.69 | -4.96 | | |
| Saturn | I | 2032-01-28T00:15:22.168 | | 39.40 | -65.61 | 59808.39 | | 34.42 | 39.89 |
| Saturn | E | 2032-01-28T03:13:50.509 | | 7.21 | -44.65 | 59937.50 | | 28.59 | 33.67 |
| B (IER) | E | 2032-01-28T03:29:29.390 | | 4.57x | -41.90 | 91984.69 | 4.78 | | |
| B (OER) | E | 2032-01-28T04:42:46.115 | | -6.94x | -28.59 | 117571.16 | 6.61 | | |
| A (IER) | E | 2032-01-28T04:53:55.194 | | -8.55x | -26.54 | 122050.38 | 6.78 | | |
| Encke (IEG) | E | 2032-01-28T05:21:11.439 | | -12.26x | -21.54 | 133423.31 | 7.11 | | |
| Encke (OEG) | E | 2032-01-28T05:21:56.656 | | -12.35x | -21.40 | 133744.89 | 7.12 | | |
| A (OER) | E | 2032-01-28T05:29:00.291 | | -13.26x | -20.11 | 136774.40 | 7.19 | | |
| F ring | E | 2032-01-28T05:37:30.527 | | -14.32x | -18.56 | 140461.00 | 7.26 | | |

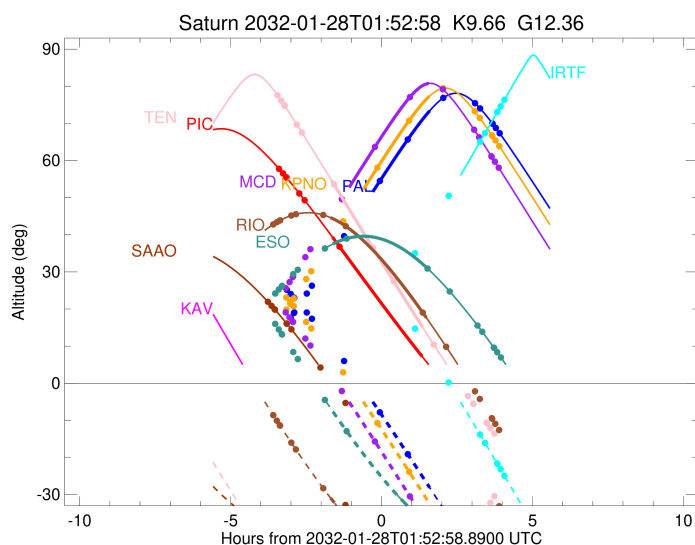
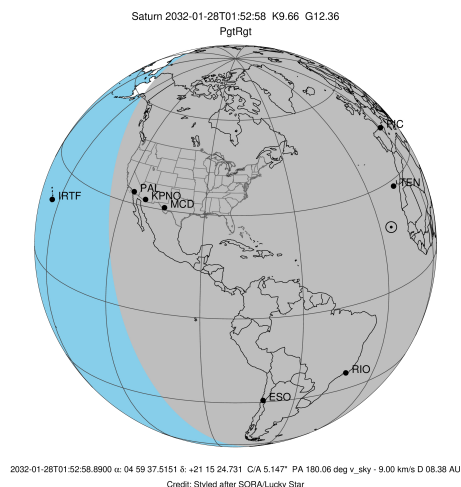
```

target                : Saturn
target radius (km)   : 60268.00
C/A epoch             : 2032-01-28T01:59:15.820
Event type            : PgtRgt
: Saturn 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        : 3412081590864663552
2Mass ID (if available) : 04593751+2115248
ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 9.657
G magnitude           : 12.361
RP magnitude          : 11.541
BP magnitude          : 13.073
DUPflag              : 0
Distance (au)         : 8.376
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -9.00
Sun-Target sep (deg)  : 128.70
Sun-Moon sep (deg)   : 58.03
B (ring opening deg) : -26.58
PA of pole (deg)     : -4.09
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation (") : 5.423
C/A sky separation (km) : 32942.7
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl.spk
Saturn_ring_plane.tf
sat378.bsp
sat286.bsp
vgr1.sat286.bsp
vgr2.sat286.bsp
HST1081HSPephemUTC.bsp
pfb10000r.bsp
cassini.bsp
earthstns_itrf93_040916.bsp
earth_200101_990628_predict.bpc
earth_720101_070426.bpc
cpck28Mar2008.tpc
pck.sat440.tpc
IAU_SATURN_for_RINGFIT.tpc
naif0012.tls
earth_flat_IAU.spk
  
```



| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:44:44.132 | | 16.04 | 25.19x | 140461.00 | -7.92 | | |
| A (OER) | I | 2032-01-27T22:52:31.432 | | 17.62 | 24.05x | 136774.40 | -7.85 | | |
| Encke (OEG) | I | 2032-01-27T22:58:58.686 | | 18.94 | 23.08x | 133744.89 | -7.79 | | |
| Encke (IEG) | I | 2032-01-27T22:59:39.978 | | 19.08 | 22.98x | 133423.31 | -7.78 | | |
| A (IER) | I | 2032-01-27T23:24:27.944 | | 24.17 | 19.06x | 122050.38 | -7.49 | | |
| B (OER) | I | 2032-01-27T23:34:32.186 | | 26.25 | 17.40x | 117571.16 | -7.34 | | |
| B (IER) | I | 2032-01-28T00:38:38.512 | b | 39.63 | 5.99x | 91984.69 | -5.76 | | |
| C (IER) | I | 2032-01-28T01:50:12.837 | b | 54.59 | -7.91 | 74490.58 | -1.99 | | |
| Saturn | I | 2032-01-28T00:29:40.203 | | 37.75 | 7.66x | 59828.40 | | 33.55 | 38.98 |
| Saturn | E | 2032-01-28T03:28:36.474 | | 73.38 | -28.10 | 59999.24 | | 25.54 | 30.32 |
| C (IER) | E | 2032-01-28T02:45:11.447 | b | 65.66 | -19.09 | 74490.58 | 2.00 | | |
| B (IER) | E | 2032-01-28T03:55:57.466 | | 76.89 | -33.81 | 91984.69 | 5.83 | | |
| B (OER) | E | 2032-01-28T04:59:06.110 | | 75.40 | -46.97 | 117571.16 | 7.47 | | |
| A (IER) | E | 2032-01-28T05:08:59.588 | | 74.03 | -49.01 | 122050.38 | 7.63 | | |
| Encke (IEG) | E | 2032-01-28T05:33:19.183 | | 70.02 | -53.97 | 133423.31 | 7.94 | | |
| Encke (OEG) | E | 2032-01-28T05:33:59.652 | | 69.90 | -54.11 | 133744.89 | 7.95 | | |
| A (OER) | E | 2032-01-28T05:40:19.097 | | 68.75 | -55.38 | 136774.40 | 8.02 | | |
| F ring | E | 2032-01-28T05:47:56.769 | | 67.33 | -56.90 | 140461.00 | 8.09 | | |

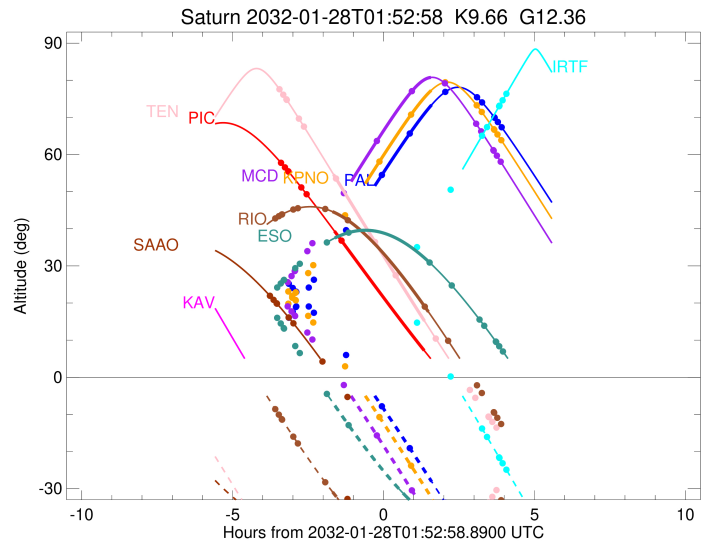
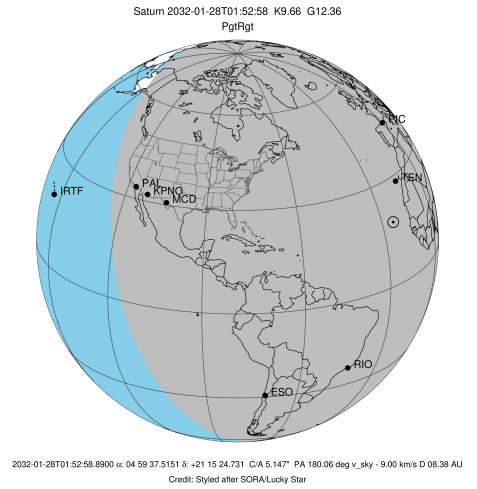
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-01-28T01:58:32.320
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3412081590864663552
 2Mass ID (if available) : 04593751+2115248
 ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.657
 G magnitude : 12.361
 RP magnitude : 11.541
 BP magnitude : 13.073
 DUPflag : 0
 Distance (au) : 8.376
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.00
 Sun-Target sep (deg) : 128.70
 Sun-Moon sep (deg) : 58.04
 B (ring opening deg) : -26.58
 PA of pole (deg) : -4.09
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.383
 C/A sky separation (km) : 32703.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:43:50.794 | | 19.82 | 23.10x | 140461.00 | -7.98 | | |
| A (OER) | I | 2032-01-27T22:51:34.753 | | 21.43 | 21.87x | 136774.40 | -7.91 | | |
| Encke (OEG) | I | 2032-01-27T22:57:59.181 | | 22.76 | 20.82x | 133744.89 | -7.85 | | |
| Encke (IEG) | I | 2032-01-27T22:58:40.168 | | 22.91 | 20.71x | 133423.31 | -7.84 | | |
| A (IER) | I | 2032-01-27T23:23:16.649 | | 28.07 | 16.53x | 122050.38 | -7.55 | | |
| B (OER) | I | 2032-01-27T23:33:15.880 | | 30.17 | 14.77x | 117571.16 | -7.40 | | |
| B (IER) | I | 2032-01-28T00:36:40.237 | b | 43.64 | 2.94x | 91984.69 | -5.84 | | |
| C (IER) | I | 2032-01-28T01:45:18.391 | b | 58.19 | -10.81 | 74490.58 | -2.27 | | |
| Saturn | I | 2032-01-28T00:28:56.089 | | 41.99 | 4.43x | 59834.71 | | 33.27 | 38.69 |
| Saturn | E | 2032-01-28T03:27:59.077 | | 77.31 | -32.31 | 60002.74 | | 25.36 | 30.11 |
| C (IER) | E | 2032-01-28T02:47:48.240 | b | 70.76 | -23.82 | 74490.58 | 2.29 | | |
| B (IER) | E | 2032-01-28T03:55:47.646 | | 79.47 | -38.22 | 91984.69 | 5.90 | | |
| B (OER) | E | 2032-01-28T04:58:29.375 | | 73.22 | -51.46 | 117571.16 | 7.50 | | |
| A (IER) | E | 2032-01-28T05:08:20.770 | | 71.45 | -53.51 | 122050.38 | 7.65 | | |
| Encke (IEG) | E | 2032-01-28T05:32:36.699 | | 66.79 | -58.48 | 133423.31 | 7.96 | | |
| Encke (OEG) | E | 2032-01-28T05:33:17.092 | | 66.65 | -58.62 | 133744.89 | 7.96 | | |
| A (OER) | E | 2032-01-28T05:39:35.887 | | 65.39 | -59.89 | 136774.40 | 8.03 | | |
| F ring | E | 2032-01-28T05:47:12.915 | | 63.85 | -61.40 | 140461.00 | 8.10 | | |

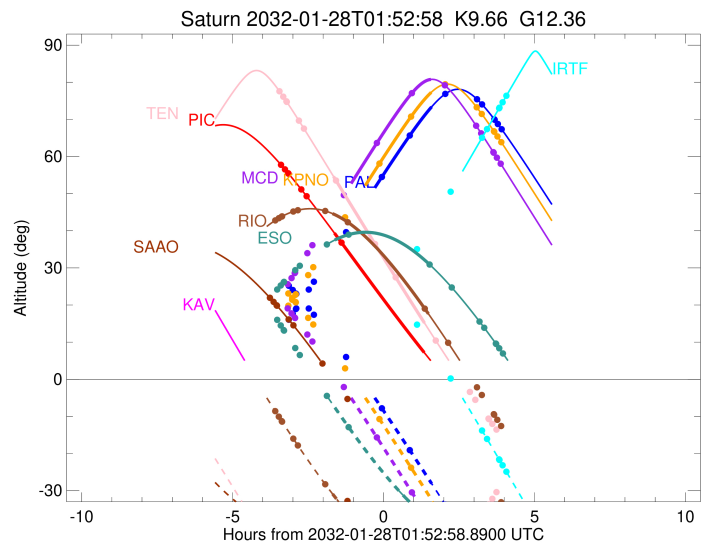
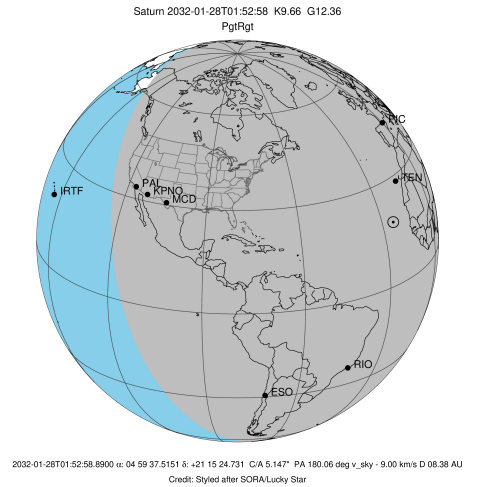
```

target                : Saturn
target radius (km)   : 60268.00
C/A epoch             : 2032-01-28T01:57:20.900
Event type            : PgtRgt
: Saturn 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       : 3412081590864663552
2Mass ID (if available) : 04593751+2115248
ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
RUWE (>1.4 is poor) : 1.12
K magnitude           : 9.657
G magnitude           : 12.361
RP magnitude          : 11.541
BP magnitude          : 13.073
DUPflag              : 0
Distance (au)        : 8.376
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -9.00
Sun-Target sep (deg) : 128.70
Sun-Moon sep (deg)   : 58.03
B (ring opening deg) : -26.58
PA of pole (deg)     : -4.09
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation (") : 5.342
C/A sky separation (km) : 32453.7
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl.spk
Saturn_ring_plane.tf
sat378.bsp
sat286.bsp
vgr1.sat286.bsp
vgr2.sat286.bsp
HST1081HSPephemUTC.bsp
pfb10000r.bsp
cassini.bsp
earthstns_itrf93_040916.bsp
earth_200101_990628_predict.bpc
earth_720101_070426.bpc
cpck28Mar2008.tpc
pck.sat440.tpc
IAU_SATURN_for_RINGFIT.tpc
naif0012.tls
earth_flat_IAU.spk
  
```



| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:42:32.937 | | 25.63 | 19.09x | 140461.00 | -8.05 | | |
| A (OER) | I | 2032-01-27T22:50:12.789 | | 27.26 | 17.75x | 136774.40 | -7.98 | | |
| Encke (OEG) | I | 2032-01-27T22:56:33.772 | | 28.61 | 16.62x | 133744.89 | -7.92 | | |
| Encke (IEG) | I | 2032-01-27T22:57:14.390 | | 28.75 | 16.50x | 133423.31 | -7.91 | | |
| A (IER) | I | 2032-01-27T23:21:37.180 | | 33.97 | 12.04x | 122050.38 | -7.62 | | |
| B (OER) | I | 2032-01-27T23:31:30.579 | | 36.10 | 10.19x | 117571.16 | -7.47 | | |
| B (IER) | I | 2032-01-28T00:34:09.127 | b | 49.61 | -2.10x | 91984.69 | -5.94 | | |
| C (IER) | I | 2032-01-28T01:40:12.494 | b | 63.73 | -15.75 | 74490.58 | -2.53 | | |
| Saturn | I | 2032-01-28T00:27:47.480 | | 48.24 | -0.82x | 59841.89 | | 32.96 | 38.36 |
| Saturn | E | 2032-01-28T03:26:54.000 | | 80.77 | -38.54 | 60005.77 | | 25.21 | 29.94 |
| C (IER) | E | 2032-01-28T02:49:24.473 | b | 77.08 | -30.48 | 74490.58 | 2.54 | | |
| B (IER) | E | 2032-01-28T03:55:03.080 | | 79.17 | -44.60 | 91984.69 | 5.97 | | |
| B (OER) | E | 2032-01-28T04:57:22.043 | | 68.25 | -57.83 | 117571.16 | 7.51 | | |
| A (IER) | E | 2032-01-28T05:07:12.111 | | 66.23 | -59.87 | 122050.38 | 7.66 | | |
| Encke (IEG) | E | 2032-01-28T05:31:26.397 | | 61.15 | -64.77 | 133423.31 | 7.96 | | |
| Encke (OEG) | E | 2032-01-28T05:32:06.774 | | 61.01 | -64.91 | 133744.89 | 7.97 | | |
| A (OER) | E | 2032-01-28T05:38:25.485 | | 59.67 | -66.14 | 136774.40 | 8.03 | | |
| F ring | E | 2032-01-28T05:46:02.571 | | 58.05 | -67.60 | 140461.00 | 8.10 | | |

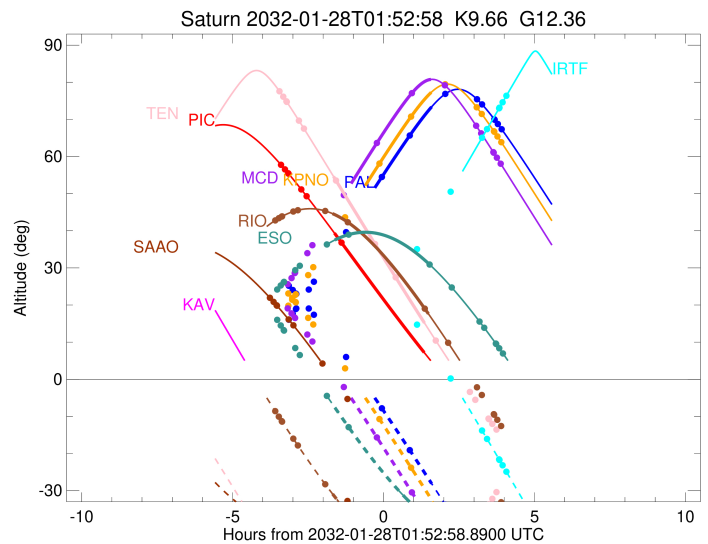
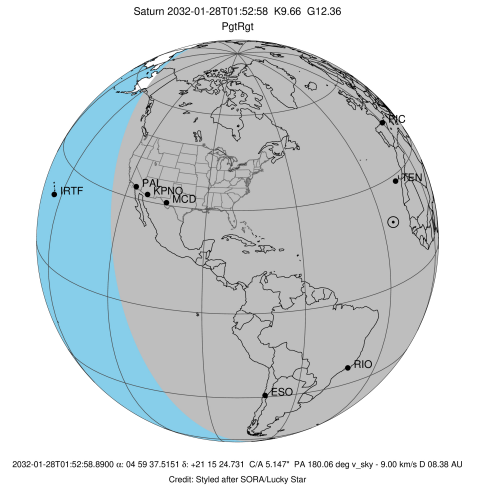
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-01-28T01:43:02.250
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3412081590864663552
 2Mass ID (if available) : 04593751+2115248
 ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.657
 G magnitude : 12.361
 RP magnitude : 11.541
 BP magnitude : 13.073
 DUPflag : 0
 Distance (au) : 8.376
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.00
 Sun-Target sep (deg) : 128.70
 Sun-Moon sep (deg) : 57.19
 B (ring opening deg) : -26.58
 PA of pole (deg) : -4.09
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.450
 C/A sky separation (km) : 33110.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 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 |
|-------------|-----|-------------------------|----|---------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:26:12.687 | | 77.58 | -49.42 | 140461.00 | -8.20 | | |
| A (OER) | I | 2032-01-27T22:33:44.873 | | 76.12 | -51.08 | 136774.40 | -8.11 | | |
| Encke (OEG) | I | 2032-01-27T22:40:00.441 | | 74.86 | -52.45 | 133744.89 | -8.03 | | |
| Encke (IEG) | I | 2032-01-27T22:40:40.533 | | 74.73 | -52.60 | 133423.31 | -8.02 | | |
| A (IER) | I | 2032-01-27T23:04:51.423 | | 69.67 | -57.87 | 122050.38 | -7.64 | | |
| B (OER) | I | 2032-01-27T23:14:44.235 | | 67.54 | -60.00 | 117571.16 | -7.46 | | |
| B (IER) | I | 2032-01-28T00:18:39.012 | b | 53.53 | -73.12 | 91984.69 | -5.67 | | |
| C (IER) | I | 2032-01-28T01:36:48.689 | b | 36.28 | -79.37 | 74490.58 | -1.39 | | |
| Saturn | I | 2032-01-28T00:13:36.614 | | 54.64 | -72.17 | 59850.55 | | 32.58 | 37.95 |
| Saturn | E | 2032-01-28T03:14:23.802 | | 15.17 | -61.77 | 59974.39 | | 26.80 | 31.70 |
| C (IER) | E | 2032-01-28T02:16:57.873 | b | 27.51 | -73.45 | 74490.58 | 1.38 | | |
| B (IER) | E | 2032-01-28T03:37:05.051 | | 10.38 | -56.87 | 91984.69 | 5.43 | | |
| B (OER) | E | 2032-01-28T04:44:55.896 | | -3.47x | -41.98 | 117571.16 | 6.93 | | |
| A (IER) | E | 2032-01-28T04:55:35.326 | | -5.57x | -39.63 | 122050.38 | 7.07 | | |
| Encke (IEG) | E | 2032-01-28T05:21:50.895 | | -10.62x | -33.84 | 133423.31 | 7.35 | | |
| Encke (OEG) | E | 2032-01-28T05:22:34.639 | | -10.76x | -33.68 | 133744.89 | 7.35 | | |
| A (OER) | E | 2032-01-28T05:29:24.940 | | -12.04x | -32.18 | 136774.40 | 7.41 | | |
| F ring | E | 2032-01-28T05:37:40.180 | | -13.57x | -30.37 | 140461.00 | 7.48 | | |

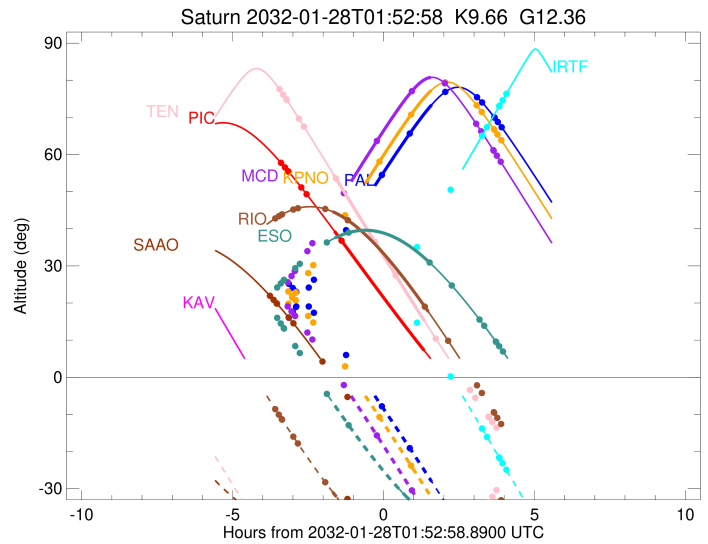
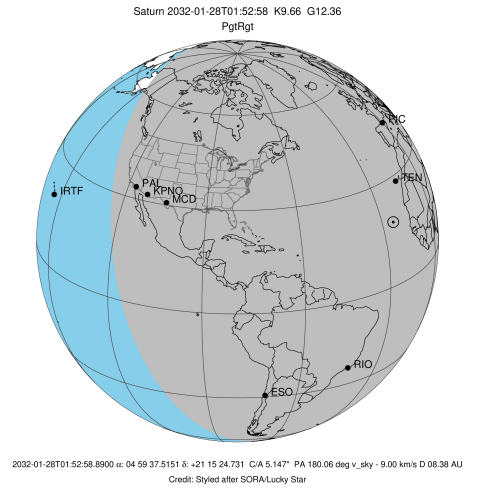
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-01-28T02:04:37.320
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 3412081590864663552
 2Mass ID (if available) : 04593751+2115248
 ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.657
 G magnitude : 12.361
 RP magnitude : 11.541
 BP magnitude : 13.073
 DUPflag : 0
 Distance (au) : 8.376
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.00
 Sun-Target sep (deg) : 128.70
 Sun-Moon sep (deg) : 57.86
 B (ring opening deg) : -26.58
 PA of pole (deg) : -4.09
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.370
 C/A sky separation (km) : 32620.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 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 |
|-------------|-----|-------------------------|----|---------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:44:39.920 | | -20.74x | 51.84x | 140461.00 | -7.67 | | |
| A (OER) | I | 2032-01-27T22:52:42.637 | | -19.14x | 51.66x | 136774.40 | -7.61 | | |
| Encke (OEG) | I | 2032-01-27T22:59:22.442 | | -17.81x | 51.44x | 133744.89 | -7.55 | | |
| Encke (IEG) | I | 2032-01-27T23:00:05.060 | | -17.66x | 51.41x | 133423.31 | -7.54 | | |
| A (IER) | I | 2032-01-27T23:25:38.814 | | -12.43x | 49.92x | 122050.38 | -7.27 | | |
| B (OER) | I | 2032-01-27T23:36:00.340 | | -10.26x | 49.06x | 117571.16 | -7.14 | | |
| B (IER) | I | 2032-01-28T00:41:26.223 | b | 3.83x | 40.84x | 91984.69 | -5.70 | | |
| C (IER) | I | 2032-01-28T01:50:16.965 | b | 19.21 | 28.76x | 74490.58 | -2.40 | | |
| Saturn | I | 2032-01-28T00:32:21.131 | | 1.84x | 42.22x | 59828.37 | | 33.55 | 38.98 |
| Saturn | E | 2032-01-28T03:35:50.588 | | 43.42 | 6.94x | 60014.19 | | 24.77 | 29.45 |
| C (IER) | E | 2032-01-28T02:59:40.453 | b | 35.06 | 14.70x | 74490.58 | 2.45 | | |
| B (IER) | E | 2032-01-28T04:06:35.801 | | 50.55 | 0.18x | 91984.69 | 5.92 | | |
| B (OER) | E | 2032-01-28T05:09:03.751 | | 65.12 | -13.86 | 117571.16 | 7.54 | | |
| A (IER) | E | 2032-01-28T05:18:51.090 | | 67.40 | -16.09 | 122050.38 | 7.71 | | |
| Encke (IEG) | E | 2032-01-28T05:42:54.132 | | 73.02 | -21.60 | 133423.31 | 8.04 | | |
| Encke (OEG) | E | 2032-01-28T05:43:34.107 | | 73.18 | -21.75 | 133744.89 | 8.05 | | |
| A (OER) | E | 2032-01-28T05:49:48.815 | | 74.63 | -23.19 | 136774.40 | 8.12 | | |
| F ring | E | 2032-01-28T05:57:20.516 | | 76.39 | -24.92 | 140461.00 | 8.20 | | |

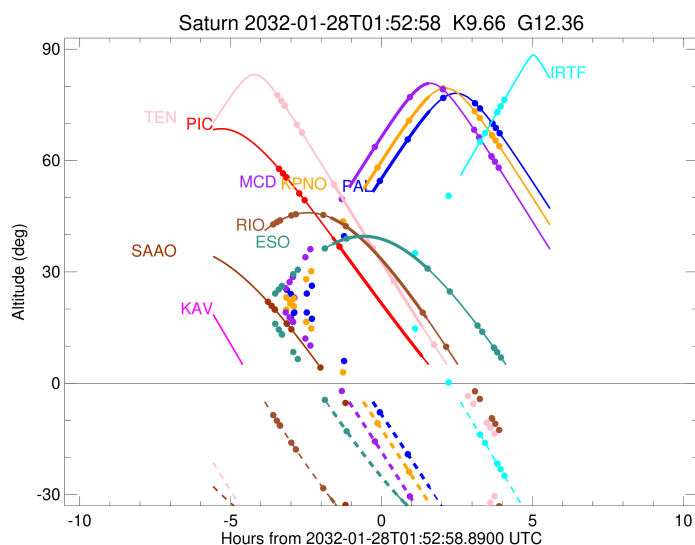
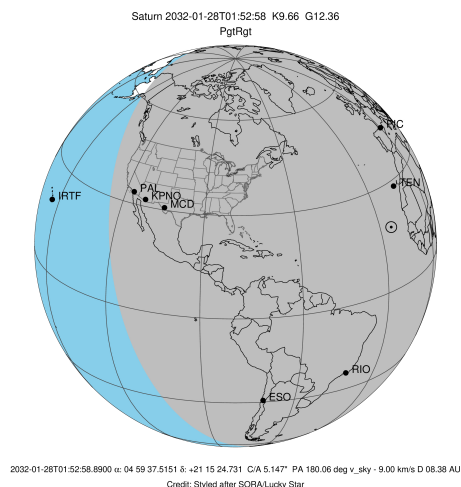
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-01-28T01:46:14.380
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 3412081590864663552
 2Mass ID (if available) : 04593751+2115248
 ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.657
 G magnitude : 12.361
 RP magnitude : 11.541
 BP magnitude : 13.073
 DUPflag : 0
 Distance (au) : 8.376
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.00
 Sun-Target sep (deg) : 128.70
 Sun-Moon sep (deg) : 57.32
 B (ring opening deg) : -26.58
 PA of pole (deg) : -4.09
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.485
 C/A sky separation (km) : 27248.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 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 |
|-------------|-----|-------------------------|----|---------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:17:52.744 | | 42.80 | -8.60 | 140461.00 | -8.71 | | |
| A (OER) | I | 2032-01-27T22:24:57.234 | | 43.39 | -10.08 | 136774.40 | -8.66 | | |
| Encke (OEG) | I | 2032-01-27T22:30:48.132 | | 43.84 | -11.30 | 133744.89 | -8.61 | | |
| Encke (IEG) | I | 2032-01-27T22:31:25.496 | | 43.88 | -11.43 | 133423.31 | -8.60 | | |
| A (IER) | I | 2032-01-27T22:53:43.821 | | 45.19 | -16.01 | 122050.38 | -8.38 | | |
| B (OER) | I | 2032-01-27T23:02:41.659 | | 45.54 | -17.82 | 117571.16 | -8.27 | | |
| B (IER) | I | 2032-01-27T23:57:13.463 | | 45.34 | -28.29 | 91984.69 | -7.24 | | |
| C (IER) | I | 2032-01-28T00:42:08.618 | b | 42.29 | -35.98 | 74490.58 | -5.57 | | |
| Saturn | I | 2032-01-28T00:11:44.954 | | 44.62 | -30.89 | 59965.59 | | 27.23 | 32.18 |
| Saturn | E | 2032-01-28T03:22:17.292 | | 17.62 | -48.72 | 60083.15 | | 20.93 | 25.11 |
| C (IER) | E | 2032-01-28T03:15:06.743 | b | 19.01 | -48.85 | 74490.58 | 5.43 | | |
| B (IER) | E | 2032-01-28T04:01:34.393 | | 9.81 | -46.71 | 91984.69 | 6.94 | | |
| B (OER) | E | 2032-01-28T04:58:58.504 | | -2.20x | -40.48 | 117571.16 | 7.79 | | |
| A (IER) | E | 2032-01-28T05:08:30.480 | | -4.25x | -39.14 | 122050.38 | 7.87 | | |
| Encke (IEG) | E | 2032-01-28T05:32:20.458 | | -9.42x | -35.51 | 133423.31 | 8.03 | | |
| Encke (OEG) | E | 2032-01-28T05:33:00.515 | | -9.57x | -35.40 | 133744.89 | 8.03 | | |
| A (OER) | E | 2032-01-28T05:39:17.046 | | -10.94x | -34.38 | 136774.40 | 8.06 | | |
| F ring | E | 2032-01-28T05:46:53.369 | | -12.61x | -33.11 | 140461.00 | 8.10 | | |

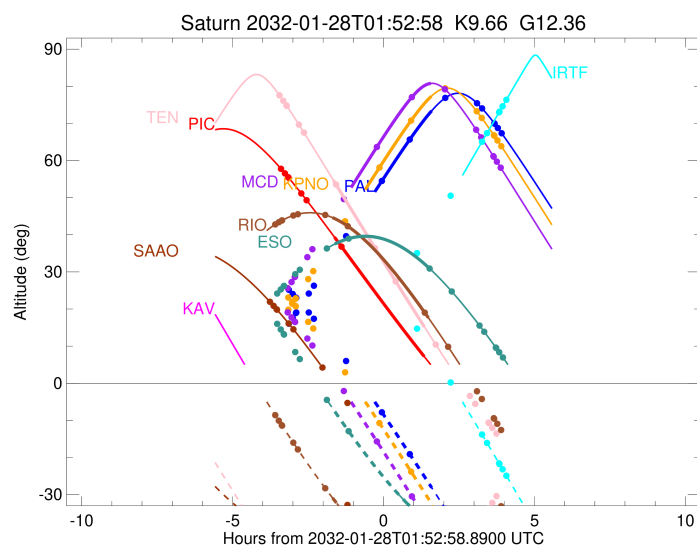
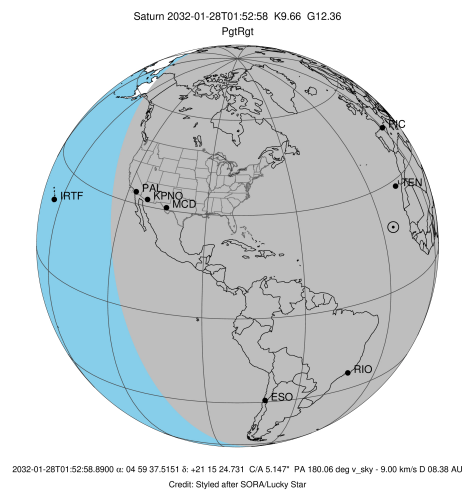
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-01-28T01:51:16.450
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 3412081590864663552
 2Mass ID (if available) : 04593751+2115248
 ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.657
 G magnitude : 12.361
 RP magnitude : 11.541
 BP magnitude : 13.073
 DUPflag : 0
 Distance (au) : 8.376
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.00
 Sun-Target sep (deg) : 128.70
 Sun-Moon sep (deg) : 57.58
 B (ring opening deg) : -26.58
 PA of pole (deg) : -4.09
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.345
 C/A sky separation (km) : 26396.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 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 |
|-------------|-----|-------------------------|----|-------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:21:42.897 | | 24.19 | 16.00x | 140461.00 | -8.67 | | |
| A (OER) | I | 2032-01-27T22:28:49.047 | | 25.27 | 14.49x | 136774.40 | -8.63 | | |
| Encke (OEG) | I | 2032-01-27T22:34:40.956 | | 26.15 | 13.24x | 133744.89 | -8.59 | | |
| Encke (IEG) | I | 2032-01-27T22:35:18.409 | | 26.25 | 13.11x | 133423.31 | -8.58 | | |
| A (IER) | I | 2032-01-27T22:57:37.157 | | 29.40 | 8.40x | 122050.38 | -8.40 | | |
| B (OER) | I | 2032-01-27T23:06:33.526 | | 30.57 | 6.53x | 117571.16 | -8.30 | | |
| B (IER) | I | 2032-01-28T00:00:28.301 | | 36.32 | -4.49x | 91984.69 | -7.40 | | |
| C (IER) | I | 2032-01-28T00:43:44.388 | b | 38.97 | -12.92 | 74490.58 | -5.92 | | |
| Saturn | I | 2032-01-28T00:16:06.824 | | 37.50 | -7.59 | 59974.23 | | 26.81 | 31.71 |
| Saturn | E | 2032-01-28T03:27:13.431 | | 30.58 | -37.99 | 60101.86 | | 19.79 | 23.80 |
| C (IER) | E | 2032-01-28T03:24:42.220 | b | 30.90 | -37.74 | 74490.58 | 5.85 | | |
| B (IER) | E | 2032-01-28T04:08:42.511 | | 24.71 | -41.25 | 91984.69 | 7.24 | | |
| B (OER) | E | 2032-01-28T05:04:02.402 | | 15.51 | -42.55 | 117571.16 | 8.05 | | |
| A (IER) | E | 2032-01-28T05:13:15.806 | | 13.86 | -42.41 | 122050.38 | 8.13 | | |
| Encke (IEG) | E | 2032-01-28T05:36:20.517 | | 9.61 | -41.60 | 133423.31 | 8.28 | | |
| Encke (OEG) | E | 2032-01-28T05:36:59.324 | | 9.49 | -41.57 | 133744.89 | 8.29 | | |
| A (OER) | E | 2032-01-28T05:43:04.149 | | 8.34 | -41.24 | 136774.40 | 8.32 | | |
| F ring | E | 2032-01-28T05:50:26.372 | | 6.94 | -40.80 | 140461.00 | 8.35 | | |

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-01-28T01:42:14.160
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 3412081590864663552
 2Mass ID (if available) : 04593751+2115248
 ICRS Star Coord at Epoch: 04h 59m 37.51511s +21:15:24.73071s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.657
 G magnitude : 12.361
 RP magnitude : 11.541
 BP magnitude : 13.073
 DUPflag : 0
 Distance (au) : 8.376
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.00
 Sun-Target sep (deg) : 128.70
 Sun-Moon sep (deg) : 56.50
 B (ring opening deg) : -26.58
 PA of pole (deg) : -4.09
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.677
 C/A sky separation (km) : 28412.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



| Ring | I/E | UTC | b? | alt | alt-sun | radius | r-dot | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|---------|---------|-----------|-------|---------|--------------|
| F ring | I | 2032-01-27T22:07:14.021 | | 21.94 | -38.41 | 140461.00 | -8.44 | | |
| A (OER) | I | 2032-01-27T22:14:32.628 | | 20.84 | -38.73 | 136774.40 | -8.37 | | |
| Encke (OEG) | I | 2032-01-27T22:20:35.921 | | 19.92 | -38.94 | 133744.89 | -8.31 | | |
| Encke (IEG) | I | 2032-01-27T22:21:14.644 | | 19.82 | -38.97 | 133423.31 | -8.30 | | |
| A (IER) | I | 2032-01-27T22:44:26.935 | | 16.10 | -39.41 | 122050.38 | -8.03 | | |
| B (OER) | I | 2032-01-27T22:53:49.555 | | 14.54 | -39.41 | 117571.16 | -7.89 | | |
| B (IER) | I | 2032-01-27T23:51:42.525 | | 4.23x | -37.28 | 91984.69 | -6.71 | | |
| C (IER) | I | 2032-01-28T00:41:30.482 | b | -5.33x | -32.77 | 74490.58 | -4.82 | | |
| Saturn | I | 2032-01-28T00:04:59.170 | | 1.73x | -36.30 | 59952.42 | | 27.88 | 32.89 |
| Saturn | E | 2032-01-28T03:21:53.582 | | -38.42x | -7.59 | 60061.82 | | 22.17 | 26.52 |
| C (IER) | E | 2032-01-28T03:08:06.159 | b | -35.51x | -10.16 | 74490.58 | 4.66 | | |
| B (IER) | E | 2032-01-28T04:00:13.347 | | -46.55x | -0.23x | 91984.69 | 6.34 | | |
| B (OER) | E | 2032-01-28T05:02:18.099 | | -59.60x | 12.25x | 117571.16 | 7.28 | | |
| A (IER) | E | 2032-01-28T05:12:29.583 | | -61.69x | 14.34x | 122050.38 | 7.37 | | |
| Encke (IEG) | E | 2032-01-28T05:37:51.482 | | -66.79x | 19.60x | 133423.31 | 7.56 | | |
| Encke (OEG) | E | 2032-01-28T05:38:33.979 | | -66.93x | 19.75x | 133744.89 | 7.57 | | |
| A (OER) | E | 2032-01-28T05:45:13.094 | | -68.22x | 21.14x | 136774.40 | 7.61 | | |
| F ring | E | 2032-01-28T05:53:15.945 | | -69.75x | 22.82x | 140461.00 | 7.66 | | |