

Five Millennium Catalog of Solar Eclipses: –1999 to +3000 (2nd Edition)
Fred Espenak and Jean Meeus

Table of Contents

PREFACE – 1ST EDITION	V
PREFACE – 2ND EDITION.....	VI
SECTION 1: ECLIPSE CATALOG AND PREDICTIONS	7
1.1 INTRODUCTION	7
1.2 EXPLANATION OF SOLAR ECLIPSE CATALOG	7
1.2.1 CATALOG NUMBER	7
1.2.2 CANON PLATE	7
1.2.3 CALENDAR DATE	7
1.2.4 TD OF GREATEST ECLIPSE	8
1.2.5 DELTA T (ΔT)	8
1.2.6 LUNATION NUMBER	8
1.2.7 SAROS SERIES NUMBER	8
1.2.5 DELTA T (ΔT)	9
1.2.8 ECLIPSE TYPE	9
1.2.9 QUINCENA LUNAR ECLIPSE PARAMETER (QLE)	9
1.2.10 GAMMA	10
1.2.11 ECLIPSE MAGNITUDE	10
1.2.12 LATITUDE AND LONGITUDE.....	10
1.2.13 ALTITUDE OF SUN	10
1.2.14 AZIMUTH OF SUN	10
1.2.15 PATH WIDTH	11
1.2.16 CENTRAL LINE DURATION.....	11
1.3 SOLAR AND LUNAR COORDINATES	11
1.4 SECULAR ACCELERATION OF THE MOON.....	12
1.5 MEAN LUNAR RADIUS	13
1.6 FIVE MILLENNIUM CATALOG OF SOLAR ECLIPSES ON ECLIPSEWISE.COM	13
SECTION 2: TIME	14
2.1 GREENWICH MEAN TIME.....	14
2.2 EPHEMERIS TIME	14
2.3 TERRESTRIAL DYNAMICAL TIME.....	14
2.4 UNIVERSAL TIME.....	14
2.5 COORDINATED UNIVERSAL TIME	15
2.6 DELTA T (ΔT)	15
2.7 POLYNOMIAL EXPRESSIONS FOR ΔT	17
2.8 UNCERTAINTY IN ΔT	19
SECTION 3: SOLAR ECLIPSE STATISTICS.....	21
3.1 STATISTICAL DISTRIBUTION OF ECLIPSE TYPES	21
3.2 DISTRIBUTION OF ECLIPSE TYPES BY CENTURY.....	22
3.3 DISTRIBUTION OF ECLIPSE TYPES BY MONTH.....	24
3.4 ECLIPSE FREQUENCY AND THE CALENDAR YEAR.....	25
3.5 EXTREMES IN ECLIPSE MAGNITUDE – PARTIAL ECLIPSES	28
3.6 EXTREMES IN ECLIPSE MAGNITUDE – ANNULAR ECLIPSES	29
3.7 EXTREMES IN ECLIPSE MAGNITUDE – TOTAL ECLIPSES.....	30
3.8 EXTREMES IN ECLIPSE MAGNITUDE – HYBRID ECLIPSES.....	31
3.9 GREATEST CENTRAL DURATION – ANNULAR ECLIPSES	31
3.10 GREATEST CENTRAL DURATION – TOTAL ECLIPSES	32
3.11 GREATEST CENTRAL DURATION – HYBRID ECLIPSES.....	33
3.12 THEORETICAL MAXIMUM DURATION OF ANNULARITY.....	33
3.13 THEORETICAL MAXIMUM DURATION OF TOTALITY	34
3.14 ECLIPSE DUOS	34
3.15 ECLIPSE DUOS IN ONE CALENDAR MONTH.....	35
3.16 JANUARY–MARCH ECLIPSE DUOS	35

3.17 ECLIPSES ON FEBRUARY 29.....	35
SECTION 4: ECLIPSES AND THE MOON'S ORBIT	36
4.1 INTRODUCTION	36
4.2 SYNODIC MONTH.....	36
4.3 ANOMALISTIC MONTH.....	39
4.4 DRACONIC MONTH.....	44
4.5 ECLIPSE CYCLES.....	48
SECTION 5: SOLAR ECLIPSE PERIODICITY.....	49
5.1 INTERVAL BETWEEN TWO SUCCESSIVE SOLAR ECLIPSES	49
5.2 SOLAR ECLIPSE REPETITION	49
5.3 SAROS SERIES.....	49
5.4 GAMMA AND SAROS SERIES	51
5.5 SAROS SERIES STATISTICS	52
5.6 SAROS AND OTHER PERIODS	58
5.7 SAROS AND INEX.....	59
5.8 SAROS—INEX PANORAMA.....	59
5.9 SECULAR VARIATIONS IN THE SAROS AND INEX.....	60
ABBREVIATIONS	62
REFERENCES.....	63
APPENDIX.....	65