

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:44:50.030  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561

Saturn 2032-12-08T04:44:50 K9.35 G13.20 PgtRgt

ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s

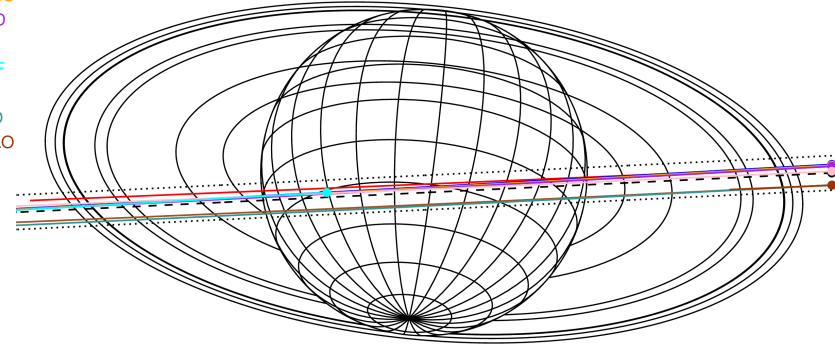
RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 129.37  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88

Saturn 2032-12-08T04:44:50 K9.35 G13.20  
 PgtRgt



2032-12-08T04:44:50.0300 α: 06 19 46.9689 δ: +22 21 56.169 C/A 1.270° PA 2.76 deg v\_sky -18.60 km/s D 08.07 AU  
 Credit: Styled after SORA/Lucky Star

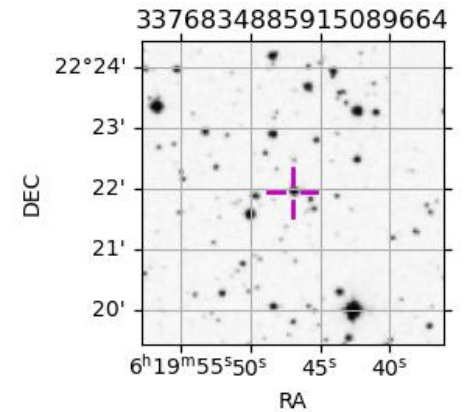
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 SAAO



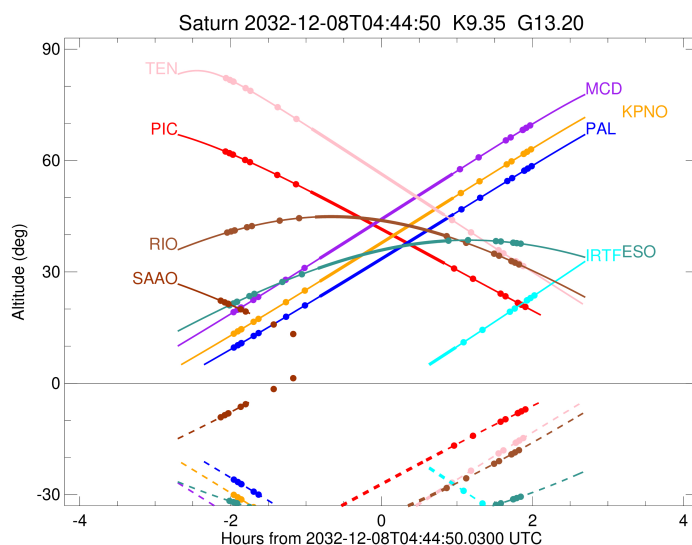
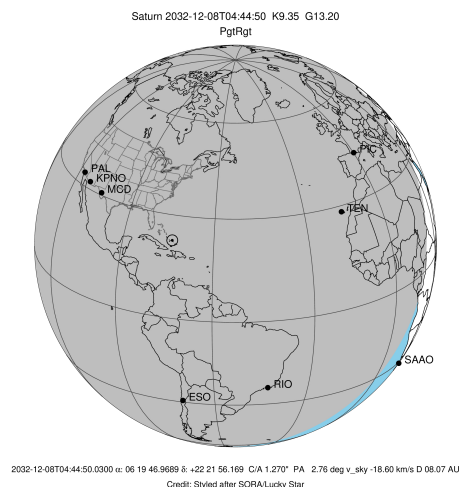
| # | a(km)    | ring        |
|---|----------|-------------|
| 1 | 74490.6  | C (IER)     |
| 2 | 91984.7  | B (IER)     |
| 3 | 117571.2 | B (OER)     |
| 4 | 122050.4 | A (IER)     |
| 5 | 133423.3 | Encke (IEG) |
| 6 | 133744.9 | Encke (OEG) |
| 7 | 136774.4 | A (OER)     |
| 8 | 140461.0 | F ring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

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   | +       | +      | +       | DEC 08 02:40 - DEC 08 06:39 | PieRie |
| PAL  | Palomar Mt (20 | 33.4  | 243.1 | +       | +      | +       | DEC 08 02:47 - DEC 08 06:44 | PieRie |
| PMO  | Purple Mtn Obs | 32.1  | 118.8 |         |        |         |                             | PnnRnn |
| KPNO | Kitt Peak Natl | 32.0  | 248.4 | +       | +      | +       | DEC 08 02:47 - DEC 08 06:43 | PieRie |
| MCD  | McDonald Obs.  | 30.7  | 256.0 | +       | +      | +       | DEC 08 02:47 - DEC 08 06:42 | PieRie |
| TEN  | Teide Obs./Ten | 28.3  | 343.5 | +       | +      | +       | DEC 08 02:41 - DEC 08 06:37 | PieRie |
| IRTF | Mauna Kea/IRTF | 19.8  | 204.5 |         | +      | +       | DEC 08 05:43 - DEC 08 06:46 | PneRne |
| KAV  | Kavalur Observ | 12.6  | 78.8  |         |        |         |                             | PnnRnn |
| RIO  | Rio de Janeiro | -22.9 | 316.8 | +       | +      | +       | DEC 08 02:42 - DEC 08 06:34 | PieRie |
| ESO  | European South | -29.3 | 289.3 | +       | +      | +       | DEC 08 02:44 - DEC 08 06:35 | PieRie |
| AAT  | Siding Spring  | -31.3 | 149.1 |         |        |         |                             | PnnRnn |
| SAAO | So. Afr. Astro | -32.4 | 20.8  | +       |        |         | DEC 08 02:37 - DEC 08 02:56 | PnnRin |
| MSO  | Mt. Stromlo Ob | -35.3 | 149.0 |         |        |         |                             | PnnRnn |



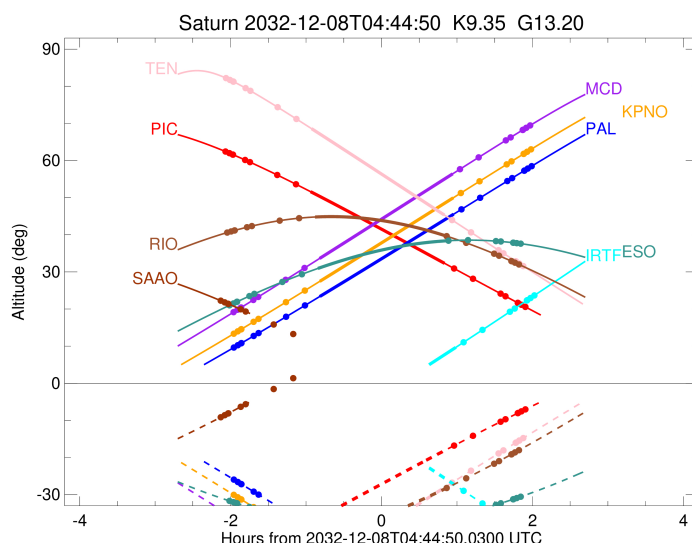
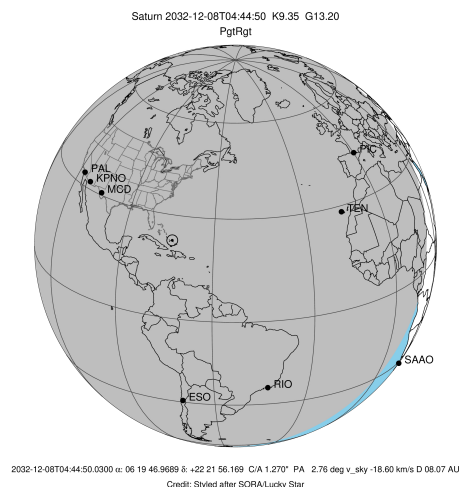
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:41:39.920  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 129.54  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.738  
 C/A sky separation (km) : 4320.0  
 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   | 2032-12-08T02:40:50.527 |    | 62.42 | -49.72  | 140461.00 | -19.68 |         |              |
| A (OER)     | I   | 2032-12-08T02:43:57.851 |    | 61.98 | -49.16  | 136774.40 | -19.68 |         |              |
| Encke (OEG) | I   | 2032-12-08T02:46:31.824 |    | 61.61 | -48.71  | 133744.89 | -19.67 |         |              |
| Encke (IEG) | I   | 2032-12-08T02:46:48.170 |    | 61.57 | -48.66  | 133423.31 | -19.67 |         |              |
| A (IER)     | I   | 2032-12-08T02:56:26.525 |    | 60.15 | -46.94  | 122050.38 | -19.65 |         |              |
| B (OER)     | I   | 2032-12-08T03:00:14.463 |    | 59.57 | -46.26  | 117571.16 | -19.65 |         |              |
| B (IER)     | I   | 2032-12-08T03:21:58.668 |    | 56.10 | -42.33  | 91984.69  | -19.58 |         |              |
| C (IER)     | I   | 2032-12-08T03:36:53.443 |    | 53.60 | -39.61  | 74490.58  | -19.51 |         |              |
| Saturn      | I   | 2032-12-08T03:48:27.680 |    | 51.61 | -37.49  | 60262.07  |        | 3.75    | 4.60         |
| Saturn      | E   | 2032-12-08T05:34:59.516 |    | 32.30 | -18.13  | 60216.78  |        | -11.08  | -13.52       |
| C (IER)     | E   | 2032-12-08T05:42:29.242 |    | 30.92 | -16.80  | 74490.58  | 19.35  |         |              |
| B (IER)     | E   | 2032-12-08T05:57:32.195 |    | 28.16 | -14.16  | 91984.69  | 19.39  |         |              |
| B (OER)     | E   | 2032-12-08T06:19:31.226 |    | 24.14 | -10.36  | 117571.16 | 19.40  |         |              |
| A (IER)     | E   | 2032-12-08T06:23:22.105 |    | 23.44 | -9.71   | 122050.38 | 19.40  |         |              |
| Encke (IEG) | E   | 2032-12-08T06:33:08.378 |    | 21.67 | -8.06   | 133423.31 | 19.40  |         |              |
| Encke (OEG) | E   | 2032-12-08T06:33:24.957 |    | 21.62 | -8.01   | 133744.89 | 19.40  |         |              |
| A (OER)     | E   | 2032-12-08T06:36:01.152 |    | 21.15 | -7.57   | 136774.40 | 19.39  |         |              |
| F ring      | E   | 2032-12-08T06:39:11.241 |    | 20.58 | -7.04   | 140461.00 | 19.39  |         |              |

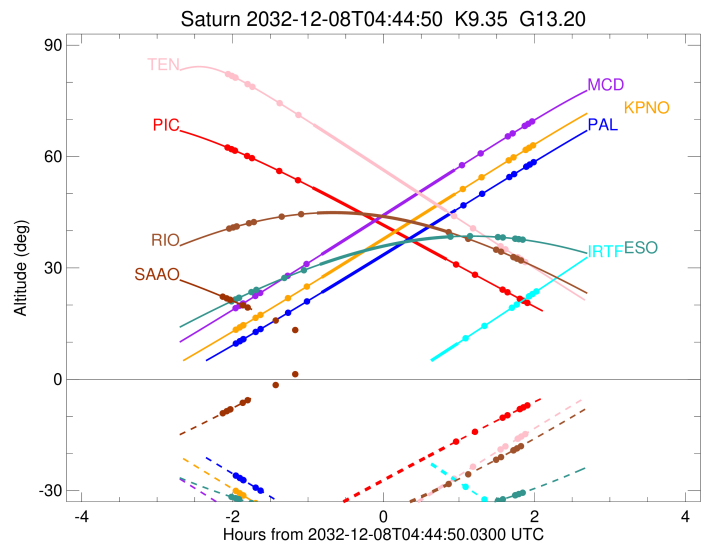
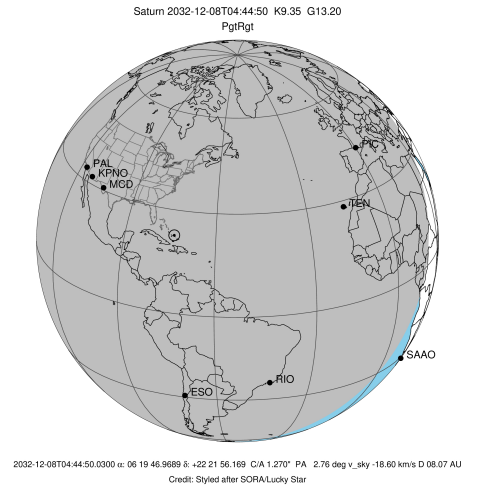
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:49:08.560  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 130.28  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.919  
 C/A sky separation (km) : 5384.8  
 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

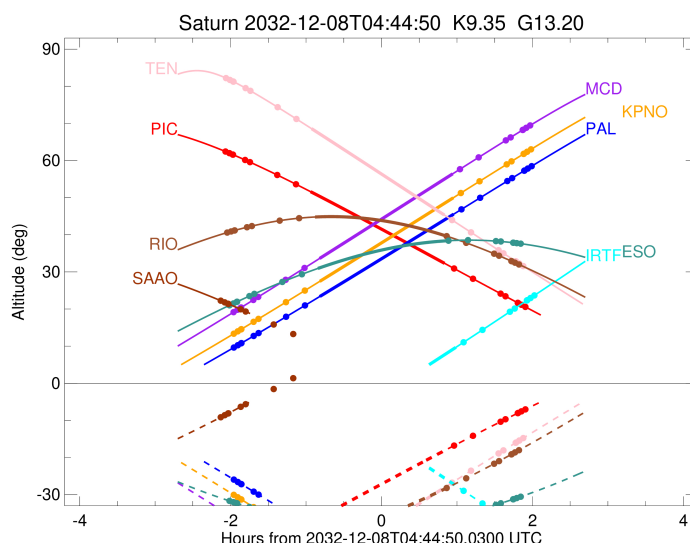
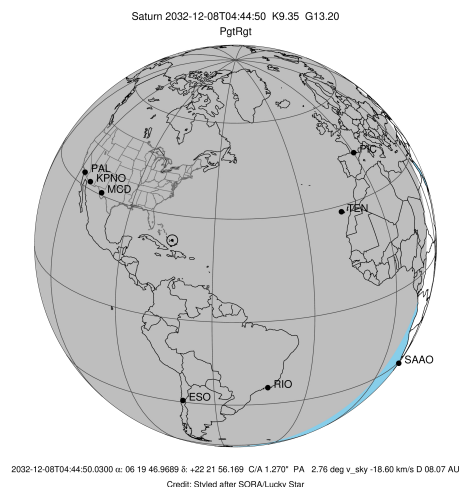
| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2032-12-08T02:47:28.663 |    | 9.63  | -25.96  | 140461.00 | -19.45 |         |              |
| A (OER)     | I   | 2032-12-08T02:50:38.181 |    | 10.25 | -26.61  | 136774.40 | -19.45 |         |              |
| Encke (OEG) | I   | 2032-12-08T02:53:13.906 |    | 10.77 | -27.14  | 133744.89 | -19.45 |         |              |
| Encke (IEG) | I   | 2032-12-08T02:53:30.435 |    | 10.82 | -27.20  | 133423.31 | -19.46 |         |              |
| A (IER)     | I   | 2032-12-08T03:03:14.960 |    | 12.75 | -29.20  | 122050.38 | -19.46 |         |              |
| B (OER)     | I   | 2032-12-08T03:07:05.164 |    | 13.52 | -29.99  | 117571.16 | -19.46 |         |              |
| B (IER)     | I   | 2032-12-08T03:29:00.723 |    | 17.92 | -34.54  | 91984.69  | -19.43 |         |              |
| C (IER)     | I   | 2032-12-08T03:44:02.147 |    | 20.98 | -37.67  | 74490.58  | -19.37 |         |              |
| Saturn      | I   | 2032-12-08T03:55:46.213 |    | 23.38 | -40.12  | 60262.88  |        | 3.48    | 4.28         |
| Saturn      | E   | 2032-12-08T05:42:13.225 |    | 45.55 | -62.23  | 60201.84  |        | -12.62  | -15.37       |
| C (IER)     | E   | 2032-12-08T05:48:21.312 |    | 46.84 | -63.47  | 74490.58  | 19.54  |         |              |
| B (IER)     | E   | 2032-12-08T06:03:13.796 |    | 49.96 | -66.43  | 91984.69  | 19.65  |         |              |
| B (OER)     | E   | 2032-12-08T06:24:52.900 |    | 54.47 | -70.57  | 117571.16 | 19.73  |         |              |
| A (IER)     | E   | 2032-12-08T06:28:39.822 |    | 55.26 | -71.27  | 122050.38 | 19.74  |         |              |
| Encke (IEG) | E   | 2032-12-08T06:38:15.489 |    | 57.25 | -72.98  | 133423.31 | 19.77  |         |              |
| Encke (OEG) | E   | 2032-12-08T06:38:31.757 |    | 57.30 | -73.03  | 133744.89 | 19.77  |         |              |
| A (OER)     | E   | 2032-12-08T06:41:04.992 |    | 57.83 | -73.47  | 136774.40 | 19.77  |         |              |
| F ring      | E   | 2032-12-08T06:44:11.408 |    | 58.47 | -73.99  | 140461.00 | 19.78  |         |              |

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:48:58.440  
 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 : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 130.31  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.969  
 C/A sky separation (km) : 5672.6  
 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



| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2032-12-08T02:47:25.423 |    | 13.35 | -30.06  | 140461.00 | -19.48 |         |              |
| A (OER)     | I   | 2032-12-08T02:50:34.656 |    | 13.99 | -30.72  | 136774.40 | -19.48 |         |              |
| Encke (OEG) | I   | 2032-12-08T02:53:10.150 |    | 14.52 | -31.27  | 133744.89 | -19.48 |         |              |
| Encke (IEG) | I   | 2032-12-08T02:53:26.655 |    | 14.57 | -31.32  | 133423.31 | -19.48 |         |              |
| A (IER)     | I   | 2032-12-08T03:03:10.348 |    | 16.56 | -33.37  | 122050.38 | -19.48 |         |              |
| B (OER)     | I   | 2032-12-08T03:07:00.242 |    | 17.34 | -34.17  | 117571.16 | -19.48 |         |              |
| B (IER)     | I   | 2032-12-08T03:28:54.288 |    | 21.85 | -38.80  | 91984.69  | -19.45 |         |              |
| C (IER)     | I   | 2032-12-08T03:43:55.089 |    | 24.98 | -41.98  | 74490.58  | -19.38 |         |              |
| Saturn      | I   | 2032-12-08T03:55:43.399 |    | 27.45 | -44.49  | 60263.62  |        | 3.22    | 3.96         |
| Saturn      | E   | 2032-12-08T05:41:56.257 |    | 49.97 | -66.82  | 60199.51  |        | -12.84  | -15.63       |
| C (IER)     | E   | 2032-12-08T05:47:52.536 |    | 51.24 | -68.02  | 74490.58  | 19.54  |         |              |
| B (IER)     | E   | 2032-12-08T06:02:45.009 |    | 54.40 | -70.97  | 91984.69  | 19.65  |         |              |
| B (OER)     | E   | 2032-12-08T06:24:23.704 |    | 58.97 | -75.01  | 117571.16 | 19.74  |         |              |
| A (IER)     | E   | 2032-12-08T06:28:10.534 |    | 59.76 | -75.67  | 122050.38 | 19.75  |         |              |
| Encke (IEG) | E   | 2032-12-08T06:37:45.960 |    | 61.77 | -77.25  | 133423.31 | 19.78  |         |              |
| Encke (OEG) | E   | 2032-12-08T06:38:02.221 |    | 61.83 | -77.30  | 133744.89 | 19.78  |         |              |
| A (OER)     | E   | 2032-12-08T06:40:35.390 |    | 62.36 | -77.69  | 136774.40 | 19.78  |         |              |
| F ring      | E   | 2032-12-08T06:43:41.727 |    | 63.00 | -78.15  | 140461.00 | 19.79  |         |              |

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:48:38.050  
 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 : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 130.33  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.025  
 C/A sky separation (km) : 6001.4  
 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

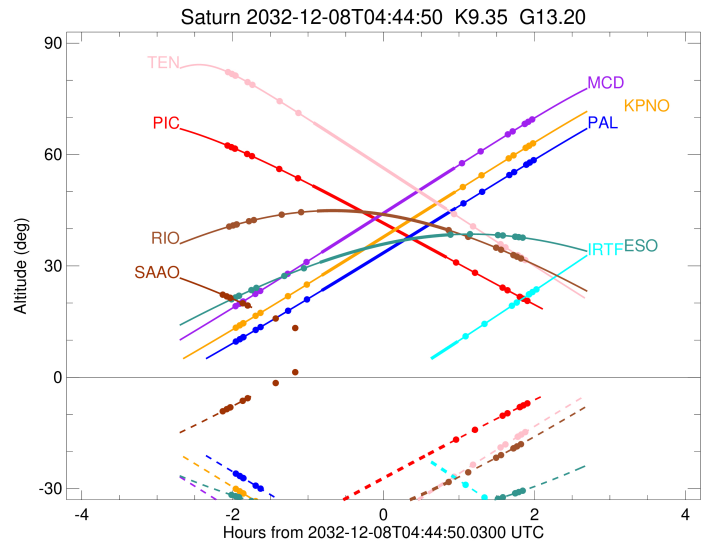
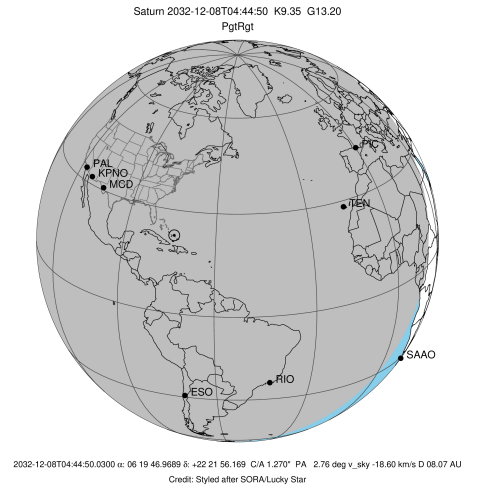


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2032-12-08T02:47:15.746 |    | 19.16 | -36.26  | 140461.00 | -19.52 |         |              |
| A (OER)     | I   | 2032-12-08T02:50:24.567 |    | 19.82 | -36.93  | 136774.40 | -19.52 |         |              |
| Encke (OEG) | I   | 2032-12-08T02:52:59.729 |    | 20.36 | -37.48  | 133744.89 | -19.52 |         |              |
| Encke (IEG) | I   | 2032-12-08T02:53:16.199 |    | 20.42 | -37.54  | 133423.31 | -19.53 |         |              |
| A (IER)     | I   | 2032-12-08T03:02:58.696 |    | 22.45 | -39.62  | 122050.38 | -19.52 |         |              |
| B (OER)     | I   | 2032-12-08T03:06:48.142 |    | 23.25 | -40.44  | 117571.16 | -19.52 |         |              |
| B (IER)     | I   | 2032-12-08T03:28:39.991 |    | 27.88 | -45.14  | 91984.69  | -19.48 |         |              |
| C (IER)     | I   | 2032-12-08T03:43:39.829 |    | 31.07 | -48.37  | 74490.58  | -19.39 |         |              |
| Saturn      | I   | 2032-12-08T03:55:32.640 |    | 33.60 | -50.92  | 60264.42  |        | 2.91    | 3.57         |
| Saturn      | E   | 2032-12-08T05:41:27.229 |    | 56.42 | -73.25  | 60196.96  |        | -13.09  | -15.92       |
| C (IER)     | E   | 2032-12-08T05:47:10.606 |    | 57.65 | -74.37  | 74490.58  | 19.53  |         |              |
| B (IER)     | E   | 2032-12-08T06:02:03.172 |    | 60.84 | -77.15  | 91984.69  | 19.65  |         |              |
| B (OER)     | E   | 2032-12-08T06:23:41.591 |    | 65.43 | -80.55  | 117571.16 | 19.75  |         |              |
| A (IER)     | E   | 2032-12-08T06:27:28.356 |    | 66.23 | -81.00  | 122050.38 | 19.76  |         |              |
| Encke (IEG) | E   | 2032-12-08T06:37:03.612 |    | 68.22 | -81.89  | 133423.31 | 19.78  |         |              |
| Encke (OEG) | E   | 2032-12-08T06:37:19.868 |    | 68.28 | -81.90  | 133744.89 | 19.78  |         |              |
| A (OER)     | E   | 2032-12-08T06:39:52.993 |    | 68.81 | -82.06  | 136774.40 | 19.79  |         |              |
| F ring      | E   | 2032-12-08T06:42:59.277 |    | 69.45 | -82.19  | 140461.00 | 19.79  |         |              |



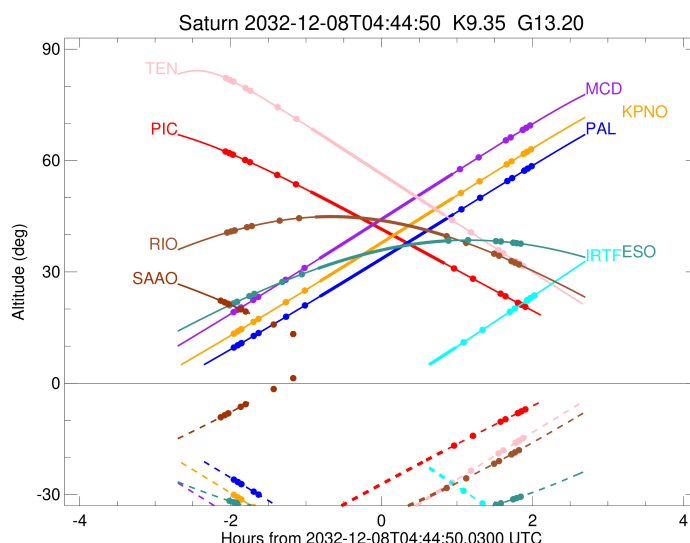
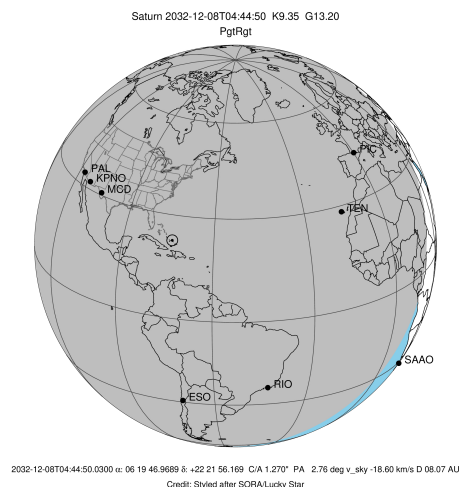
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:41:57.210  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 129.68  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.060  
 C/A sky separation (km) : 6206.1  
 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   | 2032-12-08T02:41:15.103 |    | 82.20 | -66.11  | 140461.00 | -19.75 |         |              |
| A (OER)     | I   | 2032-12-08T02:44:21.837 |    | 81.71 | -65.43  | 136774.40 | -19.74 |         |              |
| Encke (OEG) | I   | 2032-12-08T02:46:55.337 |    | 81.29 | -64.87  | 133744.89 | -19.73 |         |              |
| Encke (IEG) | I   | 2032-12-08T02:47:11.634 |    | 81.24 | -64.81  | 133423.31 | -19.73 |         |              |
| A (IER)     | I   | 2032-12-08T02:56:48.350 |    | 79.50 | -62.70  | 122050.38 | -19.71 |         |              |
| B (OER)     | I   | 2032-12-08T03:00:35.713 |    | 78.78 | -61.87  | 117571.16 | -19.69 |         |              |
| B (IER)     | I   | 2032-12-08T03:22:17.854 |    | 74.36 | -57.09  | 91984.69  | -19.59 |         |              |
| C (IER)     | I   | 2032-12-08T03:37:13.377 |    | 71.19 | -53.80  | 74490.58  | -19.46 |         |              |
| Saturn      | I   | 2032-12-08T03:49:13.604 |    | 68.59 | -51.16  | 60266.03  |        | 2.16    | 2.66         |
| Saturn      | E   | 2032-12-08T05:34:45.817 |    | 45.33 | -28.11  | 60201.08  |        | -12.69  | -15.45       |
| C (IER)     | E   | 2032-12-08T05:40:54.568 |    | 43.98 | -26.79  | 74490.58  | 19.31  |         |              |
| B (IER)     | E   | 2032-12-08T05:55:58.047 |    | 40.66 | -23.57  | 91984.69  | 19.40  |         |              |
| B (OER)     | E   | 2032-12-08T06:17:54.576 |    | 35.85 | -18.90  | 117571.16 | 19.45  |         |              |
| A (IER)     | E   | 2032-12-08T06:21:44.791 |    | 35.01 | -18.09  | 122050.38 | 19.46  |         |              |
| Encke (IEG) | E   | 2032-12-08T06:31:29.191 |    | 32.89 | -16.04  | 133423.31 | 19.46  |         |              |
| Encke (OEG) | E   | 2032-12-08T06:31:45.713 |    | 32.83 | -15.98  | 133744.89 | 19.46  |         |              |
| A (OER)     | E   | 2032-12-08T06:34:21.371 |    | 32.26 | -15.44  | 136774.40 | 19.46  |         |              |
| F ring      | E   | 2032-12-08T06:37:30.789 |    | 31.57 | -14.78  | 140461.00 | 19.46  |         |              |

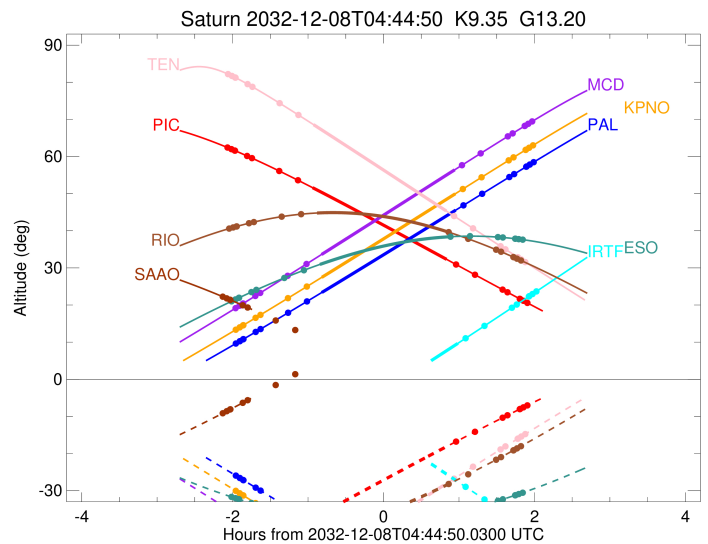
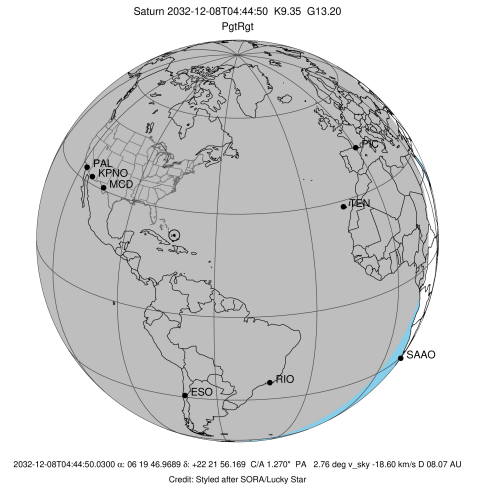
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:50:10.840  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 129.93  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.908  
 C/A sky separation (km) : 5315.6  
 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   | 2032-12-08T02:46:48.718 | -26.88x | 11.03x | 140461.00 | -19.17 |       |         |              |
| A (OER)     | I   | 2032-12-08T02:50:01.032 | -26.29x | 10.37x | 136774.40 | -19.17 |       |         |              |
| Encke (OEG) | I   | 2032-12-08T02:52:39.052 | -25.81x | 9.82x  | 133744.89 | -19.17 |       |         |              |
| Encke (IEG) | I   | 2032-12-08T02:52:55.824 | -25.75x | 9.76x  | 133423.31 | -19.17 |       |         |              |
| A (IER)     | I   | 2032-12-08T03:02:48.928 | -23.91x | 7.71x  | 122050.38 | -19.18 |       |         |              |
| B (OER)     | I   | 2032-12-08T03:06:42.492 | -23.17x | 6.90x  | 117571.16 | -19.18 |       |         |              |
| B (IER)     | I   | 2032-12-08T03:28:56.992 | -18.86x | 2.20x  | 91984.69  | -19.16 |       |         |              |
| C (IER)     | I   | 2032-12-08T03:44:11.030 | -15.82x | -1.06x | 74490.58  | -19.11 |       |         |              |
| Saturn      | I   | 2032-12-08T03:56:01.825 | -13.42x | -3.62x | 60262.40  |        |       | 3.64    | 4.47         |
| Saturn      | E   | 2032-12-08T05:43:57.793 | 9.68    | -27.59 | 60200.80  |        |       | -12.72  | -15.49       |
| C (IER)     | E   | 2032-12-08T05:50:03.994 | 11.03   | -28.97 | 74490.58  | 19.36  |       |         |              |
| B (IER)     | E   | 2032-12-08T06:05:04.560 | 14.37   | -32.37 | 91984.69  | 19.48  |       |         |              |
| B (OER)     | E   | 2032-12-08T06:26:54.360 | 19.26   | -37.34 | 117571.17 | 19.58  |       |         |              |
| A (IER)     | E   | 2032-12-08T06:30:43.009 | 20.12   | -38.21 | 122050.38 | 19.60  |       |         |              |
| Encke (IEG) | E   | 2032-12-08T06:40:22.856 | 22.30   | -40.42 | 133423.31 | 19.63  |       |         |              |
| Encke (OEG) | E   | 2032-12-08T06:40:39.238 | 22.36   | -40.48 | 133744.89 | 19.63  |       |         |              |
| A (OER)     | E   | 2032-12-08T06:43:13.534 | 22.94   | -41.07 | 136774.40 | 19.64  |       |         |              |
| F ring      | E   | 2032-12-08T06:46:21.213 | 23.65   | -41.79 | 140461.00 | 19.65  |       |         |              |

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:43:45.640  
 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 : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 129.73  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.024  
 C/A sky separation (km) : 11853.4  
 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

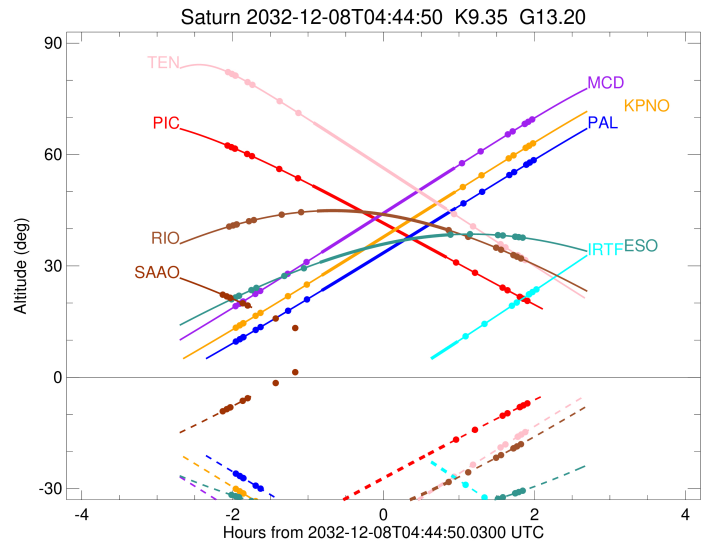
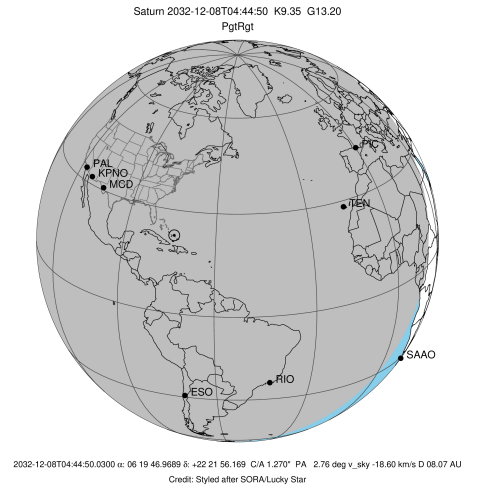


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2032-12-08T02:42:10.017 |    | 40.60 | -44.49  | 140461.00 | -19.53 |         |              |
| A (OER)     | I   | 2032-12-08T02:45:18.859 |    | 40.90 | -44.49  | 136774.40 | -19.51 |         |              |
| Encke (OEG) | I   | 2032-12-08T02:47:54.176 |    | 41.15 | -44.48  | 133744.89 | -19.50 |         |              |
| Encke (IEG) | I   | 2032-12-08T02:48:10.670 |    | 41.18 | -44.48  | 133423.31 | -19.50 |         |              |
| A (IER)     | I   | 2032-12-08T02:57:55.059 |    | 42.04 | -44.38  | 122050.38 | -19.42 |         |              |
| B (OER)     | I   | 2032-12-08T03:01:45.871 |    | 42.35 | -44.30  | 117571.16 | -19.39 |         |              |
| B (IER)     | I   | 2032-12-08T03:23:54.962 |    | 43.81 | -43.50  | 91984.69  | -19.07 |         |              |
| C (IER)     | I   | 2032-12-08T03:39:21.624 |    | 44.47 | -42.59  | 74490.58  | -18.64 |         |              |
| Saturn      | I   | 2032-12-08T03:51:59.109 |    | 44.79 | -41.64  | 60265.26  |        | -2.55   | -3.13        |
| Saturn      | E   | 2032-12-08T05:35:27.442 |    | 39.75 | -28.41  | 60140.15  |        | -17.69  | -21.36       |
| C (IER)     | E   | 2032-12-08T05:36:36.145 |    | 39.63 | -28.22  | 74490.58  | 18.56  |         |              |
| B (IER)     | E   | 2032-12-08T05:52:06.699 |    | 37.84 | -25.61  | 91984.69  | 18.99  |         |              |
| B (OER)     | E   | 2032-12-08T06:14:22.547 |    | 34.91 | -21.68  | 117571.16 | 19.28  |         |              |
| A (IER)     | E   | 2032-12-08T06:18:14.684 |    | 34.36 | -20.98  | 122050.38 | 19.31  |         |              |
| Encke (IEG) | E   | 2032-12-08T06:28:02.634 |    | 32.92 | -19.17  | 133423.31 | 19.37  |         |              |
| Encke (OEG) | E   | 2032-12-08T06:28:19.233 |    | 32.88 | -19.12  | 133744.89 | 19.37  |         |              |
| A (OER)     | E   | 2032-12-08T06:30:55.547 |    | 32.49 | -18.63  | 136774.40 | 19.39  |         |              |
| F ring      | E   | 2032-12-08T06:34:05.629 |    | 32.01 | -18.04  | 140461.00 | 19.40  |         |              |



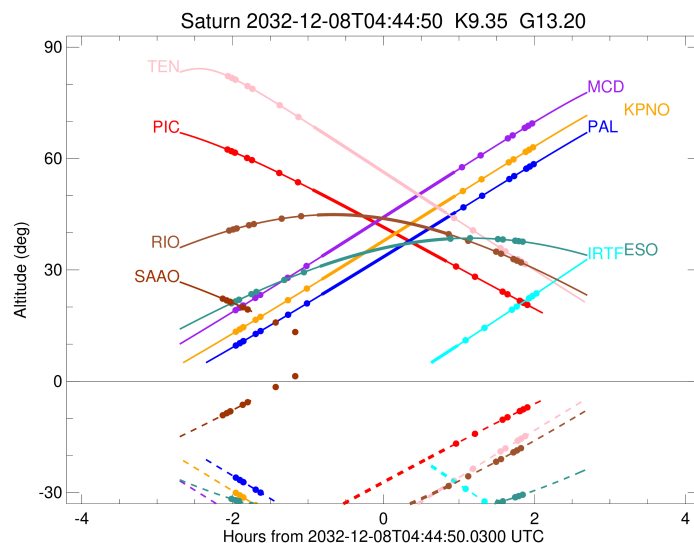
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:46:03.770  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 129.91  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.117  
 C/A sky separation (km) : 12397.1  
 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   | 2032-12-08T02:43:59.902 |    | 21.00 | -31.69  | 140461.00 | -19.41 |         |              |
| A (OER)     | I   | 2032-12-08T02:47:09.889 |    | 21.51 | -32.03  | 136774.40 | -19.40 |         |              |
| Encke (OEG) | I   | 2032-12-08T02:49:46.144 |    | 21.92 | -32.31  | 133744.89 | -19.38 |         |              |
| Encke (IEG) | I   | 2032-12-08T02:50:02.737 |    | 21.97 | -32.34  | 133423.31 | -19.38 |         |              |
| A (IER)     | I   | 2032-12-08T02:59:50.629 |    | 23.49 | -33.33  | 122050.38 | -19.31 |         |              |
| B (OER)     | I   | 2032-12-08T03:03:42.824 |    | 24.08 | -33.70  | 117571.16 | -19.27 |         |              |
| B (IER)     | I   | 2032-12-08T03:26:00.185 |    | 27.30 | -35.56  | 91984.69  | -18.95 |         |              |
| C (IER)     | I   | 2032-12-08T03:41:33.653 |    | 29.37 | -36.58  | 74490.58  | -18.48 |         |              |
| Saturn      | I   | 2032-12-08T03:54:14.698 |    | 30.93 | -37.23  | 60264.64  |        | -2.82   | -3.46        |
| Saturn      | E   | 2032-12-08T05:37:40.570 |    | 38.40 | -35.98  | 60130.66  |        | -18.36  | -22.14       |
| C (IER)     | E   | 2032-12-08T05:38:02.557 |    | 38.40 | -35.96  | 74490.58  | 18.50  |         |              |
| B (IER)     | E   | 2032-12-08T05:53:34.665 |    | 38.56 | -34.79  | 91984.69  | 18.98  |         |              |
| B (OER)     | E   | 2032-12-08T06:15:49.147 |    | 38.30 | -32.73  | 117571.16 | 19.32  |         |              |
| A (IER)     | E   | 2032-12-08T06:19:40.748 |    | 38.20 | -32.33  | 122050.38 | 19.36  |         |              |
| Encke (IEG) | E   | 2032-12-08T06:29:27.021 |    | 37.87 | -31.26  | 133423.31 | 19.44  |         |              |
| Encke (OEG) | E   | 2032-12-08T06:29:43.567 |    | 37.86 | -31.23  | 133744.89 | 19.44  |         |              |
| A (OER)     | E   | 2032-12-08T06:32:19.362 |    | 37.75 | -30.94  | 136774.40 | 19.45  |         |              |
| F ring      | E   | 2032-12-08T06:35:28.777 |    | 37.61 | -30.57  | 140461.00 | 19.47  |         |              |

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-08T04:40:07.550  
 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 : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96890s +22:21:56.16940s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 8.075  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.60  
 Sun-Target sep (deg) : 161.59  
 Sun-Moon sep (deg) : 128.83  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.861  
 C/A sky separation (km) : 10901.6  
 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   | 2032-12-08T02:37:03.469 |    | 22.24   | -9.15   | 140461.00 | -19.38 |         |              |
| A (OER)     | I   | 2032-12-08T02:40:13.769 |    | 21.79   | -8.60   | 136774.40 | -19.36 |         |              |
| Encke (OEG) | I   | 2032-12-08T02:42:50.303 |    | 21.41   | -8.14   | 133744.89 | -19.34 |         |              |
| Encke (IEG) | I   | 2032-12-08T02:43:06.926 |    | 21.37   | -8.09   | 133423.31 | -19.34 |         |              |
| A (IER)     | I   | 2032-12-08T02:52:55.996 |    | 19.92   | -6.34   | 122050.38 | -19.27 |         |              |
| B (OER)     | I   | 2032-12-08T02:56:48.682 |    | 19.34   | -5.64   | 117571.16 | -19.23 |         |              |
| B (IER)     | I   | 2032-12-08T03:19:08.261 |    | 15.83   | -1.55x  | 91984.69  | -18.94 |         |              |
| C (IER)     | I   | 2032-12-08T03:34:40.670 |    | 13.26   | 1.37x   | 74490.58  | -18.55 |         |              |
| Saturn      | I   | 2032-12-08T03:47:26.023 |    | 11.09   | 3.81x   | 60266.26  |        | -2.03   | -2.50        |
| Saturn      | E   | 2032-12-08T05:32:56.578 |    | -8.63x  | 24.96x  | 60154.47  |        | -16.64  | -20.13       |
| C (IER)     | E   | 2032-12-08T05:35:18.522 |    | -9.10x  | 25.45x  | 74490.58  | 18.36  |         |              |
| B (IER)     | E   | 2032-12-08T05:51:01.636 |    | -12.24x | 28.71x  | 91984.69  | 18.70  |         |              |
| B (OER)     | E   | 2032-12-08T06:13:40.432 |    | -16.82x | 33.44x  | 117571.16 | 18.93  |         |              |
| A (IER)     | E   | 2032-12-08T06:17:36.920 |    | -17.62x | 34.27x  | 122050.38 | 18.95  |         |              |
| Encke (IEG) | E   | 2032-12-08T06:27:36.218 |    | -19.67x | 36.37x  | 133423.31 | 19.00  |         |              |
| Encke (OEG) | E   | 2032-12-08T06:27:53.143 |    | -19.73x | 36.43x  | 133744.89 | 19.00  |         |              |
| A (OER)     | E   | 2032-12-08T06:30:32.545 |    | -20.27x | 36.99x  | 136774.40 | 19.01  |         |              |
| F ring      | E   | 2032-12-08T06:33:46.414 |    | -20.94x | 37.67x  | 140461.00 | 19.02  |         |              |