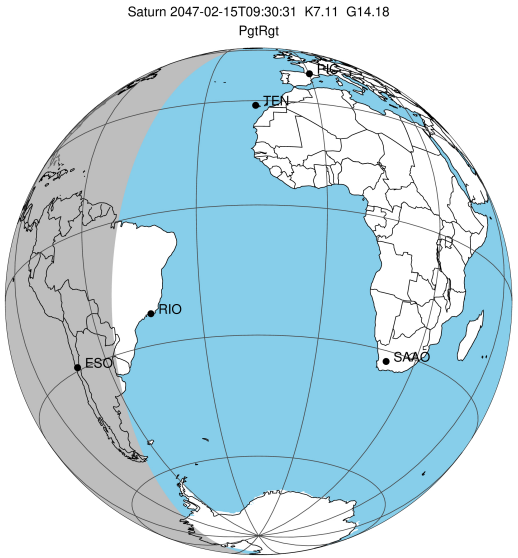
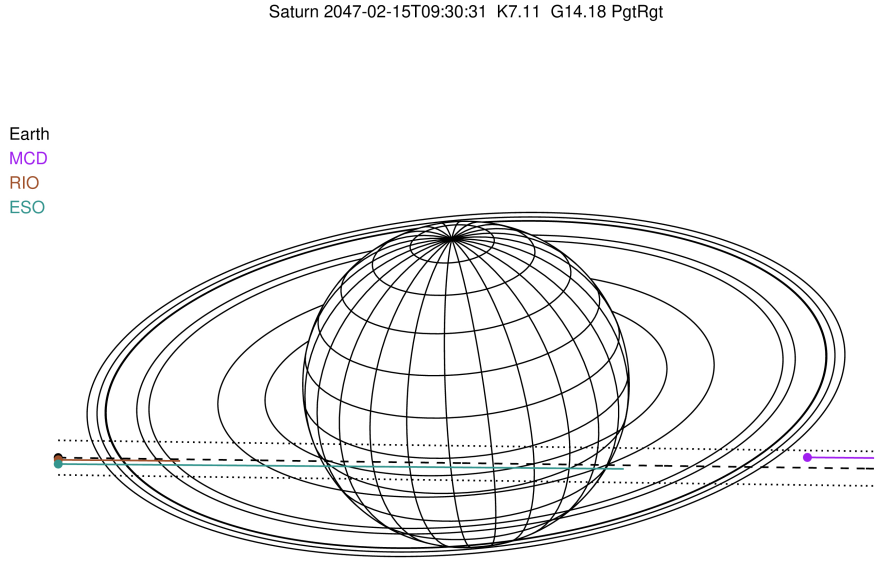
Stellar occultation prediction by rfrench@wellesley.edu Sat Jun 24 19:54:30 2023

```
target                  : Saturn
target radius (km)      :  60268.00
C/A epoch               : 2047-02-15T09:30:31.010
Event type              : PgtRgt
: Saturn occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Gaia source ID          : 4069684205378965248
2Mass ID (if available) : 18060438-2222165

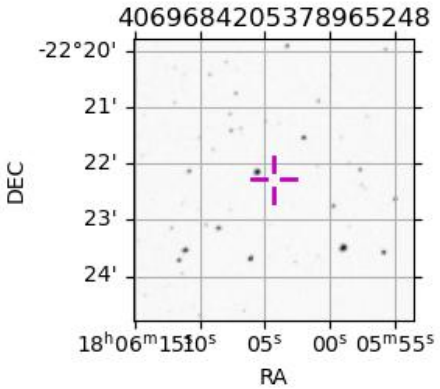
ICRS Star Coord at Epoch: 18h 06m 04.38048s -22:22:16.70405s
RUWE (>1.4 is poor)     :   0.97
K magnitude             :  7.107
G magnitude             : 14.184
RP magnitude            : 12.621
BP magnitude            : 17.943
DUPflag                 : 0
Distance (au)           : 10.585
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    :  26.87
Sun-Target sep (deg)    :   54.55
Sun-Moon sep (deg)      :   60.55
B (ring opening deg)    :   26.37
PA of pole (deg)        :    5.63
#     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
```



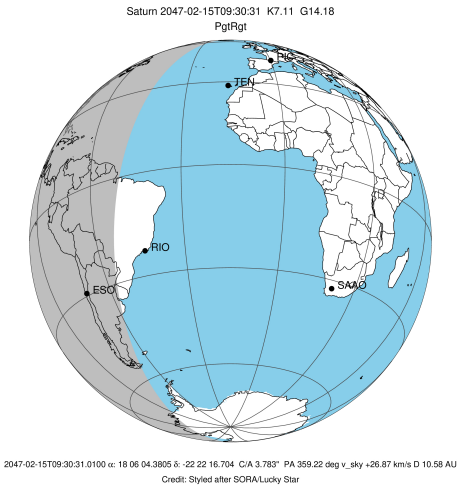


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4					PnnRnn
MCD	McDonald Obs.	30.7	256.0					PnnRnn
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+ + + + + +			FEB 15 08:04 - FEB 15 08:20	PnnRin
ESO	European South	-29.3	289.3	+ + + + + + +	+ +		FEB 15 08:04 - FEB 15 09:59	PieRin
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



Saturn_2047-02-15T09_30_31.0100_RIO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:19:21 2023




```
target                  : Saturn
target radius (km)      :  60268.00
C/A epoch               : 2047-02-15T09:28:51.340
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          : 4069684205378965248
2Mass ID (if available) : 18060438-2222165
ICRS Star Coord at Epoch: 18h 06m 04.38048s -22:22:16.70405s
RUWE (>1.4 is poor)     :   0.97
K magnitude             :  7.107
G magnitude             : 14.184
RP magnitude            : 12.621
BP magnitude            : 17.943
DUPflag                 : 0
Distance (au)           : 10.585
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    :  26.87
Sun-Target sep (deg)    :   54.55
Sun-Moon sep (deg)      :   61.14
B (ring opening deg)    :   26.37
PA of pole (deg)        :    5.63
Pole direction: RA (deg):  40.60000
Dec (deg):  83.50000
C/A sky separation (")  :   3.815
C/A sky separation (km) :  29291.1
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
Saturn_ring_plane.tf
sat378.bsp
sat286.bsp
vgr1.sat286.bsp
vgr2.sat286.bsp
HST1081HSPephemUTC.bsp
pfbl0000r.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
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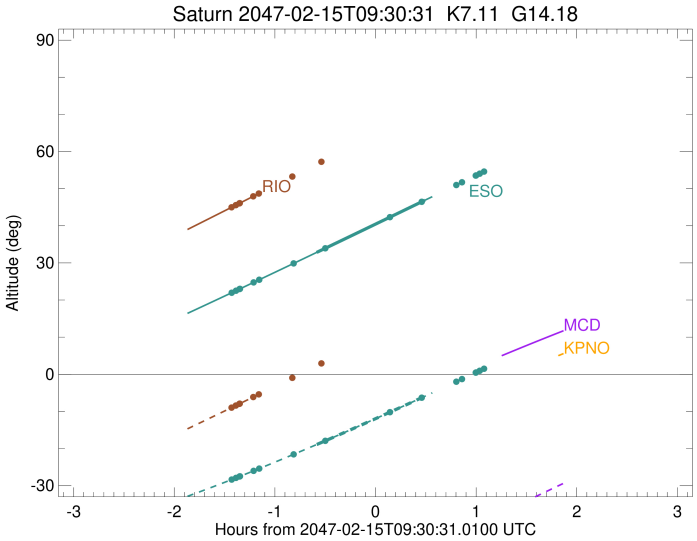

b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-02-15T08:04:39.981		44.97	-8.99	140461.00	-24.21		
A (OER)	I	2047-02-15T08:07:12.790		45.55	-8.43	136774.40	-24.03		
Encke (OEG)	I	2047-02-15T08:09:19.258		46.04	-7.97	133744.89	-23.87		
Encke (IEG)	I	2047-02-15T08:09:32.732		46.09	-7.92	133423.31	-23.86		
A (IER)	I	2047-02-15T08:17:36.542		47.93	-6.14	122050.38	-23.13		
B (OER)	I	2047-02-15T08:20:51.694		48.67	-5.42	117571.16	-22.77		
B (IER)	I	2047-02-15T08:40:53.523		53.26	-0.97x	91984.69	-19.40		
C (IER)	I	2047-02-15T08:58:15.170	b	57.24	2.92x	74490.58	-13.58		
Saturn	I	2047-02-15T08:55:52.807		56.69	2.39x	60093.96		-20.47	-24.58
Saturn	E	2047-02-15T10:01:43.620		71.86	17.34x	59884.02		-31.39	-36.69
C (IER)	E	2047-02-15T09:43:54.781	b	67.75	13.27x	74490.58	13.47		
B (IER)	E	2047-02-15T10:01:22.556	b	71.78	17.26x	91984.69	19.31		
B (OER)	E	2047-02-15T10:21:29.562		76.43	21.87x	117571.16	22.67		
A (IER)	E	2047-02-15T10:24:45.613		77.18	22.62x	122050.38	23.02		
Encke (IEG)	E	2047-02-15T10:32:51.784		79.05	24.49x	133423.31	23.74		
Encke (OEG)	E	2047-02-15T10:33:05.328		79.11	24.54x	133744.89	23.75		
A (OER)	E	2047-02-15T10:35:12.449		79.60	25.03x	136774.40	23.91		
F ring	E	2047-02-15T10:37:46.067		80.19	25.61x	140461.00	24.09		

Saturn_2047-02-15T09_30_31.0100_ESO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:20:14 2023

target : Saturn
target radius (km) : 60268.00
C/A epoch : 2047-02-15T09:27:43.960
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 : 4069684205378965248
2Mass ID (if available) : 18060438-2222165
ICRS Star Coord at Epoch: 18h 06m 04.38048s -22:22:16.70405s
RUWE (>1.4 is poor) : 0.97
K magnitude : 7.107
G magnitude : 14.184
RP magnitude : 12.621
BP magnitude : 17.943
DUPflag : 0
Distance (au) : 10.585
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : 26.87
Sun-Target sep (deg) : 54.55
Sun-Moon sep (deg) : 60.76
B (ring opening deg) : 26.37
PA of pole (deg) : 5.63
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation (") : 3.989
C/A sky separation (km) : 30625.3
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.spk
Saturn_ring_plane.tf
sat378.bsp
sat286.bsp
vgr1.sat286.bsp
vgr2.sat286.bsp
HST1081HSPephemUTC.bsp
pfbl0000r.bsp
cassini.bsp
earthstns_itrf93_040916.bsp
earth_200101_990628_predict.bpc
earth_720101_070426.bpc
cpck28Mar2008.tpc
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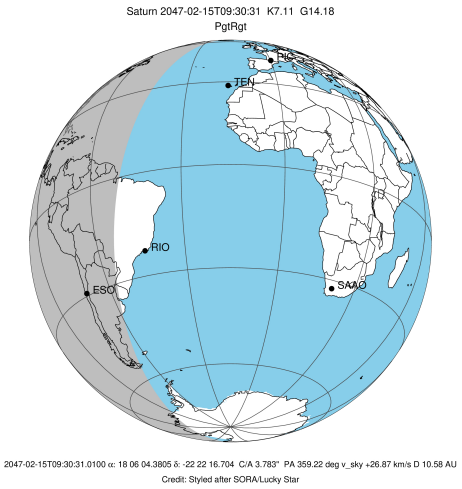
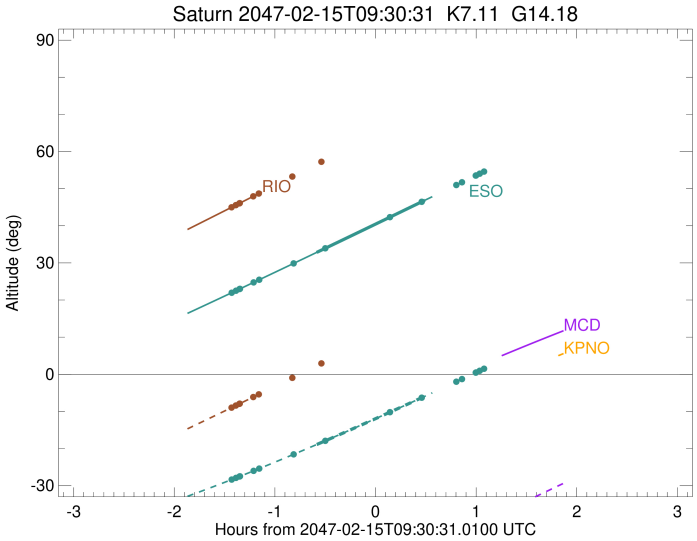
IAU_SATURN_for_RINGFIT.tpc
naif0012.tls
earth_flat_IAU.spk





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	2047-02-15T08:04:44.616		21.96	-28.37	140461.00	-24.05		
A (OER)	I	2047-02-15T08:07:18.535		22.50	-27.92	136774.40	-23.85		
Encke (OEG)	I	2047-02-15T08:09:26.038		22.96	-27.54	133744.89	-23.67		
Encke (IEG)	I	2047-02-15T08:09:39.630		23.00	-27.50	133423.31	-23.65		
A (IER)	I	2047-02-15T08:17:48.624		24.74	-26.03	122050.38	-22.83		
B (OER)	I	2047-02-15T08:21:06.515		25.45	-25.42	117571.16	-22.43		
B (IER)	I	2047-02-15T08:41:40.113		29.86	-21.58	91984.69	-18.59		
C (IER)	I	2047-02-15T09:00:34.011	b	33.94	-17.93	74490.58	-11.53		
Saturn	I	2047-02-15T08:55:26.763		32.83	-18.93	60070.73		-21.86	-26.17
Saturn	E	2047-02-15T09:59:55.961		46.87	-5.93	59858.47		-32.55	-37.92
C (IER)	E	2047-02-15T09:38:58.297	b	42.29	-10.24	74490.58	11.41		
B (IER)	E	2047-02-15T09:58:01.229	b	46.45	-6.33	91984.69	18.47		
B (OER)	E	2047-02-15T10:18:43.062		50.98	-2.00x	117571.16	22.27		
A (IER)	E	2047-02-15T10:22:02.429		51.71	-1.30x	122050.38	22.66		
Encke (IEG)	E	2047-02-15T10:30:15.333		53.51	0.43x	133423.31	23.45		
Encke (OEG)	E	2047-02-15T10:30:29.039		53.56	0.48x	133744.89	23.47		
A (OER)	E	2047-02-15T10:32:37.630		54.03	0.93x	136774.40	23.65		
F ring	E	2047-02-15T10:35:12.898		54.59	1.48x	140461.00	23.84		