

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-02-02T22:39:58.780
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 144992838874066816
 2Mass ID (if available) : 04325476+2154335

ICRS Star Coord at Epoch: 04h 32m 54.77450s +21:54:33.51457s

RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.742
 G magnitude : 18.683
 RP magnitude : 17.523
 BP magnitude : 20.055
 DUPflag : 0
 Distance (au) : 18.832
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -6.70
 Sun-Target sep (deg) : 115.90
 Sun-Moon sep (deg) : 114.51
 B (ring opening deg) : 79.07
 PA of pole (deg) : -53.50

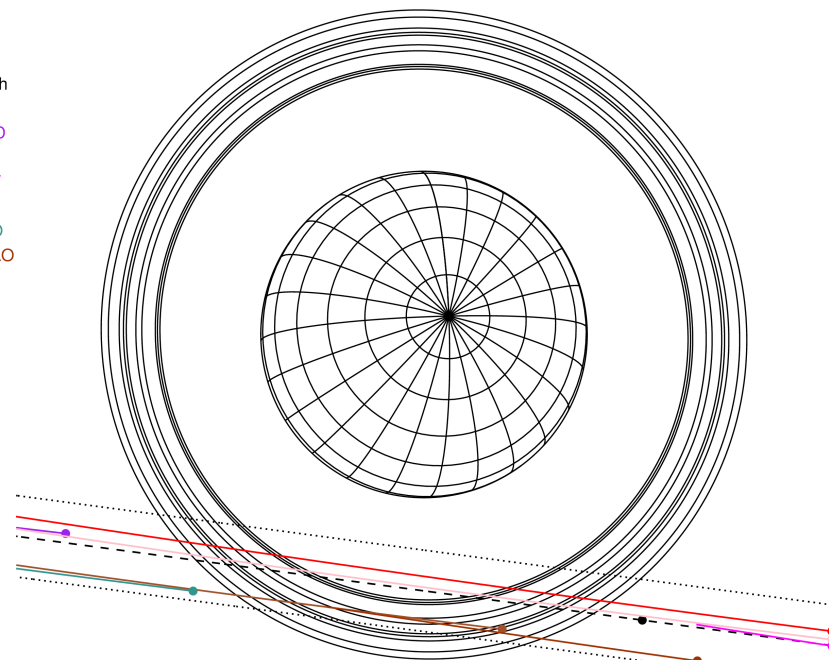
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2029-02-02T22:39:58.7800 α: 04 32 54.7745 δ: +21 54 33.515 C/A 2.908° PA 352.37 deg v_sky - 6.70 km/s D 18.83 AU
 Credit: Styled after SORA/Lucky Star

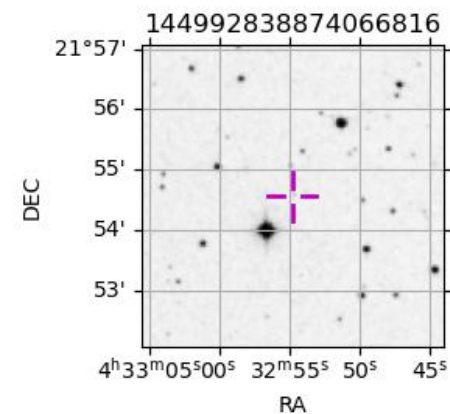
Uranus 2029-02-02T22:39:58 K14.74 G18.68 XRgt

Earth
 PIC
 MCD
 TEN
 KAV
 RIO
 ESO
 SAAO

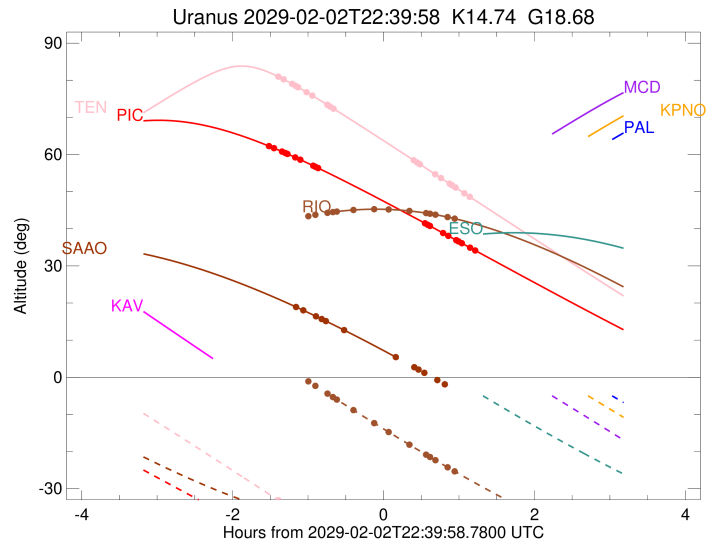
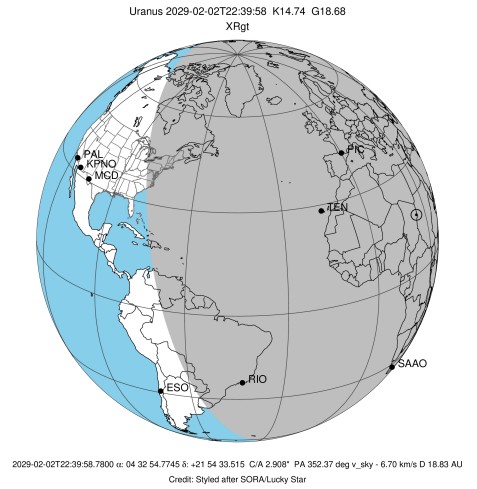


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	FEB 02 21:07 - FEB 02 23:52	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	FEB 02 21:15 - FEB 02 23:48	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	++++		+++++	FEB 02 21:59 - FEB 02 23:36	PnnRie
ESO	European Southern Obs	-29.3	289.3					PnnRnn
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++		+	FEB 02 21:28 - FEB 02 22:49	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-02-02T22:31:57.790
 Event type : XRgt
 : No Uranus occs
 : 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 : 144992838874066816
 2Mass ID (if available) : 04325476+2154335
 ICRS Star Coord at Epoch: 04h 32m 54.77450s +21:54:33.51457s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.742
 G magnitude : 18.683
 RP magnitude : 17.523
 BP magnitude : 20.055
 DUPflag : 0
 Distance (au) : 18.832
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -6.70
 Sun-Target sep (deg) : 115.90
 Sun-Moon sep (deg) : 115.40
 B (ring opening deg) : 79.07
 PA of pole (deg) : -53.50
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.746
 C/A sky separation (km) : 37506.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

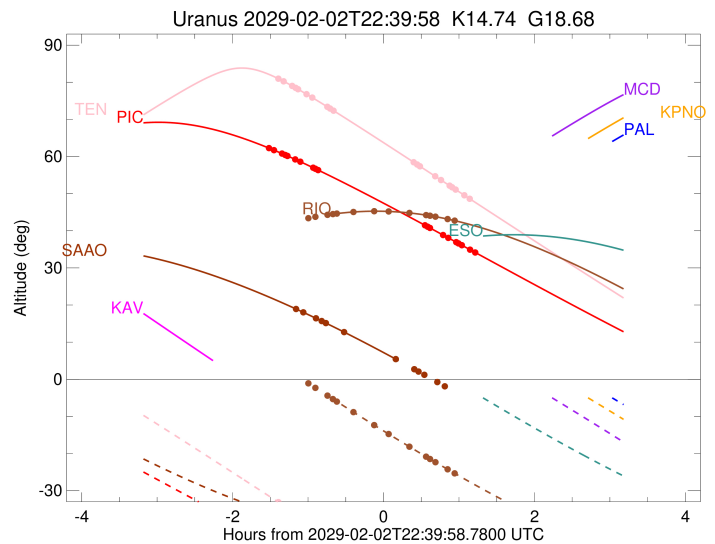
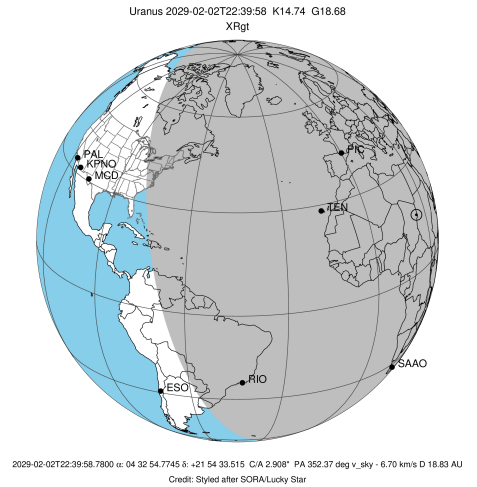


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-02-02T21:07:35.780		62.45	-42.74	51546.05	-4.80		
lambda	I	2029-02-02T21:12:57.583		61.71	-43.67	50026.71	-4.63		
delta	I	2029-02-02T21:19:19.989		60.79	-44.76	48300.35	-4.39		
gamma	I	2029-02-02T21:21:55.336		60.41	-45.20	47625.52	-4.29		
eta	I	2029-02-02T21:23:40.915		60.15	-45.50	47176.12	-4.22		
beta	I	2029-02-02T21:29:50.890		59.22	-46.53	45663.52	-3.95		
alpha	I	2029-02-02T21:34:00.221		58.58	-47.23	44702.51	-3.76		
4	I	2029-02-02T21:44:01.812		56.99	-48.87	42597.76	-3.24		
5	I	2029-02-02T21:45:42.085		56.72	-49.14	42278.60	-3.15		
6	I	2029-02-02T21:48:00.213		56.35	-49.51	41852.02	-3.01		

No planet occultations

6	E	2029-02-02T23:13:07.149		41.45	-60.80	41877.50	2.97		
5	E	2029-02-02T23:15:26.400		41.03	-61.01	42315.08	3.10		
4	E	2029-02-02T23:17:05.052		40.73	-61.16	42616.56	3.18		
alpha	E	2029-02-02T23:27:20.734		38.85	-61.99	44738.73	3.68		
beta	E	2029-02-02T23:31:20.917		38.12	-62.28	45643.47	3.86		
eta	E	2029-02-02T23:37:44.666		36.94	-62.69	47176.12	4.12		
gamma	E	2029-02-02T23:39:31.772		36.61	-62.79	47620.99	4.19		
delta	E	2029-02-02T23:42:12.159		36.12	-62.94	48300.35	4.28		
lambda	E	2029-02-02T23:48:44.938		34.92	-63.24	50026.71	4.50		
epsilon	E	2029-02-02T23:52:38.510		34.20	-63.39	51092.43	4.66		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-02-02T22:33:44.600
 Event type : XRgt
 : No Uranus occs
 : 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 : 144992838874066816
 2Mass ID (if available) : 04325476+2154335
 ICRS Star Coord at Epoch: 04h 32m 54.77450s +21:54:33.51457s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.742
 G magnitude : 18.683
 RP magnitude : 17.523
 BP magnitude : 20.055
 DUPflag : 0
 Distance (au) : 18.832
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -6.70
 Sun-Target sep (deg) : 115.90
 Sun-Moon sep (deg) : 115.50
 B (ring opening deg) : 79.07
 PA of pole (deg) : -53.50
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.872
 C/A sky separation (km) : 39223.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

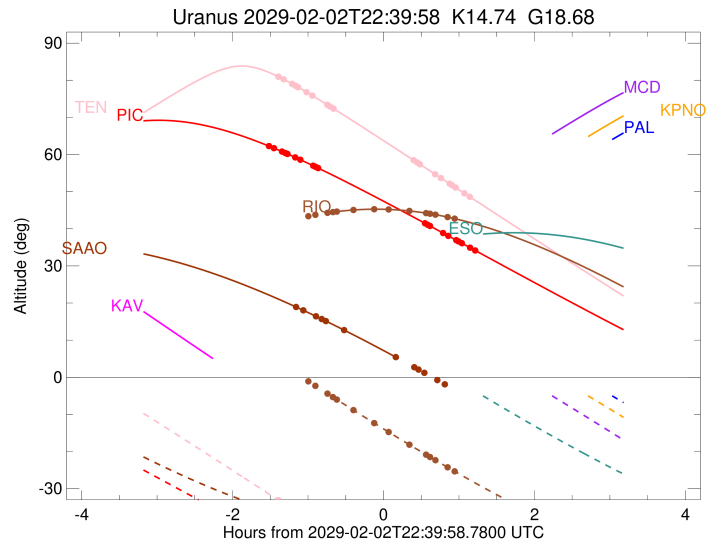
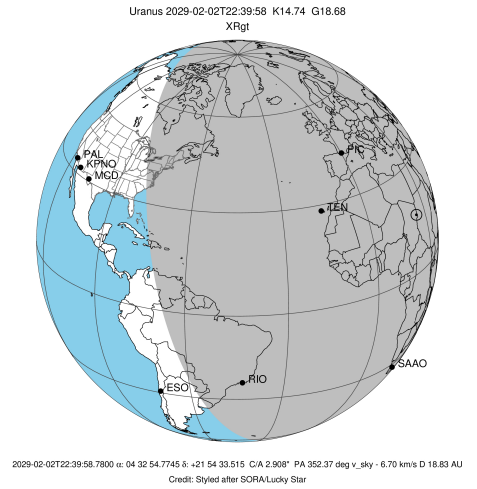


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-02-02T21:15:00.523		81.20	-32.80	51541.66	-4.58		
lambda	I	2029-02-02T21:20:38.238		80.25	-34.04	50026.71	-4.38		
delta	I	2029-02-02T21:27:25.103		79.01	-35.53	48300.35	-4.10		
gamma	I	2029-02-02T21:30:12.179		78.49	-36.15	47625.21	-3.98		
eta	I	2029-02-02T21:32:06.279		78.12	-36.56	47176.12	-3.89		
beta	I	2029-02-02T21:38:52.002		76.78	-38.05	45662.18	-3.56		
alpha	I	2029-02-02T21:43:30.059		75.85	-39.08	44704.73	-3.33		
4	I	2029-02-02T21:55:14.696		73.41	-41.66	42601.08	-2.64		
5	I	2029-02-02T21:57:17.851		72.98	-42.11	42284.98	-2.52		
6	I	2029-02-02T22:00:14.095		72.36	-42.76	41856.12	-2.32		

No planet occultations

6	E	2029-02-02T23:04:10.457		58.42	-56.70	41875.67	2.30		
5	E	2029-02-02T23:07:07.253		57.77	-57.33	42314.06	2.49		
4	E	2029-02-02T23:09:08.560		57.33	-57.77	42616.39	2.61		
alpha	E	2029-02-02T23:21:04.835		54.69	-60.30	44736.43	3.28		
beta	E	2029-02-02T23:25:32.890		53.70	-61.24	45644.25	3.51		
eta	E	2029-02-02T23:32:30.559		52.16	-62.70	47176.12	3.82		
gamma	E	2029-02-02T23:34:25.665		51.74	-63.09	47621.05	3.91		
delta	E	2029-02-02T23:37:16.961		51.11	-63.68	48300.35	4.02		
lambda	E	2029-02-02T23:44:12.088		49.58	-65.10	50026.71	4.29		
epsilon	E	2029-02-02T23:48:21.575		48.66	-65.94	51114.83	4.48		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-02-02T22:40:14.240
 Event type : XRgt
 : No Uranus occs
 : 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 : 144992838874066816
 2Mass ID (if available) : 04325476+2154335
 ICRS Star Coord at Epoch: 04h 32m 54.77450s +21:54:33.51457s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.742
 G magnitude : 18.683
 RP magnitude : 17.523
 BP magnitude : 20.055
 DUPflag : 0
 Distance (au) : 18.832
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -6.70
 Sun-Target sep (deg) : 115.90
 Sun-Moon sep (deg) : 115.15
 B (ring opening deg) : 79.07
 PA of pole (deg) : -53.50
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.241
 C/A sky separation (km) : 44265.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

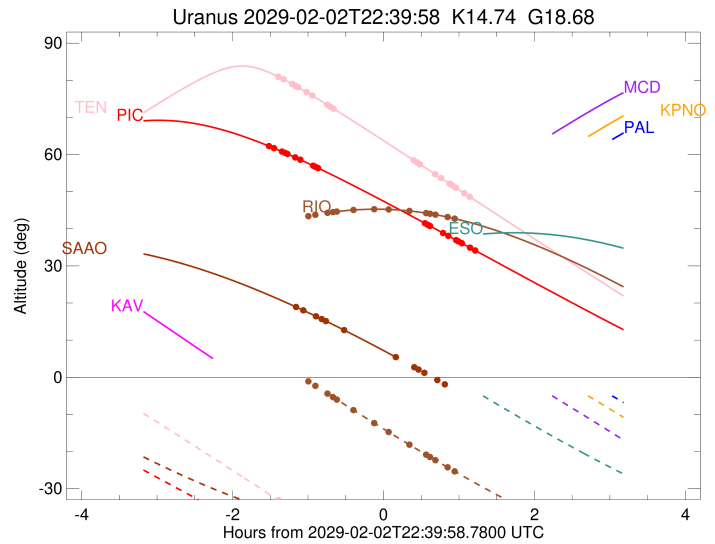
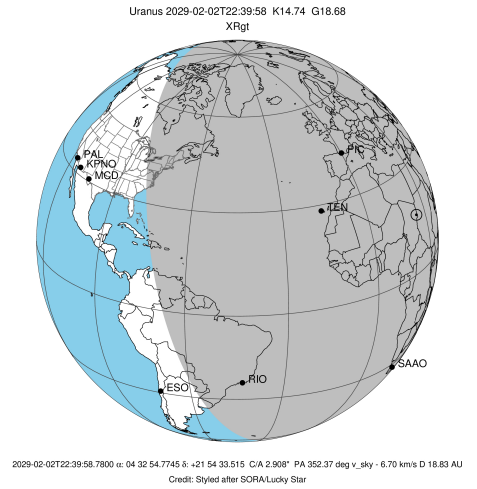


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-02-02T21:38:34.205		43.27	-0.73x	51519.06	-3.55		
lambda	I	2029-02-02T21:45:53.214		43.76	-2.33x	50026.71	-3.23		
delta	I	2029-02-02T21:55:32.586		44.30	-4.43x	48300.35	-2.73		
gamma	I	2029-02-02T21:59:52.114		44.50	-5.36	47624.07	-2.48		
eta	I	2029-02-02T22:02:59.147		44.64	-6.04	47176.12	-2.30		
beta	I	2029-02-02T22:16:18.769		45.07	-8.90	45656.10	-1.48		
alpha	I	2029-02-02T22:33:19.768		45.27	-12.51	44718.85	-0.35		

No planet occultations

alpha	E	2029-02-02T22:43:28.322		45.21	-14.63	44722.17	0.35		
beta	E	2029-02-02T23:00:16.608		44.81	-18.10	45648.61	1.48		
eta	E	2029-02-02T23:13:43.389		44.23	-20.83	47176.12	2.30		
gamma	E	2029-02-02T23:16:49.996		44.06	-21.45	47621.44	2.48		
delta	E	2029-02-02T23:21:11.559		43.81	-22.32	48300.35	2.71		
lambda	E	2029-02-02T23:30:53.477		43.16	-24.24	50026.71	3.21		
epsilon	E	2029-02-02T23:36:41.151		42.72	-25.37	51190.09	3.53		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-02-02T22:31:07.550
 Event type : XRgt
 : No Uranus occs
 : 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 : 144992838874066816
 2Mass ID (if available) : 04325476+2154335
 ICRS Star Coord at Epoch: 04h 32m 54.77450s +21:54:33.51457s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 14.742
 G magnitude : 18.683
 RP magnitude : 17.523
 BP magnitude : 20.055
 DUPflag : 0
 Distance (au) : 18.832
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -6.70
 Sun-Target sep (deg) : 115.90
 Sun-Moon sep (deg) : 114.93
 B (ring opening deg) : 79.07
 PA of pole (deg) : -53.50
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.254
 C/A sky separation (km) : 44449.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-02-02T21:28:44.986		19.20	-37.48	51513.60	-3.43		
lambda	I	2029-02-02T21:36:18.154		18.02	-38.13	50026.71	-3.10		
delta	I	2029-02-02T21:46:23.461		16.41	-38.91	48300.35	-2.59		
gamma	I	2029-02-02T21:50:57.441		15.66	-39.23	47623.90	-2.34		
eta	I	2029-02-02T21:54:16.287		15.12	-39.45	47176.12	-2.16		
beta	I	2029-02-02T22:08:55.847		12.66	-40.27	45655.21	-1.28		

No planet occultations

beta	E	2029-02-02T22:49:22.460		5.50	-41.28	45648.63	1.27		
eta	E	2029-02-02T23:04:19.626	x	2.73	-41.18	47176.12	2.12		
gamma	E	2029-02-02T23:07:41.128	x	2.10	-41.12	47621.42	2.30		
delta	E	2029-02-02T23:12:21.892	x	1.22	-41.01	48300.35	2.54		
lambda	E	2029-02-02T23:22:42.107	x	-0.75	-40.69	50026.71	3.02		
epsilon	E	2029-02-02T23:28:49.311	x	-1.92	-40.44	51184.66	3.33		