

## GEN 2.7 Sunrise/Sunset

1. The tables include 7 public airports in that part of the High Sea, which is being served by the Georgia air traffic services.

1.1 The times in the tables are given in UTC for beginning of civil morning twilight (TWIL FROM), sunrise (SR), sunset (SS) and end of civil evening twilight (TWIL TO) for the years from 2020 to 2028.

1.2 The time given for the beginning of civil morning twilight and end of civil evening twilight are calculated for an altitude of the sun 6° below the horizon, as commonly used.

1.3 The tables are calculated for the year 2024, which is used as an "average year" for the years from 2020 to 2028. In this period, the times on an arbitrary date and place will deviate less than 2 minutes from the times on the same date and place in the "average year".

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| KUTAISI /Kopitnari | <a href="#">GEN 2.7-4</a>  |
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| MESTIA             | <a href="#">GEN 2.7-9</a>  |
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### 3 Sunrise-Sunset tables

#### 3.1 TBILISI/Tbilisi and NATAKHTARI

| TBILISI/Tbilisi<br>UGTB<br>N 41° 40' 09"<br>E 044° 57' 17" |              |       |       |            |              |              |       |       |            | NATAKHTARI<br>UGSA<br>N 41° 55' 14"<br>E 044° 43' 10" |              |       |       |            |
|------------------------------------------------------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|-------------------------------------------------------|--------------|-------|-------|------------|
| MONTH<br>DAY                                               | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY                                          | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
| JAN                                                        |              |       |       |            | FEB          |              |       |       |            | MAR                                                   |              |       |       |            |
| 1                                                          | 03:56        | 04:27 | 13:40 | 14:12      | 1            | 03:43        | 04:13 | 14:15 | 14:45      | 1                                                     | 03:07        | 03:34 | 14:51 | 15:19      |
| 2                                                          | 03:56        | 04:27 | 13:41 | 14:12      | 2            | 03:43        | 04:12 | 14:17 | 14:46      | 2                                                     | 03:05        | 03:33 | 14:52 | 15:20      |
| 3                                                          | 03:56        | 04:27 | 13:42 | 14:13      | 3            | 03:42        | 04:11 | 14:18 | 14:47      | 3                                                     | 03:03        | 03:31 | 14:54 | 15:21      |
| 4                                                          | 03:56        | 04:28 | 13:43 | 14:14      | 4            | 03:41        | 04:10 | 14:19 | 14:48      | 4                                                     | 03:02        | 03:30 | 14:55 | 15:23      |
| 5                                                          | 03:56        | 04:27 | 13:44 | 14:15      | 5            | 03:40        | 04:09 | 14:20 | 14:50      | 5                                                     | 03:00        | 03:28 | 14:56 | 15:24      |
| 6                                                          | 03:56        | 04:27 | 13:45 | 14:16      | 6            | 03:39        | 04:08 | 14:22 | 14:51      | 6                                                     | 02:59        | 03:26 | 14:57 | 15:25      |
| 7                                                          | 03:56        | 04:27 | 13:46 | 14:17      | 7            | 03:37        | 04:07 | 14:23 | 14:52      | 7                                                     | 02:57        | 03:25 | 14:58 | 15:26      |
| 8                                                          | 03:56        | 04:27 | 13:47 | 14:18      | 8            | 03:36        | 04:05 | 14:24 | 14:53      | 8                                                     | 02:55        | 03:23 | 14:59 | 15:27      |
| 9                                                          | 03:56        | 04:27 | 13:48 | 14:19      | 9            | 03:35        | 04:04 | 14:25 | 14:54      | 9                                                     | 02:54        | 03:21 | 15:01 | 15:28      |
| 10                                                         | 03:56        | 04:27 | 13:49 | 14:20      | 10           | 03:34        | 04:03 | 14:27 | 14:56      | 10                                                    | 02:52        | 03:20 | 15:02 | 15:29      |
| 11                                                         | 03:56        | 04:27 | 13:50 | 14:21      | 11           | 03:33        | 04:02 | 14:28 | 14:57      | 11                                                    | 02:50        | 03:18 | 15:03 | 15:30      |
| 12                                                         | 03:55        | 04:26 | 13:51 | 14:22      | 12           | 03:32        | 04:00 | 14:29 | 14:58      | 12                                                    | 02:49        | 03:16 | 15:04 | 15:32      |
| 13                                                         | 03:55        | 04:26 | 13:52 | 14:23      | 13           | 03:30        | 03:59 | 14:30 | 14:59      | 13                                                    | 02:47        | 03:15 | 15:05 | 15:33      |
| 14                                                         | 03:55        | 04:25 | 13:53 | 14:24      | 14           | 03:29        | 03:58 | 14:32 | 15:00      | 14                                                    | 02:45        | 03:13 | 15:06 | 15:34      |
| 15                                                         | 03:54        | 04:25 | 13:54 | 14:25      | 15           | 03:28        | 03:56 | 14:33 | 15:02      | 15                                                    | 02:44        | 03:11 | 15:07 | 15:35      |
| 16                                                         | 03:54        | 04:25 | 13:56 | 14:26      | 16           | 03:27        | 03:55 | 14:34 | 15:03      | 16                                                    | 02:42        | 03:10 | 15:08 | 15:36      |
| 17                                                         | 03:54        | 04:24 | 13:57 | 14:27      | 17           | 03:25        | 03:54 | 14:35 | 15:04      | 17                                                    | 02:40        | 03:08 | 15:10 | 15:37      |
| 18                                                         | 03:53        | 04:24 | 13:58 | 14:28      | 18           | 03:24        | 03:52 | 14:37 | 15:05      | 18                                                    | 02:39        | 03:06 | 15:11 | 15:38      |
| 19                                                         | 03:53        | 04:23 | 13:59 | 14:29      | 19           | 03:23        | 03:51 | 14:38 | 15:06      | 19                                                    | 02:37        | 03:05 | 15:12 | 15:40      |
| 20                                                         | 03:52        | 04:23 | 14:00 | 14:31      | 20           | 03:21        | 03:50 | 14:39 | 15:07      | 20                                                    | 02:35        | 03:03 | 15:13 | 15:41      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| JAN          |              |       |       |            | FEB          |              |       |       |            | MAR          |              |       |       |            |
| 21           | 03:52        | 04:22 | 14:01 | 14:32      | 21           | 03:20        | 03:48 | 14:40 | 15:09      | 21           | 02:33        | 03:01 | 15:14 | 15:42      |
| 22           | 03:51        | 04:21 | 14:03 | 14:33      | 22           | 03:18        | 03:47 | 14:42 | 15:10      | 22           | 02:32        | 02:59 | 15:15 | 15:43      |
| 23           | 03:51        | 04:21 | 14:04 | 14:34      | 23           | 03:17        | 03:45 | 14:43 | 15:11      | 23           | 02:30        | 02:58 | 15:16 | 15:44      |
| 24           | 03:50        | 04:20 | 14:05 | 14:35      | 24           | 03:16        | 03:44 | 14:44 | 15:12      | 24           | 02:28        | 02:56 | 15:17 | 15:45      |
| 25           | 03:49        | 04:19 | 14:06 | 14:36      | 25           | 03:14        | 03:42 | 14:45 | 15:13      | 25           | 02:27        | 02:54 | 15:18 | 15:46      |
| 26           | 03:48        | 04:18 | 14:08 | 14:38      | 26           | 03:13        | 03:41 | 14:46 | 15:14      | 26           | 02:25        | 02:53 | 15:20 | 15:47      |
| 27           | 03:48        | 04:18 | 14:09 | 14:39      | 27           | 03:11        | 03:39 | 14:48 | 15:16      | 27           | 02:23        | 02:51 | 15:21 | 15:48      |
| 28           | 03:47        | 04:17 | 14:10 | 14:40      | 28           | 03:10        | 03:38 | 14:49 | 15:17      | 28           | 02:21        | 02:49 | 15:22 | 15:50      |
| 29           | 03:46        | 04:16 | 14:11 | 14:41      | 29           | 03:08        | 03:36 | 14:50 | 15:18      | 29           | 02:20        | 02:48 | 15:23 | 15:51      |
| 30           | 03:45        | 04:15 | 14:13 | 14:42      |              |              |       |       |            | 30           | 02:18        | 02:46 | 15:24 | 15:52      |
| 31           | 03:44        | 04:14 | 14:14 | 14:43      |              |              |       |       |            | 31           | 02:16        | 02:44 | 15:25 | 15:53      |
| APR          |              |       |       |            | MAY          |              |       |       |            | JUN          |              |       |       |            |
| 1            | 02:14        | 02:42 | 15:26 | 15:54      | 1            | 01:26        | 01:56 | 15:59 | 16:29      | 1            | 00:55        | 01:28 | 16:28 | 17:02      |
| 2            | 02:13        | 02:41 | 15:27 | 15:55      | 2            | 01:25        | 01:55 | 16:00 | 16:30      | 2            | 00:54        | 01:28 | 16:29 | 17:03      |
| 3            | 02:11        | 02:39 | 15:28 | 15:56      | 3            | 01:23        | 01:54 | 16:01 | 16:31      | 3            | 00:54        | 01:27 | 16:30 | 17:04      |
| 4            | 02:09        | 02:37 | 15:29 | 15:58      | 4            | 01:22        | 01:52 | 16:02 | 16:33      | 4            | 00:53        | 01:27 | 16:31 | 17:04      |
| 5            | 02:08        | 02:36 | 15:30 | 15:59      | 5            | 01:20        | 01:51 | 16:03 | 16:34      | 5            | 00:53        | 01:26 | 16:31 | 17:05      |
| 6            | 02:06        | 02:34 | 15:32 | 16:00      | 6            | 01:19        | 01:50 | 16:04 | 16:35      | 6            | 00:52        | 01:26 | 16:32 | 17:06      |
| 7            | 02:04        | 02:32 | 15:33 | 16:01      | 7            | 01:18        | 01:49 | 16:05 | 16:36      | 7            | 00:52        | 01:26 | 16:33 | 17:06      |
| 8            | 02:02        | 02:31 | 15:34 | 16:02      | 8            | 01:17        | 01:48 | 16:06 | 16:37      | 8            | 00:52        | 01:26 | 16:33 | 17:07      |
| 9            | 02:01        | 02:29 | 15:35 | 16:03      | 9            | 01:15        | 01:46 | 16:07 | 16:38      | 9            | 00:52        | 01:25 | 16:34 | 17:08      |
| 10           | 01:59        | 02:28 | 15:36 | 16:04      | 10           | 01:14        | 01:45 | 16:08 | 16:40      | 10           | 00:51        | 01:25 | 16:34 | 17:08      |
| 11           | 01:57        | 02:26 | 15:37 | 16:06      | 11           | 01:13        | 01:44 | 16:09 | 16:41      | 11           | 00:51        | 01:25 | 16:35 | 17:09      |
| 12           | 01:56        | 02:24 | 15:38 | 16:07      | 12           | 01:12        | 01:43 | 16:10 | 16:42      | 12           | 00:51        | 01:25 | 16:35 | 17:09      |
| 13           | 01:54        | 02:23 | 15:39 | 16:08      | 13           | 01:11        | 01:42 | 16:11 | 16:43      | 13           | 00:51        | 01:25 | 16:36 | 17:10      |
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| 18           | 01:46        | 02:15 | 15:45 | 16:14      | 18           | 01:05        | 01:37 | 16:16 | 16:48      | 18           | 00:51        | 01:25 | 16:37 | 17:12      |
| 19           | 01:44        | 02:13 | 15:46 | 16:15      | 19           | 01:04        | 01:36 | 16:17 | 16:50      | 19           | 00:51        | 01:25 | 16:38 | 17:12      |
| 20           | 01:43        | 02:12 | 15:47 | 16:16      | 20           | 01:03        | 01:36 | 16:18 | 16:51      | 20           | 00:51        | 01:26 | 16:38 | 17:12      |
| 21           | 01:41        | 02:10 | 15:48 | 16:17      | 21           | 01:02        | 01:35 | 16:19 | 16:52      | 21           | 00:52        | 01:26 | 16:38 | 17:12      |
| 22           | 01:39        | 02:09 | 15:49 | 16:18      | 22           | 01:02        | 01:34 | 16:20 | 16:53      | 22           | 00:52        | 01:26 | 16:38 | 17:13      |
| 23           | 01:38        | 02:07 | 15:50 | 16:20      | 23           | 01:01        | 01:33 | 16:21 | 16:54      | 23           | 00:52        | 01:26 | 16:38 | 17:13      |
| 24           | 01:36        | 02:06 | 15:51 | 16:21      | 24           | 01:00        | 01:33 | 16:22 | 16:55      | 24           | 00:53        | 01:27 | 16:39 | 17:13      |
| 25           | 01:35        | 02:05 | 15:52 | 16:22      | 25           | 00:59        | 01:32 | 16:23 | 16:56      | 25           | 00:53        | 01:27 | 16:39 | 17:13      |
| 26           | 01:33        | 02:03 | 15:53 | 16:23      | 26           | 00:58        | 01:31 | 16:24 | 16:57      | 26           | 00:53        | 01:27 | 16:39 | 17:13      |
| 27           | 01:32        | 02:02 | 15:54 | 16:24      | 27           | 00:58        | 01:31 | 16:25 | 16:58      | 27           | 00:54        | 01:28 | 16:39 | 17:13      |
| 28           | 01:30        | 02:00 | 15:56 | 16:26      | 28           | 00:57        | 01:30 | 16:25 | 16:58      | 28           | 00:54        | 01:28 | 16:39 | 17:13      |
| 29           | 01:29        | 01:59 | 15:57 | 16:27      | 29           | 00:56        | 01:29 | 16:26 | 16:59      | 29           | 00:55        | 01:29 | 16:39 | 17:13      |
| 30           | 01:27        | 01:58 | 15:58 | 16:28      | 30           | 00:56        | 01:29 | 16:27 | 17:00      | 30           | 00:55        | 01:29 | 16:39 | 17:12      |
|              |              |       |       |            | 31           | 00:55        | 01:28 | 16:28 | 17:01      |              |              |       |       |            |
| JUL          |              |       |       |            | AUG          |              |       |       |            | SEP          |              |       |       |            |
| 1            | 00:56        | 01:30 | 16:38 | 17:12      | 1            | 01:24        | 01:55 | 16:18 | 16:49      | 1            | 01:58        | 02:26 | 15:33 | 16:01      |
| 2            | 00:56        | 01:30 | 16:38 | 17:12      | 2            | 01:25        | 01:56 | 16:16 | 16:47      | 2            | 01:59        | 02:28 | 15:31 | 16:00      |
| 3            | 00:57        | 01:31 | 16:38 | 17:12      | 3            | 01:26        | 01:57 | 16:15 | 16:46      | 3            | 02:00        | 02:29 | 15:29 | 15:58      |
| 4            | 00:58        | 01:31 | 16:38 | 17:12      | 4            | 01:27        | 01:58 | 16:14 | 16:45      | 4            | 02:01        | 02:30 | 15:28 | 15:56      |
| 5            | 00:58        | 01:32 | 16:37 | 17:11      | 5            | 01:28        | 01:59 | 16:13 | 16:44      | 5            | 02:02        | 02:31 | 15:26 | 15:54      |
| 6            | 00:59        | 01:33 | 16:37 | 17:11      | 6            | 01:29        | 02:00 | 16:12 | 16:42      | 6            | 02:03        | 02:32 | 15:24 | 15:53      |
| 7            | 01:00        | 01:33 | 16:37 | 17:10      | 7            | 01:30        | 02:01 | 16:10 | 16:41      | 7            | 02:04        | 02:33 | 15:23 | 15:51      |
| 8            | 01:00        | 01:34 | 16:36 | 17:10      | 8            | 01:31        | 02:02 | 16:09 | 16:39      | 8            | 02:05        | 02:34 | 15:21 | 15:49      |
| 9            | 01:01        | 01:35 | 16:36 | 17:09      | 9            | 01:32        | 02:03 | 16:08 | 16:38      | 9            | 02:07        | 02:35 | 15:19 | 15:47      |
| 10           | 01:02        | 01:35 | 16:36 | 17:09      | 10           | 01:34        | 02:04 | 16:06 | 16:37      | 10           | 02:08        | 02:36 | 15:18 | 15:46      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| JUL          |              |       |       |            | AUG          |              |       |       |            | SEP          |              |       |       |            |
| 11           | 01:03        | 01:36 | 16:35 | 17:08      | 11           | 01:35        | 02:05 | 16:05 | 16:35      | 11           | 02:09        | 02:37 | 15:16 | 15:44      |
| 12           | 01:04        | 01:37 | 16:35 | 17:08      | 12           | 01:36        | 02:06 | 16:04 | 16:34      | 12           | 02:10        | 02:38 | 15:14 | 15:42      |
| 13           | 01:04        | 01:38 | 16:34 | 17:07      | 13           | 01:37        | 02:07 | 16:02 | 16:32      | 13           | 02:11        | 02:39 | 15:12 | 15:40      |
| 14           | 01:05        | 01:38 | 16:33 | 17:06      | 14           | 01:38        | 02:08 | 16:01 | 16:31      | 14           | 02:12        | 02:40 | 15:11 | 15:38      |
| 15           | 01:06        | 01:39 | 16:33 | 17:06      | 15           | 01:39        | 02:09 | 15:59 | 16:29      | 15           | 02:13        | 02:41 | 15:09 | 15:37      |
| 16           | 01:07        | 01:40 | 16:32 | 17:05      | 16           | 01:40        | 02:10 | 15:58 | 16:28      | 16           | 02:14        | 02:42 | 15:07 | 15:35      |
| 17           | 01:08        | 01:41 | 16:31 | 17:04      | 17           | 01:41        | 02:11 | 15:56 | 16:26      | 17           | 02:15        | 02:43 | 15:05 | 15:33      |
| 18           | 01:09        | 01:42 | 16:31 | 17:03      | 18           | 01:43        | 02:12 | 15:55 | 16:25      | 18           | 02:16        | 02:44 | 15:04 | 15:31      |
| 19           | 01:10        | 01:43 | 16:30 | 17:03      | 19           | 01:44        | 02:13 | 15:53 | 16:23      | 19           | 02:17        | 02:45 | 15:02 | 15:30      |
| 20           | 01:11        | 01:43 | 16:29 | 17:02      | 20           | 01:45        | 02:14 | 15:52 | 16:21      | 20           | 02:18        | 02:46 | 15:00 | 15:28      |
| 21           | 01:12        | 01:44 | 16:28 | 17:01      | 21           | 01:46        | 02:15 | 15:50 | 16:20      | 21           | 02:19        | 02:47 | 14:58 | 15:26      |
| 22           | 01:13        | 01:45 | 16:28 | 17:00      | 22           | 01:47        | 02:16 | 15:49 | 16:18      | 22           | 02:20        | 02:48 | 14:57 | 15:24      |
| 23           | 01:14        | 01:46 | 16:27 | 16:59      | 23           | 01:48        | 02:17 | 15:47 | 16:16      | 23           | 02:21        | 02:49 | 14:55 | 15:23      |
| 24           | 01:15        | 01:47 | 16:26 | 16:58      | 24           | 01:49        | 02:18 | 15:46 | 16:15      | 24           | 02:22        | 02:50 | 14:53 | 15:21      |
| 25           | 01:16        | 01:48 | 16:25 | 16:57      | 25           | 01:50        | 02:19 | 15:44 | 16:13      | 25           | 02:23        | 02:51 | 14:52 | 15:19      |
| 26           | 01:17        | 01:49 | 16:24 | 16:56      | 26           | 01:51        | 02:20 | 15:43 | 16:11      | 26           | 02:24        | 02:52 | 14:50 | 15:17      |
| 27           | 01:18        | 01:50 | 16:23 | 16:55      | 27           | 01:53        | 02:21 | 15:41 | 16:10      | 27           | 02:26        | 02:53 | 14:48 | 15:16      |
| 28           | 01:19        | 01:51 | 16:22 | 16:53      | 28           | 01:54        | 02:22 | 15:39 | 16:08      | 28           | 02:27        | 02:54 | 14:46 | 15:14      |
| 29           | 01:20        | 01:52 | 16:21 | 16:52      | 29           | 01:55        | 02:23 | 15:38 | 16:06      | 29           | 02:28        | 02:55 | 14:45 | 15:12      |
| 30           | 01:21        | 01:53 | 16:20 | 16:51      | 30           | 01:56        | 02:24 | 15:36 | 16:05      | 30           | 02:29        | 02:56 | 14:43 | 15:11      |
| 31           | 01:22        | 01:54 | 16:19 | 16:50      | 31           | 01:57        | 02:25 | 15:34 | 16:03      |              |              |       |       |            |
| OCT          |              |       |       |            | NOV          |              |       |       |            | DEC          |              |       |       |            |
| 1            | 02:30        | 02:57 | 14:41 | 15:09      | 1            | 03:04        | 03:33 | 13:54 | 14:23      | 1            | 03:37        | 04:08 | 13:31 | 14:02      |
| 2            | 02:31        | 02:58 | 14:40 | 15:07      | 2            | 03:05        | 03:34 | 13:53 | 14:22      | 2            | 03:38        | 04:09 | 13:30 | 14:01      |
| 3            | 02:32        | 03:00 | 14:38 | 15:06      | 3            | 03:06        | 03:35 | 13:52 | 14:21      | 3            | 03:39        | 04:10 | 13:30 | 14:01      |
| 4            | 02:33        | 03:01 | 14:36 | 15:04      | 4            | 03:07        | 03:36 | 13:51 | 14:20      | 4            | 03:40        | 04:11 | 13:30 | 14:01      |
| 5            | 02:34        | 03:02 | 14:34 | 15:02      | 5            | 03:08        | 03:38 | 13:49 | 14:19      | 5            | 03:41        | 04:12 | 13:30 | 14:01      |
| 6            | 02:35        | 03:03 | 14:33 | 15:01      | 6            | 03:10        | 03:39 | 13:48 | 14:18      | 6            | 03:42        | 04:13 | 13:30 | 14:01      |
| 7            | 02:36        | 03:04 | 14:31 | 14:59      | 7            | 03:11        | 03:40 | 13:47 | 14:17      | 7            | 03:43        | 04:14 | 13:30 | 14:01      |
| 8            | 02:37        | 03:05 | 14:29 | 14:57      | 8            | 03:12        | 03:41 | 13:46 | 14:16      | 8            | 03:44        | 04:15 | 13:30 | 14:01      |
| 9            | 02:38        | 03:06 | 14:28 | 14:56      | 9            | 03:13        | 03:42 | 13:45 | 14:15      | 9            | 03:44        | 04:16 | 13:30 | 14:01      |
| 10           | 02:39        | 03:07 | 14:26 | 14:54      | 10           | 03:14        | 03:44 | 13:44 | 14:14      | 10           | 03:45        | 04:17 | 13:30 | 14:01      |
| 11           | 02:40        | 03:08 | 14:25 | 14:52      | 11           | 03:15        | 03:45 | 13:43 | 14:13      | 11           | 03:46        | 04:17 | 13:30 | 14:01      |
| 12           | 02:41        | 03:09 | 14:23 | 14:51      | 12           | 03:17        | 03:46 | 13:42 | 14:12      | 12           | 03:47        | 04:18 | 13:30 | 14:02      |
| 13           | 02:43        | 03:11 | 14:21 | 14:49      | 13           | 03:18        | 03:47 | 13:41 | 14:11      | 13           | 03:48        | 04:19 | 13:30 | 14:02      |
| 14           | 02:44        | 03:12 | 14:20 | 14:48      | 14           | 03:19        | 03:49 | 13:40 | 14:10      | 14           | 03:48        | 04:20 | 13:30 | 14:02      |
| 15           | 02:45        | 03:13 | 14:18 | 14:46      | 15           | 03:20        | 03:50 | 13:40 | 14:09      | 15           | 03:49        | 04:20 | 13:31 | 14:02      |
| 16           | 02:46        | 03:14 | 14:17 | 14:45      | 16           | 03:21        | 03:51 | 13:39 | 14:09      | 16           | 03:50        | 04:21 | 13:31 | 14:03      |
| 17           | 02:47        | 03:15 | 14:15 | 14:43      | 17           | 03:22        | 03:52 | 13:38 | 14:08      | 17           | 03:50        | 04:22 | 13:31 | 14:03      |
| 18           | 02:48        | 03:16 | 14:14 | 14:42      | 18           | 03:23        | 03:53 | 13:37 | 14:07      | 18           | 03:51        | 04:22 | 13:32 | 14:03      |
| 19           | 02:49        | 03:17 | 14:12 | 14:40      | 19           | 03:24        | 03:55 | 13:36 | 14:07      | 19           | 03:51        | 04:23 | 13:32 | 14:04      |
| 20           | 02:50        | 03:18 | 14:11 | 14:39      | 20           | 03:26        | 03:56 | 13:36 | 14:06      | 20           | 03:52        | 04:24 | 13:33 | 14:04      |
| 21           | 02:51        | 03:20 | 14:09 | 14:37      | 21           | 03:27        | 03:57 | 13:35 | 14:05      | 21           | 03:52        | 04:24 | 13:33 | 14:05      |
| 22           | 02:53        | 03:21 | 14:08 | 14:36      | 22           | 03:28        | 03:58 | 13:34 | 14:05      | 22           | 03:53        | 04:25 | 13:34 | 14:05      |
| 23           | 02:54        | 03:22 | 14:06 | 14:35      | 23           | 03:29        | 03:59 | 13:34 | 14:04      | 23           | 03:53        | 04:25 | 13:34 | 14:06      |
| 24           | 02:55        | 03:23 | 14:05 | 14:33      | 24           | 03:30        | 04:00 | 13:33 | 14:04      | 24           | 03:54        | 04:25 | 13:35 | 14:06      |
| 25           | 02:56        | 03:24 | 14:03 | 14:32      | 25           | 03:31        | 04:02 | 13:33 | 14:03      | 25           | 03:54        | 04:26 | 13:36 | 14:07      |
| 26           | 02:57        | 03:26 | 14:02 | 14:31      | 26           | 03:32        | 04:03 | 13:32 | 14:03      | 26           | 03:55        | 04:26 | 13:36 | 14:08      |
| 27           | 02:58        | 03:27 | 14:01 | 14:29      | 27           | 03:33        | 04:04 | 13:32 | 14:03      | 27           | 03:55        | 04:26 | 13:37 | 14:08      |
| 28           | 02:59        | 03:28 | 13:59 | 14:28      | 28           | 03:34        | 04:05 | 13:32 | 14:02      | 28           | 03:55        | 04:27 | 13:38 | 14:09      |
| 29           | 03:00        | 03:29 | 13:58 | 14:27      | 29           | 03:35        | 04:06 | 13:31 | 14:02      | 29           | 03:55        | 04:27 | 13:38 | 14:10      |
| 30           | 03:02        | 03:30 | 13:57 | 14:26      | 30           | 03:36        | 04:07 | 13:31 | 14:02      | 30           | 03:56        | 04:27 | 13:39 | 14:11      |
| 31           | 03:03        | 03:32 | 13:55 | 14:24      |              |              |       |       |            | 31           | 03:56        | 04:27 | 13:40 | 14:11      |

### 3.2 KUTAI/Kopitnari

| <b>KUTAI/Kopitnari</b><br><b>UGKO</b><br><b>N 42° 10' 37"</b><br><b>E 042° 28' 58"</b> |              |       |       |            |              |              |       |       |            |              |              |       |       |            |
|----------------------------------------------------------------------------------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| MONTH<br>DAY                                                                           | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
| JAN                                                                                    |              |       |       |            | FEB          |              |       |       |            | MAR          |              |       |       |            |
| 1                                                                                      | 04:08        | 04:41 | 13:49 | 14:20      | 1            | 03:54        | 04:24 | 14:24 | 14:54      | 1            | 03:17        | 03:45 | 15:01 | 15:29      |
| 2                                                                                      | 04:08        | 04:41 | 13:49 | 14:21      | 2            | 03:53        | 04:23 | 14:25 | 14:55      | 2            | 03:15        | 03:43 | 15:02 | 15:30      |
| 3                                                                                      | 04:09        | 04:41 | 13:50 | 14:22      | 3            | 03:52        | 04:22 | 14:27 | 14:56      | 3            | 03:13        | 03:42 | 15:03 | 15:31      |
| 4                                                                                      | 04:09        | 04:41 | 13:51 | 14:23      | 4            | 03:51        | 04:21 | 14:28 | 14:57      | 4            | 03:12        | 03:40 | 15:04 | 15:32      |
| 5                                                                                      | 04:09        | 04:41 | 13:52 | 14:24      | 5            | 03:50        | 04:20 | 14:29 | 14:59      | 5            | 03:10        | 03:38 | 15:06 | 15:33      |
| 6                                                                                      | 04:09        | 04:41 | 13:53 | 14:25      | 6            | 03:49        | 04:19 | 14:31 | 15:00      | 6            | 03:09        | 03:37 | 15:07 | 15:35      |
| 7                                                                                      | 04:09        | 04:41 | 13:54 | 14:26      | 7            | 03:48        | 04:17 | 14:32 | 15:01      | 7            | 03:07        | 03:35 | 15:08 | 15:36      |
| 8                                                                                      | 04:08        | 04:40 | 13:55 | 14:27      | 8            | 03:47        | 04:16 | 14:33 | 15:02      | 8            | 03:05        | 03:33 | 15:09 | 15:37      |
| 9                                                                                      | 04:08        | 04:40 | 13:56 | 14:28      | 9            | 03:46        | 04:15 | 14:34 | 15:04      | 9            | 03:04        | 03:32 | 15:10 | 15:38      |
| 10                                                                                     | 04:08        | 04:40 | 13:57 | 14:29      | 10           | 03:45        | 04:14 | 14:36 | 15:05      | 10           | 03:02        | 03:30 | 15:11 | 15:39      |
| 11                                                                                     | 04:08        | 04:40 | 13:58 | 14:30      | 11           | 03:43        | 04:12 | 14:37 | 15:06      | 11           | 03:00        | 03:28 | 15:13 | 15:40      |
| 12                                                                                     | 04:08        | 04:39 | 13:59 | 14:31      | 12           | 03:42        | 04:11 | 14:38 | 15:07      | 12           | 02:59        | 03:26 | 15:14 | 15:42      |
| 13                                                                                     | 04:07        | 04:39 | 14:01 | 14:32      | 13           | 03:41        | 04:10 | 14:40 | 15:08      | 13           | 02:57        | 03:25 | 15:15 | 15:43      |
| 14                                                                                     | 04:07        | 04:39 | 14:02 | 14:33      | 14           | 03:40        | 04:09 | 14:41 | 15:10      | 14           | 02:55        | 03:23 | 15:16 | 15:44      |
| 15                                                                                     | 04:07        | 04:38 | 14:03 | 14:34      | 15           | 03:38        | 04:07 | 14:42 | 15:11      | 15           | 02:53        | 03:21 | 15:17 | 15:45      |
| 16                                                                                     | 04:06        | 04:38 | 14:04 | 14:35      | 16           | 03:37        | 04:06 | 14:43 | 15:12      | 16           | 02:52        | 03:20 | 15:18 | 15:46      |
| 17                                                                                     | 04:06        | 04:37 | 14:05 | 14:36      | 17           | 03:36        | 04:04 | 14:45 | 15:13      | 17           | 02:50        | 03:18 | 15:19 | 15:47      |
| 18                                                                                     | 04:05        | 04:36 | 14:06 | 14:37      | 18           | 03:34        | 04:03 | 14:46 | 15:14      | 18           | 02:48        | 03:16 | 15:21 | 15:49      |
| 19                                                                                     | 04:05        | 04:36 | 14:08 | 14:38      | 19           | 03:33        | 04:02 | 14:47 | 15:16      | 19           | 02:47        | 03:14 | 15:22 | 15:50      |
| 20                                                                                     | 04:04        | 04:35 | 14:09 | 14:39      | 20           | 03:32        | 04:00 | 14:48 | 15:17      | 20           | 02:45        | 03:13 | 15:23 | 15:51      |
| 21                                                                                     | 04:04        | 04:35 | 14:10 | 14:41      | 21           | 03:30        | 03:59 | 14:50 | 15:18      | 21           | 02:43        | 03:11 | 15:24 | 15:52      |
| 22                                                                                     | 04:03        | 04:34 | 14:11 | 14:42      | 22           | 03:29        | 03:57 | 14:51 | 15:19      | 22           | 02:41        | 03:09 | 15:25 | 15:53      |
| 23                                                                                     | 04:02        | 04:33 | 14:13 | 14:43      | 23           | 03:27        | 03:56 | 14:52 | 15:21      | 23           | 02:40        | 03:08 | 15:26 | 15:54      |
| 24                                                                                     | 04:02        | 04:32 | 14:14 | 14:44      | 24           | 03:26        | 03:54 | 14:53 | 15:22      | 24           | 02:38        | 03:06 | 15:27 | 15:55      |
| 25                                                                                     | 04:01        | 04:32 | 14:15 | 14:45      | 25           | 03:24        | 03:53 | 14:55 | 15:23      | 25           | 02:36        | 03:04 | 15:28 | 15:57      |
| 26                                                                                     | 04:00        | 04:31 | 14:16 | 14:46      | 26           | 03:23        | 03:51 | 14:56 | 15:24      | 26           | 02:34        | 03:02 | 15:30 | 15:58      |
| 27                                                                                     | 03:59        | 04:30 | 14:18 | 14:48      | 27           | 03:21        | 03:50 | 14:57 | 15:25      | 27           | 02:33        | 03:01 | 15:31 | 15:59      |
| 28                                                                                     | 03:58        | 04:29 | 14:19 | 14:49      | 28           | 03:20        | 03:48 | 14:58 | 15:26      | 28           | 02:31        | 02:59 | 15:32 | 16:00      |
| 29                                                                                     | 03:58        | 04:28 | 14:20 | 14:50      | 29           | 03:18        | 03:46 | 15:00 | 15:28      | 29           | 02:29        | 02:57 | 15:33 | 16:01      |
| 30                                                                                     | 03:57        | 04:27 | 14:21 | 14:51      |              |              |       |       |            | 30           | 02:27        | 02:55 | 15:34 | 16:02      |
| 31                                                                                     | 03:56        | 04:26 | 14:23 | 14:52      |              |              |       |       |            | 31           | 02:25        | 02:54 | 15:35 | 16:03      |
| APR                                                                                    |              |       |       |            | MAY          |              |       |       |            | JUN          |              |       |       |            |
| 1                                                                                      | 02:24        | 02:52 | 15:36 | 16:05      | 1            | 01:34        | 02:05 | 16:10 | 16:40      | 1            | 01:02        | 01:36 | 16:40 | 17:14      |
| 2                                                                                      | 02:22        | 02:50 | 15:37 | 16:06      | 2            | 01:33        | 02:04 | 16:11 | 16:42      | 2            | 01:02        | 01:36 | 16:41 | 17:15      |
| 3                                                                                      | 02:20        | 02:49 | 15:39 | 16:07      | 3            | 01:32        | 02:02 | 16:12 | 16:43      | 3            | 01:01        | 01:35 | 16:42 | 17:16      |
| 4                                                                                      | 02:18        | 02:47 | 15:40 | 16:08      | 4            | 01:30        | 02:01 | 16:13 | 16:44      | 4            | 01:01        | 01:35 | 16:42 | 17:16      |
| 5                                                                                      | 02:17        | 02:45 | 15:41 | 16:09      | 5            | 01:29        | 02:00 | 16:14 | 16:45      | 5            | 01:01        | 01:35 | 16:43 | 17:17      |
| 6                                                                                      | 02:15        | 02:44 | 15:42 | 16:10      | 6            | 01:28        | 01:59 | 16:15 | 16:46      | 6            | 01:00        | 01:34 | 16:44 | 17:18      |
| 7                                                                                      | 02:13        | 02:42 | 15:43 | 16:12      | 7            | 01:26        | 01:57 | 16:16 | 16:48      | 7            | 01:00        | 01:34 | 16:44 | 17:18      |
| 8                                                                                      | 02:12        | 02:40 | 15:44 | 16:13      | 8            | 01:25        | 01:56 | 16:17 | 16:49      | 8            | 01:00        | 01:34 | 16:45 | 17:19      |
| 9                                                                                      | 02:10        | 02:39 | 15:45 | 16:14      | 9            | 01:24        | 01:55 | 16:18 | 16:50      | 9            | 00:59        | 01:34 | 16:45 | 17:20      |
| 10                                                                                     | 02:08        | 02:37 | 15:46 | 16:15      | 10           | 01:22        | 01:54 | 16:19 | 16:51      | 10           | 00:59        | 01:33 | 16:46 | 17:20      |
| 11                                                                                     | 02:06        | 02:35 | 15:47 | 16:16      | 11           | 01:21        | 01:53 | 16:21 | 16:52      | 11           | 00:59        | 01:33 | 16:46 | 17:21      |
| 12                                                                                     | 02:05        | 02:34 | 15:49 | 16:18      | 12           | 01:20        | 01:52 | 16:22 | 16:53      | 12           | 00:59        | 01:33 | 16:47 | 17:21      |
| 13                                                                                     | 02:03        | 02:32 | 15:50 | 16:19      | 13           | 01:19        | 01:51 | 16:23 | 16:55      | 13           | 00:59        | 01:33 | 16:47 | 17:22      |
| 14                                                                                     | 02:01        | 02:30 | 15:51 | 16:20      | 14           | 01:18        | 01:50 | 16:24 | 16:56      | 14           | 00:59        | 01:33 | 16:48 | 17:22      |
| 15                                                                                     | 02:00        | 02:29 | 15:52 | 16:21      | 15           | 01:17        | 01:49 | 16:25 | 16:57      | 15           | 00:59        | 01:33 | 16:48 | 17:23      |
| 16                                                                                     | 01:58        | 02:27 | 15:53 | 16:22      | 16           | 01:15        | 01:48 | 16:26 | 16:58      | 16           | 00:59        | 01:33 | 16:49 | 17:23      |
| 17                                                                                     | 01:56        | 02:26 | 15:54 | 16:24      | 17           | 01:14        | 01:47 | 16:27 | 16:59      | 17           | 00:59        | 01:33 | 16:49 | 17:23      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| APR          |              |       |       |            | MAY          |              |       |       |            | JUN          |              |       |       |            |
| 18           | 01:55        | 02:24 | 15:55 | 16:25      | 18           | 01:13        | 01:46 | 16:28 | 17:00      | 18           | 00:59        | 01:33 | 16:49 | 17:24      |
| 19           | 01:53        | 02:22 | 15:56 | 16:26      | 19           | 01:12        | 01:45 | 16:29 | 17:01      | 19           | 00:59        | 01:34 | 16:49 | 17:24      |
| 20           | 01:51        | 02:21 | 15:58 | 16:27      | 20           | 01:11        | 01:44 | 16:30 | 17:02      | 20           | 00:59        | 01:34 | 16:50 | 17:24      |
| 21           | 01:50        | 02:19 | 15:59 | 16:28      | 21           | 01:10        | 01:43 | 16:31 | 17:03      | 21           | 00:59        | 01:34 | 16:50 | 17:25      |
| 22           | 01:48        | 02:18 | 16:00 | 16:30      | 22           | 01:10        | 01:42 | 16:32 | 17:04      | 22           | 01:00        | 01:34 | 16:50 | 17:25      |
| 23           | 01:47        | 02:16 | 16:01 | 16:31      | 23           | 01:09        | 01:42 | 16:32 | 17:05      | 23           | 01:00        | 01:35 | 16:50 | 17:25      |
| 24           | 01:45        | 02:15 | 16:02 | 16:32      | 24           | 01:08        | 01:41 | 16:33 | 17:06      | 24           | 01:00        | 01:35 | 16:50 | 17:25      |
| 25           | 01:43        | 02:13 | 16:03 | 16:33      | 25           | 01:07        | 01:40 | 16:34 | 17:07      | 25           | 01:01        | 01:35 | 16:50 | 17:25      |
| 26           | 01:42        | 02:12 | 16:04 | 16:34      | 26           | 01:06        | 01:40 | 16:35 | 17:08      | 26           | 01:01        | 01:36 | 16:50 | 17:25      |
| 27           | 01:40        | 02:11 | 16:05 | 16:36      | 27           | 01:06        | 01:39 | 16:36 | 17:09      | 27           | 01:01        | 01:36 | 16:50 | 17:25      |
| 28           | 01:39        | 02:09 | 16:06 | 16:37      | 28           | 01:05        | 01:38 | 16:37 | 17:10      | 28           | 01:02        | 01:36 | 16:50 | 17:25      |
| 29           | 01:37        | 02:08 | 16:08 | 16:38      | 29           | 01:04        | 01:38 | 16:38 | 17:11      | 29           | 01:02        | 01:37 | 16:50 | 17:25      |
| 30           | 01:36        | 02:06 | 16:09 | 16:39      | 30           | 01:04        | 01:37 | 16:38 | 17:12      | 30           | 01:03        | 01:37 | 16:50 | 17:25      |
|              |              |       |       |            | 31           | 01:03        | 01:37 | 16:39 | 17:13      |              |              |       |       |            |
| JUL          |              |       |       |            | AUG          |              |       |       |            | SEP          |              |       |       |            |
| 1            | 01:03        | 01:38 | 16:50 | 17:24      | 1            | 01:32        | 02:03 | 16:29 | 17:00      | 1            | 02:07        | 02:36 | 15:43 | 16:12      |
| 2            | 01:04        | 01:38 | 16:50 | 17:24      | 2            | 01:33        | 02:04 | 16:28 | 16:59      | 2            | 02:08        | 02:37 | 15:42 | 16:10      |
| 3            | 01:05        | 01:39 | 16:50 | 17:24      | 3            | 01:34        | 02:05 | 16:26 | 16:58      | 3            | 02:09        | 02:38 | 15:40 | 16:08      |
| 4            | 01:05        | 01:40 | 16:49 | 17:24      | 4            | 01:35        | 02:07 | 16:25 | 16:56      | 4            | 02:10        | 02:39 | 15:38 | 16:07      |
| 5            | 01:06        | 01:40 | 16:49 | 17:23      | 5            | 01:36        | 02:08 | 16:24 | 16:55      | 5            | 02:11        | 02:40 | 15:36 | 16:05      |
| 6            | 01:07        | 01:41 | 16:49 | 17:23      | 6            | 01:38        | 02:09 | 16:23 | 16:54      | 6            | 02:13        | 02:41 | 15:35 | 16:03      |
| 7            | 01:07        | 01:41 | 16:48 | 17:22      | 7            | 01:39        | 02:10 | 16:21 | 16:52      | 7            | 02:14        | 02:42 | 15:33 | 16:01      |
| 8            | 01:08        | 01:42 | 16:48 | 17:22      | 8            | 01:40        | 02:11 | 16:20 | 16:51      | 8            | 02:15        | 02:43 | 15:31 | 16:00      |
| 9            | 01:09        | 01:43 | 16:48 | 17:21      | 9            | 01:41        | 02:12 | 16:19 | 16:49      | 9            | 02:16        | 02:44 | 15:29 | 15:58      |
| 10           | 01:10        | 01:44 | 16:47 | 17:21      | 10           | 01:42        | 02:13 | 16:17 | 16:48      | 10           | 02:17        | 02:45 | 15:28 | 15:56      |
| 11           | 01:11        | 01:44 | 16:47 | 17:20      | 11           | 01:43        | 02:14 | 16:16 | 16:46      | 11           | 02:18        | 02:46 | 15:26 | 15:54      |
| 12           | 01:11        | 01:45 | 16:46 | 17:20      | 12           | 01:44        | 02:15 | 16:15 | 16:45      | 12           | 02:19        | 02:47 | 15:24 | 15:52      |
| 13           | 01:12        | 01:46 | 16:45 | 17:19      | 13           | 01:46        | 02:16 | 16:13 | 16:43      | 13           | 02:20        | 02:48 | 15:22 | 15:51      |
| 14           | 01:13        | 01:47 | 16:45 | 17:18      | 14           | 01:47        | 02:17 | 16:12 | 16:42      | 14           | 02:21        | 02:49 | 15:21 | 15:49      |
| 15           | 01:14        | 01:48 | 16:44 | 17:18      | 15           | 01:48        | 02:18 | 16:10 | 16:40      | 15           | 02:22        | 02:50 | 15:19 | 15:47      |
| 16           | 01:15        | 01:48 | 16:44 | 17:17      | 16           | 01:49        | 02:19 | 16:09 | 16:39      | 16           | 02:23        | 02:52 | 15:17 | 15:45      |
| 17           | 01:16        | 01:49 | 16:43 | 17:16      | 17           | 01:50        | 02:20 | 16:07 | 16:37      | 17           | 02:25        | 02:53 | 15:15 | 15:43      |
| 18           | 01:17        | 01:50 | 16:42 | 17:15      | 18           | 01:51        | 02:21 | 16:06 | 16:36      | 18           | 02:26        | 02:54 | 15:14 | 15:42      |
| 19           | 01:18        | 01:51 | 16:41 | 17:14      | 19           | 01:52        | 02:22 | 16:04 | 16:34      | 19           | 02:27        | 02:55 | 15:12 | 15:40      |
| 20           | 01:19        | 01:52 | 16:41 | 17:13      | 20           | 01:54        | 02:23 | 16:03 | 16:32      | 20           | 02:28        | 02:56 | 15:10 | 15:38      |
| 21           | 01:20        | 01:53 | 16:40 | 17:12      | 21           | 01:55        | 02:24 | 16:01 | 16:31      | 21           | 02:29        | 02:57 | 15:08 | 15:36      |
| 22           | 01:21        | 01:54 | 16:39 | 17:12      | 22           | 01:56        | 02:25 | 16:00 | 16:29      | 22           | 02:30        | 02:58 | 15:07 | 15:35      |
| 23           | 01:22        | 01:55 | 16:38 | 17:11      | 23           | 01:57        | 02:26 | 15:58 | 16:27      | 23           | 02:31        | 02:59 | 15:05 | 15:33      |
| 24           | 01:23        | 01:56 | 16:37 | 17:09      | 24           | 01:58        | 02:27 | 15:56 | 16:26      | 24           | 02:32        | 03:00 | 15:03 | 15:31      |
| 25           | 01:24        | 01:57 | 16:36 | 17:08      | 25           | 01:59        | 02:28 | 15:55 | 16:24      | 25           | 02:33        | 03:01 | 15:01 | 15:29      |
| 26           | 01:25        | 01:57 | 16:35 | 17:07      | 26           | 02:00        | 02:30 | 15:53 | 16:22      | 26           | 02:34        | 03:02 | 15:00 | 15:27      |
| 27           | 01:26        | 01:58 | 16:34 | 17:06      | 27           | 02:01        | 02:31 | 15:52 | 16:21      | 27           | 02:35        | 03:03 | 14:58 | 15:26      |
| 28           | 01:27        | 01:59 | 16:33 | 17:05      | 28           | 02:03        | 02:32 | 15:50 | 16:19      | 28           | 02:36        | 03:04 | 14:56 | 15:24      |
| 29           | 01:29        | 02:00 | 16:32 | 17:04      | 29           | 02:04        | 02:33 | 15:48 | 16:17      | 29           | 02:37        | 03:05 | 14:54 | 15:22      |
| 30           | 01:30        | 02:01 | 16:31 | 17:03      | 30           | 02:05        | 02:34 | 15:47 | 16:15      | 30           | 02:39        | 03:06 | 14:53 | 15:21      |
| 31           | 01:31        | 02:02 | 16:30 | 17:01      | 31           | 02:06        | 02:35 | 15:45 | 16:14      |              |              |       |       |            |
| OCT          |              |       |       |            | NOV          |              |       |       |            | DEC          |              |       |       |            |
| 1            | 02:40        | 03:07 | 14:51 | 15:19      | 1            | 03:14        | 03:44 | 14:03 | 14:32      | 1            | 03:48        | 04:19 | 13:39 | 14:10      |
| 2            | 02:41        | 03:09 | 14:49 | 15:17      | 2            | 03:16        | 03:45 | 14:02 | 14:31      | 2            | 03:49        | 04:21 | 13:39 | 14:10      |
| 3            | 02:42        | 03:10 | 14:47 | 15:15      | 3            | 03:17        | 03:46 | 14:01 | 14:30      | 3            | 03:50        | 04:22 | 13:38 | 14:10      |
| 4            | 02:43        | 03:11 | 14:46 | 15:14      | 4            | 03:18        | 03:47 | 13:59 | 14:29      | 4            | 03:51        | 04:23 | 13:38 | 14:10      |
| 5            | 02:44        | 03:12 | 14:44 | 15:12      | 5            | 03:19        | 03:49 | 13:58 | 14:28      | 5            | 03:52        | 04:24 | 13:38 | 14:10      |
| 6            | 02:45        | 03:13 | 14:42 | 15:10      | 6            | 03:20        | 03:50 | 13:57 | 14:27      | 6            | 03:53        | 04:25 | 13:38 | 14:10      |
| 7            | 02:46        | 03:14 | 14:41 | 15:09      | 7            | 03:21        | 03:51 | 13:56 | 14:26      | 7            | 03:54        | 04:25 | 13:38 | 14:10      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| OCT          |              |       |       |            | NOV          |              |       |       |            | DEC          |              |       |       |            |
| 8            | 02:47        | 03:15 | 14:39 | 15:07      | 8            | 03:23        | 03:52 | 13:55 | 14:25      | 8            | 03:55        | 04:26 | 13:38 | 14:10      |
| 9            | 02:48        | 03:16 | 14:37 | 15:05      | 9            | 03:24        | 03:54 | 13:54 | 14:24      | 9            | 03:56        | 04:27 | 13:38 | 14:10      |
| 10           | 02:49        | 03:17 | 14:36 | 15:04      | 10           | 03:25        | 03:55 | 13:53 | 14:23      | 10           | 03:56        | 04:28 | 13:38 | 14:10      |
| 11           | 02:51        | 03:19 | 14:34 | 15:02      | 11           | 03:26        | 03:56 | 13:52 | 14:22      | 11           | 03:57        | 04:29 | 13:38 | 14:10      |
| 12           | 02:52        | 03:20 | 14:32 | 15:01      | 12           | 03:27        | 03:57 | 13:51 | 14:21      | 12           | 03:58        | 04:30 | 13:38 | 14:10      |
| 13           | 02:53        | 03:21 | 14:31 | 14:59      | 13           | 03:28        | 03:58 | 13:50 | 14:20      | 13           | 03:59        | 04:31 | 13:39 | 14:10      |
| 14           | 02:54        | 03:22 | 14:29 | 14:57      | 14           | 03:30        | 04:00 | 13:49 | 14:19      | 14           | 03:59        | 04:31 | 13:39 | 14:11      |
| 15           | 02:55        | 03:23 | 14:28 | 14:56      | 15           | 03:31        | 04:01 | 13:48 | 14:18      | 15           | 04:00        | 04:32 | 13:39 | 14:11      |
| 16           | 02:56        | 03:24 | 14:26 | 14:54      | 16           | 03:32        | 04:02 | 13:47 | 14:18      | 16           | 04:01        | 04:33 | 13:39 | 14:11      |
| 17           | 02:57        | 03:26 | 14:24 | 14:53      | 17           | 03:33        | 04:03 | 13:46 | 14:17      | 17           | 04:01        | 04:33 | 13:40 | 14:12      |
| 18           | 02:58        | 03:27 | 14:23 | 14:51      | 18           | 03:34        | 04:05 | 13:46 | 14:16      | 18           | 04:02        | 04:34 | 13:40 | 14:12      |
| 19           | 02:59        | 03:28 | 14:21 | 14:50      | 19           | 03:35        | 04:06 | 13:45 | 14:15      | 19           | 04:03        | 04:35 | 13:40 | 14:12      |
| 20           | 03:01        | 03:29 | 14:20 | 14:48      | 20           | 03:37        | 04:07 | 13:44 | 14:15      | 20           | 04:03        | 04:35 | 13:41 | 14:13      |
| 21           | 03:02        | 03:30 | 14:18 | 14:47      | 21           | 03:38        | 04:08 | 13:44 | 14:14      | 21           | 04:04        | 04:36 | 13:41 | 14:13      |
| 22           | 03:03        | 03:31 | 14:17 | 14:45      | 22           | 03:39        | 04:09 | 13:43 | 14:14      | 22           | 04:04        | 04:36 | 13:42 | 14:14      |
| 23           | 03:04        | 03:33 | 14:15 | 14:44      | 23           | 03:40        | 04:11 | 13:42 | 14:13      | 23           | 04:05        | 04:37 | 13:43 | 14:14      |
| 24           | 03:05        | 03:34 | 14:14 | 14:43      | 24           | 03:41        | 04:12 | 13:42 | 14:13      | 24           | 04:05        | 04:37 | 13:43 | 14:15      |
| 25           | 03:06        | 03:35 | 14:13 | 14:41      | 25           | 03:42        | 04:13 | 13:41 | 14:12      | 25           | 04:05        | 04:37 | 13:44 | 14:16      |
| 26           | 03:07        | 03:36 | 14:11 | 14:40      | 26           | 03:43        | 04:14 | 13:41 | 14:12      | 26           | 04:06        | 04:38 | 13:44 | 14:16      |
| 27           | 03:09        | 03:37 | 14:10 | 14:39      | 27           | 03:44        | 04:15 | 13:40 | 14:11      | 27           | 04:06        | 04:38 | 13:45 | 14:17      |
| 28           | 03:10        | 03:39 | 14:08 | 14:37      | 28           | 03:45        | 04:16 | 13:40 | 14:11      | 28           | 04:06        | 04:38 | 13:46 | 14:18      |
| 29           | 03:11        | 03:40 | 14:07 | 14:36      | 29           | 03:46        | 04:17 | 13:40 | 14:11      | 29           | 04:07        | 04:38 | 13:47 | 14:18      |
| 30           | 03:12        | 03:41 | 14:06 | 14:35      | 30           | 03:47        | 04:18 | 13:39 | 14:10      | 30           | 04:07        | 04:39 | 13:47 | 14:19      |
| 31           | 03:13        | 03:42 | 14:04 | 14:34      |              |              |       |       |            | 31           | 04:07        | 04:39 | 13:48 | 14:20      |

### 3.3 BATUMI

| <b>BATUMI</b><br><b>UGSB</b><br><b>N 41° 36' 37"</b><br><b>E 041° 35' 58"</b> |              |       |       |            |              |              |       |       |            |              |              |       |       |            |
|-------------------------------------------------------------------------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| MONTH<br>DAY                                                                  | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
| JAN                                                                           |              |       |       |            | FEB          |              |       |       |            | MAR          |              |       |       |            |
| 1                                                                             | 04:08        | 04:41 | 13:54 | 14:25      | 1            | 03:57        | 04:26 | 14:29 | 14:58      | 1            | 03:20        | 03:48 | 15:05 | 15:33      |
| 2                                                                             | 04:08        | 04:41 | 13:55 | 14:26      | 2            | 03:56        | 04:25 | 14:30 | 14:59      | 2            | 03:18        | 03:46 | 15:06 | 15:34      |
| 3                                                                             | 04:09        | 04:41 | 13:56 | 14:27      | 3            | 03:55        | 04:24 | 14:31 | 15:01      | 3            | 03:17        | 03:45 | 15:07 | 15:35      |
| 4                                                                             | 04:09        | 04:41 | 13:57 | 14:28      | 4            | 03:54        | 04:23 | 14:33 | 15:02      | 4            | 03:15        | 03:43 | 15:08 | 15:36      |
| 5                                                                             | 04:09        | 04:41 | 13:57 | 14:29      | 5            | 03:53        | 04:22 | 14:34 | 15:03      | 5            | 03:14        | 03:41 | 15:09 | 15:37      |
| 6                                                                             | 04:09        | 04:41 | 13:58 | 14:30      | 6            | 03:52        | 04:21 | 14:35 | 15:04      | 6            | 03:12        | 03:40 | 15:11 | 15:38      |
| 7                                                                             | 04:09        | 04:41 | 13:59 | 14:30      | 7            | 03:51        | 04:20 | 14:36 | 15:05      | 7            | 03:10        | 03:38 | 15:12 | 15:39      |
| 8                                                                             | 04:08        | 04:40 | 14:00 | 14:31      | 8            | 03:50        | 04:19 | 14:38 | 15:07      | 8            | 03:09        | 03:36 | 15:13 | 15:41      |
| 9                                                                             | 04:08        | 04:40 | 14:01 | 14:32      | 9            | 03:49        | 04:17 | 14:39 | 15:08      | 9            | 03:07        | 03:35 | 15:14 | 15:42      |
| 10                                                                            | 04:08        | 04:40 | 14:02 | 14:33      | 10           | 03:47        | 04:16 | 14:40 | 15:09      | 10           | 03:06        | 03:33 | 15:15 | 15:43      |
| 11                                                                            | 04:08        | 04:40 | 14:04 | 14:34      | 11           | 03:46        | 04:15 | 14:42 | 15:10      | 11           | 03:04        | 03:32 | 15:16 | 15:44      |
| 12                                                                            | 04:08        | 04:39 | 14:05 | 14:35      | 12           | 03:45        | 04:14 | 14:43 | 15:11      | 12           | 03:02        | 03:30 | 15:17 | 15:45      |
| 13                                                                            | 04:07        | 04:39 | 14:06 | 14:36      | 13           | 03:44        | 04:12 | 14:44 | 15:13      | 13           | 03:01        | 03:28 | 15:19 | 15:46      |
| 14                                                                            | 04:07        | 04:39 | 14:07 | 14:38      | 14           | 03:43        | 04:11 | 14:45 | 15:14      | 14           | 02:59        | 03:26 | 15:20 | 15:47      |
| 15                                                                            | 04:07        | 04:38 | 14:08 | 14:39      | 15           | 03:41        | 04:10 | 14:47 | 15:15      | 15           | 02:57        | 03:25 | 15:21 | 15:48      |
| 16                                                                            | 04:06        | 04:38 | 14:09 | 14:40      | 16           | 03:40        | 04:08 | 14:48 | 15:16      | 16           | 02:55        | 03:23 | 15:22 | 15:50      |
| 17                                                                            | 04:06        | 04:37 | 14:10 | 14:41      | 17           | 03:39        | 04:07 | 14:49 | 15:17      | 17           | 02:54        | 03:21 | 15:23 | 15:51      |
| 18                                                                            | 04:05        | 04:36 | 14:11 | 14:42      | 18           | 03:37        | 04:06 | 14:50 | 15:19      | 18           | 02:52        | 03:20 | 15:24 | 15:52      |
| 19                                                                            | 04:05        | 04:36 | 14:13 | 14:43      | 19           | 03:36        | 04:04 | 14:51 | 15:20      | 19           | 02:50        | 03:18 | 15:25 | 15:53      |
| 20                                                                            | 04:04        | 04:35 | 14:14 | 14:44      | 20           | 03:35        | 04:03 | 14:53 | 15:21      | 20           | 02:49        | 03:16 | 15:26 | 15:54      |
| 21                                                                            | 04:04        | 04:35 | 14:15 | 14:45      | 21           | 03:33        | 04:01 | 14:54 | 15:22      | 21           | 02:47        | 03:15 | 15:27 | 15:55      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| JAN          |              |       |       |            | FEB          |              |       |       |            | MAR          |              |       |       |            |
| 22           | 04:03        | 04:34 | 14:16 | 14:46      | 22           | 03:32        | 04:00 | 14:55 | 15:23      | 22           | 02:45        | 03:13 | 15:29 | 15:56      |
| 23           | 04:02        | 04:33 | 14:18 | 14:48      | 23           | 03:30        | 03:59 | 14:56 | 15:24      | 23           | 02:43        | 03:11 | 15:30 | 15:57      |
| 24           | 04:02        | 04:32 | 14:19 | 14:49      | 24           | 03:29        | 03:57 | 14:58 | 15:26      | 24           | 02:42        | 03:10 | 15:31 | 15:59      |
| 25           | 04:01        | 04:32 | 14:20 | 14:50      | 25           | 03:27        | 03:56 | 14:59 | 15:27      | 25           | 02:40        | 03:08 | 15:32 | 16:00      |
| 26           | 04:00        | 04:31 | 14:21 | 14:51      | 26           | 03:26        | 03:54 | 15:00 | 15:28      | 26           | 02:38        | 03:06 | 15:33 | 16:01      |
| 27           | 03:59        | 04:30 | 14:22 | 14:52      | 27           | 03:25        | 03:52 | 15:01 | 15:29      | 27           | 02:37        | 03:04 | 15:34 | 16:02      |
| 28           | 03:58        | 04:29 | 14:24 | 14:53      | 28           | 03:23        | 03:51 | 15:02 | 15:30      | 28           | 02:35        | 03:03 | 15:35 | 16:03      |
| 29           | 03:58        | 04:28 | 14:25 | 14:55      | 29           | 03:21        | 03:49 | 15:04 | 15:31      | 29           | 02:33        | 03:01 | 15:36 | 16:04      |
| 30           | 03:57        | 04:27 | 14:26 | 14:56      |              |              |       |       |            | 30           | 02:31        | 02:59 | 15:37 | 16:05      |
| 31           | 03:56        | 04:26 | 14:28 | 14:57      |              |              |       |       |            | 31           | 02:30        | 02:58 | 15:38 | 16:06      |
| APR          |              |       |       |            | MAY          |              |       |       |            | JUN          |              |       |       |            |
| 1            | 02:28        | 02:56 | 15:39 | 16:08      | 1            | 01:40        | 02:10 | 16:12 | 16:42      | 1            | 01:08        | 01:42 | 16:42 | 17:15      |
| 2            | 02:26        | 02:54 | 15:41 | 16:09      | 2            | 01:38        | 02:09 | 16:13 | 16:44      | 2            | 01:08        | 01:41 | 16:42 | 17:16      |
| 3            | 02:24        | 02:53 | 15:42 | 16:10      | 3            | 01:37        | 02:07 | 16:14 | 16:45      | 3            | 01:07        | 01:41 | 16:43 | 17:17      |
| 4            | 02:23        | 02:51 | 15:43 | 16:11      | 4            | 01:35        | 02:06 | 16:15 | 16:46      | 4            | 01:07        | 01:40 | 16:44 | 17:17      |
| 5            | 02:21        | 02:49 | 15:44 | 16:12      | 5            | 01:34        | 02:05 | 16:16 | 16:47      | 5            | 01:06        | 01:40 | 16:45 | 17:18      |
| 6            | 02:19        | 02:48 | 15:45 | 16:13      | 6            | 01:33        | 02:04 | 16:17 | 16:48      | 6            | 01:06        | 01:40 | 16:45 | 17:19      |
| 7            | 02:18        | 02:46 | 15:46 | 16:14      | 7            | 01:31        | 02:02 | 16:18 | 16:49      | 7            | 01:06        | 01:40 | 16:46 | 17:20      |
| 8            | 02:16        | 02:44 | 15:47 | 16:15      | 8            | 01:30        | 02:01 | 16:19 | 16:51      | 8            | 01:05        | 01:39 | 16:46 | 17:20      |
| 9            | 02:14        | 02:43 | 15:48 | 16:17      | 9            | 01:29        | 02:00 | 16:21 | 16:52      | 9            | 01:05        | 01:39 | 16:47 | 17:21      |
| 10           | 02:13        | 02:41 | 15:49 | 16:18      | 10           | 01:28        | 01:59 | 16:22 | 16:53      | 10           | 01:05        | 01:39 | 16:47 | 17:21      |
| 11           | 02:11        | 02:39 | 15:50 | 16:19      | 11           | 01:27        | 01:58 | 16:23 | 16:54      | 11           | 01:05        | 01:39 | 16:48 | 17:22      |
| 12           | 02:09        | 02:38 | 15:51 | 16:20      | 12           | 01:25        | 01:57 | 16:24 | 16:55      | 12           | 01:05        | 01:39 | 16:48 | 17:22      |
| 13           | 02:07        | 02:36 | 15:53 | 16:21      | 13           | 01:24        | 01:56 | 16:25 | 16:56      | 13           | 01:05        | 01:39 | 16:49 | 17:23      |
| 14           | 02:06        | 02:35 | 15:54 | 16:22      | 14           | 01:23        | 01:55 | 16:26 | 16:57      | 14           | 01:05        | 01:39 | 16:49 | 17:23      |
| 15           | 02:04        | 02:33 | 15:55 | 16:24      | 15           | 01:22        | 01:54 | 16:27 | 16:58      | 15           | 01:05        | 01:39 | 16:50 | 17:24      |
| 16           | 02:03        | 02:31 | 15:56 | 16:25      | 16           | 01:21        | 01:53 | 16:28 | 17:00      | 16           | 01:05        | 01:39 | 16:50 | 17:24      |
| 17           | 02:01        | 02:30 | 15:57 | 16:26      | 17           | 01:20        | 01:52 | 16:29 | 17:01      | 17           | 01:05        | 01:39 | 16:50 | 17:25      |
| 18           | 01:59        | 02:28 | 15:58 | 16:27      | 18           | 01:19        | 01:51 | 16:30 | 17:02      | 18           | 01:05        | 01:39 | 16:51 | 17:25      |
| 19           | 01:58        | 02:27 | 15:59 | 16:28      | 19           | 01:18        | 01:50 | 16:31 | 17:03      | 19           | 01:05        | 01:39 | 16:51 | 17:25      |
| 20           | 01:56        | 02:25 | 16:00 | 16:29      | 20           | 01:17        | 01:49 | 16:32 | 17:04      | 20           | 01:05        | 01:39 | 16:51 | 17:25      |
| 21           | 01:55        | 02:24 | 16:01 | 16:31      | 21           | 01:16        | 01:48 | 16:32 | 17:05      | 21           | 01:05        | 01:40 | 16:51 | 17:26      |
| 22           | 01:53        | 02:22 | 16:02 | 16:32      | 22           | 01:15        | 01:48 | 16:33 | 17:06      | 22           | 01:06        | 01:40 | 16:52 | 17:26      |
| 23           | 01:51        | 02:21 | 16:03 | 16:33      | 23           | 01:14        | 01:47 | 16:34 | 17:07      | 23           | 01:06        | 01:40 | 16:52 | 17:26      |
| 24           | 01:50        | 02:19 | 16:04 | 16:34      | 24           | 01:14        | 01:46 | 16:35 | 17:08      | 24           | 01:06        | 01:40 | 16:52 | 17:26      |
| 25           | 01:48        | 02:18 | 16:06 | 16:35      | 25           | 01:13        | 01:45 | 16:36 | 17:09      | 25           | 01:07        | 01:41 | 16:52 | 17:26      |
| 26           | 01:47        | 02:17 | 16:07 | 16:36      | 26           | 01:12        | 01:45 | 16:37 | 17:10      | 26           | 01:07        | 01:41 | 16:52 | 17:26      |
| 27           | 01:45        | 02:15 | 16:08 | 16:38      | 27           | 01:11        | 01:44 | 16:38 | 17:11      | 27           | 01:07        | 01:41 | 16:52 | 17:26      |
| 28           | 01:44        | 02:14 | 16:09 | 16:39      | 28           | 01:11        | 01:44 | 16:39 | 17:12      | 28           | 01:08        | 01:42 | 16:52 | 17:26      |
| 29           | 01:42        | 02:12 | 16:10 | 16:40      | 29           | 01:10        | 01:43 | 16:39 | 17:13      | 29           | 01:08        | 01:42 | 16:52 | 17:26      |
| 30           | 01:41        | 02:11 | 16:11 | 16:41      | 30           | 01:09        | 01:43 | 16:40 | 17:13      | 30           | 01:09        | 01:43 | 16:52 | 17:26      |
|              |              |       |       |            | 31           | 01:09        | 01:42 | 16:41 | 17:14      |              |              |       |       |            |
| JUL          |              |       |       |            | AUG          |              |       |       |            | SEP          |              |       |       |            |
| 1            | 01:09        | 01:43 | 16:52 | 17:25      | 1            | 01:37        | 02:08 | 16:31 | 17:02      | 1            | 02:11        | 02:40 | 15:46 | 16:15      |
| 2            | 01:10        | 01:44 | 16:51 | 17:25      | 2            | 01:38        | 02:09 | 16:30 | 17:01      | 2            | 02:13        | 02:41 | 15:44 | 16:13      |
| 3            | 01:11        | 01:44 | 16:51 | 17:25      | 3            | 01:39        | 02:10 | 16:28 | 16:59      | 3            | 02:14        | 02:42 | 15:43 | 16:11      |
| 4            | 01:11        | 01:45 | 16:51 | 17:25      | 4            | 01:40        | 02:11 | 16:27 | 16:58      | 4            | 02:15        | 02:43 | 15:41 | 16:09      |
| 5            | 01:12        | 01:46 | 16:51 | 17:24      | 5            | 01:42        | 02:12 | 16:26 | 16:57      | 5            | 02:16        | 02:44 | 15:39 | 16:08      |
| 6            | 01:13        | 01:46 | 16:50 | 17:24      | 6            | 01:43        | 02:13 | 16:25 | 16:55      | 6            | 02:17        | 02:45 | 15:38 | 16:06      |
| 7            | 01:13        | 01:47 | 16:50 | 17:24      | 7            | 01:44        | 02:14 | 16:24 | 16:54      | 7            | 02:18        | 02:46 | 15:36 | 16:04      |
| 8            | 01:14        | 01:48 | 16:50 | 17:23      | 8            | 01:45        | 02:15 | 16:22 | 16:53      | 8            | 02:19        | 02:47 | 15:34 | 16:02      |
| 9            | 01:15        | 01:48 | 16:49 | 17:23      | 9            | 01:46        | 02:16 | 16:21 | 16:51      | 9            | 02:20        | 02:48 | 15:33 | 16:01      |
| 10           | 01:16        | 01:49 | 16:49 | 17:22      | 10           | 01:47        | 02:17 | 16:20 | 16:50      | 10           | 02:21        | 02:49 | 15:31 | 15:59      |
| 11           | 01:16        | 01:50 | 16:48 | 17:22      | 11           | 01:48        | 02:18 | 16:18 | 16:48      | 11           | 02:22        | 02:50 | 15:29 | 15:57      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| JUL          |              |       |       |            | AUG          |              |       |       |            | SEP          |              |       |       |            |
| 12           | 01:17        | 01:50 | 16:48 | 17:21      | 12           | 01:49        | 02:20 | 16:17 | 16:47      | 12           | 02:23        | 02:51 | 15:27 | 15:55      |
| 13           | 01:18        | 01:51 | 16:47 | 17:20      | 13           | 01:51        | 02:21 | 16:15 | 16:45      | 13           | 02:24        | 02:52 | 15:26 | 15:54      |
| 14           | 01:19        | 01:52 | 16:47 | 17:20      | 14           | 01:52        | 02:22 | 16:14 | 16:44      | 14           | 02:25        | 02:53 | 15:24 | 15:52      |
| 15           | 01:20        | 01:53 | 16:46 | 17:19      | 15           | 01:53        | 02:23 | 16:13 | 16:42      | 15           | 02:26        | 02:54 | 15:22 | 15:50      |
| 16           | 01:21        | 01:54 | 16:45 | 17:18      | 16           | 01:54        | 02:24 | 16:11 | 16:41      | 16           | 02:27        | 02:55 | 15:21 | 15:48      |
| 17           | 01:22        | 01:54 | 16:45 | 17:17      | 17           | 01:55        | 02:25 | 16:10 | 16:39      | 17           | 02:28        | 02:56 | 15:19 | 15:47      |
| 18           | 01:23        | 01:55 | 16:44 | 17:17      | 18           | 01:56        | 02:26 | 16:08 | 16:38      | 18           | 02:30        | 02:57 | 15:17 | 15:45      |
| 19           | 01:24        | 01:56 | 16:43 | 17:16      | 19           | 01:57        | 02:27 | 16:07 | 16:36      | 19           | 02:31        | 02:58 | 15:15 | 15:43      |
| 20           | 01:25        | 01:57 | 16:42 | 17:15      | 20           | 01:58        | 02:28 | 16:05 | 16:35      | 20           | 02:32        | 02:59 | 15:14 | 15:41      |
| 21           | 01:26        | 01:58 | 16:42 | 17:14      | 21           | 01:59        | 02:29 | 16:04 | 16:33      | 21           | 02:33        | 03:00 | 15:12 | 15:40      |
| 22           | 01:27        | 01:59 | 16:41 | 17:13      | 22           | 02:01        | 02:30 | 16:02 | 16:31      | 22           | 02:34        | 03:01 | 15:10 | 15:38      |
| 23           | 01:28        | 02:00 | 16:40 | 17:12      | 23           | 02:02        | 02:31 | 16:01 | 16:30      | 23           | 02:35        | 03:02 | 15:08 | 15:36      |
| 24           | 01:29        | 02:01 | 16:39 | 17:11      | 24           | 02:03        | 02:32 | 15:59 | 16:28      | 24           | 02:36        | 03:03 | 15:07 | 15:34      |
| 25           | 01:30        | 02:02 | 16:38 | 17:10      | 25           | 02:04        | 02:33 | 15:58 | 16:26      | 25           | 02:37        | 03:05 | 15:05 | 15:33      |
| 26           | 01:31        | 02:03 | 16:37 | 17:09      | 26           | 02:05        | 02:34 | 15:56 | 16:25      | 26           | 02:38        | 03:06 | 15:03 | 15:31      |
| 27           | 01:32        | 02:04 | 16:36 | 17:08      | 27           | 02:06        | 02:35 | 15:54 | 16:23      | 27           | 02:39        | 03:07 | 15:01 | 15:29      |
| 28           | 01:33        | 02:04 | 16:35 | 17:07      | 28           | 02:07        | 02:36 | 15:53 | 16:21      | 28           | 02:40        | 03:08 | 15:00 | 15:27      |
| 29           | 01:34        | 02:05 | 16:34 | 17:06      | 29           | 02:08        | 02:37 | 15:51 | 16:20      | 29           | 02:41        | 03:09 | 14:58 | 15:26      |
| 30           | 01:35        | 02:06 | 16:33 | 17:04      | 30           | 02:09        | 02:38 | 15:49 | 16:18      | 30           | 02:42        | 03:10 | 14:56 | 15:24      |
| 31           | 01:36        | 02:07 | 16:32 | 17:03      | 31           | 02:10        | 02:39 | 15:48 | 16:16      |              |              |       |       |            |
| OCT          |              |       |       |            | NOV          |              |       |       |            | DEC          |              |       |       |            |
| 1            | 02:43        | 03:11 | 14:55 | 15:22      | 1            | 03:17        | 03:46 | 14:08 | 14:37      | 1            | 03:50        | 04:21 | 13:44 | 14:15      |
| 2            | 02:44        | 03:12 | 14:53 | 15:21      | 2            | 03:18        | 03:47 | 14:07 | 14:35      | 2            | 03:51        | 04:22 | 13:44 | 14:15      |
| 3            | 02:45        | 03:13 | 14:51 | 15:19      | 3            | 03:19        | 03:48 | 14:05 | 14:34      | 3            | 03:52        | 04:23 | 13:44 | 14:15      |
| 4            | 02:46        | 03:14 | 14:50 | 15:17      | 4            | 03:21        | 03:50 | 14:04 | 14:33      | 4            | 03:53        | 04:24 | 13:44 | 14:15      |
| 5            | 02:47        | 03:15 | 14:48 | 15:16      | 5            | 03:22        | 03:51 | 14:03 | 14:32      | 5            | 03:54        | 04:25 | 13:43 | 14:15      |
| 6            | 02:48        | 03:16 | 14:46 | 15:14      | 6            | 03:23        | 03:52 | 14:02 | 14:31      | 6            | 03:55        | 04:26 | 13:43 | 14:15      |
| 7            | 02:50        | 03:17 | 14:45 | 15:12      | 7            | 03:24        | 03:53 | 14:01 | 14:30      | 7            | 03:56        | 04:27 | 13:43 | 14:15      |
| 8            | 02:51        | 03:18 | 14:43 | 15:11      | 8            | 03:25        | 03:55 | 14:00 | 14:29      | 8            | 03:57        | 04:28 | 13:43 | 14:15      |
| 9            | 02:52        | 03:19 | 14:41 | 15:09      | 9            | 03:26        | 03:56 | 13:59 | 14:28      | 9            | 03:58        | 04:29 | 13:43 | 14:15      |
| 10           | 02:53        | 03:21 | 14:40 | 15:07      | 10           | 03:28        | 03:57 | 13:58 | 14:27      | 10           | 03:58        | 04:30 | 13:43 | 14:15      |
| 11           | 02:54        | 03:22 | 14:38 | 15:06      | 11           | 03:29        | 03:58 | 13:57 | 14:26      | 11           | 03:59        | 04:31 | 13:44 | 14:15      |
| 12           | 02:55        | 03:23 | 14:36 | 15:04      | 12           | 03:30        | 03:59 | 13:56 | 14:25      | 12           | 04:00        | 04:31 | 13:44 | 14:15      |
| 13           | 02:56        | 03:24 | 14:35 | 15:03      | 13           | 03:31        | 04:01 | 13:55 | 14:25      | 13           | 04:01        | 04:32 | 13:44 | 14:15      |
| 14           | 02:57        | 03:25 | 14:33 | 15:01      | 14           | 03:32        | 04:02 | 13:54 | 14:24      | 14           | 04:02        | 04:33 | 13:44 | 14:16      |
| 15           | 02:58        | 03:26 | 14:32 | 15:00      | 15           | 03:33        | 04:03 | 13:53 | 14:23      | 15           | 04:02        | 04:34 | 13:44 | 14:16      |
| 16           | 02:59        | 03:27 | 14:30 | 14:58      | 16           | 03:34        | 04:04 | 13:52 | 14:22      | 16           | 04:03        | 04:34 | 13:45 | 14:16      |
| 17           | 03:00        | 03:28 | 14:29 | 14:57      | 17           | 03:36        | 04:05 | 13:51 | 14:21      | 17           | 04:03        | 04:35 | 13:45 | 14:17      |
| 18           | 03:01        | 03:30 | 14:27 | 14:55      | 18           | 03:37        | 04:07 | 13:51 | 14:21      | 18           | 04:04        | 04:36 | 13:45 | 14:17      |
| 19           | 03:03        | 03:31 | 14:26 | 14:54      | 19           | 03:38        | 04:08 | 13:50 | 14:20      | 19           | 04:05        | 04:36 | 13:46 | 14:17      |
| 20           | 03:04        | 03:32 | 14:24 | 14:52      | 20           | 03:39        | 04:09 | 13:49 | 14:20      | 20           | 04:05        | 04:37 | 13:46 | 14:18      |
| 21           | 03:05        | 03:33 | 14:23 | 14:51      | 21           | 03:40        | 04:10 | 13:49 | 14:19      | 21           | 04:06        | 04:37 | 13:47 | 14:18      |
| 22           | 03:06        | 03:34 | 14:21 | 14:49      | 22           | 03:41        | 04:11 | 13:48 | 14:18      | 22           | 04:06        | 04:38 | 13:47 | 14:19      |
| 23           | 03:07        | 03:35 | 14:20 | 14:48      | 23           | 03:42        | 04:13 | 13:47 | 14:18      | 23           | 04:07        | 04:38 | 13:48 | 14:19      |
| 24           | 03:08        | 03:37 | 14:18 | 14:47      | 24           | 03:43        | 04:14 | 13:47 | 14:17      | 24           | 04:07        | 04:39 | 13:48 | 14:20      |
| 25           | 03:09        | 03:38 | 14:17 | 14:45      | 25           | 03:44        | 04:15 | 13:46 | 14:17      | 25           | 04:07        | 04:39 | 13:49 | 14:21      |
| 26           | 03:10        | 03:39 | 14:16 | 14:44      | 26           | 03:45        | 04:16 | 13:46 | 14:17      | 26           | 04:08        | 04:39 | 13:50 | 14:21      |
| 27           | 03:12        | 03:40 | 14:14 | 14:43      | 27           | 03:46        | 04:17 | 13:45 | 14:16      | 27           | 04:08        | 04:40 | 13:50 | 14:22      |
| 28           | 03:13        | 03:41 | 14:13 | 14:42      | 28           | 03:47        | 04:18 | 13:45 | 14:16      | 28           | 04:08        | 04:40 | 13:51 | 14:23      |
| 29           | 03:14        | 03:42 | 14:12 | 14:40      | 29           | 03:48        | 04:19 | 13:45 | 14:16      | 29           | 04:09        | 04:40 | 13:52 | 14:23      |
| 30           | 03:15        | 03:44 | 14:10 | 14:39      | 30           | 03:49        | 04:20 | 13:44 | 14:15      | 30           | 04:09        | 04:40 | 13:53 | 14:24      |
| 31           | 03:16        | 03:45 | 14:09 | 14:38      |              |              |       |       |            | 31           | 04:09        | 04:40 | 13:54 | 14:25      |

**3.4 MESTIA and AMBROLAURI**

| MESTIA<br>UGMS<br>N 43° 03' 18"<br>E 042° 45' 01" |              |       |       |            | AMBROLAURI<br>UGAM<br>N 42° 31' 36"<br>E 043° 08' 10" |              |       |       |            |              |              |       |       |            |
|---------------------------------------------------|--------------|-------|-------|------------|-------------------------------------------------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| MONTH<br>DAY                                      | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY                                          | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
| JAN                                               |              |       |       |            | FEB                                                   |              |       |       |            | MAR          |              |       |       |            |
| 1                                                 | 04:08        | 04:41 | 13:45 | 14:17      | 1                                                     | 03:55        | 04:25 | 14:21 | 14:51      | 1            | 03:16        | 03:44 | 14:59 | 15:27      |
| 2                                                 | 04:08        | 04:41 | 13:45 | 14:18      | 2                                                     | 03:54        | 04:24 | 14:22 | 14:52      | 2            | 03:14        | 03:43 | 15:00 | 15:29      |
| 3                                                 | 04:09        | 04:41 | 13:46 | 14:19      | 3                                                     | 03:53        | 04:23 | 14:24 | 14:54      | 3            | 03:13        | 03:41 | 15:01 | 15:30      |
| 4                                                 | 04:09        | 04:41 | 13:47 | 14:19      | 4                                                     | 03:52        | 04:22 | 14:25 | 14:55      | 4            | 03:11        | 03:39 | 15:03 | 15:31      |
| 5                                                 | 04:09        | 04:41 | 13:48 | 14:20      | 5                                                     | 03:51        | 04:20 | 14:26 | 14:56      | 5            | 03:09        | 03:38 | 15:04 | 15:32      |
| 6                                                 | 04:09        | 04:41 | 13:49 | 14:21      | 6                                                     | 03:49        | 04:19 | 14:28 | 14:57      | 6            | 03:08        | 03:36 | 15:05 | 15:33      |
| 7                                                 | 04:09        | 04:41 | 13:50 | 14:22      | 7                                                     | 03:48        | 04:18 | 14:29 | 14:59      | 7            | 03:06        | 03:34 | 15:06 | 15:35      |
| 8                                                 | 04:08        | 04:40 | 13:51 | 14:23      | 8                                                     | 03:47        | 04:17 | 14:30 | 15:00      | 8            | 03:04        | 03:33 | 15:08 | 15:36      |
| 9                                                 | 04:08        | 04:40 | 13:52 | 14:24      | 9                                                     | 03:46        | 04:16 | 14:32 | 15:01      | 9            | 03:03        | 03:31 | 15:09 | 15:37      |
| 10                                                | 04:08        | 04:40 | 13:53 | 14:25      | 10                                                    | 03:45        | 04:14 | 14:33 | 15:02      | 10           | 03:01        | 03:29 | 15:10 | 15:38      |
| 11                                                | 04:08        | 04:40 | 13:55 | 14:26      | 11                                                    | 03:44        | 04:13 | 14:34 | 15:04      | 11           | 02:59        | 03:27 | 15:11 | 15:39      |
| 12                                                | 04:08        | 04:39 | 13:56 | 14:27      | 12                                                    | 03:42        | 04:12 | 14:36 | 15:05      | 12           | 02:57        | 03:26 | 15:12 | 15:41      |
| 13                                                | 04:07        | 04:39 | 13:57 | 14:28      | 13                                                    | 03:41        | 04:10 | 14:37 | 15:06      | 13           | 02:56        | 03:24 | 15:14 | 15:42      |
| 14                                                | 04:07        | 04:39 | 13:58 | 14:30      | 14                                                    | 03:40        | 04:09 | 14:38 | 15:08      | 14           | 02:54        | 03:22 | 15:15 | 15:43      |
| 15                                                | 04:07        | 04:38 | 13:59 | 14:31      | 15                                                    | 03:38        | 04:08 | 14:40 | 15:09      | 15           | 02:52        | 03:20 | 15:16 | 15:44      |
| 16                                                | 04:06        | 04:38 | 14:00 | 14:32      | 16                                                    | 03:37        | 04:06 | 14:41 | 15:10      | 16           | 02:50        | 03:19 | 15:17 | 15:45      |
| 17                                                | 04:06        | 04:37 | 14:02 | 14:33      | 17                                                    | 03:36        | 04:05 | 14:42 | 15:11      | 17           | 02:49        | 03:17 | 15:18 | 15:47      |
| 18                                                | 04:05        | 04:36 | 14:03 | 14:34      | 18                                                    | 03:34        | 04:03 | 14:44 | 15:13      | 18           | 02:47        | 03:15 | 15:20 | 15:48      |
| 19                                                | 04:05        | 04:36 | 14:04 | 14:35      | 19                                                    | 03:33        | 04:02 | 14:45 | 15:14      | 19           | 02:45        | 03:13 | 15:21 | 15:49      |
| 20                                                | 04:04        | 04:35 | 14:05 | 14:36      | 20                                                    | 03:31        | 04:00 | 14:46 | 15:15      | 20           | 02:43        | 03:12 | 15:22 | 15:50      |
| 21                                                | 04:04        | 04:35 | 14:07 | 14:38      | 21                                                    | 03:30        | 03:59 | 14:47 | 15:16      | 21           | 02:41        | 03:10 | 15:23 | 15:51      |
| 22                                                | 04:03        | 04:34 | 14:08 | 14:39      | 22                                                    | 03:28        | 03:57 | 14:49 | 15:18      | 22           | 02:40        | 03:08 | 15:24 | 15:53      |
| 23                                                | 04:02        | 04:33 | 14:09 | 14:40      | 23                                                    | 03:27        | 03:56 | 14:50 | 15:19      | 23           | 02:38        | 03:06 | 15:25 | 15:54      |
| 24                                                | 04:02        | 04:32 | 14:10 | 14:41      | 24                                                    | 03:25        | 03:54 | 14:51 | 15:20      | 24           | 02:36        | 03:04 | 15:27 | 15:55      |
| 25                                                | 04:01        | 04:32 | 14:12 | 14:42      | 25                                                    | 03:24        | 03:53 | 14:53 | 15:21      | 25           | 02:34        | 03:03 | 15:28 | 15:56      |
| 26                                                | 04:00        | 04:31 | 14:13 | 14:44      | 26                                                    | 03:22        | 03:51 | 14:54 | 15:22      | 26           | 02:32        | 03:01 | 15:29 | 15:57      |
| 27                                                | 03:59        | 04:30 | 14:14 | 14:45      | 27                                                    | 03:21        | 03:49 | 14:55 | 15:24      | 27           | 02:31        | 02:59 | 15:30 | 15:59      |
| 28                                                | 03:58        | 04:29 | 14:16 | 14:46      | 28                                                    | 03:19        | 03:48 | 14:56 | 15:25      | 28           | 02:29        | 02:57 | 15:31 | 16:00      |
| 29                                                | 03:58        | 04:28 | 14:17 | 14:47      | 29                                                    | 03:18        | 03:46 | 14:58 | 15:26      | 29           | 02:27        | 02:56 | 15:32 | 16:01      |
| 30                                                | 03:57        | 04:27 | 14:18 | 14:49      |                                                       |              |       |       |            | 30           | 02:25        | 02:54 | 15:34 | 16:02      |
| 31                                                | 03:56        | 04:26 | 14:20 | 14:50      |                                                       |              |       |       |            | 31           | 02:23        | 02:52 | 15:35 | 16:03      |
| APR                                               |              |       |       |            | MAY                                                   |              |       |       |            | JUN          |              |       |       |            |
| 1                                                 | 02:22        | 02:50 | 15:36 | 16:05      | 1                                                     | 01:31        | 02:02 | 16:11 | 16:42      | 1            | 00:58        | 01:32 | 16:42 | 17:17      |
| 2                                                 | 02:20        | 02:49 | 15:37 | 16:06      | 2                                                     | 01:29        | 02:01 | 16:12 | 16:43      | 2            | 00:57        | 01:32 | 16:43 | 17:17      |
| 3                                                 | 02:18        | 02:47 | 15:38 | 16:07      | 3                                                     | 01:28        | 01:59 | 16:13 | 16:44      | 3            | 00:57        | 01:31 | 16:43 | 17:18      |
| 4                                                 | 02:16        | 02:45 | 15:39 | 16:08      | 4                                                     | 01:27        | 01:58 | 16:14 | 16:46      | 4            | 00:56        | 01:31 | 16:44 | 17:19      |
| 5                                                 | 02:14        | 02:43 | 15:41 | 16:09      | 5                                                     | 01:25        | 01:57 | 16:15 | 16:47      | 5            | 00:56        | 01:31 | 16:45 | 17:20      |
| 6                                                 | 02:13        | 02:42 | 15:42 | 16:11      | 6                                                     | 01:24        | 01:55 | 16:16 | 16:48      | 6            | 00:55        | 01:30 | 16:46 | 17:20      |
| 7                                                 | 02:11        | 02:40 | 15:43 | 16:12      | 7                                                     | 01:22        | 01:54 | 16:17 | 16:49      | 7            | 00:55        | 01:30 | 16:46 | 17:21      |
| 8                                                 | 02:09        | 02:38 | 15:44 | 16:13      | 8                                                     | 01:21        | 01:53 | 16:18 | 16:50      | 8            | 00:55        | 01:30 | 16:47 | 17:22      |
| 9                                                 | 02:07        | 02:36 | 15:45 | 16:14      | 9                                                     | 01:20        | 01:52 | 16:20 | 16:52      | 9            | 00:54        | 01:29 | 16:47 | 17:22      |
| 10                                                | 02:06        | 02:35 | 15:46 | 16:16      | 10                                                    | 01:18        | 01:51 | 16:21 | 16:53      | 10           | 00:54        | 01:29 | 16:48 | 17:23      |
| 11                                                | 02:04        | 02:33 | 15:47 | 16:17      | 11                                                    | 01:17        | 01:49 | 16:22 | 16:54      | 11           | 00:54        | 01:29 | 16:48 | 17:24      |
| 12                                                | 02:02        | 02:31 | 15:49 | 16:18      | 12                                                    | 01:16        | 01:48 | 16:23 | 16:55      | 12           | 00:54        | 01:29 | 16:49 | 17:24      |
| 13                                                | 02:00        | 02:30 | 15:50 | 16:19      | 13                                                    | 01:15        | 01:47 | 16:24 | 16:57      | 13           | 00:54        | 01:29 | 16:49 | 17:25      |
| 14                                                | 01:59        | 02:28 | 15:51 | 16:21      | 14                                                    | 01:14        | 01:46 | 16:25 | 16:58      | 14           | 00:54        | 01:29 | 16:50 | 17:25      |
| 15                                                | 01:57        | 02:26 | 15:52 | 16:22      | 15                                                    | 01:12        | 01:45 | 16:26 | 16:59      | 15           | 00:54        | 01:29 | 16:50 | 17:26      |
| 16                                                | 01:55        | 02:25 | 15:53 | 16:23      | 16                                                    | 01:11        | 01:44 | 16:27 | 17:00      | 16           | 00:54        | 01:29 | 16:51 | 17:26      |
| 17                                                | 01:53        | 02:23 | 15:54 | 16:24      | 17                                                    | 01:10        | 01:43 | 16:28 | 17:01      | 17           | 00:54        | 01:29 | 16:51 | 17:26      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| APR          |              |       |       |            | MAY          |              |       |       |            | JUN          |              |       |       |            |
| 18           | 01:52        | 02:22 | 15:56 | 16:25      | 18           | 01:09        | 01:42 | 16:29 | 17:02      | 18           | 00:54        | 01:29 | 16:51 | 17:27      |
| 19           | 01:50        | 02:20 | 15:57 | 16:27      | 19           | 01:08        | 01:41 | 16:30 | 17:03      | 19           | 00:54        | 01:29 | 16:52 | 17:27      |
| 20           | 01:48        | 02:18 | 15:58 | 16:28      | 20           | 01:07        | 01:40 | 16:31 | 17:05      | 20           | 00:54        | 01:30 | 16:52 | 17:27      |
| 21           | 01:47        | 02:17 | 15:59 | 16:29      | 21           | 01:06        | 01:39 | 16:32 | 17:06      | 21           | 00:54        | 01:30 | 16:52 | 17:27      |
| 22           | 01:45        | 02:15 | 16:00 | 16:30      | 22           | 01:05        | 01:39 | 16:33 | 17:07      | 22           | 00:55        | 01:30 | 16:52 | 17:28      |
| 23           | 01:43        | 02:14 | 16:01 | 16:32      | 23           | 01:04        | 01:38 | 16:34 | 17:08      | 23           | 00:55        | 01:30 | 16:52 | 17:28      |
| 24           | 01:42        | 02:12 | 16:03 | 16:33      | 24           | 01:03        | 01:37 | 16:35 | 17:09      | 24           | 00:55        | 01:31 | 16:52 | 17:28      |
| 25           | 01:40        | 02:11 | 16:04 | 16:34      | 25           | 01:02        | 01:36 | 16:36 | 17:10      | 25           | 00:56        | 01:31 | 16:52 | 17:28      |
| 26           | 01:39        | 02:09 | 16:05 | 16:36      | 26           | 01:02        | 01:36 | 16:37 | 17:11      | 26           | 00:56        | 01:31 | 16:52 | 17:28      |
| 27           | 01:37        | 02:08 | 16:06 | 16:37      | 27           | 01:01        | 01:35 | 16:38 | 17:12      | 27           | 00:56        | 01:32 | 16:52 | 17:28      |
| 28           | 01:36        | 02:06 | 16:07 | 16:38      | 28           | 01:00        | 01:34 | 16:39 | 17:13      | 28           | 00:57        | 01:32 | 16:52 | 17:28      |
| 29           | 01:34        | 02:05 | 16:08 | 16:39      | 29           | 00:59        | 01:34 | 16:40 | 17:14      | 29           | 00:57        | 01:33 | 16:52 | 17:28      |
| 30           | 01:32        | 02:03 | 16:09 | 16:41      | 30           | 00:59        | 01:33 | 16:40 | 17:15      | 30           | 00:58        | 01:33 | 16:52 | 17:27      |
|              |              |       |       |            | 31           | 00:58        | 01:33 | 16:41 | 17:16      |              |              |       |       |            |
| JUL          |              |       |       |            | AUG          |              |       |       |            | SEP          |              |       |       |            |
| 1            | 00:58        | 01:34 | 16:52 | 17:27      | 1            | 01:28        | 02:00 | 16:30 | 17:02      | 1            | 02:05        | 02:34 | 15:43 | 16:12      |
| 2            | 00:59        | 01:34 | 16:52 | 17:27      | 2            | 01:29        | 02:01 | 16:29 | 17:01      | 2            | 02:06        | 02:35 | 15:41 | 16:10      |
| 3            | 01:00        | 01:35 | 16:52 | 17:27      | 3            | 01:30        | 02:02 | 16:27 | 16:59      | 3            | 02:07        | 02:36 | 15:40 | 16:09      |
| 4            | 01:00        | 01:35 | 16:51 | 17:26      | 4            | 01:31        | 02:03 | 16:26 | 16:58      | 4            | 02:08        | 02:37 | 15:38 | 16:07      |
| 5            | 01:01        | 01:36 | 16:51 | 17:26      | 5            | 01:33        | 02:04 | 16:25 | 16:57      | 5            | 02:09        | 02:38 | 15:36 | 16:05      |
| 6            | 01:02        | 01:37 | 16:51 | 17:26      | 6            | 01:34        | 02:05 | 16:24 | 16:55      | 6            | 02:10        | 02:39 | 15:34 | 16:03      |
| 7            | 01:03        | 01:37 | 16:50 | 17:25      | 7            | 01:35        | 02:06 | 16:22 | 16:54      | 7            | 02:11        | 02:40 | 15:33 | 16:01      |
| 8            | 01:03        | 01:38 | 16:50 | 17:25      | 8            | 01:36        | 02:08 | 16:21 | 16:52      | 8            | 02:13        | 02:41 | 15:31 | 16:00      |
| 9            | 01:04        | 01:39 | 16:49 | 17:24      | 9            | 01:37        | 02:09 | 16:20 | 16:51      | 9            | 02:14        | 02:42 | 15:29 | 15:58      |
| 10           | 01:05        | 01:40 | 16:49 | 17:23      | 10           | 01:39        | 02:10 | 16:18 | 16:49      | 10           | 02:15        | 02:44 | 15:27 | 15:56      |
| 11           | 01:06        | 01:40 | 16:48 | 17:23      | 11           | 01:40        | 02:11 | 16:17 | 16:48      | 11           | 02:16        | 02:45 | 15:25 | 15:54      |
| 12           | 01:07        | 01:41 | 16:48 | 17:22      | 12           | 01:41        | 02:12 | 16:15 | 16:46      | 12           | 02:17        | 02:46 | 15:24 | 15:52      |
| 13           | 01:08        | 01:42 | 16:47 | 17:22      | 13           | 01:42        | 02:13 | 16:14 | 16:45      | 13           | 02:18        | 02:47 | 15:22 | 15:50      |
| 14           | 01:09        | 01:43 | 16:47 | 17:21      | 14           | 01:43        | 02:14 | 16:12 | 16:43      | 14           | 02:19        | 02:48 | 15:20 | 15:49      |
| 15           | 01:10        | 01:44 | 16:46 | 17:20      | 15           | 01:45        | 02:15 | 16:11 | 16:41      | 15           | 02:20        | 02:49 | 15:18 | 15:47      |
| 16           | 01:10        | 01:44 | 16:45 | 17:19      | 16           | 01:46        | 02:16 | 16:09 | 16:40      | 16           | 02:22        | 02:50 | 15:16 | 15:45      |
| 17           | 01:11        | 01:45 | 16:45 | 17:18      | 17           | 01:47        | 02:17 | 16:08 | 16:38      | 17           | 02:23        | 02:51 | 15:15 | 15:43      |
| 18           | 01:12        | 01:46 | 16:44 | 17:18      | 18           | 01:48        | 02:18 | 16:06 | 16:37      | 18           | 02:24        | 02:52 | 15:13 | 15:41      |
| 19           | 01:13        | 01:47 | 16:43 | 17:17      | 19           | 01:49        | 02:20 | 16:05 | 16:35      | 19           | 02:25        | 02:53 | 15:11 | 15:39      |
| 20           | 01:15        | 01:48 | 16:42 | 17:16      | 20           | 01:50        | 02:21 | 16:03 | 16:33      | 20           | 02:26        | 02:54 | 15:09 | 15:38      |
| 21           | 01:16        | 01:49 | 16:41 | 17:15      | 21           | 01:52        | 02:22 | 16:02 | 16:32      | 21           | 02:27        | 02:56 | 15:07 | 15:36      |
| 22           | 01:17        | 01:50 | 16:40 | 17:14      | 22           | 01:53        | 02:23 | 16:00 | 16:30      | 22           | 02:28        | 02:57 | 15:06 | 15:34      |
| 23           | 01:18        | 01:51 | 16:40 | 17:13      | 23           | 01:54        | 02:24 | 15:58 | 16:28      | 23           | 02:29        | 02:58 | 15:04 | 15:32      |
| 24           | 01:19        | 01:52 | 16:39 | 17:12      | 24           | 01:55        | 02:25 | 15:57 | 16:26      | 24           | 02:31        | 02:59 | 15:02 | 15:30      |
| 25           | 01:20        | 01:53 | 16:38 | 17:11      | 25           | 01:56        | 02:26 | 15:55 | 16:25      | 25           | 02:32        | 03:00 | 15:00 | 15:28      |
| 26           | 01:21        | 01:54 | 16:37 | 17:09      | 26           | 01:58        | 02:27 | 15:53 | 16:23      | 26           | 02:33        | 03:01 | 14:58 | 15:27      |
| 27           | 01:22        | 01:55 | 16:36 | 17:08      | 27           | 01:59        | 02:28 | 15:52 | 16:21      | 27           | 02:34        | 03:02 | 14:57 | 15:25      |
| 28           | 01:23        | 01:56 | 16:34 | 17:07      | 28           | 02:00        | 02:29 | 15:50 | 16:19      | 28           | 02:35        | 03:03 | 14:55 | 15:23      |
| 29           | 01:24        | 01:57 | 16:33 | 17:06      | 29           | 02:01        | 02:30 | 15:48 | 16:18      | 29           | 02:36        | 03:04 | 14:53 | 15:21      |
| 30           | 01:26        | 01:58 | 16:32 | 17:05      | 30           | 02:02        | 02:32 | 15:47 | 16:16      | 30           | 02:37        | 03:06 | 14:51 | 15:20      |
| 31           | 01:27        | 01:59 | 16:31 | 17:03      | 31           | 02:03        | 02:33 | 15:45 | 16:14      |              |              |       |       |            |
| OCT          |              |       |       |            | NOV          |              |       |       |            | DEC          |              |       |       |            |
| 1            | 02:38        | 03:07 | 14:49 | 15:18      | 1            | 03:15        | 03:44 | 14:00 | 14:30      | 1            | 03:49        | 04:21 | 13:35 | 14:07      |
| 2            | 02:40        | 03:08 | 14:48 | 15:16      | 2            | 03:16        | 03:45 | 13:59 | 14:29      | 2            | 03:50        | 04:22 | 13:35 | 14:07      |
| 3            | 02:41        | 03:09 | 14:46 | 15:14      | 3            | 03:17        | 03:47 | 13:58 | 14:28      | 3            | 03:51        | 04:23 | 13:35 | 14:07      |
| 4            | 02:42        | 03:10 | 14:44 | 15:13      | 4            | 03:18        | 03:48 | 13:57 | 14:26      | 4            | 03:52        | 04:24 | 13:34 | 14:06      |
| 5            | 02:43        | 03:11 | 14:42 | 15:11      | 5            | 03:19        | 03:49 | 13:55 | 14:25      | 5            | 03:53        | 04:25 | 13:34 | 14:06      |
| 6            | 02:44        | 03:12 | 14:41 | 15:09      | 6            | 03:21        | 03:51 | 13:54 | 14:24      | 6            | 03:54        | 04:26 | 13:34 | 14:06      |
| 7            | 02:45        | 03:14 | 14:39 | 15:07      | 7            | 03:22        | 03:52 | 13:53 | 14:23      | 7            | 03:55        | 04:27 | 13:34 | 14:06      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| OCT          |              |       |       |            | NOV          |              |       |       |            | DEC          |              |       |       |            |
| 8            | 02:46        | 03:15 | 14:37 | 15:06      | 8            | 03:23        | 03:53 | 13:52 | 14:22      | 8            | 03:56        | 04:28 | 13:34 | 14:06      |
| 9            | 02:48        | 03:16 | 14:36 | 15:04      | 9            | 03:24        | 03:54 | 13:51 | 14:21      | 9            | 03:57        | 04:29 | 13:34 | 14:06      |
| 10           | 02:49        | 03:17 | 14:34 | 15:02      | 10           | 03:25        | 03:56 | 13:50 | 14:20      | 10           | 03:58        | 04:30 | 13:34 | 14:06      |
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| 14           | 02:53        | 03:22 | 14:27 | 14:56      | 14           | 03:30        | 04:01 | 13:46 | 14:16      | 14           | 04:01        | 04:33 | 13:35 | 14:07      |
| 15           | 02:54        | 03:23 | 14:26 | 14:54      | 15           | 03:31        | 04:02 | 13:45 | 14:16      | 15           | 04:01        | 04:34 | 13:35 | 14:07      |
| 16           | 02:56        | 03:24 | 14:24 | 14:53      | 16           | 03:33        | 04:03 | 13:44 | 14:15      | 16           | 04:02        | 04:35 | 13:35 | 14:08      |
| 17           | 02:57        | 03:25 | 14:22 | 14:51      | 17           | 03:34        | 04:05 | 13:43 | 14:14      | 17           | 04:03        | 04:35 | 13:36 | 14:08      |
| 18           | 02:58        | 03:27 | 14:21 | 14:50      | 18           | 03:35        | 04:06 | 13:42 | 14:13      | 18           | 04:03        | 04:36 | 13:36 | 14:08      |
| 19           | 02:59        | 03:28 | 14:19 | 14:48      | 19           | 03:36        | 04:07 | 13:42 | 14:13      | 19           | 04:04        | 04:36 | 13:36 | 14:09      |
| 20           | 03:00        | 03:29 | 14:18 | 14:46      | 20           | 03:37        | 04:08 | 13:41 | 14:12      | 20           | 04:05        | 04:37 | 13:37 | 14:09      |
| 21           | 03:01        | 03:30 | 14:16 | 14:45      | 21           | 03:38        | 04:10 | 13:40 | 14:11      | 21           | 04:05        | 04:37 | 13:37 | 14:10      |
| 22           | 03:03        | 03:32 | 14:15 | 14:44      | 22           | 03:40        | 04:11 | 13:39 | 14:11      | 22           | 04:06        | 04:38 | 13:38 | 14:10      |
| 23           | 03:04        | 03:33 | 14:13 | 14:42      | 23           | 03:41        | 04:12 | 13:39 | 14:10      | 23           | 04:06        | 04:38 | 13:38 | 14:11      |
| 24           | 03:05        | 03:34 | 14:12 | 14:41      | 24           | 03:42        | 04:13 | 13:38 | 14:10      | 24           | 04:06        | 04:39 | 13:39 | 14:12      |
| 25           | 03:06        | 03:35 | 14:10 | 14:39      | 25           | 03:43        | 04:14 | 13:38 | 14:09      | 25           | 04:07        | 04:39 | 13:40 | 14:12      |
| 26           | 03:07        | 03:37 | 14:09 | 14:38      | 26           | 03:44        | 04:16 | 13:37 | 14:09      | 26           | 04:07        | 04:40 | 13:40 | 14:13      |
| 27           | 03:09        | 03:38 | 14:07 | 14:36      | 27           | 03:45        | 04:17 | 13:37 | 14:08      | 27           | 04:07        | 04:40 | 13:41 | 14:14      |
| 28           | 03:10        | 03:39 | 14:06 | 14:35      | 28           | 03:46        | 04:18 | 13:36 | 14:08      | 28           | 04:08        | 04:40 | 13:42 | 14:14      |
| 29           | 03:11        | 03:40 | 14:04 | 14:34      | 29           | 03:47        | 04:19 | 13:36 | 14:07      | 29           | 04:08        | 04:40 | 13:43 | 14:15      |
| 30           | 03:12        | 03:42 | 14:03 | 14:33      | 30           | 03:48        | 04:20 | 13:35 | 14:07      | 30           | 04:08        | 04:40 | 13:43 | 14:16      |
| 31           | 03:13        | 03:43 | 14:02 | 14:31      |              |              |       |       |            | 31           | 04:08        | 04:41 | 13:44 | 14:17      |

**3.5 TELAVI**

| <b>TELAVI</b><br><b>UGGT</b><br><b>N 41° 57' 12"</b><br><b>E 045° 30' 32"</b> |              |       |       |            |              |              |       |       |            |              |              |       |       |            |
|-------------------------------------------------------------------------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| MONTH<br>DAY                                                                  | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
| JAN                                                                           |              |       |       |            | FEB          |              |       |       |            | MAR          |              |       |       |            |
| 1                                                                             | 03:54        | 04:26 | 13:37 | 14:09      | 1            | 03:42        | 04:11 | 14:12 | 14:42      | 1            | 03:04        | 03:32 | 14:49 | 15:17      |
| 2                                                                             | 03:55        | 04:26 | 13:38 | 14:10      | 2            | 03:41        | 04:10 | 14:14 | 14:43      | 2            | 03:03        | 03:31 | 14:50 | 15:18      |
| 3                                                                             | 03:55        | 04:26 | 13:39 | 14:10      | 3            | 03:40        | 04:09 | 14:15 | 14:44      | 3            | 03:01        | 03:29 | 14:51 | 15:19      |
| 4                                                                             | 03:55        | 04:26 | 13:40 | 14:11      | 4            | 03:39        | 04:08 | 14:16 | 14:46      | 4            | 03:00        | 03:28 | 14:52 | 15:20      |
| 5                                                                             | 03:55        | 04:26 | 13:41 | 14:12      | 5            | 03:38        | 04:07 | 14:18 | 14:47      | 5            | 02:58        | 03:26 | 14:54 | 15:21      |
| 6                                                                             | 03:55        | 04:26 | 13:42 | 14:13      | 6            | 03:37        | 04:06 | 14:19 | 14:48      | 6            | 02:56        | 03:24 | 14:55 | 15:23      |
| 7                                                                             | 03:55        | 04:26 | 13:43 | 14:14      | 7            | 03:36        | 04:05 | 14:20 | 14:49      | 7            | 02:55        | 03:23 | 14:56 | 15:24      |
| 8                                                                             | 03:55        | 04:26 | 13:44 | 14:15      | 8            | 03:35        | 04:04 | 14:21 | 14:50      | 8            | 02:53        | 03:21 | 14:57 | 15:25      |
| 9                                                                             | 03:54        | 04:26 | 13:45 | 14:16      | 9            | 03:33        | 04:02 | 14:23 | 14:52      | 9            | 02:52        | 03:19 | 14:58 | 15:26      |
| 10                                                                            | 03:54        | 04:25 | 13:46 | 14:17      | 10           | 03:32        | 04:01 | 14:24 | 14:53      | 10           | 02:50        | 03:18 | 14:59 | 15:27      |
| 11                                                                            | 03:54        | 04:25 | 13:47 | 14:18      | 11           | 03:31        | 04:00 | 14:25 | 14:54      | 11           | 02:48        | 03:16 | 15:01 | 15:28      |
| 12                                                                            | 03:54        | 04:25 | 13:48 | 14:19      | 12           | 03:30        | 03:59 | 14:27 | 14:55      | 12           | 02:47        | 03:14 | 15:02 | 15:29      |
| 13                                                                            | 03:54        | 04:25 | 13:49 | 14:20      | 13           | 03:29        | 03:57 | 14:28 | 14:57      | 13           | 02:45        | 03:13 | 15:03 | 15:31      |
| 14                                                                            | 03:53        | 04:24 | 13:50 | 14:21      | 14           | 03:27        | 03:56 | 14:29 | 14:58      | 14           | 02:43        | 03:11 | 15:04 | 15:32      |
| 15                                                                            | 03:53        | 04:24 | 13:51 | 14:22      | 15           | 03:26        | 03:55 | 14:30 | 14:59      | 15           | 02:41        | 03:09 | 15:05 | 15:33      |
| 16                                                                            | 03:53        | 04:23 | 13:53 | 14:23      | 16           | 03:25        | 03:53 | 14:32 | 15:00      | 16           | 02:40        | 03:08 | 15:06 | 15:34      |
| 17                                                                            | 03:52        | 04:23 | 13:54 | 14:24      | 17           | 03:23        | 03:52 | 14:33 | 15:01      | 17           | 02:38        | 03:06 | 15:07 | 15:35      |
| 18                                                                            | 03:52        | 04:22 | 13:55 | 14:25      | 18           | 03:22        | 03:51 | 14:34 | 15:03      | 18           | 02:36        | 03:04 | 15:08 | 15:36      |
| 19                                                                            | 03:51        | 04:22 | 13:56 | 14:27      | 19           | 03:21        | 03:49 | 14:35 | 15:04      | 19           | 02:35        | 03:02 | 15:10 | 15:37      |
| 20                                                                            | 03:51        | 04:21 | 13:57 | 14:28      | 20           | 03:19        | 03:48 | 14:37 | 15:05      | 20           | 02:33        | 03:01 | 15:11 | 15:39      |
| 21                                                                            | 03:50        | 04:21 | 13:59 | 14:29      | 21           | 03:18        | 03:46 | 14:38 | 15:06      | 21           | 02:31        | 02:59 | 15:12 | 15:40      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| JAN          |              |       |       |            | FEB          |              |       |       |            | MAR          |              |       |       |            |
| 22           | 03:50        | 04:20 | 14:00 | 14:30      | 22           | 03:16        | 03:45 | 14:39 | 15:07      | 22           | 02:29        | 02:57 | 15:13 | 15:41      |
| 23           | 03:49        | 04:19 | 14:01 | 14:31      | 23           | 03:15        | 03:43 | 14:40 | 15:09      | 23           | 02:28        | 02:56 | 15:14 | 15:42      |
| 24           | 03:48        | 04:18 | 14:02 | 14:32      | 24           | 03:14        | 03:42 | 14:42 | 15:10      | 24           | 02:26        | 02:54 | 15:15 | 15:43      |
| 25           | 03:48        | 04:18 | 14:03 | 14:34      | 25           | 03:12        | 03:40 | 14:43 | 15:11      | 25           | 02:24        | 02:52 | 15:16 | 15:44      |
| 26           | 03:47        | 04:17 | 14:05 | 14:35      | 26           | 03:11        | 03:39 | 14:44 | 15:12      | 26           | 02:22        | 02:50 | 15:17 | 15:45      |
| 27           | 03:46        | 04:16 | 14:06 | 14:36      | 27           | 03:09        | 03:37 | 14:45 | 15:13      | 27           | 02:21        | 02:49 | 15:19 | 15:47      |
| 28           | 03:45        | 04:15 | 14:07 | 14:37      | 28           | 03:08        | 03:36 | 14:46 | 15:14      | 28           | 02:19        | 02:47 | 15:20 | 15:48      |
| 29           | 03:44        | 04:14 | 14:09 | 14:38      | 29           | 03:06        | 03:34 | 14:48 | 15:16      | 29           | 02:17        | 02:45 | 15:21 | 15:49      |
| 30           | 03:44        | 04:13 | 14:10 | 14:40      |              |              |       |       |            | 30           | 02:15        | 02:43 | 15:22 | 15:50      |
| 31           | 03:43        | 04:12 | 14:11 | 14:41      |              |              |       |       |            | 31           | 02:14        | 02:42 | 15:23 | 15:51      |
| APR          |              |       |       |            | MAY          |              |       |       |            | JUN          |              |       |       |            |
| 1            | 02:12        | 02:40 | 15:24 | 15:52      | 1            | 01:23        | 01:53 | 15:57 | 16:28      | 1            | 00:51        | 01:25 | 16:27 | 17:01      |
| 2            | 02:10        | 02:38 | 15:25 | 15:53      | 2            | 01:22        | 01:52 | 15:58 | 16:29      | 2            | 00:51        | 01:24 | 16:28 | 17:02      |
| 3            | 02:08        | 02:37 | 15:26 | 15:55      | 3            | 01:20        | 01:51 | 15:59 | 16:30      | 3            | 00:50        | 01:24 | 16:29 | 17:02      |
| 4            | 02:07        | 02:35 | 15:27 | 15:56      | 4            | 01:19        | 01:50 | 16:00 | 16:31      | 4            | 00:50        | 01:24 | 16:29 | 17:03      |
| 5            | 02:05        | 02:33 | 15:28 | 15:57      | 5            | 01:17        | 01:48 | 16:01 | 16:32      | 5            | 00:49        | 01:23 | 16:30 | 17:04      |
| 6            | 02:03        | 02:32 | 15:30 | 15:58      | 6            | 01:16        | 01:47 | 16:03 | 16:34      | 6            | 00:49        | 01:23 | 16:31 | 17:05      |
| 7            | 02:01        | 02:30 | 15:31 | 15:59      | 7            | 01:15        | 01:46 | 16:04 | 16:35      | 7            | 00:49        | 01:23 | 16:31 | 17:05      |
| 8            | 02:00        | 02:28 | 15:32 | 16:00      | 8            | 01:14        | 01:45 | 16:05 | 16:36      | 8            | 00:48        | 01:23 | 16:32 | 17:06      |
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| 14           | 01:50        | 02:19 | 15:38 | 16:07      | 14           | 01:06        | 01:38 | 16:11 | 16:43      | 14           | 00:48        | 01:22 | 16:35 | 17:09      |
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| 24           | 01:33        | 02:03 | 15:49 | 16:19      | 24           | 00:57        | 01:29 | 16:21 | 16:54      | 24           | 00:49        | 01:24 | 16:37 | 17:12      |
| 25           | 01:32        | 02:02 | 15:51 | 16:20      | 25           | 00:56        | 01:29 | 16:21 | 16:55      | 25           | 00:49        | 01:24 | 16:37 | 17:12      |
| 26           | 01:30        | 02:00 | 15:52 | 16:22      | 26           | 00:55        | 01:28 | 16:22 | 16:55      | 26           | 00:50        | 01:24 | 16:37 | 17:12      |
| 27           | 01:29        | 01:59 | 15:53 | 16:23      | 27           | 00:54        | 01:27 | 16:23 | 16:56      | 27           | 00:50        | 01:25 | 16:37 | 17:12      |
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| 30           | 01:24        | 01:55 | 15:56 | 16:26      | 30           | 00:52        | 01:26 | 16:26 | 16:59      | 30           | 00:52        | 01:26 | 16:37 | 17:11      |
|              |              |       |       |            | 31           | 00:52        | 01:25 | 16:26 | 17:00      |              |              |       |       |            |
| JUL          |              |       |       |            | AUG          |              |       |       |            | SEP          |              |       |       |            |
| 1            | 00:52        | 01:26 | 16:37 | 17:11      | 1            | 01:20        | 01:52 | 16:16 | 16:47      | 1            | 01:55        | 02:24 | 15:31 | 16:00      |
| 2            | 00:53        | 01:27 | 16:37 | 17:11      | 2            | 01:22        | 01:53 | 16:15 | 16:46      | 2            | 01:56        | 02:25 | 15:29 | 15:58      |
| 3            | 00:53        | 01:28 | 16:37 | 17:11      | 3            | 01:23        | 01:54 | 16:14 | 16:45      | 3            | 01:57        | 02:26 | 15:28 | 15:56      |
| 4            | 00:54        | 01:28 | 16:36 | 17:10      | 4            | 01:24        | 01:55 | 16:12 | 16:44      | 4            | 01:59        | 02:27 | 15:26 | 15:54      |
| 5            | 00:55        | 01:29 | 16:36 | 17:10      | 5            | 01:25        | 01:56 | 16:11 | 16:42      | 5            | 02:00        | 02:28 | 15:24 | 15:53      |
| 6            | 00:56        | 01:29 | 16:36 | 17:10      | 6            | 01:26        | 01:57 | 16:10 | 16:41      | 6            | 02:01        | 02:29 | 15:22 | 15:51      |
| 7            | 00:56        | 01:30 | 16:36 | 17:09      | 7            | 01:27        | 01:58 | 16:09 | 16:39      | 7            | 02:02        | 02:30 | 15:21 | 15:49      |
| 8            | 00:57        | 01:31 | 16:35 | 17:09      | 8            | 01:28        | 01:59 | 16:07 | 16:38      | 8            | 02:03        | 02:31 | 15:19 | 15:47      |
| 9            | 00:58        | 01:31 | 16:35 | 17:08      | 9            | 01:29        | 02:00 | 16:06 | 16:37      | 9            | 02:04        | 02:32 | 15:17 | 15:45      |
| 10           | 00:59        | 01:32 | 16:34 | 17:08      | 10           | 01:31        | 02:01 | 16:05 | 16:35      | 10           | 02:05        | 02:33 | 15:15 | 15:44      |
| 11           | 00:59        | 01:33 | 16:34 | 17:07      | 11           | 01:32        | 02:02 | 16:03 | 16:34      | 11           | 02:06        | 02:34 | 15:14 | 15:42      |

| MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO | MONTH<br>DAY | TWIL<br>FROM | SR    | SS    | TWIL<br>TO |
|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|--------------|--------------|-------|-------|------------|
| JUL          |              |       |       |            | AUG          |              |       |       |            | SEP          |              |       |       |            |
| 12           | 01:00        | 01:34 | 16:33 | 17:07      | 12           | 01:33        | 02:03 | 16:02 | 16:32      | 12           | 02:07        | 02:35 | 15:12 | 15:40      |
| 13           | 01:01        | 01:34 | 16:33 | 17:06      | 13           | 01:34        | 02:04 | 16:01 | 16:31      | 13           | 02:08        | 02:36 | 15:10 | 15:38      |
| 14           | 01:02        | 01:35 | 16:32 | 17:05      | 14           | 01:35        | 02:05 | 15:59 | 16:29      | 14           | 02:09        | 02:37 | 15:09 | 15:37      |
| 15           | 01:03        | 01:36 | 16:31 | 17:05      | 15           | 01:36        | 02:06 | 15:58 | 16:28      | 15           | 02:10        | 02:38 | 15:07 | 15:35      |
| 16           | 01:04        | 01:37 | 16:31 | 17:04      | 16           | 01:37        | 02:07 | 15:56 | 16:26      | 16           | 02:12        | 02:39 | 15:05 | 15:33      |
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| 18           | 01:06        | 01:39 | 16:29 | 17:02      | 18           | 01:40        | 02:09 | 15:53 | 16:23      | 18           | 02:14        | 02:42 | 15:02 | 15:29      |
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| 20           | 01:08        | 01:40 | 16:28 | 17:00      | 20           | 01:42        | 02:12 | 15:50 | 16:20      | 20           | 02:16        | 02:44 | 14:58 | 15:26      |
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| 24           | 01:12        | 01:44 | 16:24 | 16:57      | 24           | 01:46        | 02:16 | 15:44 | 16:13      | 24           | 02:20        | 02:48 | 14:51 | 15:19      |
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| OCT          |              |       |       |            | NOV          |              |       |       |            | DEC          |              |       |       |            |
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