ANNULAR SOLAR ECLIPSE OF 2012 MAY 20

TABLE 1

ELEMENTS OF THE ANNULAR SOLAR ECLIPSE OF 2012 MAY 20

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Time</th>
<th>J.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equatorial Conjunction</td>
<td>00:00:16.01 TDT</td>
<td>2456068.500185</td>
</tr>
<tr>
<td>(Sun &amp; Moon in R.A.)</td>
<td>(=23:59:09.29 UT)</td>
<td></td>
</tr>
<tr>
<td>Ecliptic Conjunction</td>
<td>23:48:07.87 TDT</td>
<td>2456068.491758</td>
</tr>
<tr>
<td>(Sun &amp; Moon in Ec. Lo.)</td>
<td>(=23:47:01.15 UT)</td>
<td></td>
</tr>
<tr>
<td>Instant of Greatest Eclipse</td>
<td>23:53:53.39 TDT</td>
<td>2456068.495757</td>
</tr>
</tbody>
</table>

Geocentric Coordinates of Sun & Moon at Greatest Eclipse (JPL DE200/LE200):

- **Sun**
  - R.A. = 03h52m43.048s
  - Dec. = +20°13'15.15"
  - Semi-Diameter = 15'48.11"
  - Eq.Hor.Par. = 08.69"
  - ∆ R.A. = 10.029s/h
  - ∆ Dec. = 30.26"/h

- **Moon**
  - R.A. = 03h52m30.731s
  - Dec. = +20°39'06.32"
  - Semi-Diameter = 14'43.35"
  - Eq.Hor.Par. = 0°54'01.67"
  - ∆ R.A. = 125.927s/h
  - ∆ Dec. = 211.62"/h

- **Lunar Radius**
  - k1 = 0.2725076 (Penumbra)
  - k2 = 0.2722810 (Umbra)
  - Shift in ∆b = 0.00"

- **Constants**
  - Brown Lun. No. = 1106
  - Lunar Position: ∆l = 0.00" (Optical + Physical)
  - nDot = -26.00 "/cy**2

- **Eclipse Magnitude**
  - = 0.94389
  - Gamma = 0.48279
  - ∆T = 66.7 s

Polynomial Besselian Elements for: 2012 May 21 00:00:00.0 TDT (=t0)

<table>
<thead>
<tr>
<th>n</th>
<th>x</th>
<th>y</th>
<th>d</th>
<th>l1</th>
<th>l2</th>
<th>µ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.0022373</td>
<td>0.4855297</td>
<td>20.2205563</td>
<td>0.5665071</td>
<td>0.0202486</td>
<td>180.856583</td>
</tr>
<tr>
<td>1</td>
<td>0.5031837</td>
<td>0.0560538</td>
<td>0.0082712</td>
<td>-0.0000312</td>
<td>-0.0000311</td>
<td>15.000578</td>
</tr>
<tr>
<td>2</td>
<td>0.0000183</td>
<td>-0.0001411</td>
<td>-0.000047</td>
<td>-0.000097</td>
<td>-0.000097</td>
<td>-0.00002</td>
</tr>
<tr>
<td>3</td>
<td>-0.0000057</td>
<td>-0.0000006</td>
<td>0.0000000</td>
<td>0.0000000</td>
<td>0.0000000</td>
<td>0.0000000</td>
</tr>
</tbody>
</table>

Tan f1 = 0.0046205       Tan f2 = 0.0045974

At time t1 (decimal hours), each Besselian element is evaluated by:

\[ a = a_0 + a_1t + a_2t^2 + a_3t^3 \]

(or \( a = \sum [a_n t^n] \); \( n = 0 \) to \( 3 \))

where:

- \( a = x, y, d, l_1, l_2, \) or \( µ \)
- \( t = t_1 - t_0 \) (decimal hours) and \( t_0 = 0.00 \) TDT

The Besselian elements were derived from a least-squares fit to elements calculated at five uniformly spaced times over a 6-hour period centered at \( t_0 \). They are valid over the period 21.00 (May 20) ≤ \( t_1 \) ≤ 03.00 (May 21) TDT.

Note that all times are expressed in Terrestrial Dynamical Time (TDT).

Saros Series 128: Member 58 of 73 eclipses in series.

Eclipse Predictions by Fred Espenak, NASA’s GSFC (2012 May)