

## OCCULTATIONS OF PLANETS AND BRIGHT STARS AND SOLAR ECLIPSES BY THE MOON June 22, 2022

The moon, as our nearest neighbor, sometimes blocks the light coming from a planet, a star, or the sun. Occultations and solar eclipses are listed below for 2022 through 2024. The name of the planet or star, along with its visual magnitude, is listed along with the percentage of the moon's disk that is illuminated at the time, and the phase of the moon. The date and time (MST) when the geocentric angle between the center of the moon and the center of the planet or star is minimal (mid-point of the occultation), and the angle of separation are also listed. **NOTE: previous editions of this listing should be discarded.**

The date and times (MST) when the occultation first commences, and last ends, for the first and last observations on earth are listed, followed by the longitude and latitude of the location where the line from the object's center through the moon's center strikes the surface of the earth at mid-occultation.

If the occultation is visible, in whole or in part, from **The Journey Museum and Learning Center (JMLC)**, the times (MST) of the various stages are listed along with the altitude above the horizon, and the azimuth, of the object, and the altitude of the sun with respect to the horizon. For occultations of Venus and solar eclipses, when the object is above the horizon, and for other objects when the sun is below the horizon, this is noted with three asterisks (\*\*\*) . If, on the other hand, the Moon is visible when the object in question appears closest to the Moon, but the planet or star is not occulted because of perspective, then the angle between the edge of the Moon and the edge of the object (the miss angle) is listed. *If MDT is required, add one hour to the listed time. For UTC, add 7 hours.*

Note: The calculations for "global events" are made in terms of Terrestrial Time (TT), but listed in UTC or a derivative such as MST or EST. Therefore, they are dependent on DUTC ( $DUTC = TT - UTC$ ) which for dates more than a few months into the future can only be predicted. For observations at a particular location, and for predictions of where to observe an occultation or eclipse, the Earth's rotational position is also needed, and thus DUT1 ( $DUT1 = TT - UT1$ ) is involved which again can only be estimated for dates in the future. Also, a number of other factors are involved in the computation of an occultation, and the results given here for more than a year in the future could be off by a few seconds. In addition, direct visual observation can be uncertain in terms of reaction time, plus establishing the accuracy of the clock an observer uses can require considerable effort.

The values of DUTC ( $TT - UTC$ ) and DUT1 ( $TT - UT1$ ), are shown in seconds.

**N.B. This edition replaces all previous editions.**

Lunar occultations of planets and bright stars, and Solar eclipses.

Dates and times are MST (add 7 hours for UTC, or add one hour for MDT).

Reference location: Journey Museum 103.2187W 44.0866N

A "miss angle" is the angle between the edges of the Moon and the object.

Selected stars are magnitude 3.5 or brighter.

Occultation of 42 theta Ophiuchi 3.27 by moon 3% illuminated at phase= 341 degrees  
01/01/2022 02:52:50.6 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.294  
Global start/end: 01/01/2022 00:49:40.7 and 01/01/2022 04:55:59.7  
Mid-occultation observing point 11.845E 23.576S

Occultation of 30 eta Leonis 3.48 by moon 94% illuminated at phase= 208 degrees  
01/20/2022 03:38:20.3 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.293  
Global start/end: 01/20/2022 01:24:50.9 and 01/20/2022 05:51:49.4  
Mid-occultation observing point 122.503W 27.982N  
At Journey Museum, the miss angle is 276.5 arc-sec at 01/20/2022 03:44:00.1

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 70% illuminated at phase= 247 degrees  
01/23/2022 10:10:18.5 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.292  
Global start/end: 01/23/2022 09:00:15.3 and 01/23/2022 11:20:20.2  
Mid-occultation observing point 100.331W 63.729N

Occultation of Porrima 2.74 by moon 70% illuminated at phase= 247 degrees  
01/23/2022 10:10:20.5 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.292  
Global start/end: 01/23/2022 09:00:23.4 and 01/23/2022 11:20:15.9  
Mid-occultation observing point 100.34W 63.729N

Occultation of Zubenelgenubi 2.75 by moon 42% illuminated at phase= 279 degrees  
01/25/2022 23:50:43.1 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.292  
Global start/end: 01/25/2022 22:19:30.8 and 01/26/2022 01:21:52.1  
Mid-occultation observing point 21.955E 42.974N

Occultation of 42 theta Ophiuchi 3.27 by moon 16% illuminated at phase= 313 degrees  
01/28/2022 12:34:26.3 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.292  
Global start/end: 01/28/2022 10:29:23.5 and 01/28/2022 14:39:27.3  
Mid-occultation observing point 161.723W 30.552S

Occultation of Kaus Borealis 2.82 by moon 8% illuminated at phase= 327 degrees  
01/29/2022 12:47:16.7 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.292  
Global start/end: 01/29/2022 11:22:02.1 and 01/29/2022 14:12:30.3  
Mid-occultation observing point 45.217E 85.776S

Occultation of 27 phi Sagittarii 3.17 by moon 6% illuminated at phase= 330 degrees  
01/29/2022 19:13:06.4 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.292  
Global start/end: 01/29/2022 17:23:42.3 and 01/29/2022 21:02:29.5  
Mid-occultation observing point 118.631E 10.606N

Occultation of Nunki 2.05 by moon 6% illuminated at phase= 332 degrees  
01/29/2022 22:42:50.3 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.292  
Global start/end: 01/29/2022 20:38:19.9 and 01/30/2022 00:47:19.7  
Mid-occultation observing point 69.062E 28.201S

Occultation of Uranus 5.8 by moon 43% illuminated at phase= 82 degrees  
02/07/2022 13:32:55.7 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.292  
Global start/end: 02/07/2022 12:40:54.4 and 02/07/2022 14:24:58.2  
Mid-occultation observing point 13.57E 63.788S  
At Journey Museum, the miss angle is 5620.3 arc-sec at 02/07/2022 13:29:46.9

Occultation of 30 eta Leonis 3.48 by moon 100% illuminated at phase= 180 degrees  
02/16/2022 10:21:51.0 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.288  
Global start/end: 02/16/2022 08:08:23.6 and 02/16/2022 12:35:17.1  
Mid-occultation observing point 108.022E 24.069N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 89% illuminated at phase= 219 degrees  
02/19/2022 15:43:22.5 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.288  
Global start/end: 02/19/2022 14:05:57.6 and 02/19/2022 17:20:45.7  
Mid-occultation observing point 95.075E 48.616N

Occultation of Porrima 2.74 by moon 89% illuminated at phase= 219 degrees  
02/19/2022 15:43:24.4 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.288  
Global start/end: 02/19/2022 14:06:03.0 and 02/19/2022 17:20:44.1  
Mid-occultation observing point 95.136E 48.666N

Occultation of Zubenelgenubi 2.75 by moon 66% illuminated at phase= 252 degrees  
02/22/2022 05:19:30.3 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.287  
Global start/end: 02/22/2022 03:27:07.1 and 02/22/2022 07:11:51.8  
Mid-occultation observing point 99.803W 20.216N

**---For observations at Journey Museum:**

**02/22/2022 04:19:13.9 Start Total (elev 30 az 175 deg.) -26.2 \*\*\***  
**02/22/2022 04:47:04.6 OCCULTATION MID-POINT (elev 30 az 183 deg.) -21.3 \*\*\***  
**02/22/2022 05:15:06.7 End Total (elev 29 az 191 deg.) -16.2 \*\*\***

Occultation of 42 theta Ophiuchi 3.27 by moon 37% illuminated at phase= 285 degrees  
02/24/2022 19:24:57.4 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.287  
Global start/end: 02/24/2022 17:21:53.9 and 02/24/2022 21:27:59.3  
Mid-occultation observing point 65.866E 44.469S

Occultation of Kaus Borealis 2.82 by moon 26% illuminated at phase= 299 degrees  
02/25/2022 20:26:24.2 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.287  
Global start/end: 02/25/2022 19:30:08.2 and 02/25/2022 21:22:39.7  
Mid-occultation observing point 108.214W 63.469S

Occultation of 27 phi Sagittarii 3.17 by moon 23% illuminated at phase= 303 degrees  
02/26/2022 03:04:54.9 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.287  
Global start/end: 02/26/2022 01:05:37.6 and 02/26/2022 05:04:10.8  
Mid-occultation observing point 26.171W 1.309S

Occultation of Nunki 2.05 by moon 21% illuminated at phase= 305 degrees  
02/26/2022 06:41:59.1 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.287  
Global start/end: 02/26/2022 04:36:53.9 and 02/26/2022 08:47:03.0  
Mid-occultation observing point 77.158W 38.539S  
At Journey Museum, the miss angle is 2970.5 arc-sec at 02/26/2022 05:48:31.6

Occultation of Uranus 5.8 by moon 21% illuminated at phase= 55 degrees  
03/06/2022 23:45:38.4 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.286  
Global start/end: 03/06/2022 22:02:17.4 and 03/07/2022 01:29:04.0  
Mid-occultation observing point 157.079E 37.346S

Occultation of 30 eta Leonis 3.48 by moon 94% illuminated at phase= 153 degrees  
03/15/2022 18:39:10.9 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.285  
Global start/end: 03/15/2022 16:26:50.2 and 03/15/2022 20:51:28.2  
Mid-occultation observing point 41.5W 27.83N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 99% illuminated at phase= 192 degrees  
03/18/2022 22:55:09.3 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.285  
Global start/end: 03/18/2022 21:09:31.4 and 03/19/2022 00:40:44.5  
Mid-occultation observing point 49.314W 39.876N  
At Journey Museum, the miss angle is 260.5 arc-sec at 03/18/2022 21:39:11.3

Occultation of Porrima 2.74 by moon 99% illuminated at phase= 192 degrees  
03/18/2022 22:55:11.2 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.285  
Global start/end: 03/18/2022 21:09:36.0 and 03/19/2022 00:40:43.7  
Mid-occultation observing point 49.283W 39.917N  
At Journey Museum, the miss angle is 262.5 arc-sec at 03/18/2022 21:39:14.3

Occultation of Zubenelgenubi 2.75 by moon 86% illuminated at phase= 224 degrees  
03/21/2022 11:10:13.8 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.284  
Global start/end: 03/21/2022 09:09:22.2 and 03/21/2022 13:11:05.2  
Mid-occultation observing point 140.187E 6.632N

Occultation of Dschubba 2.29 by moon 75% illuminated at phase= 241 degrees  
03/22/2022 17:02:59.8 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.284  
Global start/end: 03/22/2022 16:13:51.0 and 03/22/2022 17:52:08.6  
Mid-occultation observing point 98.123E 63.445N

Occultation of 42 theta Ophiuchi 3.27 by moon 60% illuminated at phase= 258 degrees  
03/24/2022 00:44:33.2 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.284  
Global start/end: 03/23/2022 22:50:44.8 and 03/24/2022 02:38:22.1  
Mid-occultation observing point 46.477W 59.958S

Occultation of 27 phi Sagittarii 3.17 by moon 45% illuminated at phase= 276 degrees  
03/25/2022 08:43:28.0 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.284  
Global start/end: 03/25/2022 06:37:11.4 and 03/25/2022 10:49:44.9  
Mid-occultation observing point 137.44W 15.084S  
At Journey Museum, the miss angle is 1205.6 arc-sec at 03/25/2022 09:49:54.4

Occultation of Nunki 2.05 by moon 44% illuminated at phase= 278 degrees  
03/25/2022 12:24:14.5 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.284  
Global start/end: 03/25/2022 10:23:58.6 and 03/25/2022 14:24:30.9  
Mid-occultation observing point 171.44E 52.358S

Occultation of 40 tau Sagittarii 3.32 by moon 41% illuminated at phase= 280 degrees  
03/25/2022 16:42:34.8 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.284  
Global start/end: 03/25/2022 15:35:16.4 and 03/25/2022 17:49:53.6  
Mid-occultation observing point 100.083E 63.55N

Occultation of Uranus 5.9 by moon 6% illuminated at phase= 29 degrees  
04/03/2022 10:52:03.2 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.283  
Global start/end: 04/03/2022 08:49:54.2 and 04/03/2022 12:54:16.9  
Mid-occultation observing point 46.157W 16.813S  
At Journey Museum, the miss angle is 3366.4 arc-sec at 04/03/2022 10:48:37.9

Occultation of 30 eta Leonis 3.48 by moon 79% illuminated at phase= 126 degrees  
04/12/2022 03:45:59.9 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.283  
Global start/end: 04/12/2022 01:35:54.9 and 04/12/2022 05:55:59.7  
Mid-occultation observing point 158.836E 35.474N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 98% illuminated at phase= 165 degrees  
04/15/2022 08:06:53.7 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.283  
Global start/end: 04/15/2022 06:22:23.0 and 04/15/2022 09:51:19.8  
Mid-occultation observing point 146.462E 40.381N

Occultation of Porrima 2.74 by moon 98% illuminated at phase= 165 degrees  
04/15/2022 08:06:55.6 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.283  
Global start/end: 04/15/2022 06:22:27.6 and 04/15/2022 09:51:19.0  
Mid-occultation observing point 146.495E 40.423N

Occultation of Zubenelgenubi 2.75 by moon 98% illuminated at phase= 197 degrees  
04/17/2022 19:09:08.1 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.282  
Global start/end: 04/17/2022 17:07:28.1 and 04/17/2022 21:10:47.3  
Mid-occultation observing point 8.357W 1.628N

Occultation of Dschubba 2.29 by moon 92% illuminated at phase= 214 degrees  
04/19/2022 00:11:14.0 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.282  
Global start/end: 04/18/2022 22:59:19.0 and 04/19/2022 01:23:09.2  
Mid-occultation observing point 35.649W 63.403N  
At Journey Museum, the miss angle is 428.1 arc-sec at 04/18/2022 23:06:38.8

Occultation of 42 theta Ophiuchi 3.27 by moon 81% illuminated at phase= 231 degrees  
04/20/2022 07:01:11.6 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.282  
Global start/end: 04/20/2022 05:16:46.0 and 04/20/2022 08:45:38.8  
Mid-occultation observing point 175.061W 69.608S

Occultation of 27 phi Sagittarii 3.17 by moon 68% illuminated at phase= 249 degrees  
04/21/2022 14:21:57.0 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.282  
Global start/end: 04/21/2022 12:15:03.9 and 04/21/2022 16:28:51.2  
Mid-occultation observing point 111.279E 24.04S

Occultation of Nunki 2.05 by moon 67% illuminated at phase= 251 degrees  
04/21/2022 17:59:34.7 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.282  
Global start/end: 04/21/2022 16:06:45.4 and 04/21/2022 19:52:26.6  
Mid-occultation observing point 61.955E 62.392S

Occultation of 40 tau Sagittarii 3.32 by moon 65% illuminated at phase= 253 degrees  
04/21/2022 22:14:38.7 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.282  
Global start/end: 04/21/2022 20:47:01.4 and 04/21/2022 23:42:17.9  
Mid-occultation observing point 6.127W 40.008N

Eclipse of the Sun -- Global data; DUTC= 69.184 DUT1= 69.282  
04/30/2022 11:45:22.3 Start Partial Solar  
04/30/2022 13:41:25.9 PARTIAL SOLAR ECLIPSE MID-POINT  
04/30/2022 13:41:26.4 SOLAR ECLIPSE MAXIMUM 54.1%  
04/30/2022 15:37:59.7 End Partial Solar  
Mid-eclipse observing point 69.278W 62.907S  
At Journey Museum, the miss angle is 3047.1 arc-sec at 04/30/2022 15:13:11.7

Occultation of 30 eta Leonis 3.48 by moon 58% illuminated at phase= 99 degrees  
05/09/2022 12:27:51.2 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/09/2022 10:19:05.2 and 05/09/2022 14:36:32.5  
Mid-occultation observing point 4.253E 40.077N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 87% illuminated at phase= 138 degrees  
05/12/2022 18:10:00.6 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/12/2022 16:27:38.9 and 05/12/2022 19:52:16.3  
Mid-occultation observing point 28.538W 43.04N  
At Journey Museum, the miss angle is 667.7 arc-sec at 05/12/2022 16:40:07.6

Occultation of Porrima 2.74 by moon 87% illuminated at phase= 138 degrees  
05/12/2022 18:10:02.5 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/12/2022 16:27:43.8 and 05/12/2022 19:52:15.3  
Mid-occultation observing point 28.498W 43.084N  
At Journey Museum, the miss angle is 669.8 arc-sec at 05/12/2022 16:40:10.1

Occultation of Zubenelgenubi 2.75 by moon 99% illuminated at phase= 171 degrees  
05/15/2022 05:08:41.9 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/15/2022 03:07:44.2 and 05/15/2022 07:09:36.9  
Mid-occultation observing point 174.717E 1.53N

Occultation of Dschubba 2.29 by moon 100% illuminated at phase= 187 degrees  
05/16/2022 09:38:35.6 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/16/2022 08:24:15.7 and 05/16/2022 10:52:54.6  
Mid-occultation observing point 155.629E 63.384N

Occultation of 42 theta Ophiuchi 3.27 by moon 95% illuminated at phase= 205 degrees  
05/17/2022 15:37:19.5 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/17/2022 13:55:27.6 and 05/17/2022 17:19:12.3  
Mid-occultation observing point 27.765E 70.558S

Occultation of 27 phi Sagittarii 3.17 by moon 87% illuminated at phase= 222 degrees  
05/18/2022 21:57:49.5 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/18/2022 19:53:03.4 and 05/19/2022 00:02:36.9  
Mid-occultation observing point 29.574W 25.722S

Occultation of Nunki 2.05 by moon 86% illuminated at phase= 224 degrees  
05/19/2022 01:28:26.6 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/18/2022 23:38:36.3 and 05/19/2022 03:18:20.0  
Mid-occultation observing point 76.955W 63.812S  
At Journey Museum, the miss angle is 4491.3 arc-sec at 05/19/2022 00:34:42.0

Occultation of 40 tau Sagittarii 3.32 by moon 84% illuminated at phase= 227 degrees  
05/19/2022 05:35:24.4 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.281  
Global start/end: 05/19/2022 04:05:02.6 and 05/19/2022 07:05:48.9  
Mid-occultation observing point 142.728W 34.22N

Occultation of Venus -4.0 by moon 11% illuminated at phase= 322 degrees  
05/26/2022 20:02:33.6 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.28  
Global start/end: 05/26/2022 17:34:33.8 and 05/26/2022 22:30:35.2  
Mid-occultation observing point 101.631E 1.226S

Occultation of Uranus 5.9 by moon 3% illuminated at phase= 339 degrees  
05/28/2022 06:52:46.7 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.28  
Global start/end: 05/28/2022 04:37:52.5 and 05/28/2022 09:07:41.7  
Mid-occultation observing point 45.048W 2.556N  
At Journey Museum, the miss angle is 2459.6 arc-sec at 05/28/2022 06:31:36.7

Occultation of 30 eta Leonis 3.48 by moon 35% illuminated at phase= 73 degrees  
06/05/2022 19:52:22.6 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.275  
Global start/end: 06/05/2022 17:40:42.6 and 06/05/2022 22:04:00.2  
Mid-occultation observing point 135.603W 37.209N  
At Journey Museum, the miss angle is 154.9 arc-sec at 06/05/2022 20:20:29.9

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 69% illuminated at phase= 112 degrees  
06/09/2022 03:28:09.7 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.272  
Global start/end: 06/09/2022 01:40:50.9 and 06/09/2022 05:15:22.2  
Mid-occultation observing point 161.756E 39.921N

Occultation of Porrima 2.74 by moon 69% illuminated at phase= 112 degrees  
06/09/2022 03:28:11.7 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.272  
Global start/end: 06/09/2022 01:40:55.7 and 06/09/2022 05:15:21.4  
Mid-occultation observing point 161.788E 39.964N

Occultation of Zubenelgenubi 2.75 by moon 91% illuminated at phase= 144 degrees  
06/11/2022 15:40:33.7 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.27  
Global start/end: 06/11/2022 13:38:05.7 and 06/11/2022 17:42:57.5  
Mid-occultation observing point 10.854W 0.114N

Occultation of Dschubba 2.29 by moon 97% illuminated at phase= 161 degrees  
06/12/2022 20:19:35.7 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.269  
Global start/end: 06/12/2022 19:04:15.9 and 06/12/2022 21:34:53.3  
Mid-occultation observing point 31.756W 63.412N  
At Journey Museum, the miss angle is 410.7 arc-sec at 06/12/2022 19:12:17.9

Occultation of 42 theta Ophiuchi 3.27 by moon 100% illuminated at phase= 178 degrees  
06/14/2022 02:04:04.3 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.268  
Global start/end: 06/14/2022 00:21:28.6 and 06/14/2022 03:46:38.9  
Mid-occultation observing point 153.765W 68.845S  
At Journey Museum, the miss angle is 4917.3 arc-sec at 06/14/2022 02:57:46.9

Occultation of 27 phi Sagittarii 3.17 by moon 98% illuminated at phase= 196 degrees  
06/15/2022 07:46:41.7 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.267  
Global start/end: 06/15/2022 05:43:49.4 and 06/15/2022 09:49:34.8  
Mid-occultation observing point 156.138E 23.268S

Occultation of Nunki 2.05 by moon 98% illuminated at phase= 198 degrees  
06/15/2022 11:11:49.1 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.266  
Global start/end: 06/15/2022 09:20:55.9 and 06/15/2022 13:02:44.1  
Mid-occultation observing point 109.716E 60.056S

Occultation of 40 tau Sagittarii 3.32 by moon 97% illuminated at phase= 200 degrees  
06/15/2022 15:11:46.5 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.266  
Global start/end: 06/15/2022 13:46:24.3 and 06/15/2022 16:37:10.3  
Mid-occultation observing point 45.674E 39.204N

Occultation of Mars 0.5 by moon 33% illuminated at phase= 290 degrees  
06/22/2022 12:06:46.2 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.26  
Global start/end: 06/22/2022 10:25:56.4 and 06/22/2022 13:47:40.2  
Mid-occultation observing point 138.87W 49.496S

Occultation of Uranus 5.8 by moon 15% illuminated at phase= 314 degrees  
06/24/2022 15:15:00.5 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.258  
Global start/end: 06/24/2022 12:56:46.4 and 06/24/2022 17:33:13.6  
Mid-occultation observing point 159.443E 14.046N

Occultation of 30 eta Leonis 3.48 by moon 16% illuminated at phase= 47 degrees  
07/03/2022 02:00:08.1 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.25  
Global start/end: 07/02/2022 23:44:18.4 and 07/03/2022 04:15:57.5  
Mid-occultation observing point 101.073E 28.832N

Occultation of 29 gamma^2 Virginis 2.74 by moon 46% illuminated at phase= 86 degrees  
07/06/2022 10:58:12.3 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.247  
Global start/end: 07/06/2022 08:58:43.9 and 07/06/2022 12:57:35.6  
Mid-occultation observing point 13.615E 29.113N

Occultation of Porrima 2.74 by moon 46% illuminated at phase= 86 degrees  
07/06/2022 10:58:14.3 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.247  
Global start/end: 07/06/2022 08:58:47.9 and 07/06/2022 12:57:35.7  
Mid-occultation observing point 13.633E 29.15N

Occultation of Zubenelgenubi 2.75 by moon 74% illuminated at phase= 118 degrees  
07/09/2022 01:02:18.0 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.244  
Global start/end: 07/08/2022 22:55:18.9 and 07/09/2022 03:09:13.8  
Mid-occultation observing point 178.864E 7.179S

Occultation of Dschubba 2.29 by moon 85% illuminated at phase= 135 degrees  
07/10/2022 06:28:15.1 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.243  
Global start/end: 07/10/2022 05:01:58.5 and 07/10/2022 07:54:27.9  
Mid-occultation observing point 130.673E 42.695N

Occultation of 42 theta Ophiuchi 3.27 by moon 94% illuminated at phase= 152 degrees  
07/11/2022 12:44:51.2 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.241  
Global start/end: 07/11/2022 11:04:51.8 and 07/11/2022 14:24:47.6  
Mid-occultation observing point 14.632E 72.642S

Occultation of 27 phi Sagittarii 3.17 by moon 99% illuminated at phase= 170 degrees  
07/12/2022 18:34:59.9 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.24  
Global start/end: 07/12/2022 16:32:22.4 and 07/12/2022 20:37:37.0  
Mid-occultation observing point 33.02W 22.604S

Occultation of Nunki 2.05 by moon 100% illuminated at phase= 172 degrees  
07/12/2022 21:59:34.7 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.24  
Global start/end: 07/12/2022 20:08:04.0 and 07/12/2022 23:51:04.8  
Mid-occultation observing point 79.249W 58.73S  
At Journey Museum, the miss angle is 4327.2 arc-sec at 07/12/2022 21:13:08.0

Occultation of 40 tau Sagittarii 3.32 by moon 100% illuminated at phase= 174 degrees  
07/13/2022 01:57:48.3 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.24  
Global start/end: 07/13/2022 00:35:08.0 and 07/13/2022 03:20:28.4  
Mid-occultation observing point 143.449W 42.892N

---For observations at Journey Museum:

07/13/2022 02:26:17.0 Start Total (elev 9 az 217 deg.) -16.0 \*\*\*  
07/13/2022 02:53:32.5 OCCULTATION MID-POINT (elev 5 az 222 deg.) -13.0 \*\*\*  
07/13/2022 03:19:54.0 End Total (elev 2 az 227 deg.) -9.7 \*\*\*

Occultation of Mars 0.3 by moon 39% illuminated at phase= 282 degrees  
07/21/2022 08:55:04.0 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.231  
Global start/end: 07/21/2022 07:33:43.2 and 07/21/2022 10:16:27.6  
Mid-occultation observing point 100.464E 62.808N

Occultation of Uranus 5.8 by moon 34% illuminated at phase= 289 degrees  
07/21/2022 23:11:20.8 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.23  
Global start/end: 07/21/2022 20:55:45.8 and 07/22/2022 01:26:57.4  
Mid-occultation observing point 7.527E 30.08N

Occultation of 30 eta Leonis 3.48 by moon 3% illuminated at phase= 21 degrees  
07/30/2022 07:40:09.5 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.221  
Global start/end: 07/30/2022 05:23:04.0 and 07/30/2022 09:57:15.3  
Mid-occultation observing point 14.318W 21.059N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 25% illuminated at phase= 60 degrees  
08/02/2022 16:48:45.0 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.218  
Global start/end: 08/02/2022 14:39:11.8 and 08/02/2022 18:58:16.3  
Mid-occultation observing point 109.068W 15.656N  
At Journey Museum, the miss angle is 253.8 arc-sec at 08/02/2022 16:14:24.8

Occultation of Porrima 2.74 by moon 25% illuminated at phase= 60 degrees  
08/02/2022 16:48:47.1 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.218  
Global start/end: 08/02/2022 14:39:14.9 and 08/02/2022 18:58:17.2  
Mid-occultation observing point 109.057W 15.69N  
At Journey Museum, the miss angle is 251.9 arc-sec at 08/02/2022 16:14:28.8

Occultation of Zubenelgenubi 2.75 by moon 52% illuminated at phase= 92 degrees  
08/05/2022 08:16:21.4 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.215  
Global start/end: 08/05/2022 06:06:25.3 and 08/05/2022 10:26:16.0  
Mid-occultation observing point 38.214E 19.946S

Occultation of Dschubba 2.29 by moon 66% illuminated at phase= 109 degrees  
08/06/2022 14:40:26.7 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.214  
Global start/end: 08/06/2022 12:55:40.9 and 08/06/2022 16:25:07.8  
Mid-occultation observing point 27.278W 22.749N

Occultation of 42 theta Ophiuchi 3.27 by moon 80% illuminated at phase= 126 degrees  
08/07/2022 21:58:06.0 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.212  
Global start/end: 08/07/2022 20:31:05.5 and 08/07/2022 23:25:03.5  
Mid-occultation observing point 123.061E 82.568S  
At Journey Museum, the miss angle is 5685.6 arc-sec at 08/07/2022 22:42:48.9

Occultation of 27 phi Sagittarii 3.17 by moon 90% illuminated at phase= 144 degrees  
08/09/2022 04:37:00.6 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.211  
Global start/end: 08/09/2022 02:32:41.1 and 08/09/2022 06:41:19.0  
Mid-occultation observing point 149.596E 27.945S

Occultation of Nunki 2.05 by moon 91% illuminated at phase= 146 degrees  
08/09/2022 08:06:18.9 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.211  
Global start/end: 08/09/2022 06:18:03.9 and 08/09/2022 09:54:31.7  
Mid-occultation observing point 103.511E 65.088S

Occultation of 40 tau Sagittarii 3.32 by moon 93% illuminated at phase= 148 degrees  
08/09/2022 12:08:51.5 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.211  
Global start/end: 08/09/2022 10:38:39.1 and 08/09/2022 13:39:02.3  
Mid-occultation observing point 37.445E 33.433N

Occultation of Uranus 5.7 by moon 56% illuminated at phase= 263 degrees  
08/18/2022 07:14:29.9 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.202  
Global start/end: 08/18/2022 05:11:40.7 and 08/18/2022 09:17:24.0  
Mid-occultation observing point 151.504W 48.27N



Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 8% illuminated at phase= 34 degrees  
08/29/2022 22:16:55.7 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.19  
Global start/end: 08/29/2022 20:04:19.6 and 08/30/2022 00:29:31.8  
Mid-occultation observing point 136.654E 5.409N

Occultation of Porrima 2.74 by moon 8% illuminated at phase= 34 degrees  
08/29/2022 22:16:57.8 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.19  
Global start/end: 08/29/2022 20:04:22.1 and 08/30/2022 00:29:33.5  
Mid-occultation observing point 136.662E 5.441N

Occultation of Zubenelgenubi 2.75 by moon 30% illuminated at phase= 66 degrees  
09/01/2022 13:49:48.8 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.187  
Global start/end: 09/01/2022 11:43:22.4 and 09/01/2022 15:56:13.5  
Mid-occultation observing point 78.786W 33.697S  
At Journey Museum, the miss angle is 1907.5 arc-sec at 09/01/2022 12:08:47.1

Occultation of Dschubba 2.29 by moon 44% illuminated at phase= 82 degrees  
09/02/2022 20:45:23.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.187  
Global start/end: 09/02/2022 18:45:46.3 and 09/02/2022 22:44:58.0  
Mid-occultation observing point 150.378W 5.323N

Occultation of 42 theta Ophiuchi 3.27 by moon 59% illuminated at phase= 100 degrees  
09/04/2022 04:54:16.4 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.186  
Global start/end: 09/04/2022 04:02:42.7 and 09/04/2022 05:45:49.3  
Mid-occultation observing point 64.354W 62.845S

Occultation of 27 phi Sagittarii 3.17 by moon 73% illuminated at phase= 117 degrees  
09/05/2022 12:33:16.7 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.185  
Global start/end: 09/05/2022 10:28:20.6 and 09/05/2022 14:38:10.8  
Mid-occultation observing point 4.026E 38.856S

Occultation of Nunki 2.05 by moon 75% illuminated at phase= 119 degrees  
09/05/2022 16:09:45.5 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.185  
Global start/end: 09/05/2022 14:32:43.9 and 09/05/2022 17:46:44.8  
Mid-occultation observing point 33.305W 80.929S

Occultation of 40 tau Sagittarii 3.32 by moon 76% illuminated at phase= 122 degrees  
09/05/2022 20:19:55.0 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.185  
Global start/end: 09/05/2022 18:35:17.8 and 09/05/2022 22:04:30.0  
Mid-occultation observing point 111.203W 17.847N

**---For observations at Journey Museum:**

**09/05/2022 20:16:55.7 Start Total (elev 18 az 184 deg.) -20.2 \*\*\***  
**09/05/2022 20:40:36.7 OCCULTATION MID-POINT (elev 18 az 189 deg.) -23.7 \*\*\***  
**09/05/2022 21:04:01.2 End Total (elev 17 az 195 deg.) -27.0 \*\*\***

Occultation of Uranus 5.7 by moon 78% illuminated at phase= 237 degrees  
09/14/2022 15:26:23.0 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.181  
Global start/end: 09/14/2022 13:40:23.7 and 09/14/2022 17:12:27.7  
Mid-occultation observing point 38.361E 62.335N

Occultation of 30 eta Leonis 3.48 by moon 8% illuminated at phase= 328 degrees  
09/22/2022 21:25:55.0 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.177  
Global start/end: 09/22/2022 19:09:53.4 and 09/22/2022 23:41:54.1  
Mid-occultation observing point 86.606E 23.524N

Occultation of Zubenelgenubi 2.75 by moon 11% illuminated at phase= 39 degrees  
09/28/2022 19:26:37.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.174  
Global start/end: 09/28/2022 17:26:52.1 and 09/28/2022 21:26:21.7  
Mid-occultation observing point 164.09E 42.839S

Occultation of Dschubba 2.29 by moon 22% illuminated at phase= 56 degrees  
09/30/2022 02:06:01.8 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.173  
Global start/end: 09/30/2022 00:00:36.2 and 09/30/2022 04:11:27.0  
Mid-occultation observing point 99.563E 6.248S

Occultation of 27 phi Sagittarii 3.17 by moon 51% illuminated at phase= 91 degrees  
10/02/2022 18:24:44.2 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.173  
Global start/end: 10/02/2022 16:23:11.4 and 10/02/2022 20:26:16.2  
Mid-occultation observing point 110.031W 50.473S  
At Journey Museum, the miss angle is 3751.8 arc-sec at 10/02/2022 18:57:24.1

Occultation of Nunki 2.05 by moon 53% illuminated at phase= 93 degrees  
10/02/2022 22:05:43.0 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.173  
Global start/end: 10/02/2022 20:48:16.6 and 10/02/2022 23:23:08.9  
Mid-occultation observing point 9.555E 62.491S

Occultation of 40 tau Sagittarii 3.32 by moon 55% illuminated at phase= 95 degrees  
10/03/2022 02:21:09.6 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.173  
Global start/end: 10/03/2022 00:25:11.7 and 10/03/2022 04:17:06.7  
Mid-occultation observing point 132.465E 4.617N

Occultation of Uranus 5.7 by moon 94% illuminated at phase= 209 degrees  
10/11/2022 23:11:40.0 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.172  
Global start/end: 10/11/2022 21:31:17.6 and 10/12/2022 00:52:07.0  
Mid-occultation observing point 114.9W 65.205N

**---For observations at Journey Museum:**

10/11/2022 22:14:25.3 Start Partial (elev 40 az 107 deg.) -48.9 \*\*\*  
10/11/2022 22:14:36.7 Start Total (elev 40 az 107 deg.) -48.9 \*\*\*  
10/11/2022 22:39:29.4 OCCULTATION MID-POINT (elev 45 az 113 deg.) -51.1 \*\*\*  
10/11/2022 23:05:09.6 End Total (elev 49 az 120 deg.) -52.6 \*\*\*  
10/11/2022 23:05:21.6 End Partial (elev 49 az 120 deg.) -52.6 \*\*\*

Occultation of 30 eta Leonis 3.48 by moon 24% illuminated at phase= 301 degrees  
10/20/2022 05:57:04.0 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.172  
Global start/end: 10/20/2022 03:41:56.5 and 10/20/2022 08:12:07.9  
Mid-occultation observing point 65.178W 29.558N

**---For observations at Journey Museum:**

10/20/2022 04:02:12.5 Start Total (elev 32 az 98 deg.) -24.3 \*\*\*  
10/20/2022 04:38:39.3 OCCULTATION MID-POINT (elev 39 az 105 deg.) -17.9 \*\*\*  
10/20/2022 05:16:49.0 End Total (elev 45 az 114 deg.) -11.0 \*\*\*

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 3% illuminated at phase= 340 degrees  
10/23/2022 13:30:37.2 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.172  
Global start/end: 10/23/2022 11:19:19.6 and 10/23/2022 15:41:52.3  
Mid-occultation observing point 146.95W 2.751N  
At Journey Museum, the miss angle is 1792.3 arc-sec at 10/23/2022 13:35:56.9

Occultation of Porrima 2.74 by moon 3% illuminated at phase= 340 degrees  
10/23/2022 13:30:39.2 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.172  
Global start/end: 10/23/2022 11:19:21.9 and 10/23/2022 15:41:54.1  
Mid-occultation observing point 146.942W 2.783N  
At Journey Museum, the miss angle is 1790.3 arc-sec at 10/23/2022 13:36:00.2

Eclipse of the Sun -- Global data; DUTC= 69.184 DUT1= 69.171  
10/25/2022 01:58:21.8 Start Partial Solar  
10/25/2022 04:00:11.0 PARTIAL SOLAR ECLIPSE MID-POINT  
10/25/2022 04:00:11.5 SOLAR ECLIPSE MAXIMUM 82.1%  
10/25/2022 06:02:15.7 End Partial Solar  
Mid-eclipse observing point 79.788E 62.327N

Occultation of Zubenelgenubi 2.75 by moon 1% illuminated at phase= 12 degrees  
10/26/2022 02:55:07.2 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.171  
Global start/end: 10/26/2022 00:58:35.5 and 10/26/2022 04:51:36.7  
Mid-occultation observing point 23.239E 45.016S

Occultation of Dschubba 2.29 by moon 6% illuminated at phase= 29 degrees  
10/27/2022 08:49:03.3 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.171  
Global start/end: 10/27/2022 06:43:56.7 and 10/27/2022 10:54:09.9  
Mid-occultation observing point 29.168W 10.298S

Occultation of 27 phi Sagittarii 3.17 by moon 28% illuminated at phase= 64 degrees  
10/29/2022 23:53:38.3 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.171  
Global start/end: 10/29/2022 21:56:05.9 and 10/30/2022 01:51:12.0  
Mid-occultation observing point 141.333E 56.196S

Occultation of Nunki 2.05 by moon 30% illuminated at phase= 66 degrees  
10/30/2022 03:32:31.9 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.171  
Global start/end: 10/30/2022 02:28:36.2 and 10/30/2022 04:36:28.2  
Mid-occultation observing point 98.931W 62.488S

Occultation of 40 tau Sagittarii 3.32 by moon 31% illuminated at phase= 68 degrees  
10/30/2022 07:46:00.5 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.171  
Global start/end: 10/30/2022 05:46:38.4 and 10/30/2022 09:45:23.9  
Mid-occultation observing point 24.81E 1.542S

Occultation of Uranus 5.6 by moon 100% illuminated at phase= 181 degrees  
11/08/2022 05:39:47.0 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.171  
Global start/end: 11/08/2022 03:51:33.2 and 11/08/2022 07:28:04.1  
Mid-occultation observing point 134.757E 58.86N

Occultation of 30 eta Leonis 3.48 by moon 47% illuminated at phase= 274 degrees  
11/16/2022 14:32:32.0 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.171  
Global start/end: 11/16/2022 12:16:32.3 and 11/16/2022 16:48:29.5  
Mid-occultation observing point 139.427E 30.374N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 16% illuminated at phase= 313 degrees  
11/19/2022 23:18:39.7 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.17  
Global start/end: 11/19/2022 21:06:24.4 and 11/20/2022 01:30:52.1  
Mid-occultation observing point 39.062E 2.818N

Occultation of Porrima 2.74 by moon 16% illuminated at phase= 313 degrees  
11/19/2022 23:18:41.7 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.17  
Global start/end: 11/19/2022 21:06:26.8 and 11/20/2022 01:30:53.9  
Mid-occultation observing point 39.07E 2.85N

Occultation of Zubenelgenubi 2.75 by moon 2% illuminated at phase= 345 degrees  
11/22/2022 12:41:40.8 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.17  
Global start/end: 11/22/2022 10:45:26.4 and 11/22/2022 14:37:50.6  
Mid-occultation observing point 150.034W 44.595S  
At Journey Museum, the miss angle is 4137.3 arc-sec at 11/22/2022 12:27:36.5

Occultation of 27 phi Sagittarii 3.17 by moon 10% illuminated at phase= 36 degrees  
11/26/2022 07:16:42.6 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.17  
Global start/end: 11/26/2022 05:19:49.5 and 11/26/2022 09:13:37.3  
Mid-occultation observing point 3.472E 53.85S

Occultation of Nunki 2.05 by moon 11% illuminated at phase= 38 degrees  
11/26/2022 10:48:39.2 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.17  
Global start/end: 11/26/2022 09:38:35.2 and 11/26/2022 11:58:44.0  
Mid-occultation observing point 125.075E 62.467S

Occultation of 40 tau Sagittarii 3.32 by moon 12% illuminated at phase= 41 degrees  
11/26/2022 14:54:03.3 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.17  
Global start/end: 11/26/2022 12:57:40.4 and 11/26/2022 16:50:28.2  
Mid-occultation observing point 109.231W 0.082N  
At Journey Museum, the miss angle is 704.8 arc-sec at 11/26/2022 15:15:32.2

Occultation of Uranus 5.7 by moon 94% illuminated at phase= 152 degrees  
12/05/2022 10:31:31.2 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.17  
Global start/end: 12/05/2022 08:35:44.0 and 12/05/2022 12:27:20.7  
Mid-occultation observing point 42.674E 52.479N

Occultation of Mars -1.9 by moon 100% illuminated at phase= 180 degrees  
12/07/2022 21:14:11.6 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.169  
Global start/end: 12/07/2022 19:16:27.7 and 12/07/2022 23:11:57.6  
Mid-occultation observing point 77.825W 60.338N

**---For observations at Journey Museum:**

**12/07/2022 19:51:29.9 Start Partial (elev 40 az 92 deg.) -38.1 \*\*\***  
**12/07/2022 19:52:08.4 Start Total (elev 40 az 92 deg.) -38.2 \*\*\***  
**12/07/2022 20:24:33.4 OCCULTATION MID-POINT (elev 46 az 98 deg.) -44.0 \*\*\***  
**12/07/2022 20:58:31.7 End Total (elev 52 az 106 deg.) -49.9 \*\*\***  
**12/07/2022 20:59:13.9 End Partial (elev 52 az 106 deg.) -50.0 \*\*\***

Occultation of 30 eta Leonis 3.48 by moon 70% illuminated at phase= 246 degrees  
12/13/2022 22:11:49.3 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.168  
Global start/end: 12/13/2022 19:52:56.5 and 12/14/2022 00:30:42.5  
Mid-occultation observing point 5.915W 23.037N

Occultation of 29 gamma^2 Virginis 2.74 by moon 37% illuminated at phase= 285 degrees  
12/17/2022 08:40:01.6 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.168  
Global start/end: 12/17/2022 06:25:32.2 and 12/17/2022 10:54:29.4  
Mid-occultation observing point 131.743W 3.897S  
At Journey Museum, the miss angle is 1827.8 arc-sec at 12/17/2022 08:12:48.4

Occultation of Porrima 2.74 by moon 37% illuminated at phase= 285 degrees  
12/17/2022 08:40:03.7 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.168  
Global start/end: 12/17/2022 06:25:34.2 and 12/17/2022 10:54:31.7  
Mid-occultation observing point 131.734W 3.864S  
At Journey Museum, the miss angle is 1825.9 arc-sec at 12/17/2022 08:12:52.6

Occultation of Zubenelgenubi 2.75 by moon 13% illuminated at phase= 317 degrees  
12/19/2022 23:25:30.0 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.168  
Global start/end: 12/19/2022 21:32:00.8 and 12/20/2022 01:18:52.6  
Mid-occultation observing point 17.906E 49.224S

Occultation of Dschubba 2.29 by moon 5% illuminated at phase= 333 degrees  
12/21/2022 05:01:06.0 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.168  
Global start/end: 12/21/2022 02:56:47.6 and 12/21/2022 07:05:21.2  
Mid-occultation observing point 26.683W 11.832S

Occultation of 40 tau Sagittarii 3.32 by moon 1% illuminated at phase= 13 degrees  
12/24/2022 00:48:22.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.167  
Global start/end: 12/23/2022 22:56:36.1 and 12/24/2022 02:40:09.3  
Mid-occultation observing point 74.805E 4.557N

Occultation of Uranus 5.7 by moon 78% illuminated at phase= 124 degrees  
01/01/2023 14:45:37.8 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.166  
Global start/end: 01/01/2023 12:52:42.4 and 01/01/2023 16:38:36.1  
Mid-occultation observing point 52.934W 55.715N

Occultation of Mars -1.1 by moon 91% illuminated at phase= 146 degrees  
01/03/2023 12:52:00.3 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.166  
Global start/end: 01/03/2023 10:50:40.6 and 01/03/2023 14:53:22.1  
Mid-occultation observing point 33.145E 9.764S

Occultation of 30 eta Leonis 3.48 by moon 89% illuminated at phase= 218 degrees  
01/10/2023 04:40:57.6 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 01/10/2023 02:22:03.5 and 01/10/2023 06:59:53.1  
Mid-occultation observing point 134.797W 11.998N  
At Journey Museum, the miss angle is 1364.5 arc-sec at 01/10/2023 04:41:30.0

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 62% illuminated at phase= 257 degrees  
01/13/2023 16:12:22.2 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 01/13/2023 14:00:11.4 and 01/13/2023 18:24:30.1  
Mid-occultation observing point 80.879E 17.603S

Occultation of Porrima 2.74 by moon 62% illuminated at phase= 257 degrees  
01/13/2023 16:12:24.4 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 01/13/2023 14:00:12.6 and 01/13/2023 18:24:33.3  
Mid-occultation observing point 80.89E 17.568S

Occultation of Zubenelgenubi 2.75 by moon 34% illuminated at phase= 289 degrees  
01/16/2023 08:56:28.6 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 01/16/2023 07:16:41.3 and 01/16/2023 10:36:10.0  
Mid-occultation observing point 174.947W 63.405S  
At Journey Museum, the miss angle is 5087.4 arc-sec at 01/16/2023 08:29:54.7

Occultation of Dschubba 2.29 by moon 21% illuminated at phase= 305 degrees  
01/17/2023 15:28:48.8 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 01/17/2023 13:20:59.1 and 01/17/2023 17:36:36.9  
Mid-occultation observing point 146.659E 21.103S

Occultation of 27 phi Sagittarii 3.17 by moon 3% illuminated at phase= 340 degrees  
01/20/2023 04:52:18.4 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 01/20/2023 02:55:26.5 and 01/20/2023 06:49:07.5  
Mid-occultation observing point 14.46W 51.153S

Occultation of Nunki 2.05 by moon 2% illuminated at phase= 342 degrees  
01/20/2023 08:18:57.2 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 01/20/2023 07:01:18.9 and 01/20/2023 09:36:33.8  
Mid-occultation observing point 104.323E 71.306S

Occultation of 40 tau Sagittarii 3.32 by moon 2% illuminated at phase= 345 degrees  
01/20/2023 12:15:53.6 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 01/20/2023 10:23:54.0 and 01/20/2023 14:07:50.9  
Mid-occultation observing point 124.237W 4.079N  
At Journey Museum, the miss angle is 271.4 arc-sec at 01/20/2023 13:01:48.1

Occultation of Uranus 5.7 by moon 55% illuminated at phase= 96 degrees  
01/28/2023 20:27:58.2 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.161  
Global start/end: 01/28/2023 18:56:45.5 and 01/28/2023 21:59:14.8  
Mid-occultation observing point 145.271E 68.801N  
At Journey Museum, the miss angle is 1281.6 arc-sec at 01/28/2023 21:47:09.2

Occultation of Mars -0.3 by moon 74% illuminated at phase= 119 degrees  
01/30/2023 21:27:44.3 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.161  
Global start/end: 01/30/2023 19:08:05.8 and 01/30/2023 23:47:23.3  
Mid-occultation observing point 127.516W 18.462N  
At Journey Museum, the miss angle is 410.8 arc-sec at 01/30/2023 22:25:37.0

Occultation of 30 eta Leonis 3.48 by moon 99% illuminated at phase= 191 degrees  
02/06/2023 10:40:40.1 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 02/06/2023 08:24:03.0 and 02/06/2023 12:57:16.9  
Mid-occultation observing point 105.633E 5.083N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 83% illuminated at phase= 229 degrees  
02/09/2023 22:06:16.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 02/09/2023 20:04:48.3 and 02/10/2023 00:07:42.5  
Mid-occultation observing point 44.386W 32.64S

Occultation of Porrima 2.74 by moon 83% illuminated at phase= 229 degrees  
02/09/2023 22:06:18.8 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 02/09/2023 20:04:48.4 and 02/10/2023 00:07:46.9  
Mid-occultation observing point 44.365W 32.601S

Occultation of Zubenelgenubi 2.75 by moon 58% illuminated at phase= 261 degrees  
02/12/2023 16:02:03.2 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 02/12/2023 15:00:19.4 and 02/12/2023 17:03:45.0  
Mid-occultation observing point 32.018W 62.489S

Occultation of Dschubba 2.29 by moon 43% illuminated at phase= 278 degrees  
02/13/2023 23:35:54.9 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 02/13/2023 21:27:49.3 and 02/14/2023 01:43:57.0  
Mid-occultation observing point 7.121W 35.922S

Occultation of 27 phi Sagittarii 3.17 by moon 16% illuminated at phase= 313 degrees  
02/16/2023 15:13:17.9 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 02/16/2023 13:20:54.5 and 02/16/2023 17:05:36.9  
Mid-occultation observing point 164.741E 61.531S

Occultation of Nunki 2.05 by moon 15% illuminated at phase= 315 degrees  
02/16/2023 18:46:26.1 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 02/16/2023 17:51:49.1 and 02/16/2023 19:41:01.7  
Mid-occultation observing point 76.965W 62.393S

Occultation of 40 tau Sagittarii 3.32 by moon 13% illuminated at phase= 317 degrees  
02/16/2023 22:49:35.1 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 02/16/2023 20:50:59.3 and 02/17/2023 00:48:07.1  
Mid-occultation observing point 50.802E 4.198S

Occultation of Jupiter -2.1 by moon 10% illuminated at phase= 37 degrees  
02/22/2023 15:56:52.1 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 02/22/2023 14:45:10.4 and 02/22/2023 17:08:37.3  
Mid-occultation observing point 39.964W 62.493S

Occultation of Uranus 5.8 by moon 32% illuminated at phase= 69 degrees  
02/25/2023 05:12:46.7 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 02/25/2023 04:42:56.4 and 02/25/2023 05:42:37.7  
Mid-occultation observing point 61.791W 62.348N

Occultation of Mars 0.4 by moon 58% illuminated at phase= 99 degrees  
02/27/2023 21:11:32.9 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 02/27/2023 20:11:34.7 and 02/27/2023 22:11:32.6  
Mid-occultation observing point 56.23E 62.264N

Occultation of 30 eta Leonis 3.48 by moon 98% illuminated at phase= 163 degrees  
03/05/2023 17:05:59.1 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 03/05/2023 14:49:11.7 and 03/05/2023 19:22:44.6  
Mid-occultation observing point 17.157W 6.256N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 96% illuminated at phase= 202 degrees  
03/09/2023 03:50:57.2 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 03/09/2023 01:59:34.9 and 03/09/2023 05:42:17.3  
Mid-occultation observing point 165.594W 41.594S  
At Journey Museum, the miss angle is 4235.0 arc-sec at 03/09/2023 03:18:20.7

Occultation of Porrima 2.74 by moon 96% illuminated at phase= 202 degrees  
03/09/2023 03:50:59.4 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 03/09/2023 01:59:34.2 and 03/09/2023 05:42:22.4  
Mid-occultation observing point 165.558W 41.551S  
At Journey Museum, the miss angle is 4233.0 arc-sec at 03/09/2023 03:18:25.2

Occultation of Dschubba 2.29 by moon 67% illuminated at phase= 250 degrees  
03/13/2023 05:28:58.2 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 03/13/2023 03:27:01.7 and 03/13/2023 07:30:51.9  
Mid-occultation observing point 129.187W 49.692S  
At Journey Museum, the miss angle is 3862.7 arc-sec at 03/13/2023 04:54:39.2

Occultation of 20 sigma Scorpii 2.9 by moon 63% illuminated at phase= 255 degrees  
03/13/2023 15:02:39.0 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 03/13/2023 14:28:25.5 and 03/13/2023 15:36:52.0  
Mid-occultation observing point 134.522E 62.333N

Occultation of 27 phi Sagittarii 3.17 by moon 37% illuminated at phase= 285 degrees  
03/15/2023 22:54:40.9 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 03/15/2023 21:12:57.8 and 03/16/2023 00:36:20.5  
Mid-occultation observing point 28.733E 77.455S

Occultation of 40 tau Sagittarii 3.32 by moon 33% illuminated at phase= 289 degrees  
03/16/2023 06:47:26.1 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 03/16/2023 04:42:01.4 and 03/16/2023 08:52:48.4  
Mid-occultation observing point 94.79W 15.071S  
At Journey Museum, the miss angle is 1640.2 arc-sec at 03/16/2023 06:41:50.5

Occultation of Jupiter -2.1 by moon 2% illuminated at phase= 15 degrees  
03/22/2023 13:21:10.2 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.159  
Global start/end: 03/22/2023 11:20:57.9 and 03/22/2023 15:21:27.4  
Mid-occultation observing point 95.746W 19.847S  
At Journey Museum, the miss angle is 2278.7 arc-sec at 03/22/2023 14:32:27.0

Occultation of Venus -4.0 by moon 9% illuminated at phase= 35 degrees  
03/24/2023 03:31:53.8 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 03/24/2023 01:09:34.7 and 03/24/2023 05:54:18.7  
Mid-occultation observing point 59.271E 9.628N

Occultation of 30 eta Leonis 3.48 by moon 86% illuminated at phase= 136 degrees  
04/02/2023 00:24:54.9 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 04/01/2023 22:06:30.2 and 04/02/2023 02:43:17.4  
Mid-occultation observing point 151.653W 11.601N  
At Journey Museum, the miss angle is 1792.9 arc-sec at 04/02/2023 00:42:12.0

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 100% illuminated at phase= 175 deg.  
04/05/2023 10:45:49.5 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 04/05/2023 08:55:55.3 and 04/05/2023 12:35:40.1  
Mid-occultation observing point 62.976E 42.213S

Occultation of Porrima 2.74 by moon 100% illuminated at phase= 175 degrees  
04/05/2023 10:45:51.7 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 04/05/2023 08:55:54.6 and 04/05/2023 12:35:45.3  
Mid-occultation observing point 63.014E 42.169S

Occultation of Dschubba 2.29 by moon 86% illuminated at phase= 223 degrees  
04/09/2023 11:01:07.5 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.161  
Global start/end: 04/09/2023 09:04:55.3 and 04/09/2023 12:57:18.1  
Mid-occultation observing point 115.935E 56.151S

Occultation of 20 sigma Scorpii 2.9 by moon 83% illuminated at phase= 228 degrees  
04/09/2023 20:30:17.7 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.161  
Global start/end: 04/09/2023 19:27:38.7 and 04/09/2023 21:32:55.8  
Mid-occultation observing point 25.829E 62.322N

Occultation of 27 phi Sagittarii 3.17 by moon 60% illuminated at phase= 258 degrees  
04/12/2023 04:33:04.2 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.161  
Global start/end: 04/12/2023 03:01:26.7 and 04/12/2023 06:04:40.3  
Mid-occultation observing point 12.273E 87.622S  
At Journey Museum, the miss angle is 5535.3 arc-sec at 04/12/2023 04:05:16.7

Occultation of 40 tau Sagittarii 3.32 by moon 57% illuminated at phase= 263 degrees  
04/12/2023 12:33:09.8 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.161  
Global start/end: 04/12/2023 10:25:13.4 and 04/12/2023 14:41:06.0  
Mid-occultation observing point 152.49E 21.684S

Eclipse of the Sun -- Global data; DUTC= 69.184 DUT1= 69.162  
04/19/2023 18:34:25.4 Start Partial Solar  
04/19/2023 19:37:07.9 Start Annular Solar  
04/19/2023 19:37:18.9 Start Total Solar  
04/19/2023 21:16:44.2 TOTAL SOLAR ECLIPSE MID-POINT  
04/19/2023 22:55:30.9 End Total Solar  
04/19/2023 22:56:40.7 End Annular Solar  
04/19/2023 23:59:20.9 End Partial Solar  
Mid-eclipse observing point 125.772E 9.607S

Occultation of 30 eta Leonis 3.48 by moon 66% illuminated at phase= 109 degrees  
04/29/2023 08:25:44.7 Geocentric minimum <0.05 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 04/29/2023 06:06:26.3 and 04/29/2023 10:45:01.8  
Mid-occultation observing point 62.129E 13.833N

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 92% illuminated at phase= 148 degrees  
05/02/2023 19:03:39.5 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 05/02/2023 17:12:27.3 and 05/02/2023 20:54:46.7  
Mid-occultation observing point 87.273W 41.098S  
At Journey Museum, the miss angle is 2538.0 arc-sec at 05/02/2023 17:18:04.0

Occultation of Porrima 2.74 by moon 92% illuminated at phase= 148 degrees  
05/02/2023 19:03:41.7 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 05/02/2023 17:12:26.6 and 05/02/2023 20:54:51.8  
Mid-occultation observing point 87.237W 41.055S  
At Journey Museum, the miss angle is 2535.8 arc-sec at 05/02/2023 17:18:06.6

Occultation of Dschubba 2.29 by moon 98% illuminated at phase= 197 degrees  
05/06/2023 18:02:05.3 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 05/06/2023 16:06:51.5 and 05/06/2023 19:57:16.8  
Mid-occultation observing point 15.701W 55.595S

Occultation of 20 sigma Scorpii 2.9 by moon 96% illuminated at phase= 202 degrees  
05/07/2023 03:18:43.4 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 05/07/2023 02:15:36.6 and 05/07/2023 04:21:49.1  
Mid-occultation observing point 103.168W 62.335N

**---For observations at Journey Museum:**

**05/07/2023 03:07:24.4 Start Total (elev 16 az 206 deg.) -14.3 \*\*\***  
**05/07/2023 03:38:21.3 OCCULTATION MID-POINT (elev 13 az 213 deg.) -9.9 \*\*\***  
**05/07/2023 04:08:28.2 End Total (elev 10 az 219 deg.) -5.3 \*\*\***



Occultation of 27 phi Sagittarii 3.17 by moon 81% illuminated at phase= 232 degrees  
05/09/2023 10:15:04.2 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 05/09/2023 08:42:47.4 and 05/09/2023 11:47:20.8  
Mid-occultation observing point 143.884W 87.391S

Occultation of 40 tau Sagittarii 3.32 by moon 78% illuminated at phase= 236 degrees  
05/09/2023 18:08:43.4 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 05/09/2023 16:01:49.2 and 05/09/2023 20:15:38.4  
Mid-occultation observing point 41.705E 21.084S

Occultation of Jupiter -2.1 by moon 5% illuminated at phase= 334 degrees  
05/17/2023 05:40:01.1 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.165  
Global start/end: 05/17/2023 03:52:05.0 and 05/17/2023 07:27:59.4  
Mid-occultation observing point 68.006W 51.673N

Occultation of 30 eta Leonis 3.48 by moon 44% illuminated at phase= 83 degrees  
05/26/2023 16:29:53.1 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.166  
Global start/end: 05/26/2023 14:10:59.1 and 05/26/2023 18:48:47.0  
Mid-occultation observing point 87.944W 8.796N  
At Journey Museum, the miss angle is 566.8 arc-sec at 05/26/2023 15:22:33.3

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 76% illuminated at phase= 122 degrees  
05/30/2023 03:58:34.3 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.167  
Global start/end: 05/30/2023 02:12:31.8 and 05/30/2023 05:44:31.5  
Mid-occultation observing point 106.063E 46.301S

Occultation of Porrima 2.74 by moon 76% illuminated at phase= 122 degrees  
05/30/2023 03:58:36.5 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.167  
Global start/end: 05/30/2023 02:12:30.7 and 05/30/2023 05:44:37.1  
Mid-occultation observing point 106.115E 46.254S

Occultation of Dschubba 2.29 by moon 99% illuminated at phase= 170 degrees  
06/03/2023 02:57:57.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.167  
Global start/end: 06/03/2023 01:02:48.7 and 06/03/2023 04:53:02.1  
Mid-occultation observing point 175.794W 54.755S

Occultation of 20 sigma Scorpii 2.9 by moon 100% illuminated at phase= 175 degrees  
06/03/2023 12:05:38.1 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.167  
Global start/end: 06/03/2023 11:04:59.5 and 06/03/2023 13:06:15.2  
Mid-occultation observing point 97.963E 62.388N

Occultation of 27 phi Sagittarii 3.17 by moon 95% illuminated at phase= 205 degrees  
06/05/2023 17:45:28.7 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.166  
Global start/end: 06/05/2023 16:06:51.2 and 06/05/2023 19:24:05.7  
Mid-occultation observing point 27.388E 79.011S

Occultation of 40 tau Sagittarii 3.32 by moon 93% illuminated at phase= 210 degrees  
06/06/2023 01:25:54.9 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.166  
Global start/end: 06/05/2023 23:22:00.4 and 06/06/2023 03:29:50.0  
Mid-occultation observing point 94.952W 16.11S  
At Journey Museum, the miss angle is 1719.8 arc-sec at 06/06/2023 01:21:30.4

Occultation of 30 eta Leonis 3.48 by moon 22% illuminated at phase= 57 degrees  
06/22/2023 23:58:01.3 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.164  
Global start/end: 06/22/2023 21:43:24.5 and 06/23/2023 02:12:39.1  
Mid-occultation observing point 128.717E 2.078S

Occultation of 29 gamma<sup>2</sup> Virginis 2.74 by moon 55% illuminated at phase= 95 degrees  
06/26/2023 12:24:18.6 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 06/26/2023 11:00:05.0 and 06/26/2023 13:48:29.1  
Mid-occultation observing point 110.532W 62.318S

Occultation of Porrima 2.74 by moon 55% illuminated at phase= 95 degrees  
06/26/2023 12:24:20.9 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 06/26/2023 11:00:01.6 and 06/26/2023 13:48:37.0  
Mid-occultation observing point 110.543W 62.318S

Occultation of Dschubba 2.29 by moon 91% illuminated at phase= 144 degrees  
06/30/2023 12:55:29.7 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 06/30/2023 11:04:20.0 and 06/30/2023 14:46:33.3  
Mid-occultation observing point 2.794E 60.158S

Occultation of 20 sigma Scorpii 2.9 by moon 93% illuminated at phase= 149 degrees  
06/30/2023 22:04:57.0 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.163  
Global start/end: 06/30/2023 20:53:13.5 and 06/30/2023 23:16:37.5  
Mid-occultation observing point 79.199W 62.462N

**---For observations at Journey Museum:**

**06/30/2023 21:13:02.4 Start Total (elev 20 az 174 deg.) -13.1 \*\*\***  
**06/30/2023 21:46:22.8 OCCULTATION MID-POINT (elev 20 az 182 deg.) -16.5 \*\*\***  
**06/30/2023 22:19:56.6 End Total (elev 20 az 190 deg.) -19.3 \*\*\***

Occultation of 27 phi Sagittarii 3.17 by moon 100% illuminated at phase= 179 degrees  
07/03/2023 03:19:21.9 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.162  
Global start/end: 07/03/2023 01:37:55.4 and 07/03/2023 05:00:46.2  
Mid-occultation observing point 146.217W 74.521S

Occultation of 40 tau Sagittarii 3.32 by moon 100% illuminated at phase= 184 degrees  
07/03/2023 10:50:21.4 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.162  
Global start/end: 07/03/2023 08:48:49.8 and 07/03/2023 12:51:52.0  
Mid-occultation observing point 96.608E 12.718S

Occultation of 30 eta Leonis 3.48 by moon 7% illuminated at phase= 31 degrees  
07/20/2023 06:34:23.9 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.161  
Global start/end: 07/20/2023 04:27:45.9 and 07/20/2023 08:41:03.0  
Mid-occultation observing point 1.976W 13.369S

Occultation of Dschubba 2.29 by moon 74% illuminated at phase= 118 degrees  
07/27/2023 22:26:06.2 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 07/27/2023 20:48:39.7 and 07/28/2023 00:03:27.0  
Mid-occultation observing point 160.668E 73.61S  
At Journey Museum, the miss angle is 5249.4 arc-sec at 07/27/2023 23:16:02.5

Occultation of 20 sigma Scorpii 2.9 by moon 77% illuminated at phase= 123 degrees  
07/28/2023 07:48:24.7 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 07/28/2023 06:14:54.1 and 07/28/2023 09:21:49.8  
Mid-occultation observing point 91.967E 34.825N

Occultation of 27 phi Sagittarii 3.17 by moon 95% illuminated at phase= 153 degrees  
07/30/2023 13:51:59.6 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 07/30/2023 12:14:57.4 and 07/30/2023 15:28:57.8  
Mid-occultation observing point 35.405E 80.104S

Occultation of 40 tau Sagittarii 3.32 by moon 96% illuminated at phase= 157 degrees  
07/30/2023 21:23:58.0 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.16  
Global start/end: 07/30/2023 19:21:26.1 and 07/30/2023 23:26:27.4  
Mid-occultation observing point 88.662W 15.318S  
At Journey Museum, the miss angle is 1676.6 arc-sec at 07/30/2023 21:06:19.3

Occultation of Dschubba 2.29 by moon 52% illuminated at phase= 92 degrees  
08/24/2023 06:16:41.9 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.157  
Global start/end: 08/24/2023 05:10:46.6 and 08/24/2023 07:22:34.7  
Mid-occultation observing point 77.217W 61.957S

Occultation of 20 sigma Scorpii 2.9 by moon 56% illuminated at phase= 97 degrees  
08/24/2023 15:56:24.2 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.157  
Global start/end: 08/24/2023 14:03:33.6 and 08/24/2023 17:49:09.1  
Mid-occultation observing point 62.393W 14.519N

Occultation of Antares 1.06 by moon 58% illuminated at phase= 98 degrees  
08/24/2023 19:30:03.0 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.157  
Global start/end: 08/24/2023 18:19:31.9 and 08/24/2023 20:40:31.0  
Mid-occultation observing point 95.46W 62.19N

**---For observations at Journey Museum:**

**08/24/2023 18:59:37.9 Start Total (elev 19 az 191 deg.) -3.4 \*\*\***

**08/24/2023 19:35:59.3 OCCULTATION MID-POINT (elev 17 az 200 deg.) -9.8 \*\*\***

**08/24/2023 20:11:41.4 End Total (elev 14 az 208 deg.) -15.4 \*\*\***

Occultation of 27 phi Sagittarii 3.17 by moon 80% illuminated at phase= 127 degrees  
08/26/2023 23:43:16.3 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.157  
Global start/end: 08/26/2023 22:20:49.2 and 08/27/2023 01:05:39.5  
Mid-occultation observing point 11.349E 76.883S

Occultation of 40 tau Sagittarii 3.32 by moon 83% illuminated at phase= 131 degrees  
08/27/2023 07:27:04.9 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.157  
Global start/end: 08/27/2023 05:21:12.6 and 08/27/2023 09:32:55.0  
Mid-occultation observing point 94.288E 23.349S

Occultation of Alcyone 2.85 by moon 61% illuminated at phase= 257 degrees  
09/05/2023 13:51:02.2 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.155  
Global start/end: 09/05/2023 12:59:02.2 and 09/05/2023 14:43:03.9  
Mid-occultation observing point 157.26E 62.106S

Occultation of Elnath 1.65 by moon 43% illuminated at phase= 278 degrees  
09/07/2023 08:19:55.4 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.155  
Global start/end: 09/07/2023 07:15:33.7 and 09/07/2023 09:24:19.0  
Mid-occultation observing point 121.751W 62.128S  
At Journey Museum, the miss angle is 3897.1 arc-sec at 09/07/2023 08:58:51.3

Occultation of 30 eta Leonis 3.48 by moon 4% illuminated at phase= 338 degrees  
09/12/2023 18:39:42.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.154  
Global start/end: 09/12/2023 16:35:24.8 and 09/12/2023 20:43:58.9  
Mid-occultation observing point 121.628E 15.889S

Occultation of Mars 1.7 by moon 3% illuminated at phase= 19 degrees  
09/16/2023 12:59:28.0 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.153  
Global start/end: 09/16/2023 10:54:04.6 and 09/16/2023 15:04:49.0  
Mid-occultation observing point 82.57W 30.158N

Occultation of 20 sigma Scorpii 2.9 by moon 33% illuminated at phase= 70 degrees  
09/20/2023 22:09:29.9 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.152  
Global start/end: 09/20/2023 20:06:33.5 and 09/21/2023 00:12:23.0  
Mid-occultation observing point 174.878E 2.644N

Occultation of Antares 1.06 by moon 35% illuminated at phase= 72 degrees  
09/21/2023 01:47:40.5 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.152  
Global start/end: 09/21/2023 00:14:33.5 and 09/21/2023 03:20:44.3  
Mid-occultation observing point 130.096E 37.529N

Occultation of 27 phi Sagittarii 3.17 by moon 59% illuminated at phase= 100 degrees  
09/23/2023 07:33:12.4 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.151  
Global start/end: 09/23/2023 06:35:25.2 and 09/23/2023 08:30:57.8  
Mid-occultation observing point 125.895W 61.759S

Occultation of 40 tau Sagittarii 3.32 by moon 63% illuminated at phase= 105 degrees  
09/23/2023 15:33:16.3 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.151  
Global start/end: 09/23/2023 13:24:59.7 and 09/23/2023 17:41:31.0  
Mid-occultation observing point 53.241W 31.787S

Occultation of Alcyone 2.85 by moon 82% illuminated at phase= 231 degrees  
10/02/2023 22:45:47.7 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.149  
Global start/end: 10/02/2023 21:28:53.7 and 10/03/2023 00:02:45.7  
Mid-occultation observing point 3.319W 62.096S  
At Journey Museum, the miss angle is 5136.1 arc-sec at 10/02/2023 22:23:59.2

Occultation of Elnath 1.65 by moon 66% illuminated at phase= 251 degrees  
10/04/2023 16:08:56.9 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.149  
Global start/end: 10/04/2023 14:41:57.8 and 10/04/2023 17:36:00.3  
Mid-occultation observing point 89.992E 48.239S

Occultation of 30 eta Leonis 3.48 by moon 17% illuminated at phase= 311 degrees  
10/10/2023 01:23:52.2 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.147  
Global start/end: 10/09/2023 23:15:25.9 and 10/10/2023 03:32:16.9  
Mid-occultation observing point 4.296W 11.186S

Eclipse of the Sun -- Global data; DUTC= 69.184 DUT1= 69.146  
10/14/2023 08:03:48.7 Start Partial Solar  
10/14/2023 09:10:11.3 Start Annular Solar  
10/14/2023 10:59:31.9 ANNULAR SOLAR ECLIPSE MID-POINT  
10/14/2023 11:03:34.5 SOLAR ECLIPSE MAXIMUM 90.8%  
10/14/2023 12:49:00.5 End Annular Solar  
10/14/2023 13:55:15.9 End Partial Solar  
Mid-eclipse observing point 83.104W 11.359N

**---For observations at Journey Museum:**

**10/14/2023 08:17:03.9 Start Partial (elev 21 az 125 deg.) 20.7 \*\*\***  
**10/14/2023 09:36:33.3 ECLIPSE MID-POINT (64.3%) (elev 31 az 144 deg.) 30.9 \*\*\***  
**10/14/2023 11:02:32.4 End Partial (elev 37 az 169 deg.) 37.0 \*\*\***

Occultation of 20 sigma Scorpii 2.9 by moon 14% illuminated at phase= 43 degrees  
10/18/2023 03:35:02.7 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.145  
Global start/end: 10/18/2023 01:30:33.3 and 10/18/2023 05:39:30.4  
Mid-occultation observing point 65.987E 0.519S

Occultation of Antares 1.06 by moon 15% illuminated at phase= 45 degrees  
10/18/2023 07:12:42.7 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.145  
Global start/end: 10/18/2023 05:34:55.0 and 10/18/2023 08:50:28.4  
Mid-occultation observing point 20.258E 31.549N

Occultation of 27 phi Sagittarii 3.17 by moon 36% illuminated at phase= 73 degrees  
10/20/2023 13:22:46.0 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.144  
Global start/end: 10/20/2023 12:39:24.5 and 10/20/2023 14:06:07.0  
Mid-occultation observing point 119.878E 61.771S

Occultation of 40 tau Sagittarii 3.32 by moon 39% illuminated at phase= 78 degrees  
10/20/2023 21:32:07.6 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.144  
Global start/end: 10/20/2023 19:22:57.5 and 10/20/2023 23:41:17.2  
Mid-occultation observing point 169.438W 34.701S

Occultation of Alcyone 2.85 by moon 96% illuminated at phase= 203 degrees  
10/30/2023 08:49:59.3 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.141  
Global start/end: 10/30/2023 07:32:39.5 and 10/30/2023 10:07:22.3  
Mid-occultation observing point 178.634E 62.096S

Occultation of Elnath 1.65 by moon 86% illuminated at phase= 224 degrees  
11/01/2023 01:25:01.3 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.141  
Global start/end: 10/31/2023 23:58:14.9 and 11/01/2023 02:51:52.2  
Mid-occultation observing point 76.387W 46.458S  
At Journey Museum, the miss angle is 3491.1 arc-sec at 11/01/2023 01:18:34.4

Occultation of 30 eta Leonis 3.48 by moon 38% illuminated at phase= 284 degrees  
11/06/2023 09:01:24.8 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.139  
Global start/end: 11/06/2023 06:53:41.8 and 11/06/2023 11:09:07.3  
Mid-occultation observing point 146.154W 12.442S  
At Journey Museum, the miss angle is 2784.6 arc-sec at 11/06/2023 08:46:32.3

Occultation of Venus -4.4 by moon 15% illuminated at phase= 314 degrees  
11/09/2023 03:34:23.5 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.138  
Global start/end: 11/09/2023 01:56:30.1 and 11/09/2023 05:12:13.1  
Mid-occultation observing point 41.693E 59.096N

Occultation of 20 sigma Scorpii 2.9 by moon 2% illuminated at phase= 16 degrees  
11/14/2023 10:04:41.9 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.137  
Global start/end: 11/14/2023 08:03:07.0 and 11/14/2023 12:06:14.4  
Mid-occultation observing point 57.825W 1.893N

Occultation of Antares 1.06 by moon 2% illuminated at phase= 18 degrees  
11/14/2023 13:38:07.7 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.137  
Global start/end: 11/14/2023 12:05:03.1 and 11/14/2023 15:11:10.1  
Mid-occultation observing point 101.806W 35.882N

Occultation of 27 phi Sagittarii 3.17 by moon 15% illuminated at phase= 46 degrees  
11/16/2023 18:54:48.5 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.136  
Global start/end: 11/16/2023 17:53:51.5 and 11/16/2023 19:55:45.0  
Mid-occultation observing point 9.962E 61.763S

Occultation of 40 tau Sagittarii 3.32 by moon 18% illuminated at phase= 50 degrees  
11/17/2023 02:59:18.2 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.136  
Global start/end: 11/17/2023 00:50:24.6 and 11/17/2023 05:08:12.7  
Mid-occultation observing point 81.362E 30.254S

Occultation of Alcyone 2.85 by moon 100% illuminated at phase= 176 degrees  
11/26/2023 18:22:40.7 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.133  
Global start/end: 11/26/2023 17:10:03.0 and 11/26/2023 19:35:20.3  
Mid-occultation observing point 8.279E 62.146S  
At Journey Museum, the miss angle is 5457.7 arc-sec at 11/26/2023 17:55:04.0

Occultation of Elnath 1.65 by moon 98% illuminated at phase= 197 degrees  
11/28/2023 10:55:32.8 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.133  
Global start/end: 11/28/2023 09:39:32.4 and 11/28/2023 12:11:35.9  
Mid-occultation observing point 118.161E 62.177S

Occultation of 30 eta Leonis 3.48 by moon 62% illuminated at phase= 257 degrees  
12/03/2023 17:12:31.1 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.131  
Global start/end: 12/03/2023 15:15:19.4 and 12/03/2023 19:09:44.4  
Mid-occultation observing point 58.771E 23.955S

Occultation of 20 sigma Scorpii 2.9 by moon 1% illuminated at phase= 348 degrees  
12/11/2023 18:41:30.1 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.129  
Global start/end: 12/11/2023 16:41:03.8 and 12/11/2023 20:41:52.1  
Mid-occultation observing point 146.023E 2.332N

Occultation of 27 phi Sagittarii 3.17 by moon 3% illuminated at phase= 18 degrees  
12/14/2023 02:17:11.6 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.129  
Global start/end: 12/14/2023 00:58:38.7 and 12/14/2023 03:35:43.3  
Mid-occultation observing point 127.883W 61.73S

Occultation of 40 tau Sagittarii 3.32 by moon 4% illuminated at phase= 23 degrees  
12/14/2023 10:08:20.2 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.129  
Global start/end: 12/14/2023 08:01:33.9 and 12/14/2023 12:15:06.9  
Mid-occultation observing point 53.605W 23.35S

Occultation of Alcyone 2.85 by moon 93% illuminated at phase= 148 degrees  
12/24/2023 01:57:34.7 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.126  
Global start/end: 12/24/2023 00:36:10.3 and 12/24/2023 03:19:00.7  
Mid-occultation observing point 132.722W 62.241S  
At Journey Museum, the miss angle is 3844.4 arc-sec at 12/24/2023 03:09:06.7

Occultation of Elnath 1.65 by moon 99% illuminated at phase= 169 degrees  
12/25/2023 19:10:04.4 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.126  
Global start/end: 12/25/2023 17:57:48.1 and 12/25/2023 20:22:22.4  
Mid-occultation observing point 32.848W 62.207S  
At Journey Museum, the miss angle is 4636.6 arc-sec at 12/25/2023 18:34:37.8

Occultation of 30 eta Leonis 3.48 by moon 83% illuminated at phase= 229 degrees  
12/31/2023 01:15:14.6 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.124  
Global start/end: 12/30/2023 23:41:41.8 and 12/31/2023 02:48:49.3  
Mid-occultation observing point 105.14W 47.395S  
At Journey Museum, the miss angle is 3067.0 arc-sec at 12/30/2023 23:51:22.8

Occultation of 20 sigma Scorpii 2.9 by moon 11% illuminated at phase= 320 degrees  
01/08/2024 04:45:38.5 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.122  
Global start/end: 01/08/2024 02:40:12.7 and 01/08/2024 06:50:58.7  
Mid-occultation observing point 33.682W 5.217S

Occultation of Antares 1.06 by moon 10% illuminated at phase= 322 degrees  
01/08/2024 08:16:41.1 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.122  
Global start/end: 01/08/2024 06:34:27.4 and 01/08/2024 09:58:48.9  
Mid-occultation observing point 78.672W 24.886N

**---For observations at Journey Museum:**

**01/08/2024 06:47:12.8 Start Total (elev 12 az 147 deg.) -7.3 \*\*\***  
**01/08/2024 07:23:47.9 OCCULTATION MID-POINT (elev 15 az 155 deg.) -0.8**  
**01/08/2024 08:01:53.1 End Total (elev 18 az 163 deg.) 4.5**

Occultation of Alcyone 2.85 by moon 75% illuminated at phase= 120 degrees  
01/20/2024 07:39:36.1 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.119  
Global start/end: 01/20/2024 05:56:20.3 and 01/20/2024 09:22:54.5  
Mid-occultation observing point 92.368E 27.191S

Occultation of Elnath 1.65 by moon 89% illuminated at phase= 141 degrees  
01/22/2024 01:32:16.0 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.118  
Global start/end: 01/22/2024 00:03:12.8 and 01/22/2024 03:01:21.1  
Mid-occultation observing point 160.181W 43.99S  
At Journey Museum, the miss angle is 3950.9 arc-sec at 01/22/2024 02:28:23.4

Occultation of 30 eta Leonis 3.48 by moon 97% illuminated at phase= 201 degrees  
01/27/2024 08:32:30.2 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.117  
Global start/end: 01/27/2024 07:26:37.3 and 01/27/2024 09:38:24.0  
Mid-occultation observing point 93.511E 61.964S

Occultation of 20 sigma Scorpii 2.9 by moon 31% illuminated at phase= 293 degrees  
02/04/2024 14:27:41.0 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.115  
Global start/end: 02/04/2024 12:15:38.1 and 02/04/2024 16:39:40.8  
Mid-occultation observing point 150.891E 18.649S

Occultation of Antares 1.06 by moon 29% illuminated at phase= 294 degrees  
02/04/2024 18:04:14.1 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.115  
Global start/end: 02/04/2024 16:05:51.9 and 02/04/2024 20:02:29.4  
Mid-occultation observing point 103.775E 7.687N

Occultation of 27 phi Sagittarii 3.17 by moon 10% illuminated at phase= 323 degrees  
02/06/2024 22:57:38.0 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.114  
Global start/end: 02/06/2024 21:52:37.5 and 02/07/2024 00:02:35.7  
Mid-occultation observing point 133.156W 61.659S

Occultation of 40 tau Sagittarii 3.32 by moon 8% illuminated at phase= 327 degrees  
02/07/2024 06:43:54.6 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.114  
Global start/end: 02/07/2024 04:37:25.5 and 02/07/2024 08:50:21.3  
Mid-occultation observing point 56.194W 26.672S

Occultation of Alcyone 2.85 by moon 53% illuminated at phase= 93 degrees  
02/16/2024 13:18:40.9 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.111  
Global start/end: 02/16/2024 11:19:01.8 and 02/16/2024 15:18:24.9  
Mid-occultation observing point 25.066W 7.448S  
At Journey Museum, the miss angle is 3557.3 arc-sec at 02/16/2024 12:44:16.8

Occultation of Elnath 1.65 by moon 70% illuminated at phase= 114 degrees  
02/18/2024 07:01:56.4 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.111  
Global start/end: 02/18/2024 05:12:05.0 and 02/18/2024 08:51:51.4  
Mid-occultation observing point 87.513E 19.008S

Occultation of 30 eta Leonis 3.48 by moon 100% illuminated at phase= 173 degrees  
02/23/2024 14:57:44.5 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.109  
Global start/end: 02/23/2024 13:57:52.2 and 02/23/2024 15:57:37.1  
Mid-occultation observing point 29.917W 61.793S

Occultation of 20 sigma Scorpii 2.9 by moon 54% illuminated at phase= 265 degrees  
03/02/2024 22:19:04.6 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.107  
Global start/end: 03/02/2024 20:04:44.4 and 03/03/2024 00:33:23.7  
Mid-occultation observing point 3.117E 30.819S

Occultation of Antares 1.06 by moon 53% illuminated at phase= 267 degrees  
03/03/2024 02:01:55.5 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.107  
Global start/end: 03/02/2024 23:53:04.5 and 03/03/2024 04:10:42.3  
Mid-occultation observing point 45.109W 5.682S

Occultation of 27 phi Sagittarii 3.17 by moon 29% illuminated at phase= 295 degrees  
03/05/2024 08:40:19.0 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.106  
Global start/end: 03/05/2024 08:34:52.8 and 03/05/2024 08:45:45.2  
Mid-occultation observing point 0.0E 0.0N

Occultation of 40 tau Sagittarii 3.32 by moon 26% illuminated at phase= 299 degrees  
03/05/2024 16:41:26.7 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.106  
Global start/end: 03/05/2024 14:33:22.7 and 03/05/2024 18:49:27.6  
Mid-occultation observing point 128.614E 35.262S

Occultation of Alcyone 2.85 by moon 29% illuminated at phase= 65 degrees  
03/14/2024 20:52:19.0 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.103  
Global start/end: 03/14/2024 18:47:47.9 and 03/14/2024 22:56:55.8  
Mid-occultation observing point 168.27W 3.544N  
At Journey Museum, the miss angle is 1782.5 arc-sec at 03/14/2024 22:10:53.2

Occultation of Elnath 1.65 by moon 47% illuminated at phase= 86 degrees  
03/16/2024 13:30:43.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.102  
Global start/end: 03/16/2024 11:30:52.7 and 03/16/2024 15:30:39.9  
Mid-occultation observing point 37.712W 5.701S  
At Journey Museum, the miss angle is 3038.9 arc-sec at 03/16/2024 12:43:26.9

Occultation of 30 eta Leonis 3.48 by moon 91% illuminated at phase= 146 degrees  
03/21/2024 21:01:12.7 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.101  
Global start/end: 03/21/2024 19:49:01.5 and 03/21/2024 22:13:24.0  
Mid-occultation observing point 147.787W 61.694S

Occultation of 20 sigma Scorpii 2.9 by moon 77% illuminated at phase= 238 degrees  
03/30/2024 04:23:28.4 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.098  
Global start/end: 03/30/2024 02:09:32.2 and 03/30/2024 06:37:23.9  
Mid-occultation observing point 116.283W 35.808S  
At Journey Museum, the miss angle is 2804.6 arc-sec at 03/30/2024 03:53:51.9

Occultation of Antares 1.06 by moon 75% illuminated at phase= 240 degrees  
03/30/2024 08:09:11.4 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.098  
Global start/end: 03/30/2024 05:57:21.4 and 03/30/2024 10:20:59.9  
Mid-occultation observing point 164.751W 10.759S

Occultation of 40 tau Sagittarii 3.32 by moon 48% illuminated at phase= 272 degrees  
04/02/2024 00:18:57.5 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.097  
Global start/end: 04/01/2024 22:09:48.0 and 04/02/2024 02:28:04.2  
Mid-occultation observing point 11.924W 39.8S

Occultation of Saturn 1.1 by moon 8% illuminated at phase= 327 degrees  
04/06/2024 03:18:38.9 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.096  
Global start/end: 04/06/2024 02:10:24.3 and 04/06/2024 04:26:52.1  
Mid-occultation observing point 103.474E 61.456S

Occultation of Venus -3.8 by moon 2% illuminated at phase= 345 degrees  
04/07/2024 09:18:09.8 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.095  
Global start/end: 04/07/2024 07:08:44.0 and 04/07/2024 11:27:34.8  
Mid-occultation observing point 87.419W 17.183N  
At Journey Museum, the miss angle is 461.9 arc-sec at 04/07/2024 09:38:53.3

Eclipse of the Sun -- Global data; DUTC= 69.184 DUT1= 69.095  
04/08/2024 08:42:14.2 Start Partial Solar  
04/08/2024 09:38:51.6 Start Total Solar  
04/08/2024 11:17:18.7 TOTAL SOLAR ECLIPSE MID-POINT  
04/08/2024 12:55:35.2 End Total Solar  
04/08/2024 13:52:19.8 End Partial Solar  
Mid-eclipse observing point 104.146W 25.281N

**---For observations at Journey Museum:**

**04/08/2024 10:38:50.4 Start Partial (elev 50 az 150 deg.) 50.0 \*\*\***  
**04/08/2024 11:48:27.0 ECLIPSE MID-POINT (57.9%) (elev 54 az 177 deg.) 53.5 \*\*\***  
**04/08/2024 12:58:47.9 End Partial (elev 51 az 206 deg.) 50.9 \*\*\***

Occultation of Alcyone 2.85 by moon 11% illuminated at phase= 38 degrees  
04/11/2024 06:33:44.5 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.094  
Global start/end: 04/11/2024 04:30:21.7 and 04/11/2024 08:37:12.4  
Mid-occultation observing point 18.849E 5.527N

Occultation of Elnath 1.65 by moon 25% illuminated at phase= 59 degrees  
04/12/2024 21:57:38.4 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.094  
Global start/end: 04/12/2024 19:57:54.8 and 04/12/2024 23:57:28.6  
Mid-occultation observing point 168.39E 3.161S  
At Journey Museum, the miss angle is 3134.5 arc-sec at 04/12/2024 22:58:24.3

Occultation of 30 eta Leonis 3.48 by moon 74% illuminated at phase= 119 degrees  
04/18/2024 03:29:58.7 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.092  
Global start/end: 04/18/2024 02:15:30.2 and 04/18/2024 04:44:27.7  
Mid-occultation observing point 88.11E 61.677S

Occultation of 20 sigma Scorpii 2.9 by moon 93% illuminated at phase= 211 degrees  
04/26/2024 10:02:00.8 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.089  
Global start/end: 04/26/2024 07:48:21.6 and 04/26/2024 12:15:40.0  
Mid-occultation observing point 132.873E 33.705S



Occultation of Antares 1.06 by moon 92% illuminated at phase= 213 degrees  
04/26/2024 13:46:15.0 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.089  
Global start/end: 04/26/2024 11:36:06.3 and 04/26/2024 15:56:22.6  
Mid-occultation observing point 84.56E 8.494S

Occultation of 40 tau Sagittarii 3.32 by moon 71% illuminated at phase= 245 degrees  
04/29/2024 06:04:14.5 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.088  
Global start/end: 04/29/2024 03:53:37.2 and 04/29/2024 08:14:51.2  
Mid-occultation observing point 125.64W 36.551S  
At Journey Museum, the miss angle is 2378.5 arc-sec at 04/29/2024 07:21:50.2

Occultation of Saturn 1.2 by moon 23% illuminated at phase= 303 degrees  
05/03/2024 16:10:35.9 Geocentric minimum 0.7 degrees. DUTC= 69.184 DUT1= 69.087  
Global start/end: 05/03/2024 14:27:31.0 and 05/03/2024 17:53:38.1  
Mid-occultation observing point 169.414E 47.565S

Occultation of Mars 1.1 by moon 13% illuminated at phase= 318 degrees  
05/04/2024 19:15:48.1 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.087  
Global start/end: 05/04/2024 17:04:57.3 and 05/04/2024 21:26:36.8  
Mid-occultation observing point 101.476E 8.861N

Occultation of Alcyone 2.85 by moon 1% illuminated at phase= 11 degrees  
05/08/2024 16:55:40.0 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.086  
Global start/end: 05/08/2024 14:54:18.3 and 05/08/2024 18:57:05.2  
Mid-occultation observing point 163.024W 2.964N  
At Journey Museum, the miss angle is 1752.4 arc-sec at 05/08/2024 18:12:08.4

Occultation of Elnath 1.65 by moon 8% illuminated at phase= 33 degrees  
05/10/2024 07:42:21.2 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.085  
Global start/end: 05/10/2024 05:47:48.6 and 05/10/2024 09:36:59.8  
Mid-occultation observing point 4.436W 8.257S  
At Journey Museum, the miss angle is 3866.3 arc-sec at 05/10/2024 06:55:54.3

Occultation of 30 eta Leonis 3.48 by moon 52% illuminated at phase= 93 degrees  
05/15/2024 10:53:01.5 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.084  
Global start/end: 05/15/2024 10:05:31.6 and 05/15/2024 11:40:32.0  
Mid-occultation observing point 49.571W 61.686S

Occultation of 20 sigma Scorpii 2.9 by moon 100% illuminated at phase= 185 degrees  
05/23/2024 16:37:25.9 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.081  
Global start/end: 05/23/2024 14:24:20.5 and 05/23/2024 18:50:30.7  
Mid-occultation observing point 8.05E 30.493S

Occultation of Antares 1.06 by moon 100% illuminated at phase= 187 degrees  
05/23/2024 20:18:22.4 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.081  
Global start/end: 05/23/2024 18:11:04.2 and 05/23/2024 22:25:38.1  
Mid-occultation observing point 39.729W 4.904S

Occultation of 27 phi Sagittarii 3.17 by moon 91% illuminated at phase= 215 degrees  
05/26/2024 03:25:36.1 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.081  
Global start/end: 05/26/2024 02:38:53.0 and 05/26/2024 04:12:18.6  
Mid-occultation observing point 51.702E 61.663S

Occultation of 40 tau Sagittarii 3.32 by moon 89% illuminated at phase= 219 degrees  
05/26/2024 11:41:31.0 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.08  
Global start/end: 05/26/2024 09:30:57.1 and 05/26/2024 13:52:06.0  
Mid-occultation observing point 122.037E 28.679S

Occultation of Saturn 1.2 by moon 43% illuminated at phase= 278 degrees  
05/31/2024 01:26:37.9 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.079  
Global start/end: 05/30/2024 23:22:59.9 and 05/31/2024 03:30:14.5  
Mid-occultation observing point 15.67W 23.742S

Occultation of Alcyone 2.85 by moon 2% illuminated at phase= 345 degrees  
06/05/2024 02:11:49.8 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.078  
Global start/end: 06/05/2024 00:09:48.8 and 06/05/2024 04:13:52.4  
Mid-occultation observing point 30.941E 2.731N

Occultation of Spica 0.98 by moon 74% illuminated at phase= 118 degrees  
06/16/2024 12:14:27.1 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.077  
Global start/end: 06/16/2024 11:16:58.3 and 06/16/2024 13:11:54.8  
Mid-occultation observing point 78.436E 61.768N

Occultation of 20 sigma Scorpii 2.9 by moon 97% illuminated at phase= 159 degrees  
06/20/2024 00:39:30.6 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.076  
Global start/end: 06/19/2024 22:27:04.0 and 06/20/2024 02:51:54.8  
Mid-occultation observing point 139.89W 32.367S  
At Journey Museum, the miss angle is 2654.0 arc-sec at 06/20/2024 01:20:29.4

Occultation of Antares 1.06 by moon 97% illuminated at phase= 161 degrees  
06/20/2024 04:18:32.5 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.076  
Global start/end: 06/20/2024 02:10:48.9 and 06/20/2024 06:26:12.1  
Mid-occultation observing point 172.911E 6.576S

Occultation of 27 phi Sagittarii 3.17 by moon 99% illuminated at phase= 189 degrees  
06/22/2024 10:38:32.9 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.076  
Global start/end: 06/22/2024 09:31:39.4 and 06/22/2024 11:45:24.9  
Mid-occultation observing point 83.866W 61.622S

Occultation of 40 tau Sagittarii 3.32 by moon 99% illuminated at phase= 193 degrees  
06/22/2024 18:44:07.9 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.076  
Global start/end: 06/22/2024 16:35:21.8 and 06/22/2024 20:52:53.6  
Mid-occultation observing point 11.312W 22.668S

Occultation of Deneb Algedi 2.85 by moon 83% illuminated at phase= 229 degrees  
06/25/2024 12:54:36.8 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.075  
Global start/end: 06/25/2024 11:56:21.1 and 06/25/2024 13:52:52.4  
Mid-occultation observing point 120.764W 61.684S

Occultation of Saturn 1.1 by moon 65% illuminated at phase= 253 degrees  
06/27/2024 07:56:27.6 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.075  
Global start/end: 06/27/2024 05:48:54.9 and 06/27/2024 10:04:00.9  
Mid-occultation observing point 151.122W 2.508S

Occultation of Alcyone 2.85 by moon 12% illuminated at phase= 319 degrees  
07/02/2024 09:26:04.4 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.074  
Global start/end: 07/02/2024 07:19:36.2 and 07/02/2024 11:32:33.0  
Mid-occultation observing point 106.247W 9.136N  
At Journey Museum, the miss angle is 997.6 arc-sec at 07/02/2024 09:58:30.9

Occultation of Elnath 1.65 by moon 3% illuminated at phase= 340 degrees  
07/04/2024 01:12:26.3 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.074  
Global start/end: 07/03/2024 23:20:19.9 and 07/04/2024 03:04:35.2  
Mid-occultation observing point 39.173E 12.262S

Occultation of Spica 0.98 by moon 52% illuminated at phase= 92 degrees  
07/13/2024 20:19:51.4 Geocentric minimum 0.8 degrees. DUTC= 69.184 DUT1= 69.074  
Global start/end: 07/13/2024 18:40:28.6 and 07/13/2024 21:59:12.2  
Mid-occultation observing point 106.962W 44.214N

**---For observations at Journey Museum:**

**07/13/2024 19:44:34.2 Start Total (elev 29 az 213 deg.) -1.8**

**07/13/2024 20:25:11.9 OCCULTATION MID-POINT (elev 24 az 223 deg.) -8.2 \*\*\***

**07/13/2024 21:04:24.7 End Total (elev 19 az 231 deg.) -13.2 \*\*\***

Occultation of 20 sigma Scorpii 2.9 by moon 84% illuminated at phase= 133 degrees  
07/17/2024 09:39:22.9 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.073  
Global start/end: 07/17/2024 07:28:40.8 and 07/17/2024 11:50:00.2  
Mid-occultation observing point 55.528E 41.207S

Occultation of Antares 1.06 by moon 85% illuminated at phase= 134 degrees  
07/17/2024 13:19:42.7 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.073  
Global start/end: 07/17/2024 11:07:55.1 and 07/17/2024 15:31:26.4  
Mid-occultation observing point 8.982E 15.234S

Occultation of 27 phi Sagittarii 3.17 by moon 98% illuminated at phase= 163 degrees  
07/19/2024 19:37:07.2 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.073  
Global start/end: 07/19/2024 18:33:38.0 and 07/19/2024 20:40:34.2  
Mid-occultation observing point 113.996E 61.577S

Occultation of 40 tau Sagittarii 3.32 by moon 99% illuminated at phase= 167 degrees  
07/20/2024 03:37:00.3 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.073  
Global start/end: 07/20/2024 01:28:54.8 and 07/20/2024 05:45:04.3  
Mid-occultation observing point 171.49W 22.962S

Occultation of Deneb Algedi 2.85 by moon 96% illuminated at phase= 203 degrees  
07/22/2024 20:26:01.3 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.073  
Global start/end: 07/22/2024 19:05:18.1 and 07/22/2024 21:46:44.0  
Mid-occultation observing point 71.26E 67.376S

Occultation of Saturn 0.9 by moon 85% illuminated at phase= 226 degrees  
07/24/2024 13:28:23.9 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.073  
Global start/end: 07/24/2024 11:27:30.1 and 07/24/2024 15:29:19.2  
Mid-occultation observing point 90.938E 11.723N

Occultation of Alcyone 2.85 by moon 30% illuminated at phase= 293 degrees  
07/29/2024 15:03:16.8 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.072  
Global start/end: 07/29/2024 12:52:59.8 and 07/29/2024 17:13:33.5  
Mid-occultation observing point 139.487E 20.544N

Occultation of Elnath 1.65 by moon 15% illuminated at phase= 314 degrees  
07/31/2024 07:26:57.1 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.072  
Global start/end: 07/31/2024 05:26:26.1 and 07/31/2024 09:27:30.2  
Mid-occultation observing point 82.122W 2.729S  
At Journey Museum, the miss angle is 1968.8 arc-sec at 07/31/2024 07:10:45.4

Occultation of Spica 0.98 by moon 30% illuminated at phase= 66 degrees  
08/10/2024 03:52:14.6 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.071  
Global start/end: 08/10/2024 01:51:55.7 and 08/10/2024 05:52:32.8  
Mid-occultation observing point 97.821E 24.877N

Occultation of 20 sigma Scorpii 2.9 by moon 64% illuminated at phase= 106 degrees  
08/13/2024 18:32:17.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.07  
Global start/end: 08/13/2024 16:27:05.2 and 08/13/2024 20:37:24.2  
Mid-occultation observing point 110.144W 53.957S  
At Journey Museum, the miss angle is 3629.4 arc-sec at 08/13/2024 17:22:19.0

Occultation of Antares 1.06 by moon 66% illuminated at phase= 108 degrees  
08/13/2024 22:16:57.3 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.07  
Global start/end: 08/13/2024 20:01:54.3 and 08/14/2024 00:31:58.0  
Mid-occultation observing point 154.682W 26.897S

Occultation of 27 phi Sagittarii 3.17 by moon 86% illuminated at phase= 136 degrees  
08/16/2024 05:29:29.7 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.07  
Global start/end: 08/16/2024 04:56:31.2 and 08/16/2024 06:02:27.3  
Mid-occultation observing point 61.515W 61.551S

Occultation of 40 tau Sagittarii 3.32 by moon 89% illuminated at phase= 141 degrees  
08/16/2024 13:33:29.0 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.07  
Global start/end: 08/16/2024 11:24:22.8 and 08/16/2024 15:42:33.6  
Mid-occultation observing point 13.191E 28.884S

Occultation of Deneb Algedi 2.85 by moon 100% illuminated at phase= 177 degrees  
08/19/2024 06:06:02.7 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.07  
Global start/end: 08/19/2024 04:41:41.1 and 08/19/2024 07:30:22.3  
Mid-occultation observing point 121.788W 67.598S

Occultation of Saturn 0.7 by moon 97% illuminated at phase= 199 degrees  
08/20/2024 19:41:37.2 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.069  
Global start/end: 08/20/2024 17:44:25.7 and 08/20/2024 21:38:49.1  
Mid-occultation observing point 32.235W 14.016N

Occultation of Alcyone 2.85 by moon 53% illuminated at phase= 267 degrees  
08/25/2024 20:38:24.1 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.069  
Global start/end: 08/25/2024 18:29:11.0 and 08/25/2024 22:47:39.0  
Mid-occultation observing point 25.426E 31.445N

Occultation of Elnath 1.65 by moon 35% illuminated at phase= 288 degrees  
08/27/2024 12:52:21.4 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.069  
Global start/end: 08/27/2024 10:44:54.9 and 08/27/2024 14:59:50.7  
Mid-occultation observing point 168.889E 8.307N  
At Journey Museum, the miss angle is 2505.2 arc-sec at 08/27/2024 13:55:22.1

Occultation of Venus -3.8 by moon 5% illuminated at phase= 25 degrees  
09/05/2024 01:58:26.4 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.067  
Global start/end: 09/05/2024 00:50:47.5 and 09/05/2024 03:06:05.8  
Mid-occultation observing point 28.428W 61.072S

Occultation of Spica 0.98 by moon 12% illuminated at phase= 40 degrees  
09/06/2024 10:33:03.8 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.067  
Global start/end: 09/06/2024 08:25:31.7 and 09/06/2024 12:40:36.4  
Mid-occultation observing point 33.874W 16.716N

Occultation of 6 pi Scorpii 2.89 by moon 38% illuminated at phase= 76 degrees  
09/09/2024 16:57:53.6 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.066  
Global start/end: 09/09/2024 16:02:45.6 and 09/09/2024 17:53:00.5  
Mid-occultation observing point 77.502W 61.535N

Occultation of 20 sigma Scorpii 2.9 by moon 41% illuminated at phase= 80 degrees  
09/10/2024 02:15:27.9 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.066  
Global start/end: 09/10/2024 00:17:13.3 and 09/10/2024 04:13:38.4  
Mid-occultation observing point 99.233E 64.186S

Occultation of Antares 1.06 by moon 43% illuminated at phase= 82 degrees  
09/10/2024 06:05:15.7 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.066  
Global start/end: 09/10/2024 03:49:37.2 and 09/10/2024 08:20:52.6  
Mid-occultation observing point 59.268E 35.457S

Occultation of Kaus Media 2.72 by moon 63% illuminated at phase= 105 degrees  
09/12/2024 04:39:30.3 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.066  
Global start/end: 09/12/2024 04:23:56.4 and 09/12/2024 04:55:04.0  
Mid-occultation observing point 104.616E 61.489N

Occultation of 40 tau Sagittarii 3.32 by moon 70% illuminated at phase= 114 degrees  
09/12/2024 23:04:41.0 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.066  
Global start/end: 09/12/2024 20:54:14.5 and 09/13/2024 01:15:04.3  
Mid-occultation observing point 155.571W 35.216S

Occultation of Deneb Algedi 2.85 by moon 93% illuminated at phase= 150 degrees  
09/15/2024 16:51:03.9 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.065  
Global start/end: 09/15/2024 15:30:48.3 and 09/15/2024 18:11:16.2  
Mid-occultation observing point 71.638E 66.963S

Occultation of Saturn 0.6 by moon 99% illuminated at phase= 170 degrees  
09/17/2024 03:08:24.1 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.065  
Global start/end: 09/17/2024 01:08:13.5 and 09/17/2024 05:08:33.1  
Mid-occultation observing point 168.742W 5.923N

**---For observations at Journey Museum:**

**09/17/2024 04:13:15.6 Start Partial (elev 6 az 254 deg.) -15.3 \*\*\***  
**09/17/2024 04:13:47.4 Start Total (elev 5 az 254 deg.) -15.2 \*\*\***  
**09/17/2024 04:40:36.7 OCCULTATION MID-POINT (elev 1 az 258 deg.) -10.6 \*\*\***  
**09/17/2024 05:06:37.8 End Total (elev -4 az 263 deg.) -5.9**  
**09/17/2024 05:07:07.9 End Partial (elev -4 az 263 deg.) -5.9**

Occultation of Alcyone 2.85 by moon 75% illuminated at phase= 240 degrees  
09/22/2024 03:57:32.1 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.064  
Global start/end: 09/22/2024 01:51:41.0 and 09/22/2024 06:03:27.1  
Mid-occultation observing point 113.185W 36.573N

**---For observations at Journey Museum:**

**09/22/2024 03:43:51.3 Start Total (elev 70 az 186 deg.) -21.3 \*\*\***  
**09/22/2024 04:21:35.7 OCCULTATION MID-POINT (elev 68 az 210 deg.) -14.9 \*\*\***  
**09/22/2024 04:59:11.7 End Total (elev 64 az 228 deg.) -8.3 \*\*\***

Occultation of Elnath 1.65 by moon 57% illuminated at phase= 261 degrees  
09/23/2024 19:09:07.4 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.063  
Global start/end: 09/23/2024 17:00:25.3 and 09/23/2024 21:17:53.4  
Mid-occultation observing point 47.405E 14.233N

Eclipse of the Sun -- Global data; DUTC= 69.184 DUT1= 69.061

10/02/2024 08:42:58.6 Start Partial Solar  
10/02/2024 09:50:38.4 Start Annular Solar  
10/02/2024 11:44:42.0 SOLAR ECLIPSE MAXIMUM 87.1%  
10/02/2024 11:45:03.0 ANNULAR SOLAR ECLIPSE MID-POINT  
10/02/2024 13:39:14.1 End Annular Solar  
10/02/2024 14:46:58.8 End Partial Solar

Mid-eclipse observing point 114.517W 21.955S

At Journey Museum, the miss angle is 1024.4 arc-sec at 10/02/2024 10:07:09.1

Occultation of Spica 0.98 by moon 1% illuminated at phase= 13 degrees  
10/03/2024 16:38:17.0 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.061  
Global start/end: 10/03/2024 14:30:37.4 and 10/03/2024 18:45:56.6  
Mid-occultation observing point 152.375W 16.068N  
At Journey Museum, the miss angle is 565.7 arc-sec at 10/03/2024 17:09:10.9

Occultation of 6 pi Scorpii 2.89 by moon 17% illuminated at phase= 49 degrees  
10/06/2024 23:09:12.6 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.06  
Global start/end: 10/06/2024 22:11:19.2 and 10/07/2024 00:07:05.3  
Mid-occultation observing point 162.759E 61.537N

Occultation of 20 sigma Scorpii 2.9 by moon 20% illuminated at phase= 53 degrees  
10/07/2024 08:32:19.9 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.06  
Global start/end: 10/07/2024 06:35:06.4 and 10/07/2024 10:29:31.1  
Mid-occultation observing point 23.629W 65.716S

Occultation of Antares 1.06 by moon 22% illuminated at phase= 55 degrees  
10/07/2024 12:24:50.6 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.06  
Global start/end: 10/07/2024 10:08:52.2 and 10/07/2024 14:40:48.8  
Mid-occultation observing point 62.785W 36.518S

Occultation of Kaus Media 2.72 by moon 40% illuminated at phase= 78 degrees  
10/09/2024 11:53:40.2 Geocentric minimum 1.2 degrees. DUTC= 69.184 DUT1= 69.059  
Global start/end: 10/09/2024 11:44:24.3 and 10/09/2024 12:02:56.1  
Mid-occultation observing point 30.894W 61.471N

Occultation of 40 tau Sagittarii 3.32 by moon 48% illuminated at phase= 87 degrees  
10/10/2024 06:50:55.8 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.059  
Global start/end: 10/10/2024 04:38:31.0 and 10/10/2024 09:03:18.6  
Mid-occultation observing point 61.034E 35.773S

Occultation of Deneb Algedi 2.85 by moon 78% illuminated at phase= 123 degrees  
10/13/2024 02:49:43.8 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.058  
Global start/end: 10/13/2024 01:29:32.3 and 10/13/2024 04:09:51.4  
Mid-occultation observing point 95.558W 65.718S

Occultation of Saturn 0.7 by moon 89% illuminated at phase= 142 degrees  
10/14/2024 11:07:59.6 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.058  
Global start/end: 10/14/2024 09:03:49.1 and 10/14/2024 13:12:07.9  
Mid-occultation observing point 47.269E 3.423S

Occultation of Alcyone 2.85 by moon 92% illuminated at phase= 213 degrees  
10/19/2024 13:39:41.5 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.056  
Global start/end: 10/19/2024 11:35:35.7 and 10/19/2024 15:43:50.5  
Mid-occultation observing point 74.884E 35.024N

Occultation of Elnath 1.65 by moon 79% illuminated at phase= 234 degrees  
10/21/2024 03:33:32.6 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.056  
Global start/end: 10/21/2024 01:27:50.8 and 10/21/2024 05:39:19.6  
Mid-occultation observing point 105.523W 12.248N  
At Journey Museum, the miss angle is 965.6 arc-sec at 10/21/2024 03:44:14.4

Occultation of Spica 0.98 by moon 1% illuminated at phase= 346 degrees  
10/30/2024 22:47:49.5 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.053  
Global start/end: 10/30/2024 20:40:44.3 and 10/31/2024 00:54:53.1  
Mid-occultation observing point 88.611E 16.597N

Occultation of 6 pi Scorpii 2.89 by moon 4% illuminated at phase= 22 degrees  
11/03/2024 04:52:13.1 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.052  
Global start/end: 11/03/2024 04:16:45.3 and 11/03/2024 05:27:40.6  
Mid-occultation observing point 49.983E 61.583N

Occultation of 20 sigma Scorpii 2.9 by moon 5% illuminated at phase= 26 degrees  
11/03/2024 14:12:42.9 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.052  
Global start/end: 11/03/2024 12:11:05.0 and 11/03/2024 16:14:19.0  
Mid-occultation observing point 130.006W 60.203S  
At Journey Museum, the miss angle is 4132.5 arc-sec at 11/03/2024 13:48:17.6

Occultation of Antares 1.06 by moon 6% illuminated at phase= 28 degrees  
11/03/2024 18:04:08.7 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.052  
Global start/end: 11/03/2024 15:47:50.9 and 11/03/2024 20:20:27.2  
Mid-occultation observing point 173.217W 31.657S

Occultation of 40 tau Sagittarii 3.32 by moon 25% illuminated at phase= 60 degrees  
11/06/2024 12:45:51.0 Geocentric minimum 0.0 degrees. DUTC= 69.184 DUT1= 69.051  
Global start/end: 11/06/2024 10:31:54.1 and 11/06/2024 14:59:48.0  
Mid-occultation observing point 55.739W 28.547S

Occultation of Deneb Algedi 2.85 by moon 55% illuminated at phase= 96 degrees  
11/09/2024 10:31:13.6 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.05  
Global start/end: 11/09/2024 08:57:06.7 and 11/09/2024 12:05:16.5  
Mid-occultation observing point 70.586E 65.128S

Occultation of Saturn 0.8 by moon 70% illuminated at phase= 114 degrees  
11/10/2024 18:38:52.9 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.05  
Global start/end: 11/10/2024 16:31:38.0 and 11/10/2024 20:46:05.8  
Mid-occultation observing point 92.638W 4.707S  
At Journey Museum, the miss angle is 1320.2 arc-sec at 11/10/2024 19:27:15.3

Occultation of Alcyone 2.85 by moon 100% illuminated at phase= 186 degrees  
11/16/2024 00:41:30.3 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.048  
Global start/end: 11/15/2024 22:37:30.5 and 11/16/2024 02:45:31.3  
Mid-occultation observing point 116.396W 31.722N

**---For observations at Journey Museum:**

**11/16/2024 00:41:35.8 Start Total (elev 68 az 207 deg.) -61.5 \*\*\***  
**11/16/2024 01:13:19.8 OCCULTATION MID-POINT (elev 65 az 224 deg.) -57.8 \*\*\***  
**11/16/2024 01:44:43.9 End Total (elev 61 az 236 deg.) -53.4 \*\*\***

Occultation of Elnath 1.65 by moon 95% illuminated at phase= 207 degrees  
11/17/2024 13:53:10.6 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.048  
Global start/end: 11/17/2024 11:52:21.9 and 11/17/2024 15:54:04.1  
Mid-occultation observing point 72.952E 5.444N

Occultation of Spica 0.98 by moon 13% illuminated at phase= 318 degrees  
11/27/2024 05:38:32.6 Geocentric minimum 0.4 degrees. DUTC= 69.184 DUT1= 69.045  
Global start/end: 11/27/2024 03:26:51.4 and 11/27/2024 07:50:11.4  
Mid-occultation observing point 44.035W 10.834N

**---For observations at Journey Museum:**

**11/27/2024 03:27:09.7 Start Total (elev -1 az 104 deg.) -38.4**  
**11/27/2024 03:56:41.6 OCCULTATION MID-POINT (elev 4 az 109 deg.) -33.1 \*\*\***  
**11/27/2024 04:27:24.7 End Total (elev 9 az 115 deg.) -27.6 \*\*\***

Occultation of 27 phi Sagittarii 3.17 by moon 6% illuminated at phase= 29 degrees  
12/03/2024 09:44:58.8 Geocentric minimum 1.0 degrees. DUTC= 69.184 DUT1= 69.043  
Global start/end: 12/03/2024 08:39:58.0 and 12/03/2024 10:49:58.6  
Mid-occultation observing point 126.44E 61.543S

Occultation of 40 tau Sagittarii 3.32 by moon 8% illuminated at phase= 33 degrees  
12/03/2024 18:18:08.7 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.043  
Global start/end: 12/03/2024 16:06:14.4 and 12/03/2024 20:30:02.8  
Mid-occultation observing point 167.093W 18.428S

Occultation of Deneb Algedi 2.85 by moon 32% illuminated at phase= 69 degrees  
12/06/2024 16:08:04.2 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.043  
Global start/end: 12/06/2024 14:15:31.7 and 12/06/2024 18:00:34.4  
Mid-occultation observing point 71.983W 51.366S  
At Journey Museum, the miss angle is 3952.0 arc-sec at 12/06/2024 17:25:38.3

Occultation of Saturn 0.9 by moon 47% illuminated at phase= 86 degrees  
12/08/2024 01:41:11.7 Geocentric minimum 0.3 degrees. DUTC= 69.184 DUT1= 69.042  
Global start/end: 12/07/2024 23:34:41.3 and 12/08/2024 03:47:40.3  
Mid-occultation observing point 129.995E 5.883N

Occultation of Alcyone 2.85 by moon 96% illuminated at phase= 158 degrees  
12/13/2024 10:55:08.1 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.041  
Global start/end: 12/13/2024 08:50:23.6 and 12/13/2024 12:59:52.4  
Mid-occultation observing point 62.639E 33.352N

Occultation of Elnath 1.65 by moon 100% illuminated at phase= 179 degrees  
12/15/2024 00:26:23.7 Geocentric minimum 0.5 degrees. DUTC= 69.184 DUT1= 69.04  
Global start/end: 12/14/2024 22:28:04.2 and 12/15/2024 02:24:46.0  
Mid-occultation observing point 112.221W 1.233N  
At Journey Museum, the miss angle is 1626.0 arc-sec at 12/15/2024 00:45:55.2

Occultation of Mars -0.9 by moon 89% illuminated at phase= 218 degrees  
12/18/2024 02:17:38.0 Geocentric minimum 0.9 degrees. DUTC= 69.184 DUT1= 69.04  
Global start/end: 12/18/2024 00:46:44.2 and 12/18/2024 03:48:36.0  
Mid-occultation observing point 15.529W 74.226N  
At Journey Museum, the miss angle is 1108.6 arc-sec at 12/18/2024 02:02:36.7

Occultation of Spica 0.98 by moon 32% illuminated at phase= 291 degrees  
12/24/2024 13:20:21.8 Geocentric minimum 0.2 degrees. DUTC= 69.184 DUT1= 69.038  
Global start/end: 12/24/2024 11:01:44.6 and 12/24/2024 15:38:57.6  
Mid-occultation observing point 167.01E 2.542S

Occultation of 6 pi Scorpii 2.89 by moon 8% illuminated at phase= 326 degrees  
12/27/2024 19:13:47.8 Geocentric minimum 1.1 degrees. DUTC= 69.184 DUT1= 69.037  
Global start/end: 12/27/2024 18:17:41.5 and 12/27/2024 20:09:52.8  
Mid-occultation observing point 140.007E 61.781N

Occultation of 20 sigma Scorpii 2.9 by moon 6% illuminated at phase= 331 degrees  
12/28/2024 04:27:52.8 Geocentric minimum 0.6 degrees. DUTC= 69.184 DUT1= 69.037  
Global start/end: 12/28/2024 02:28:03.2 and 12/28/2024 06:27:37.7  
Mid-occultation observing point 37.996W 61.395S

Occultation of Antares 1.06 by moon 6% illuminated at phase= 333 degrees  
12/28/2024 08:15:09.7 Geocentric minimum 0.1 degrees. DUTC= 69.184 DUT1= 69.037  
Global start/end: 12/28/2024 06:00:00.6 and 12/28/2024 10:30:16.3  
Mid-occultation observing point 79.785W 31.908S  
At Journey Museum, the miss angle is 1889.0 arc-sec at 12/28/2024 06:47:20.3

\*\*\* = The Moon is above the horizon, and the Sun is not a factor.

Program LOSEP4 version 220620a + gplib version 220617a  
delta-T data as of 2022-JUN-16