

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:17:56.190  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335

Saturn 2035-01-10T04:17:56 K8.15 G8.73 PgtRgt

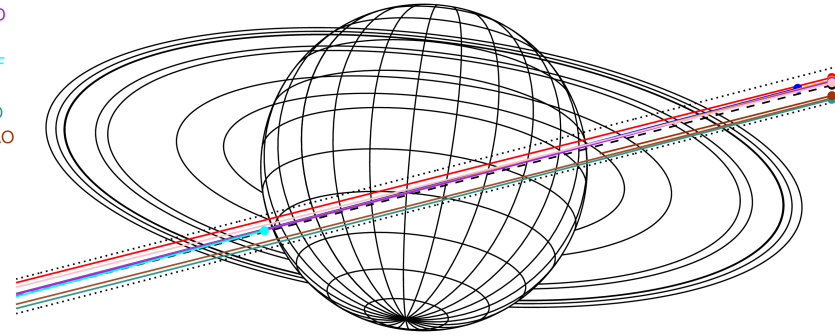
ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s

RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.113  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 171.86  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 # a(km) ring



2035-01-10T04:17:56.1900 α: 08 19 00.0486 δ: +19 58 33.142 C/A 1.418° PA 14.51 deg v\_sky -19.39 km/s D 08.11 AU  
 Credit: Styled after SORA/Lucky Star

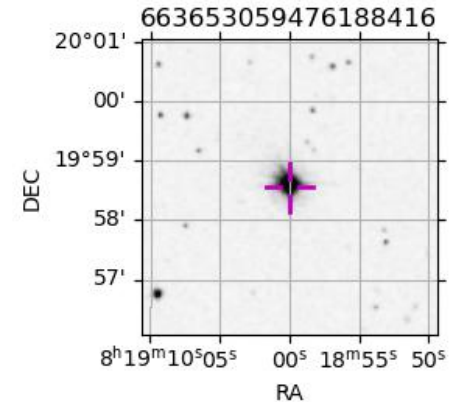
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO  
 SAAO



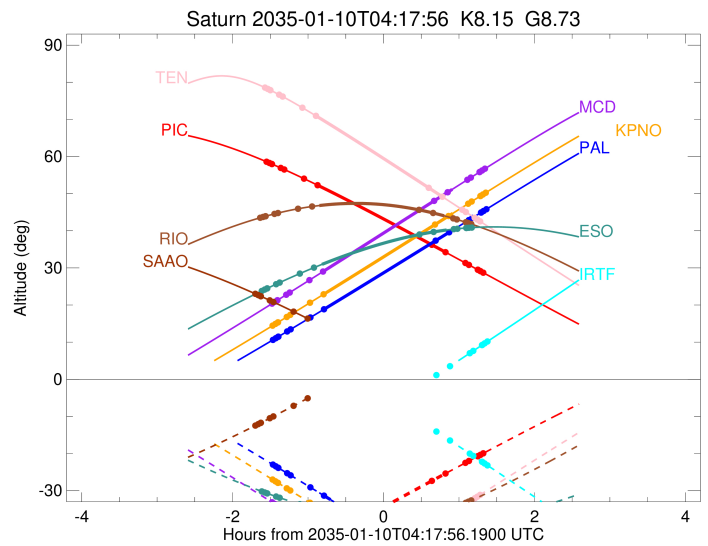
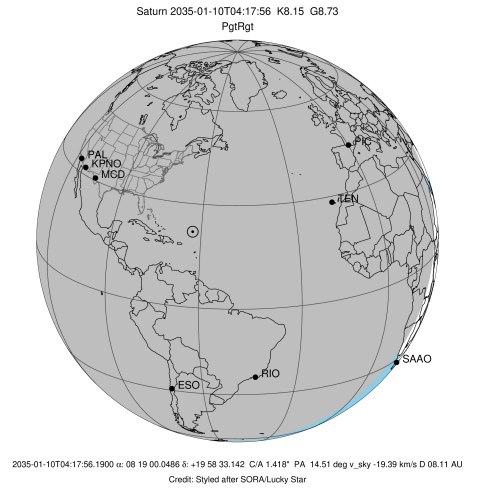
| # | a(km)    | ring        |
|---|----------|-------------|
| 1 | 74490.6  | C (IER)     |
| 2 | 91984.7  | B (IER)     |
| 3 | 117571.2 | B (OER)     |
| 4 | 122050.4 | A (IER)     |
| 5 | 133423.3 | Encke (IEG) |
| 6 | 133744.9 | Encke (OEG) |
| 7 | 136774.4 | A (OER)     |
| 8 | 140461.0 | F ring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

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   | +       | +      | +       | JAN 10 02:45 - JAN 10 05:37 | PieRie |
| PAL  | Palomar Mt (20 | 33.4  | 243.1 | +       | +      | +       | JAN 10 02:50 - JAN 10 05:39 | PieRie |
| PMO  | Purple Mtn Obs | 32.1  | 118.8 |         |        |         |                             | PnnRnn |
| KPNO | Kitt Peak Natl | 32.0  | 248.4 | +       | +      | +       | JAN 10 02:49 - JAN 10 05:39 | PieRie |
| MCD  | McDonald Obs.  | 30.7  | 256.0 | +       | +      | +       | JAN 10 02:49 - JAN 10 05:38 | PieRie |
| TEN  | Teide Obs./Ten | 28.3  | 343.5 | +       | +      | +       | JAN 10 02:43 - JAN 10 05:34 | PieRie |
| IRTF | Mauna Kea/IRTF | 19.8  | 204.5 |         |        | +       | JAN 10 05:26 - JAN 10 05:40 | PnnRne |
| KAV  | Kavalur Observ | 12.6  | 78.8  |         |        |         |                             | PnnRnn |
| RIO  | Rio de Janeiro | -22.9 | 316.8 | +       | +      | +       | JAN 10 02:39 - JAN 10 05:27 | PieRie |
| ESO  | European South | -29.3 | 289.3 | +       | +      | +       | JAN 10 02:41 - JAN 10 05:28 | PieRie |
| AAT  | Siding Spring  | -31.3 | 149.1 |         |        |         |                             | PnnRnn |
| SAAO | So. Afr. Astro | -32.4 | 20.8  | +       | +      | +       | JAN 10 02:36 - JAN 10 03:17 | PnnRin |
| MSO  | Mt. Stromlo Ob | -35.3 | 149.0 |         |        |         |                             | PnnRnn |

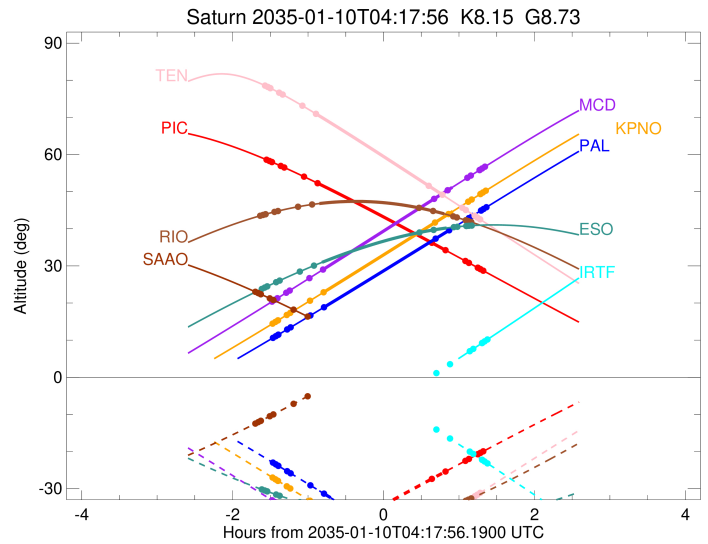
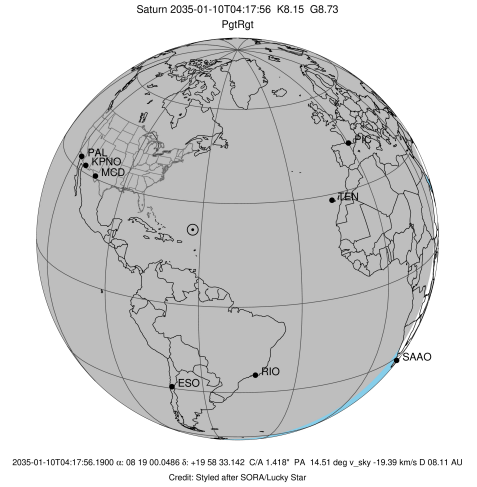


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:15:42.770  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335  
 ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.113  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 172.55  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.771  
 C/A sky separation (km) : 4538.2  
 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



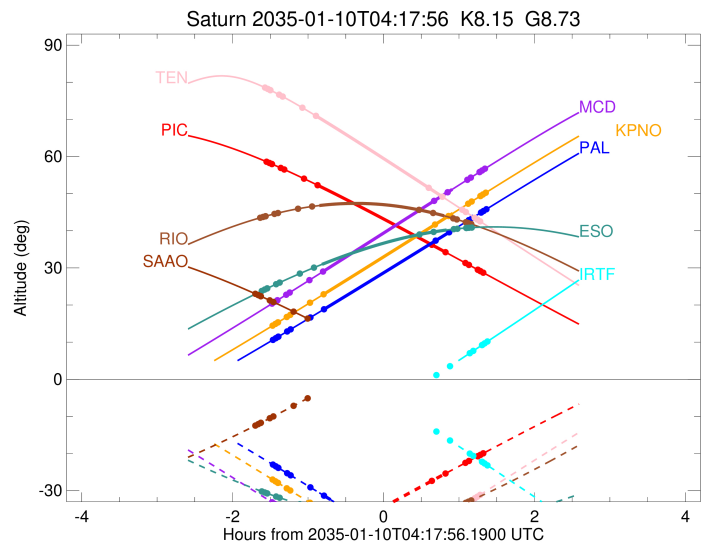
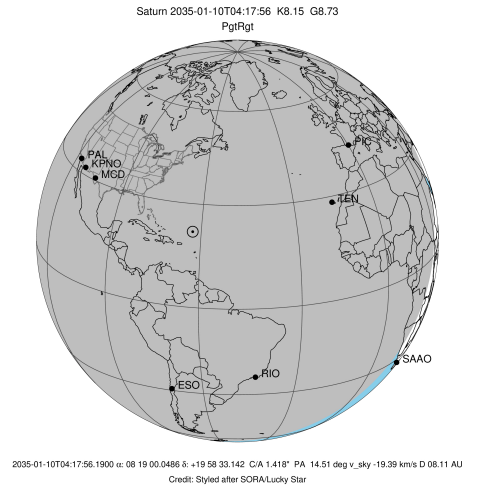
| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2035-01-10T02:45:03.033 |    | 58.58 | -51.16  | 140461.00 | -27.20 |         |              |
| A (OER)     | I   | 2035-01-10T02:47:18.585 |    | 58.25 | -50.77  | 136774.40 | -27.19 |         |              |
| Encke (OEG) | I   | 2035-01-10T02:49:10.002 |    | 57.98 | -50.44  | 133744.89 | -27.19 |         |              |
| Encke (IEG) | I   | 2035-01-10T02:49:21.830 |    | 57.95 | -50.41  | 133423.31 | -27.19 |         |              |
| A (IER)     | I   | 2035-01-10T02:56:20.326 |    | 56.92 | -49.19  | 122050.38 | -27.16 |         |              |
| B (OER)     | I   | 2035-01-10T02:59:05.257 |    | 56.50 | -48.71  | 117571.16 | -27.15 |         |              |
| B (IER)     | I   | 2035-01-10T03:14:48.855 |    | 54.03 | -45.91  | 91984.69  | -27.07 |         |              |
| C (IER)     | I   | 2035-01-10T03:25:36.102 | b  | 52.27 | -43.97  | 74490.58  | -26.98 |         |              |
| Saturn      | I   | 2035-01-10T03:24:40.956 |    | 52.42 | -44.14  | 60210.22  |        | 15.57   | 18.87        |
| Saturn      | E   | 2035-01-10T05:06:49.560 |    | 34.31 | -25.46  | 60139.78  |        | -23.59  | -28.13       |
| C (IER)     | E   | 2035-01-10T04:56:18.774 | b  | 36.24 | -27.38  | 74490.58  | 26.82  |         |              |
| B (IER)     | E   | 2035-01-10T05:07:10.155 |    | 34.25 | -25.40  | 91984.69  | 26.89  |         |              |
| B (OER)     | E   | 2035-01-10T05:23:00.946 |    | 31.33 | -22.52  | 117571.16 | 26.93  |         |              |
| A (IER)     | E   | 2035-01-10T05:25:47.290 |    | 30.82 | -22.02  | 122050.38 | 26.93  |         |              |
| Encke (IEG) | E   | 2035-01-10T05:32:49.589 |    | 29.53 | -20.75  | 133423.31 | 26.93  |         |              |
| Encke (OEG) | E   | 2035-01-10T05:33:01.529 |    | 29.49 | -20.72  | 133744.89 | 26.93  |         |              |
| A (OER)     | E   | 2035-01-10T05:34:54.012 |    | 29.14 | -20.38  | 136774.40 | 26.93  |         |              |
| F ring      | E   | 2035-01-10T05:37:10.891 |    | 28.72 | -19.97  | 140461.00 | 26.93  |         |              |

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:22:33.230  
 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 : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335  
 ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.113  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 171.36  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.205  
 C/A sky separation (km) : 7093.7  
 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



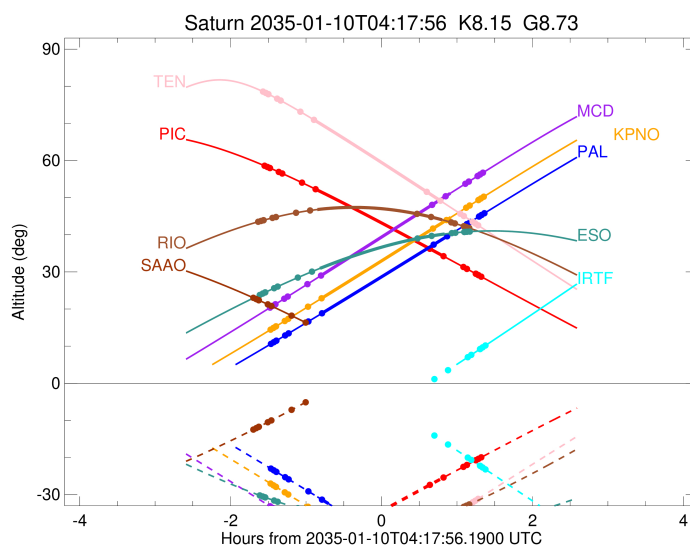
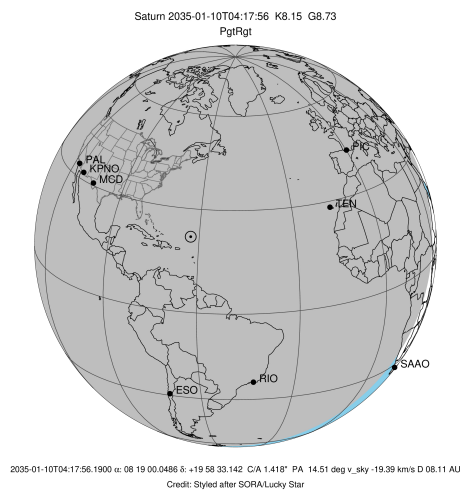
| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2035-01-10T02:50:07.461 |    | 10.62 | -23.01  | 140461.00 | -27.20 |         |              |
| A (OER)     | I   | 2035-01-10T02:52:22.986 |    | 11.08 | -23.47  | 136774.40 | -27.20 |         |              |
| Encke (OEG) | I   | 2035-01-10T02:54:14.374 |    | 11.45 | -23.85  | 133744.88 | -27.20 |         |              |
| Encke (IEG) | I   | 2035-01-10T02:54:26.199 |    | 11.49 | -23.89  | 133423.31 | -27.20 |         |              |
| A (IER)     | I   | 2035-01-10T03:01:24.543 |    | 12.90 | -25.32  | 122050.38 | -27.15 |         |              |
| B (OER)     | I   | 2035-01-10T03:04:09.408 |    | 13.46 | -25.88  | 117571.16 | -27.16 |         |              |
| B (IER)     | I   | 2035-01-10T03:19:52.992 |    | 16.66 | -29.13  | 91984.69  | -27.05 |         |              |
| C (IER)     | I   | 2035-01-10T03:30:41.441 |    | 18.87 | -31.37  | 74490.58  | -26.88 |         |              |
| Saturn      | I   | 2035-01-10T03:31:29.897 |    | 19.04 | -31.54  | 60221.51  |        | 13.93   | 16.93        |
| Saturn      | E   | 2035-01-10T05:13:18.661 |    | 40.26 | -52.77  | 60109.83  |        | -26.40  | -31.26       |
| C (IER)     | E   | 2035-01-10T04:59:18.122 | b  | 37.32 | -49.86  | 74490.58  | 26.95  |         |              |
| B (IER)     | E   | 2035-01-10T05:10:04.559 | b  | 39.58 | -52.10  | 91984.69  | 27.16  |         |              |
| B (OER)     | E   | 2035-01-10T05:25:43.784 |    | 42.87 | -55.35  | 117571.16 | 27.31  |         |              |
| A (IER)     | E   | 2035-01-10T05:28:27.743 |    | 43.44 | -55.91  | 122050.38 | 27.33  |         |              |
| Encke (IEG) | E   | 2035-01-10T05:35:23.613 |    | 44.89 | -57.34  | 133423.31 | 27.37  |         |              |
| Encke (OEG) | E   | 2035-01-10T05:35:35.364 |    | 44.93 | -57.38  | 133744.89 | 27.37  |         |              |
| A (OER)     | E   | 2035-01-10T05:37:26.050 |    | 45.32 | -57.75  | 136774.40 | 27.37  |         |              |
| F ring      | E   | 2035-01-10T05:39:40.699 |    | 45.79 | -58.21  | 140461.00 | 27.38  |         |              |

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:22:22.870  
 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 : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335  
 ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.113  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 171.37  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.246  
 C/A sky separation (km) : 7334.1  
 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



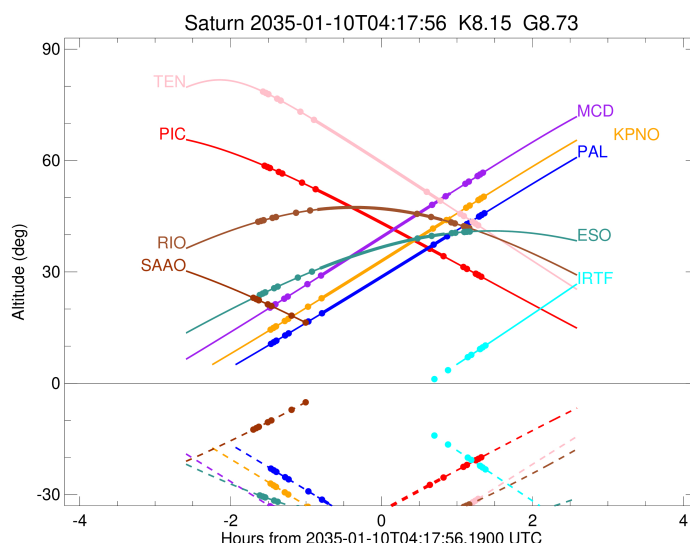
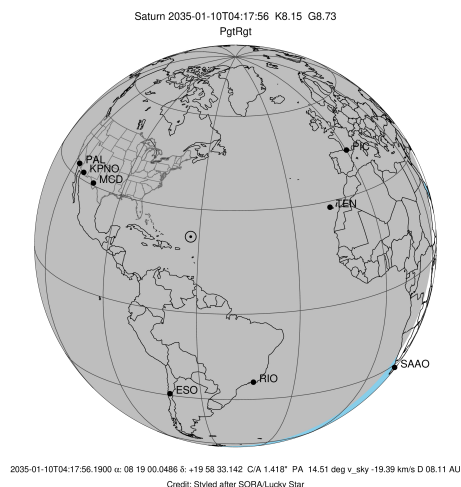
| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2035-01-10T02:49:50.014 |    | 14.46 | -27.03  | 140461.00 | -27.23 |         |              |
| A (OER)     | I   | 2035-01-10T02:52:05.419 |    | 14.93 | -27.51  | 136774.40 | -27.22 |         |              |
| Encke (OEG) | I   | 2035-01-10T02:53:56.711 |    | 15.31 | -27.89  | 133744.89 | -27.22 |         |              |
| Encke (IEG) | I   | 2035-01-10T02:54:08.526 |    | 15.35 | -27.94  | 133423.31 | -27.22 |         |              |
| A (IER)     | I   | 2035-01-10T03:01:06.538 |    | 16.79 | -29.40  | 122050.38 | -27.19 |         |              |
| B (OER)     | I   | 2035-01-10T03:03:51.285 |    | 17.36 | -29.97  | 117571.17 | -27.18 |         |              |
| B (IER)     | I   | 2035-01-10T03:19:34.390 |    | 20.64 | -33.28  | 91984.69  | -27.06 |         |              |
| C (IER)     | I   | 2035-01-10T03:30:22.811 |    | 22.90 | -35.56  | 74490.58  | -26.88 |         |              |
| Saturn      | I   | 2035-01-10T03:31:26.238 |    | 23.13 | -35.78  | 60223.11  |        | 13.68   | 16.64        |
| Saturn      | E   | 2035-01-10T05:13:01.934 |    | 44.69 | -57.30  | 60107.86  |        | -26.58  | -31.46       |
| C (IER)     | E   | 2035-01-10T04:58:47.360 | b  | 41.66 | -54.30  | 74490.58  | 26.93  |         |              |
| B (IER)     | E   | 2035-01-10T05:09:34.120 | b  | 43.95 | -56.58  | 91984.69  | 27.15  |         |              |
| B (OER)     | E   | 2035-01-10T05:25:13.479 |    | 47.28 | -59.86  | 117571.16 | 27.31  |         |              |
| A (IER)     | E   | 2035-01-10T05:27:57.442 |    | 47.86 | -60.42  | 122050.38 | 27.33  |         |              |
| Encke (IEG) | E   | 2035-01-10T05:34:53.306 |    | 49.33 | -61.86  | 133423.31 | 27.37  |         |              |
| Encke (OEG) | E   | 2035-01-10T05:35:05.057 |    | 49.38 | -61.90  | 133744.89 | 27.37  |         |              |
| A (OER)     | E   | 2035-01-10T05:36:55.738 |    | 49.77 | -62.28  | 136774.40 | 27.38  |         |              |
| F ring      | E   | 2035-01-10T05:39:10.380 |    | 50.24 | -62.75  | 140461.00 | 27.39  |         |              |

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:22:03.120  
 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 : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335  
 ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.113  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 171.41  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.288  
 C/A sky separation (km) : 7577.3  
 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



| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2035-01-10T02:49:24.503 |    | 20.40 | -33.15  | 140461.00 | -27.26 |         |              |
| A (OER)     | I   | 2035-01-10T02:51:39.745 |    | 20.87 | -33.63  | 136774.40 | -27.26 |         |              |
| Encke (OEG) | I   | 2035-01-10T02:53:30.905 |    | 21.27 | -34.03  | 133744.89 | -27.25 |         |              |
| Encke (IEG) | I   | 2035-01-10T02:53:42.706 |    | 21.31 | -34.07  | 133423.31 | -27.25 |         |              |
| A (IER)     | I   | 2035-01-10T03:00:40.261 |    | 22.79 | -35.56  | 122050.38 | -27.22 |         |              |
| B (OER)     | I   | 2035-01-10T03:03:24.844 |    | 23.37 | -36.14  | 117571.17 | -27.21 |         |              |
| B (IER)     | I   | 2035-01-10T03:19:07.241 |    | 26.72 | -39.51  | 91984.69  | -27.07 |         |              |
| C (IER)     | I   | 2035-01-10T03:29:55.519 |    | 29.03 | -41.83  | 74490.58  | -26.88 |         |              |
| Saturn      | I   | 2035-01-10T03:31:15.091 |    | 29.32 | -42.12  | 60224.81  |        | 13.42   | 16.32        |
| Saturn      | E   | 2035-01-10T05:12:34.386 |    | 51.16 | -63.82  | 60106.07  |        | -26.74  | -31.64       |
| C (IER)     | E   | 2035-01-10T04:58:06.977 | b  | 48.05 | -60.76  | 74490.58  | 26.90  |         |              |
| B (IER)     | E   | 2035-01-10T05:08:54.143 | b  | 50.37 | -63.04  | 91984.69  | 27.14  |         |              |
| B (OER)     | E   | 2035-01-10T05:24:33.772 |    | 53.73 | -66.32  | 117571.16 | 27.30  |         |              |
| A (IER)     | E   | 2035-01-10T05:27:17.764 |    | 54.31 | -66.89  | 122050.38 | 27.32  |         |              |
| Encke (IEG) | E   | 2035-01-10T05:34:13.693 |    | 55.79 | -68.32  | 133423.31 | 27.36  |         |              |
| Encke (OEG) | E   | 2035-01-10T05:34:25.445 |    | 55.84 | -68.36  | 133744.89 | 27.36  |         |              |
| A (OER)     | E   | 2035-01-10T05:36:16.142 |    | 56.23 | -68.74  | 136774.40 | 27.37  |         |              |
| F ring      | E   | 2035-01-10T05:38:30.803 |    | 56.71 | -69.19  | 140461.00 | 27.38  |         |              |

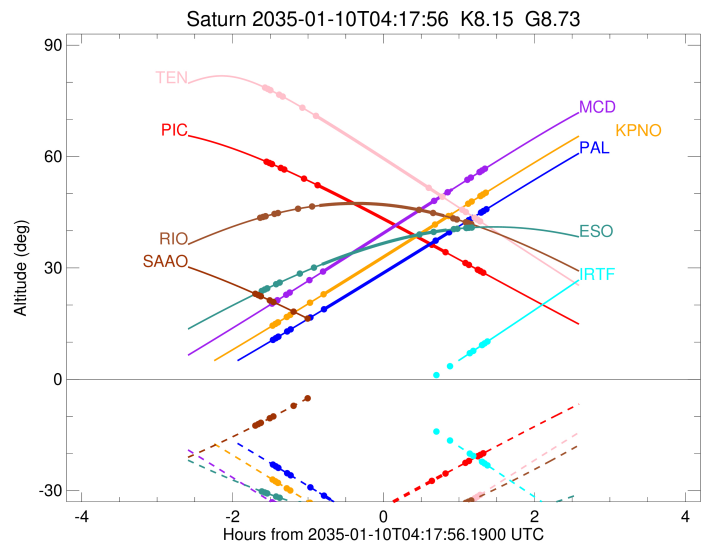
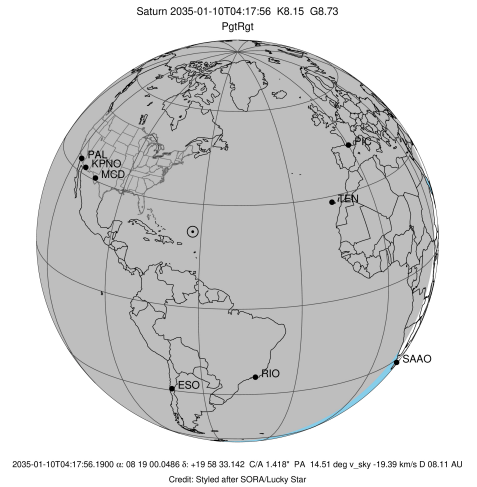
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:15:47.030  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335  
 ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.113  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 172.42  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.092  
 C/A sky separation (km) : 6423.9  
 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   | 2035-01-10T02:43:48.516 |    | 78.56 | -68.63  | 140461.00 | -27.28 |         |              |
| A (OER)     | I   | 2035-01-10T02:46:03.657 |    | 78.19 | -68.14  | 136774.40 | -27.27 |         |              |
| Encke (OEG) | I   | 2035-01-10T02:47:54.748 |    | 77.89 | -67.74  | 133744.89 | -27.27 |         |              |
| Encke (IEG) | I   | 2035-01-10T02:48:06.542 |    | 77.86 | -67.70  | 133423.31 | -27.27 |         |              |
| A (IER)     | I   | 2035-01-10T02:55:03.938 |    | 76.65 | -66.19  | 122050.38 | -27.23 |         |              |
| B (OER)     | I   | 2035-01-10T02:57:48.494 |    | 76.15 | -65.59  | 117571.16 | -27.21 |         |              |
| B (IER)     | I   | 2035-01-10T03:13:30.903 |    | 73.14 | -62.15  | 91984.69  | -27.07 |         |              |
| C (IER)     | I   | 2035-01-10T03:24:18.902 |    | 70.95 | -59.78  | 74490.58  | -26.90 |         |              |
| Saturn      | I   | 2035-01-10T03:25:11.447 |    | 70.77 | -59.59  | 60221.97  |        | 13.86   | 16.84        |
| Saturn      | E   | 2035-01-10T05:06:24.966 |    | 48.81 | -37.33  | 60122.95  |        | -25.20  | -29.93       |
| C (IER)     | E   | 2035-01-10T04:53:49.475 | b  | 51.59 | -40.08  | 74490.58  | 26.72  |         |              |
| B (IER)     | E   | 2035-01-10T05:04:42.144 | b  | 49.19 | -37.70  | 91984.69  | 26.87  |         |              |
| B (OER)     | E   | 2035-01-10T05:20:32.542 |    | 45.68 | -34.24  | 117571.16 | 26.96  |         |              |
| A (IER)     | E   | 2035-01-10T05:23:18.661 |    | 45.07 | -33.64  | 122050.38 | 26.97  |         |              |
| Encke (IEG) | E   | 2035-01-10T05:30:20.253 |    | 43.52 | -32.11  | 133423.31 | 26.98  |         |              |
| Encke (OEG) | E   | 2035-01-10T05:30:32.171 |    | 43.47 | -32.07  | 133744.89 | 26.98  |         |              |
| A (OER)     | E   | 2035-01-10T05:32:24.439 |    | 43.06 | -31.66  | 136774.40 | 26.99  |         |              |
| F ring      | E   | 2035-01-10T05:34:41.043 |    | 42.56 | -31.16  | 140461.00 | 26.99  |         |              |

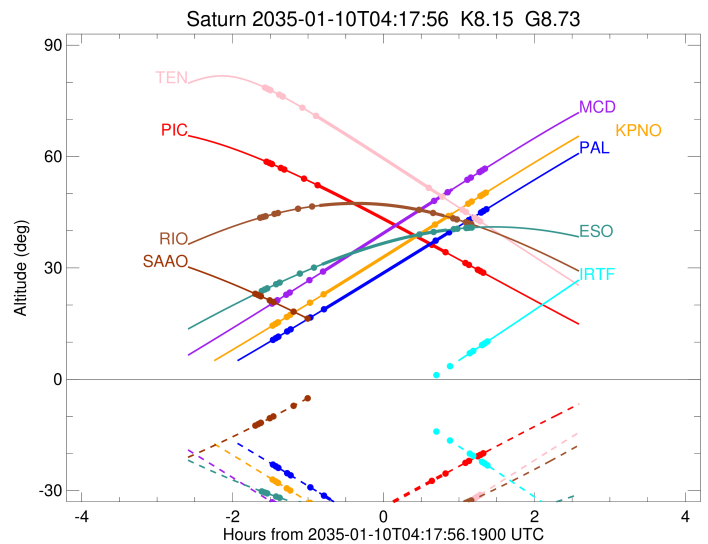
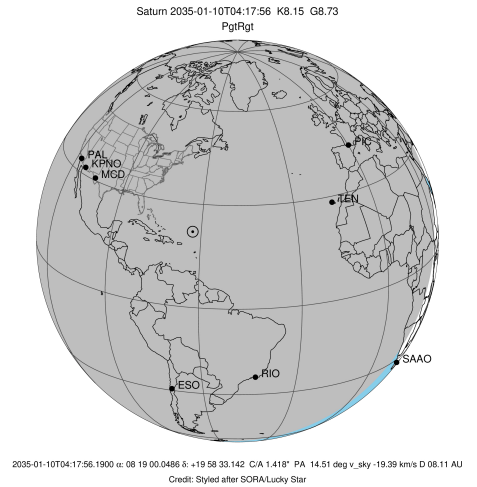
```

target                : Saturn
target radius (km)   : 60268.00
C/A epoch            : 2035-01-10T04:23:15.410
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      : 663653059476188416
2Mass ID (if available) : 08190007+1958335
ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s
RUWE (>1.4 is poor) : 0.97
K magnitude          : 8.154
G magnitude          : 8.726
RP magnitude         : 8.493
BP magnitude         : 8.847
DUPflag             : 0
Distance (au)       : 8.113
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -19.39
Sun-Target sep (deg) : 166.85
Sun-Moon sep (deg)  : 171.16
B (ring opening deg) : -20.50
PA of pole (deg)    : -6.91
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation (") : 1.245
C/A sky separation (km) : 7324.2
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   | 2035-01-10T02:49:45.526 | -26.13x | 13.91x | 140461.00 | -26.92    |       |         |              |
| A (OER)     | I   | 2035-01-10T02:52:02.477 | -25.69x | 13.45x | 136774.40 | -26.92    |       |         |              |
| Encke (OEG) | I   | 2035-01-10T02:53:55.033 | -25.33x | 13.06x | 133744.88 | -26.91    |       |         |              |
| Encke (IEG) | I   | 2035-01-10T02:54:06.981 | -25.29x | 13.02x | 133423.31 | -26.91    |       |         |              |
| A (IER)     | I   | 2035-01-10T03:01:09.677 | -23.91x | 11.57x | 122050.38 | -26.90    |       |         |              |
| B (OER)     | I   | 2035-01-10T03:03:56.243 | -23.36x | 11.00x | 117571.16 | -26.89    |       |         |              |
| B (IER)     | I   | 2035-01-10T03:19:49.438 | -20.19x | 7.69x  | 91984.69  | -26.78    |       |         |              |
| C (IER)     | I   | 2035-01-10T03:30:44.436 | -17.97x | 5.38x  | 74490.58  | -26.62    |       |         |              |
| Saturn      | I   | 2035-01-10T03:31:32.091 | -17.80x | 5.21x  | 60221.38  |           |       | 13.95   | 16.95        |
| Saturn      | E   | 2035-01-10T05:14:36.993 | 4.36x   | -17.35 | 60104.61  |           |       | -26.87  | -31.78       |
| C (IER)     | E   | 2035-01-10T04:59:55.004 | b       | 1.10x  | -14.06    | 74490.58  | 26.77 |         |              |
| B (IER)     | E   | 2035-01-10T05:10:45.520 | b       | 3.51x  | -16.49    | 91984.69  | 27.00 |         |              |
| B (OER)     | E   | 2035-01-10T05:26:29.786 |         | 7.01   | -20.02    | 117571.16 | 27.18 |         |              |
| A (IER)     | E   | 2035-01-10T05:29:14.533 |         | 7.63   | -20.64    | 122050.38 | 27.20 |         |              |
| Encke (IEG) | E   | 2035-01-10T05:36:12.288 |         | 9.19   | -22.20    | 133423.31 | 27.25 |         |              |
| Encke (OEG) | E   | 2035-01-10T05:36:24.090 |         | 9.23   | -22.25    | 133744.89 | 27.25 |         |              |
| A (OER)     | E   | 2035-01-10T05:38:15.249 |         | 9.65   | -22.67    | 136774.40 | 27.26 |         |              |
| F ring      | E   | 2035-01-10T05:40:30.458 |         | 10.16  | -23.18    | 140461.00 | 27.27 |         |              |

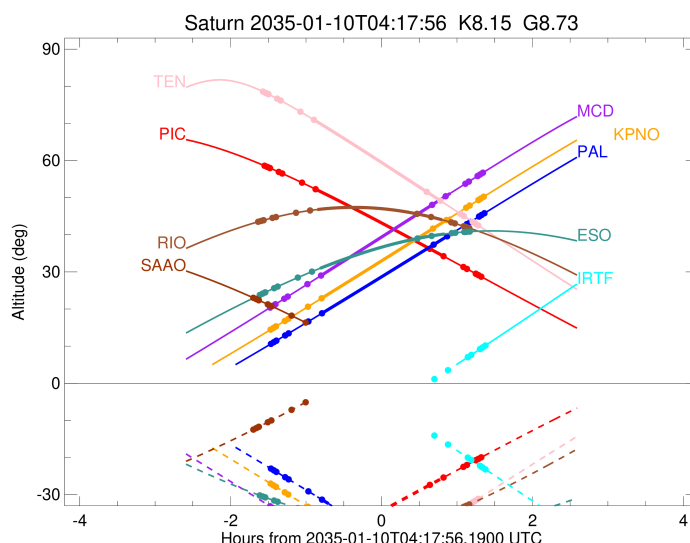
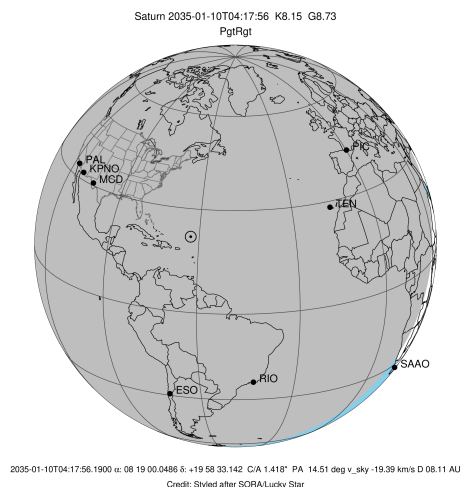
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:16:37.110  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335  
 ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.113  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 171.82  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.102  
 C/A sky separation (km) : 12369.0  
 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



| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2035-01-10T02:39:57.581 |    | 43.51 | -44.98  | 140461.00 | -27.08 |         |              |
| A (OER)     | I   | 2035-01-10T02:42:13.771 |    | 43.73 | -45.04  | 136774.40 | -27.06 |         |              |
| Encke (OEG) | I   | 2035-01-10T02:44:05.791 |    | 43.91 | -45.08  | 133744.89 | -27.03 |         |              |
| Encke (IEG) | I   | 2035-01-10T02:44:17.687 |    | 43.93 | -45.09  | 133423.31 | -27.03 |         |              |
| A (IER)     | I   | 2035-01-10T02:51:19.217 |    | 44.55 | -45.20  | 122050.38 | -26.93 |         |              |
| B (OER)     | I   | 2035-01-10T02:54:05.723 |    | 44.78 | -45.23  | 117571.17 | -26.88 |         |              |
| B (IER)     | I   | 2035-01-10T03:10:04.576 |    | 45.94 | -45.19  | 91984.69  | -26.44 |         |              |
| C (IER)     | I   | 2035-01-10T03:21:12.931 |    | 46.55 | -44.96  | 74490.58  | -25.85 |         |              |
| Saturn      | I   | 2035-01-10T03:26:58.244 |    | 46.80 | -44.78  | 60249.90  |        | 8.64    | 10.57        |
| Saturn      | E   | 2035-01-10T05:06:07.963 |    | 44.04 | -35.77  | 60061.44  |        | -30.56  | -35.80       |
| C (IER)     | E   | 2035-01-10T04:46:05.293 | b  | 45.64 | -38.37  | 74490.58  | 25.68  |         |              |
| B (IER)     | E   | 2035-01-10T04:57:17.769 | b  | 44.80 | -36.95  | 91984.69  | 26.28  |         |              |
| B (OER)     | E   | 2035-01-10T05:13:22.601 |    | 43.34 | -34.75  | 117571.16 | 26.70  |         |              |
| A (IER)     | E   | 2035-01-10T05:16:10.222 |    | 43.06 | -34.35  | 122050.38 | 26.74  |         |              |
| Encke (IEG) | E   | 2035-01-10T05:23:14.710 |    | 42.31 | -33.31  | 133423.31 | 26.84  |         |              |
| Encke (OEG) | E   | 2035-01-10T05:23:26.692 |    | 42.29 | -33.28  | 133744.89 | 26.84  |         |              |
| A (OER)     | E   | 2035-01-10T05:25:19.534 |    | 42.08 | -33.00  | 136774.40 | 26.86  |         |              |
| F ring      | E   | 2035-01-10T05:27:36.743 |    | 41.82 | -32.65  | 140461.00 | 26.88  |         |              |

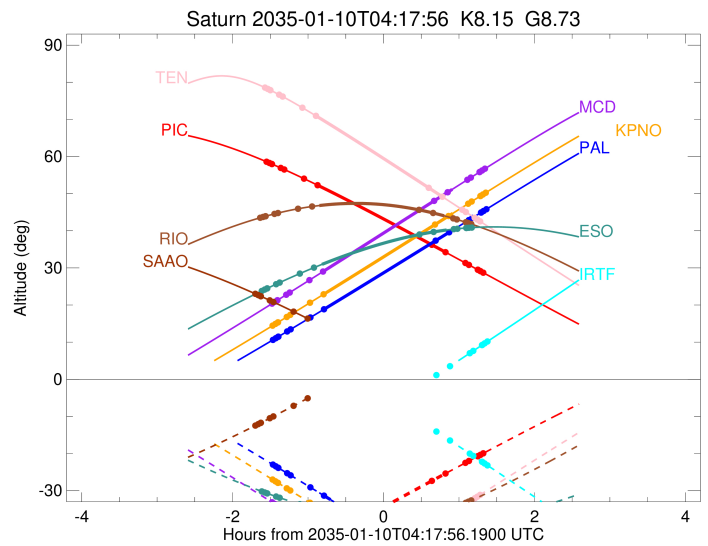
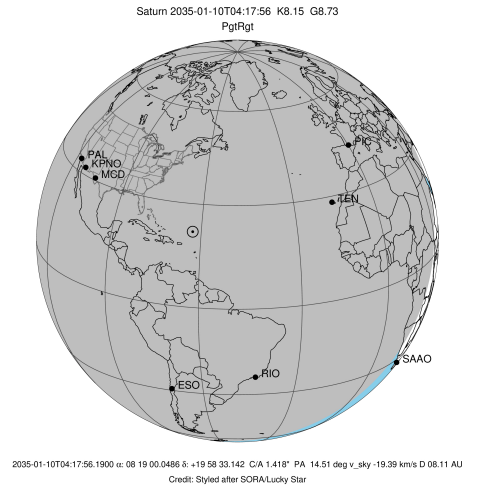


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:18:39.860  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335  
 ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.113  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 171.43  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.274  
 C/A sky separation (km) : 13381.3  
 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



| Ring        | I/E | UTC                     | b? | alt   | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|-------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2035-01-10T02:41:15.143 |    | 23.80 | -30.22  | 140461.00 | -27.00 |         |              |
| A (OER)     | I   | 2035-01-10T02:43:31.748 |    | 24.17 | -30.50  | 136774.40 | -26.97 |         |              |
| Encke (OEG) | I   | 2035-01-10T02:45:24.118 |    | 24.47 | -30.73  | 133744.89 | -26.95 |         |              |
| Encke (IEG) | I   | 2035-01-10T02:45:36.052 |    | 24.50 | -30.76  | 133423.31 | -26.94 |         |              |
| A (IER)     | I   | 2035-01-10T02:52:38.989 |    | 25.62 | -31.60  | 122050.38 | -26.83 |         |              |
| B (OER)     | I   | 2035-01-10T02:55:26.100 |    | 26.06 | -31.92  | 117571.17 | -26.78 |         |              |
| B (IER)     | I   | 2035-01-10T03:11:29.404 |    | 28.48 | -33.66  | 91984.69  | -26.29 |         |              |
| C (IER)     | I   | 2035-01-10T03:22:42.759 |    | 30.08 | -34.75  | 74490.58  | -25.60 |         |              |
| Saturn      | I   | 2035-01-10T03:29:04.101 |    | 30.95 | -35.31  | 60252.73  |        | 7.93    | 9.71         |
| Saturn      | E   | 2035-01-10T05:08:00.666 |    | 40.21 | -38.75  | 60048.04  |        | -31.65  | -36.97       |
| C (IER)     | E   | 2035-01-10T04:46:27.841 | b  | 39.00 | -38.92  | 74490.58  | 25.50  |         |              |
| B (IER)     | E   | 2035-01-10T04:57:43.385 | b  | 39.69 | -38.90  | 91984.69  | 26.22  |         |              |
| B (OER)     | E   | 2035-01-10T05:13:48.868 |    | 40.44 | -38.61  | 117571.16 | 26.72  |         |              |
| A (IER)     | E   | 2035-01-10T05:16:36.324 |    | 40.54 | -38.54  | 122050.38 | 26.78  |         |              |
| Encke (IEG) | E   | 2035-01-10T05:23:40.131 |    | 40.75 | -38.30  | 133423.31 | 26.89  |         |              |
| Encke (OEG) | E   | 2035-01-10T05:23:52.090 |    | 40.76 | -38.29  | 133744.89 | 26.89  |         |              |
| A (OER)     | E   | 2035-01-10T05:25:44.692 |    | 40.81 | -38.22  | 136774.40 | 26.92  |         |              |
| F ring      | E   | 2035-01-10T05:28:01.582 |    | 40.86 | -38.13  | 140461.00 | 26.94  |         |              |

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2035-01-10T04:12:59.950  
 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 : 663653059476188416  
 2Mass ID (if available) : 08190007+1958335  
 ICRS Star Coord at Epoch: 08h 19m 00.04864s +19:58:33.14215s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 8.154  
 G magnitude : 8.726  
 RP magnitude : 8.493  
 BP magnitude : 8.847  
 DUPflag : 0  
 Distance (au) : 8.114  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.39  
 Sun-Target sep (deg) : 166.85  
 Sun-Moon sep (deg) : 172.35  
 B (ring opening deg) : -20.50  
 PA of pole (deg) : -6.91  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.837  
 C/A sky separation (km) : 10811.4  
 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



| Ring        | I/E | UTC                     | b? | alt    | alt-sun | radius    | r-dot  | lat-geo | lat-geodetic |
|-------------|-----|-------------------------|----|--------|---------|-----------|--------|---------|--------------|
| F ring      | I   | 2035-01-10T02:36:08.418 |    | 23.01  | -12.46  | 140461.00 | -26.81 |         |              |
| A (OER)     | I   | 2035-01-10T02:38:25.995 |    | 22.66  | -12.07  | 136774.40 | -26.78 |         |              |
| Encke (OEG) | I   | 2035-01-10T02:40:19.143 |    | 22.37  | -11.75  | 133744.89 | -26.76 |         |              |
| Encke (IEG) | I   | 2035-01-10T02:40:31.159 |    | 22.34  | -11.71  | 133423.31 | -26.76 |         |              |
| A (IER)     | I   | 2035-01-10T02:47:36.795 |    | 21.24  | -10.49  | 122050.38 | -26.67 |         |              |
| B (OER)     | I   | 2035-01-10T02:50:24.847 |    | 20.80  | -10.00  | 117571.16 | -26.63 |         |              |
| B (IER)     | I   | 2035-01-10T03:06:31.161 |    | 18.21  | -7.14   | 91984.69  | -26.29 |         |              |
| C (IER)     | I   | 2035-01-10T03:17:41.957 |    | 16.34  | -5.11   | 74490.58  | -25.83 |         |              |
| Saturn      | I   | 2035-01-10T03:22:25.747 |    | 15.53  | -4.24x  | 60244.30  |        | 9.89    | 12.09        |
| Saturn      | E   | 2035-01-10T05:03:37.374 |    | -3.27x | 15.45x  | 60078.68  |        | -29.12  | -34.25       |
| C (IER)     | E   | 2035-01-10T04:45:21.142 | b  | 0.30x  | 11.77x  | 74490.58  | 25.62  |         |              |
| B (IER)     | E   | 2035-01-10T04:56:37.353 | b  | -1.89x | 14.03x  | 91984.69  | 26.07  |         |              |
| B (OER)     | E   | 2035-01-10T05:12:52.329 |    | -5.11x | 17.33x  | 117571.16 | 26.38  |         |              |
| A (IER)     | E   | 2035-01-10T05:15:42.045 |    | -5.67x | 17.91x  | 122050.38 | 26.41  |         |              |
| Encke (IEG) | E   | 2035-01-10T05:22:52.128 |    | -7.10x | 19.37x  | 133423.31 | 26.48  |         |              |
| Encke (OEG) | E   | 2035-01-10T05:23:04.274 |    | -7.14x | 19.41x  | 133744.89 | 26.48  |         |              |
| A (OER)     | E   | 2035-01-10T05:24:58.664 |    | -7.53x | 19.80x  | 136774.40 | 26.49  |         |              |
| F ring      | E   | 2035-01-10T05:27:17.785 |    | -7.99x | 20.28x  | 140461.00 | 26.51  |         |              |