ECLIPSES, 2025

In the year 2025, there are two eclipses of the Sun and two eclipses of the Moon.

I	March	14	Total eclipse of the Moon	326
II	March	29	Partial eclipse of the Sun	320-322
III	September	07	Total eclipse of the Moon	327
IV	September	21	Partial eclipse of the Sun	323-325

II-Partial eclipse of the Sun, 29 March, 2025, Saturday.

Not Visible in India

Area of Visibility

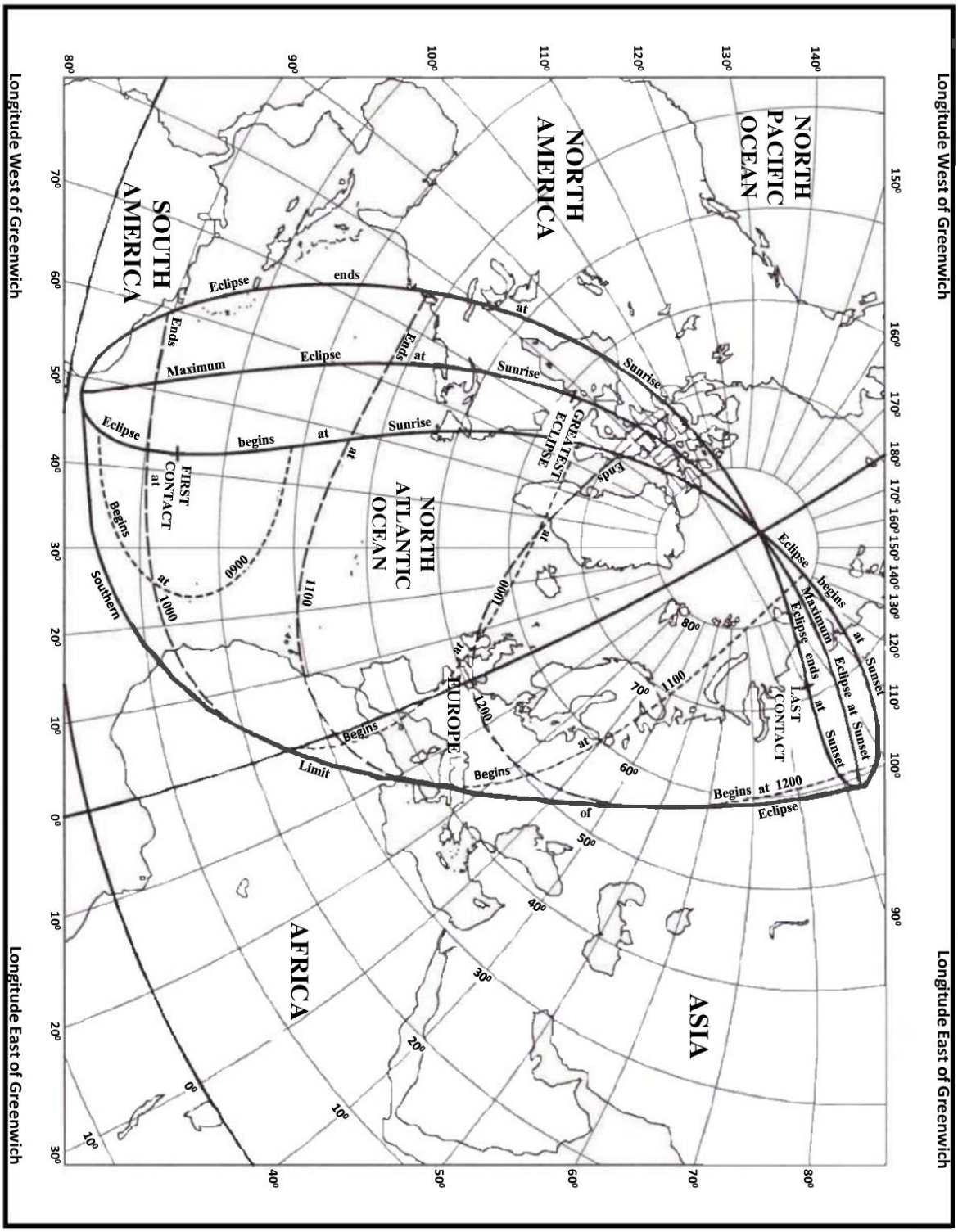
The eclipse will be visible in the region covering North-eastern North America, Greenland, Iceland, North Atlantic Ocean, most of Europe, North-western Russia.

ELEMENTS OF THE ECLIPSE						
Universal Time of Conjunction in Right Ascension :March $29^d11^h46^m16^s.2$						
	MOON			SUN		
	h	m	s	h	m	s
Right Ascension	0	33	12.03	0	33	12.03
Hourly Motion			133.79			09.11
	°	'	"	°	'	"
Declination	5	05	12.54	3	34	52.27
Hourly Motion		17	59.61			58.39
Equatorial Horizontal Parallax		61	08.46			08.81
True Semi-diameter		16	39.06		16	01.08

CIRCUMSTANCES OF THE ECLIPSE										
	Universal Time			Indian Standard Time			Latitude		Longitude	
	d	h	m	d	h	m	°	'	°	'
Eclipse begins	29	8	50.8	29	14	20.8	14	02.1	-42	24.8
Greatest eclipse*	29	10	47.4	29	16	17.4	61	15.6	-77	12.5
Eclipse ends	29	12	43.6	29	18	13.6	71	15.0	+90	55.1

*Magnitude of the eclipse = 0.937, Duration of eclipse = 3h. 53 m.

ECLIPSES, 2025



ECLIPSES, 2025

BESSELIAN ELEMENTS OF THE PARTIAL ECLIPSE OF THE SUN
MARCH 29

Terrestrial Time (TT)		Co-ordinates of the Centre of Shadow on the Fundamental Plane		Direction of the Axis of Shadow *					Radius of Penumbra and Umbra on the Fundamental Plane
h	m	x	y	sin d	cos d	μ °	'	"	l_1
8	30	-1.676012	+0.268233	+0.061521	+0.998106	306	19	14.6	+0.534951
	40	-1.591169	+0.314749	+0.061567	+0.998103	308	49	17.2	+0.534952
	50	-1.506320	+0.361263	+0.061612	+0.998100	311	19	19.8	+0.534953
9	00	-1.421466	+0.407774	+0.061657	+0.998097	313	49	22.4	+0.534953
	10	-1.336608	+0.454283	+0.061702	+0.998095	316	19	25.1	+0.534952
	20	-1.251744	+0.500789	+0.061747	+0.998092	318	49	27.7	+0.534951
	30	-1.166876	+0.547293	+0.061792	+0.998089	321	19	30.3	+0.534949
	40	-1.082004	+0.593793	+0.061837	+0.998086	323	49	32.9	+0.534946
	50	-0.997128	+0.640291	+0.061882	+0.998083	326	19	35.5	+0.534943
10	00	-0.912248	+0.686785	+0.061928	+0.998081	328	49	38.2	+0.534938
	10	-0.827364	+0.733277	+0.061973	+0.998078	331	19	40.8	+0.534934
	20	-0.742477	+0.779764	+0.062018	+0.998075	333	49	43.4	+0.534928
	30	-0.657587	+0.826249	+0.062063	+0.998072	336	19	46.0	+0.534922
	40	-0.572694	+0.872729	+0.062108	+0.998069	338	49	48.6	+0.534915
	50	-0.487799	+0.919206	+0.062153	+0.998067	341	19	51.2	+0.534907
11	00	-0.402901	+0.965678	+0.062198	+0.998064	343	49	53.9	+0.534899
	10	-0.318000	+1.012147	+0.062243	+0.998061	346	19	56.5	+0.534890
	20	-0.233098	+1.058611	+0.062289	+0.998058	348	49	59.1	+0.534880
	30	-0.148195	+1.105071	+0.062334	+0.998055	351	20	01.7	+0.534870
	40	-0.063289	+1.151527	+0.062379	+0.998053	353	50	04.3	+0.534859
	50	+0.021617	+1.197978	+0.062424	+0.998050	356	20	06.9	+0.534847
12	00	+0.106525	+1.244424	+0.062469	+0.998047	358	50	09.6	+0.534835
	10	+0.191433	+1.290865	+0.062514	+0.998044	361	20	12.2	+0.534821
	20	+0.276342	+1.337301	+0.062559	+0.998041	363	50	14.8	+0.534808
	30	+0.361251	+1.383732	+0.062604	+0.998038	366	20	17.4	+0.534793
	40	+0.446160	+1.430158	+0.062649	+0.998036	368	50	20.0	+0.534778
	50	+0.531069	+1.476578	+0.062695	+0.998033	371	20	22.6	+0.534762
13	00	+0.615978	+1.522993	+0.062740	+0.998030	373	50	25.3	+0.534745

tanf1= 0.00468985 tanf2= 0.00466652

TT hr	d °	'	"	Variations per minute x'	y'	μ' '	"
9	3	32	06	+0.008 486	+0.004 651	15	00
10	3	33	02	+0.008 488	+0.004 649	15	00
11	3	33	58	+0.008 490	+0.004 647	15	00
12	3	34	54	+0.008 491	+0.004 644	15	00

$\xi' = 0.004364\ \rho\cos\phi'\cos(\mu+\lambda)$ $\eta' = 0.004364\ \xi\sin d$

*d stands for declination and μ stands for hour angle

ECLIPSES, 2025

IV-Partial eclipse of the Sun, 21 September, 2025, Sunday.

Not Visible in India

Area of Visibility

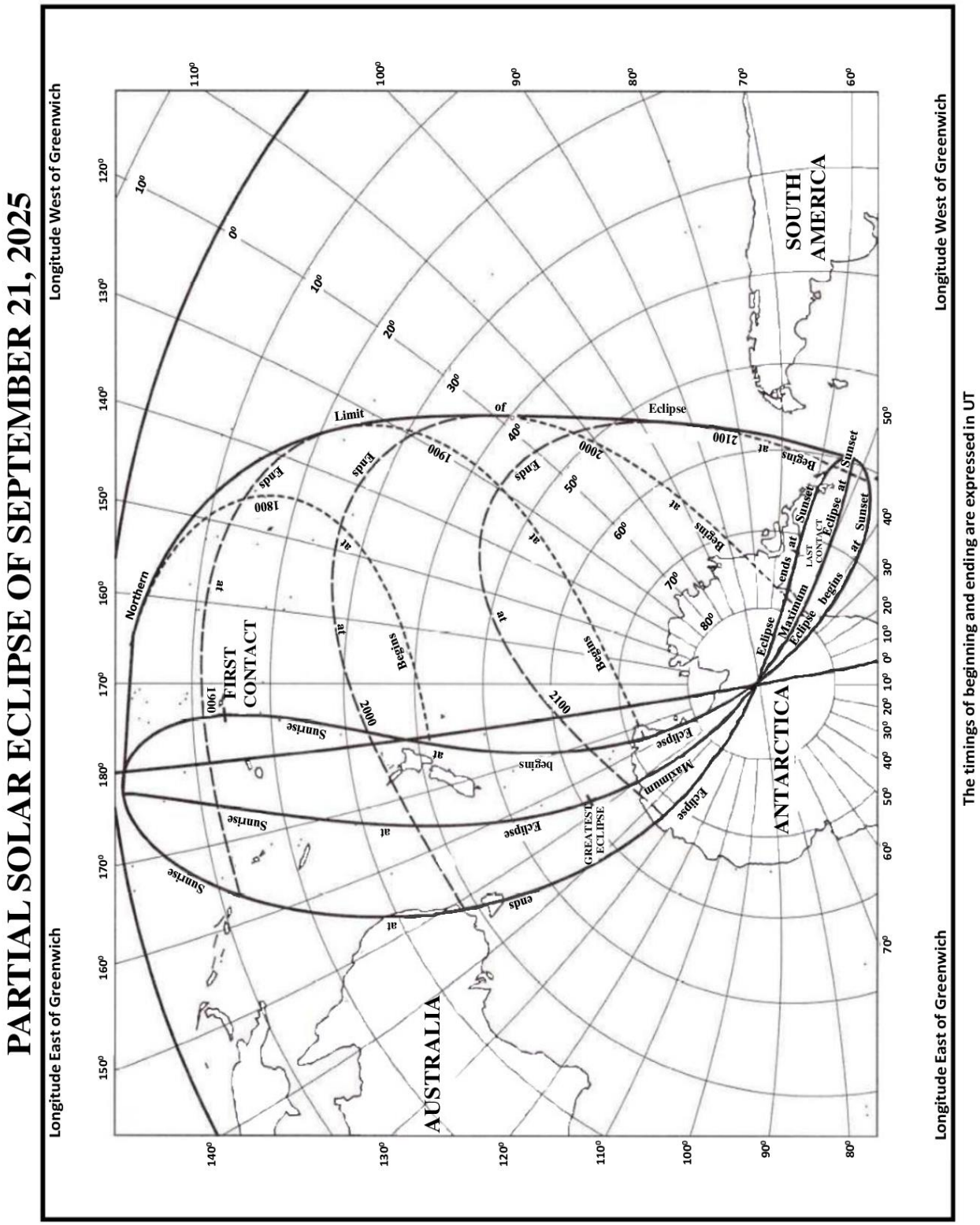
The eclipse is visible in the region covering New Zealand, eastern Melanesia, southern Polynesia, western Antarctica.

ELEMENTS OF THE ECLIPSE						
Universal Time of Conjunction in Right Ascension : September $21^d20^h50^m29^s.07$						
	MOON			SUN		
	h	m	s	h	m	s
Right Ascension	11	56	47.14	11	56	47.14
Hourly Motion			108.79			08.98
	°	'	"	°	'	"
Declination	-0	46	12.23	+0	20	54.02
Hourly Motion		–14	50.14			–58.37
Equatorial Horizontal Parallax		55	11.99			08.76
True Semi-diameter		15	02.15		15	55.94

CIRCUMSTANCES OF THE ECLIPSE										
	Universal Time			Indian Standard Time			Latitude		Longitude	
	d	h	m	d	h	m	°	'	°	'
Eclipse begins	21	17	29.8	21	22	59.8	-14	00.4	-174	07.8
Greatest eclipse*	21	19	41.9	22	01	11.9	-61	03.9	+153	24.7
Eclipse ends	21	21	53.6	22	03	23.6	-72	17.9	-61	14.4

*Magnitude of the eclipse = 0.855, Duration of eclipse = 4 h. 24 m.

ECLIPSES, 2025



ECLIPSES, 2025

BESSELIAN ELEMENTS OF THE ANNULAR ECLIPSE OF THE SUN
SEPTEMBER 21

Terrestrial Time (TT)		Co-ordinates of the Centre of Shadow on the Fundamental Plane		Direction of the Axis of Shadow *					Radius of Penumbra and Umbra on the Fundamental Plane
h	m	x	y	sin d	cos d	μ °	'	"	l_1
17	00	-1.749374	-0.245015	+0.007182	+0.999974	76	46	03.3	+0.561171
	10	-1.673874	-0.287073	+0.007137	+0.999975	79	16	06.1	+0.561196
	20	-1.598372	-0.329129	+0.007092	+0.999975	81	46	09.0	+0.561221
	30	-1.522867	-0.371184	+0.007046	+0.999975	84	16	11.8	+0.561244
	40	-1.447360	-0.413238	+0.007001	+0.999975	86	46	14.7	+0.561268
	50	-1.371850	-0.455291	+0.006956	+0.999976	89	16	17.6	+0.561290
18	00	-1.296338	-0.497342	+0.006910	+0.999976	91	46	20.4	+0.561313
	10	-1.220824	-0.539392	+0.006865	+0.999976	94	16	23.3	+0.561334
	20	-1.145308	-0.581440	+0.006819	+0.999977	96	46	26.2	+0.561355
	30	-1.069790	-0.623486	+0.006774	+0.999977	99	16	29.0	+0.561375
	40	-0.994271	-0.665531	+0.006729	+0.999977	101	46	31.9	+0.561395
	50	-0.918750	-0.707574	+0.006683	+0.999978	104	16	34.7	+0.561414
19	00	-0.843227	-0.749614	+0.006638	+0.999978	106	46	37.6	+0.561433
	10	-0.767704	-0.791653	+0.006593	+0.999978	109	16	40.5	+0.561451
	20	-0.692179	-0.833689	+0.006547	+0.999979	111	46	43.3	+0.561468
	30	-0.616653	-0.875724	+0.006502	+0.999979	114	16	46.2	+0.561485
	40	-0.541127	-0.917755	+0.006456	+0.999979	116	46	49.0	+0.561501
	50	-0.465600	-0.959785	+0.006411	+0.999979	119	16	51.9	+0.561517
20	00	-0.390072	-1.001812	+0.006366	+0.999980	121	46	54.8	+0.561532
	10	-0.314544	-1.043836	+0.006320	+0.999980	124	16	57.6	+0.561546
	20	-0.239015	-1.085858	+0.006275	+0.999980	126	47	00.5	+0.561560
	30	-0.163487	-1.127877	+0.006230	+0.999981	129	17	03.3	+0.561574
	40	-0.087958	-1.169893	+0.006184	+0.999981	131	47	06.2	+0.561586
	50	-0.012430	-1.211906	+0.006139	+0.999981	134	17	09.0	+0.561598
21	00	+0.063098	-1.253916	+0.006093	+0.999981	136	47	11.9	+0.561610
	10	+0.138626	-1.295922	+0.006048	+0.999982	139	17	14.8	+0.561621
	20	+0.214153	-1.337926	+0.006003	+0.999982	141	47	17.6	+0.561631
	30	+0.289679	-1.379926	+0.005957	+0.999982	144	17	20.5	+0.561641
	40	+0.365204	-1.421923	+0.005912	+0.999982	146	47	23.3	+0.561650
	50	+0.440729	-1.463917	+0.005866	+0.999983	149	17	26.2	+0.561659
22	00	+0.516252	-1.505907	+0.005821	+0.999983	151	47	29.0	+0.561667

tanf1= 0.00466578 tanf2= 0.00464257

TT hr	d °	'	"	Variations per minute x'	y'	μ' '	"
17	0	24	42	+0.007 550	-0.004 206	15	00
18	0	23	45	+0.007 551	-0.004 205	15	00
19	0	22	49	+0.007 552	-0.004 204	15	00
20	0	21	53	+0.007 553	-0.004 202	15	00
21	0	20	57	+0.007 553	-0.004 201	15	00

$\xi' = 0.004364\ \rho\cos\phi'\cos(\mu+\lambda)$ $\eta' = 0.004364\ \xi\sin d$

*d stands for declination and μ stands for hour angle

ECLIPSES, 2025

I- Total eclipse of the Moon, 14 March, 2025, Friday

Not Visible in India

The eclipse will be visible in the region covering Pacific, Americas, West Europe, West Africa,North Atlantic Ocean and South Atlantic Ocean.

The places from where the beginning of Umbral phase is visible at the time of moonset are-South Atlantic Ocean, Nigeria, Italy, France, Western part of Poland, Norway, Sweden.

The places from where the ending of Umbral phase is visible at the time of moonrise are- New Zealand, North Pacific Ocean, Eastern part of Russia.

ELEMENTS OF THE ECLIPSE						
Universal Time of Opposition in Right Ascension: March $14^d06^h35^m59^s.32$						
	MOON			SUN		
	h	m	s	h	m	s
Right Ascension	11	37	42.49	23	37	42.49
Hourly Motion			106.65			09.16
	°	'	"	°	'	"
Declination	2	46	25.38	-2	24	40.45
Hourly Motion		-14	31.10			59.17
Equatorial Horizontal Parallax		54	37.05			08.85
True Semi-diameter		14	52.63		16	05.25

CIRCUMSTANCES OF THE ECLIPSE											
	Universal Time			Indian Standard Time			Position Angle measured from the North Point of Moon's Limb (N.E.S.W.)	The Moon being in the Zenith in			
								Latitude		Longitude	
	d	h	m	d	h	m	°	°	'	°	'
Moon enters penumbra	14	03	55.7	14	9	25.7	132	+3	25	-57	26
Moon enters umbra	14	05	09.3	14	10	39.3	140	+3	22	-75	47
Moon enters Totality	14	06	25.6	14	11	55.6	-10	+2	49	-93	54
Middle of the eclipse*	14	06	59.9	14	12	29.9	-	+2	41	-101	57
Moon leaves Totality	14	07	31.9	14	13	01.9	68	+2	33	-110	01
Moon leaves umbra	14	08	48.2	14	14	18.2	279	+2	14	-128	35
Moon leaves penumbra	14	10	01.8	14	15	31.8	281	+2	11	-146	56

*Magnitude of the eclipse =1.183(Moon's diam =1.0). Distance between the centers at middle 1141".7

Radius of shadow cone at Moon's distance: Penumbra 4329".5, Umbra 2360".4

EASTERN AND WESTERN LIMITS OF VISIBILITY

Eastern Limit Moonset at beginning (5h 09.3m U.T.)						Western Limit Moonrise at ending (8 h 48.2 m U.T.)					
Latitude	Longitude		Latitude	Longitude		Latitude	Longitude		Latitude	Longitude	
°	°	′	°	°	′	°	°	′	°	°	′
-50	+10	12	+10	+14	49	-50	+144	06	+10	+141	02
-40	+11	23	+20	+15	26	-40	+143	18	+20	+140	36
-30	+12	16	+30	+16	10	-30	+142	43	+30	+140	08
-20	+12	59	+40	+17	03	-20	+142	14	+40	+139	32
-10	+13	37	+50	+18	14	-10	+141	49	+50	+138	45
0	+14	13	+60	+20	04	0	+141	25	+60	+137	32

The eclipse is visible in the region west of the eastern limit and east of the western limit. Here, moonset and moonrise times relate to visibility of the center of the Moon on the horizon.

ECLIPSES, 2025

III- Total eclipse of the Moon, 07 September, 2025, Sunday.

Visible in India

The eclipse will be visible in the region covering parts of Antarctica, western Pacific Ocean, Australasia, Asia, Indian Ocean, Europe, eastern Atlantic Ocean.

The places from where the beginning of the umbral phase will be visible at the time of moonset are parts of Russia and Pacific Ocean.

The places from where the ending of the umbral phase will be visible at the time of moonrise are parts of Iceland, western parts of Africa and Atlantic Ocean.

ELEMENTS OF THE ECLIPSE						
Universal Time of Opposition Right Ascension :Sept $7^d17^h55^m52^s.83$						
	MOON			SUN		
	h	m	s	h	m	s
Right Ascension	23	06	06.73	11	06	06.73
Hourly Motion			126.76			08.99
	°	'	"	°	'	"
Declination	-6	04	35.99	5	46	03.61
Hourly Motion		16	45.36			-56.29
Equatorial Horizontal Parallax		59	18.67			08.73
True Semi-diameter		16	09.33		15	52.43

CIRCUMSTANCES OF THE ECLIPSE											
	Universal Time			Indian Standard Time			Position Angle measured from the North Point of Moon's Limb (N.E.S.W.)	The Moon being in the Zenith in			
								Latitude		Longitude	
	d	h	m	d	h	m	°	°	'	°	'
Moon enters penumbra	7	15	27.1	7	20	57.1	51	-6	29	+127	18
Moon enters umbra	7	16	26.8	7	21	56.8	46	-6	13	+112	51
Moon enters Totality	7	17	30.4	7	23	00.4	26	-5	38	+98	00
Middle of the eclipse*	7	18	11.8	7	23	41.8	-	-5	43	+87	27
Moon leaves Totality	7	18	53.3	8	00	23.3	277	-5	15	+77	58
Moon leaves umbra	7	19	56.8	8	01	26.8	257	-4	57	+62	35
Moon leaves penumbra	7	20	56.5	8	02	26.5	252	-4	40	+48	08

*Magnitude of the eclipse =1.368(Moon's diam =1.0). Distance between the centers at middle 979".6

Radius of shadow cone at Moon's distance: Penumbra 4606".0, Umbra 2663".0

EASTERN AND WESTERN LIMITS OF VISIBILITY

Eastern Limit Moonset at beginning (16h 26.8m U.T.)						Western Limit Moonrise at ending (19h 56.8m U.T.)					
Latitude	Longitude		Latitude	Longitude		Latitude	Longitude		Latitude	Longitude	
°	°	′	°	°	′	°	°	′	°	°	′
-50	-149	42	+10	-158	15	-50	-33	20	+10	-26	32
-40	-151	55	+20	-159	25	-40	-31	35	+20	-25	36
-30	-153	33	+30	-160	45	-30	-30	16	+30	-24	33
-20	-154	53	+40	-162	24	-20	-29	13	+40	-23	15
-10	-156	03	+50	-164	36	-10	-28	17	+50	-21	29
0	-157	09	+60	-168	01	0	-27	25	+60	-18	47

The eclipse is visible in the region west of the eastern limit and east of the western limit. Here, moonset and moonrise times relate to visibility of the center of the Moon on the horizon.