

# TRANSIT OF MERCURY, 2016

A transit of Mercury over the disk of the Sun will occur on May 9. The entire transit will be visible in eastern North America, northern South America, the Arctic, Greenland, extreme northwestern Africa, western Europe, and the Atlantic Ocean.

The times provided in the following tables are given provisionally in Universal Time, using  $\Delta T(A) = +68^s.0$ . Once the value of  $\Delta T$  is known, the data on these pages may be expressed in Universal Time as follows:

Define  $\delta T = \Delta T - \Delta T(A)$ , in units of seconds of time.

Change the times given in provisional Universal Time by subtracting  $\delta T$ .

Apply the correction  $0.00417807 \delta T$  to the longitudes in such a way that if  $\delta T$  is positive, the longitudes shift to the east.

Leave all other quantities unchanged.

Longitude is positive to the east and negative to the west.

## GEOCENTRIC PHASES

	UT	Position Angle $P$	Mercury being in the Zenith in	
			Longitude	Latitude
	d h m s	°	° ' "	° ' "
Ingress, exterior contact	May 9 11 12 17.6	83.2	+ 11 18.6	+17 34.1
Ingress, interior contact	9 11 15 29.5	83.5	+ 10 30.4	+17 34.0
Least angular distance	9 14 57 25.3	153.8	- 45 12.6	+17 29.9
Egress, interior contact	9 18 39 12.8	224.1	-100 53.5	+17 25.8
Egress, exterior contact	9 18 42 24.8	224.4	-101 41.7	+17 25.7

Least angular distance:  $5' 18''.5$

The position angle  $P$  of the point of contact is reckoned from the north point of the limb of the Sun towards the east as viewed at the geocenter.

The position angle  $V$  of the point of contact, reckoned from the vertex of the limb of the Sun towards the east, is found by:

$$V = P - C$$

where  $C$ , the parallactic angle, is given by:

$$\tan C = \frac{\cos \phi' \sin h}{\sin \phi' \cos \delta - \cos \phi' \sin \delta \cos h}$$

in which  $\phi'$  is the geocentric latitude of the place,  $\delta$  is the declination of the Sun, and  $h$  is the local hour angle of the Sun;  $\sin C$  has the same algebraic sign as  $\sin h$ .

# TRANSIT OF MERCURY OF 2016 MAY 9

Location	Position		Ingress Exterior Contact		Ingress Interior Contact		Least Angular Distance Separation		Egress Interior Contact		Egress Exterior Contact	
	Latitude	Longitude	UT	P	UT	P	UT	Separation	UT	P	UT	P
<b>United States</b>												
Hartford, CT	+41 46.2	- 72 40.6	11 13 32.7	83.6	11 16 45.0	83.9	14 57 51.9	5 22.4	18 38 10.1	224.0	18 41 21.4	224.3
Boston, MA	+42 20.0	- 71 05.0	11 13 31.7	83.6	11 16 43.9	83.8	14 57 49.4	5 22.3	18 38 08.0	224.0	18 41 19.3	224.3
New York, NY	+40 44.0	- 74 00.0	11 13 34.3	83.6	11 16 46.7	83.9	14 57 54.7	5 22.4	18 38 12.4	224.0	18 41 23.6	224.3
Washington, DC	+38 53.7	- 77 02.2	11 13 37.0	83.6	11 16 49.4	83.9	14 58 00.5	5 22.3	18 38 17.3	224.0	18 41 28.5	224.3
Raleigh, NC	+35 49.1	- 78 38.7	11 13 41.1	83.6	11 16 53.6	83.8	14 58 06.7	5 22.2	18 38 22.2	224.0	18 41 33.3	224.3
Atlanta, GA	+33 45.3	- 84 23.4	11 13 43.1	83.6	11 16 55.6	83.8	14 58 15.2	5 22.3	18 38 31.1	224.0	18 41 42.2	224.3
Miami, FL	+25 45.0	- 80 15.0	11 13 52.8	83.5	11 17 05.2	83.8	14 58 22.4	5 21.4	18 38 35.2	224.1	18 41 46.1	224.4
Montgomery, AL	+32 21.7	- 86 16.8	11 13 44.3	83.6	11 16 56.9	83.8	14 58 19.0	5 22.3	18 38 34.9	224.0	18 41 46.0	224.3
Detroit, MI	+42 19.9	- 83 02.8	11 13 31.7	83.6	11 16 44.2	83.9	14 58 00.7	5 22.9	18 38 20.5	224.0	18 41 31.8	224.2
Indianapolis, IN	+39 47.5	- 86 08.9	11 13 34.7	83.6	11 16 47.3	83.9	14 58 07.3	5 22.9	18 38 26.5	224.0	18 41 37.7	224.3
Chicago, IL	+41 50.0	- 87 38.0	11 13 31.5	83.6	11 16 44.1	83.9	14 58 05.2	5 23.1	18 38 25.9	224.0	18 41 37.2	224.2
Milwaukee, WI	+43 03.0	- 87 57.0	11 13 29.6	83.6	11 16 42.3	83.9	14 58 03.4	5 23.2	18 38 24.9	224.0	18 41 36.2	224.2
Minneapolis, MN	+44 58.8	- 93 15.1	11 13 25.0	83.6	11 16 37.8	83.9	14 58 03.5	5 23.5	18 38 28.2	223.9	18 41 39.6	224.2
St. Louis, MO	+38 40.0	- 90 15.0	11 13 35.1	83.6	11 16 47.7	83.9	14 58 12.3	5 23.0	18 38 32.2	224.0	18 41 43.5	224.3
Louisville, KY	+38 15.3	- 85 45.6	11 13 36.9	83.6	11 16 49.5	83.9	14 58 09.5	5 22.7	18 38 27.7	224.0	18 41 38.9	224.3
Lincoln, NE	+40 48.6	- 96 40.5	. . . . .	. . . . .	. . . . .	. . . . .	14 58 12.8	5 23.4	18 38 36.6	224.0	18 41 47.9	224.2
Oklahoma City, OK	+35 28.9	- 97 32.1	. . . . .	. . . . .	. . . . .	. . . . .	14 58 22.3	5 23.1	18 38 44.3	224.0	18 41 55.5	224.3
Denver, CO	+39 44.4	-104 59.1	. . . . .	. . . . .	. . . . .	. . . . .	14 58 18.5	5 23.7	18 38 46.6	223.9	18 41 58.0	224.2
Salt Lake City, UT	+40 45.0	-111 55.0	. . . . .	. . . . .	. . . . .	. . . . .	14 58 18.6	5 24.1	18 38 52.0	223.9	18 42 03.5	224.2
Dallas, TX	+32 47.0	- 96 48.2	. . . . .	. . . . .	. . . . .	. . . . .	14 58 26.2	5 22.9	18 38 46.9	224.0	18 41 58.1	224.3
Houston, TX	+29 45.0	- 95 25.0	. . . . .	. . . . .	. . . . .	. . . . .	14 58 30.1	5 22.5	18 38 49.2	224.0	18 42 00.3	224.3
Albuquerque, NM	+35 06.6	-106 36.6	. . . . .	. . . . .	. . . . .	. . . . .	14 58 27.1	5 23.5	18 38 54.8	224.0	18 42 06.0	224.2
Las Vegas, NV	+36 10.6	-115 08.2	. . . . .	. . . . .	. . . . .	. . . . .	14 58 27.2	5 23.9	18 39 02.0	223.9	18 42 13.4	224.2
Los Angeles, CA	+34 03.0	-118 15.0	. . . . .	. . . . .	. . . . .	. . . . .	14 58 31.1	5 23.9	18 39 08.3	223.9	18 42 19.7	224.2
San Diego, CA	+32 42.9	-117 09.7	. . . . .	. . . . .	. . . . .	. . . . .	14 58 33.3	5 23.8	18 39 09.3	224.0	18 42 20.7	224.2
San Francisco, CA	+37 46.8	-122 25.2	. . . . .	. . . . .	. . . . .	. . . . .	14 58 24.5	5 24.3	18 39 06.2	223.9	18 42 17.7	224.2
Portland, OR	+45 32.0	-122 40.0	. . . . .	. . . . .	. . . . .	. . . . .	14 58 10.2	5 24.7	18 38 54.0	223.9	18 42 05.7	224.1
Seattle, WA	+47 36.6	-122 20.0	. . . . .	. . . . .	. . . . .	. . . . .	14 58 06.2	5 24.8	18 38 50.5	223.9	18 42 02.2	224.1
Fairbanks, AK	+64 50.0	-147 50.0	. . . . .	. . . . .	. . . . .	. . . . .	14 57 25.9	5 25.5	18 38 34.3	223.7	18 41 46.5	224.0
Nome, AK	+64 30.0	-165 30.0	. . . . .	. . . . .	. . . . .	. . . . .	14 57 17.6	5 25.6	18 38 38.0	223.7	18 41 50.4	224.0
Unalaska, AK	+53 53.3	-166 31.6	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 38 58.4	223.7	18 42 10.7	224.0
Honolulu, HI	+21 18.5	-157 49.6	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 39 58.2	223.9	18 43 10.2	224.1
<b>Canada</b>												
St. John's, Nfld.	+47 34.1	- 52 42.4	11 13 17.4	83.6	11 16 29.4	83.8	14 57 22.1	5 22.0	18 37 47.7	224.0	18 40 59.2	224.2
Moncton, N.B.	+46 07.0	- 64 48.2	11 13 24.7	83.6	11 16 36.8	83.8	14 57 37.5	5 22.4	18 37 59.2	224.0	18 41 10.5	224.2
Halifax, N.S.	+44 38.0	- 63 35.0	11 13 26.5	83.6	11 16 38.6	83.8	14 57 38.1	5 22.2	18 37 58.9	224.0	18 41 10.3	224.3
Charlottetown, P.E.I.	+46 14.4	- 63 08.4	11 13 24.0	83.6	11 16 36.1	83.8	14 57 35.6	5 22.3	18 37 57.5	224.0	18 41 08.9	224.2
Montreal, Que.	+45 30.5	- 73 33.2	11 13 27.2	83.6	11 16 39.6	83.9	14 57 47.3	5 22.7	18 38 08.0	224.0	18 41 19.4	224.2
Toronto, Ont.	+43 43.0	- 79 20.4	11 13 30.0	83.6	11 16 42.5	83.9	14 57 55.3	5 22.8	18 38 15.3	224.0	18 41 26.6	224.2
Thunder Bay, Ont.	+48 22.9	- 89 14.8	11 13 21.2	83.6	11 16 33.9	83.9	14 57 55.1	5 23.6	18 38 20.7	223.9	18 41 32.1	224.2
Winnipeg, Man.	+49 54.0	- 97 08.0	11 13 16.0	83.6	11 16 28.8	83.9	14 57 56.7	5 24.0	18 38 26.3	223.9	18 41 37.8	224.2

# TRANSIT OF MERCURY OF 2016 MAY 9

Location	Position		Ingress				Least		Egress		Egress	
	Latitude	Longitude	Exterior Contact UT	<i>P</i>	Interior Contact UT	<i>P</i>	Angular Distance UT	Separation	Interior Contact UT	<i>P</i>	Exterior Contact UT	<i>P</i>
<b>Canada</b>	° ' "	° ' "	h m s °		h m s °		h m s ' "		h m s °		h m s °	
Edmonton, Alta.	+53 34.6	-113 31.0	. . . . .	. . .	. . . . .	. . .	14 57 54.3	5 24.7	18 38 35.1	223.8	18 41 46.8	224.1
Iqaluit, Nunavut	+63 44.9	- 68 31.2	11 12 55.7	83.6	11 16 08.1	83.9	14 57 16.2	5 23.7	18 37 54.3	223.9	18 41 06.1	224.1
Yellowknife, N.W.T.	+62 26.5	-114 23.8	11 12 48.0	83.6	11 16 00.9	83.9	14 57 36.4	5 24.9	18 38 23.9	223.8	18 41 35.8	224.1
Vancouver, B.C.	+49 15.0	-123 06.0	. . . . .	. . .	. . . . .	. . .	14 58 03.0	5 24.8	18 38 48.5	223.8	18 42 00.2	224.1
Whitehorse, Y.T.	+60 43.0	-135 03.0	. . . . .	. . .	. . . . .	. . .	14 57 38.0	5 25.3	18 38 36.9	223.8	18 41 48.9	224.0
<b>Martinique</b> Fort-de-France	+14 36.0	- 61 05.0	11 13 58.4	83.4	11 17 10.1	83.7	14 58 09.7	5 19.1	18 38 23.1	224.2	18 41 33.9	224.5
<b>Bermuda</b> Hamilton	+32 18.0	- 64 48.0	11 13 43.4	83.5	11 16 55.5	83.8	14 57 55.3	5 21.1	18 38 09.5	224.1	18 41 20.6	224.3
<b>Puerto Rico</b> San Juan	+18 29.0	- 66 08.0	11 13 57.7	83.5	11 17 09.7	83.7	14 58 13.3	5 19.8	18 38 25.2	224.2	18 41 36.0	224.5
<b>Haiti</b> Port-au-Prince	+18 32.0	- 72 20.0	11 13 59.2	83.5	11 17 11.4	83.8	14 58 21.8	5 20.2	18 38 33.2	224.2	18 41 44.1	224.4
<b>Jamaica</b> Kingston	+17 58.0	- 76 48.0	11 14 00.1	83.5	11 17 12.4	83.8	14 58 28.1	5 20.4	18 38 39.9	224.2	18 41 50.7	224.4
<b>Bahamas</b> Nassau	+25 03.6	- 77 20.7	11 13 53.7	83.5	11 17 06.0	83.8	14 58 20.1	5 21.1	18 38 32.2	224.1	18 41 43.2	224.4
<b>Cuba</b> Havana	+23 08.0	- 82 23.0	11 13 55.1	83.5	11 17 07.6	83.8	14 58 28.2	5 21.2	18 38 41.0	224.1	18 41 52.0	224.4
<b>Mexico</b>												
Mexico City	+19 25.0	- 99 10.0	. . . . .	. . .	. . . . .	. . .	14 58 47.3	5 21.9	18 39 07.9	224.1	18 42 18.9	224.4
Monterrey	+25 40.0	-100 20.0	. . . . .	. . .	. . . . .	. . .	14 58 39.3	5 22.5	18 39 00.7	224.1	18 42 11.8	224.3
Guadalajara	+20 40.0	-103 21.0	. . . . .	. . .	. . . . .	. . .	14 58 48.0	5 22.2	18 39 11.5	224.1	18 42 22.5	224.3
Veracruz	+19 26.1	- 96 23.0	. . . . .	. . .	. . . . .	. . .	14 58 45.4	5 21.7	18 39 04.3	224.1	18 42 15.2	224.4
<b>Guatemala</b> Guatemala City	+14 38.0	- 90 22.0	. . . . .	. . .	. . . . .	. . .	14 58 46.5	5 20.9	18 39 02.6	224.2	18 42 13.5	224.4
<b>El Salvador</b> San Salvador	+13 40.0	- 89 10.0	. . . . .	. . .	. . . . .	. . .	14 58 46.5	5 20.7	18 39 02.3	224.2	18 42 13.1	224.4
<b>Honduras</b> Tegucigalpa	+14 05.0	- 87 14.0	. . . . .	. . .	. . . . .	. . .	14 58 44.2	5 20.6	18 38 59.1	224.2	18 42 09.9	224.4
<b>Belize</b> Belmopan	+17 13.0	- 88 48.0	. . . . .	. . .	. . . . .	. . .	14 58 42.0	5 21.1	18 38 57.1	224.2	18 42 07.9	224.4
<b>Nicaragua</b> Managua	+12 06.0	- 86 18.0	. . . . .	. . .	. . . . .	. . .	14 58 45.4	5 20.4	18 39 00.4	224.2	18 42 11.1	224.5
<b>Venezuela</b> Caracas	+10 30.0	- 66 55.0	11 14 03.4	83.4	11 17 15.3	83.7	14 58 22.6	5 19.0	18 38 35.6	224.3	18 41 46.4	224.5
<b>Costa Rica</b> San Jose	+ 9 59.0	- 84 04.0	. . . . .	. . .	. . . . .	. . .	14 58 45.3	5 20.0	18 39 00.0	224.2	18 42 10.8	224.5
<b>Panama</b> Panama City	+ 8 57.0	- 79 30.0	11 14 05.9	83.5	11 17 18.2	83.7	14 58 41.1	5 19.7	18 38 55.0	224.2	18 42 05.7	224.5
<b>Argentina</b>												
Buenos Aires	-34 40.0	- 58 30.0	11 13 51.8	83.1	11 17 03.1	83.4	14 58 34.0	5 14.2	18 39 27.3	224.5	18 42 37.9	224.8
Cordoba	-31 25.0	- 64 11.0	11 13 57.0	83.1	11 17 08.5	83.4	14 58 41.4	5 14.7	18 39 29.0	224.5	18 42 39.6	224.8
<b>Falkland Islands</b> Stanley	-51 41.5	- 57 51.5	. . . . .	. . .	. . . . .	. . .	14 58 32.3	5 13.1	18 39 50.3	224.6	18 43 01.2	224.8

Location	Position		Ingress Exterior Contact		Ingress Interior Contact		Least Angular Distance		Egress Interior Contact		Egress Exterior Contact	
	Latitude	Longitude	UT	<i>P</i>	UT	<i>P</i>	UT	Separation	UT	<i>P</i>	UT	<i>P</i>
<b>Brazil</b>												
Recife	− 8° 03.0′	− 34° 54.0′	11 13 41.3	83.2	11 16 52.1	83.5	14 57 42.0	5 15.3	18 38 22.4	224.4	18 41 33.3	224.7
Rio de Janeiro	−22 54.5	− 43 11.8	11 13 47.8	83.1	11 16 58.9	83.4	14 58 06.5	5 14.3	18 38 53.3	224.5	18 42 04.1	224.7
Belo Horizonte	−19 55.1	− 43 56.3	11 13 49.7	83.2	11 17 00.8	83.4	14 58 06.1	5 14.6	18 38 49.4	224.5	18 42 00.1	224.7
Sao Paolo	−23 33.0	− 46 38.0	11 13 50.8	83.1	11 17 01.9	83.4	14 58 12.6	5 14.5	18 38 57.9	224.5	18 42 08.6	224.7
Brasilia	−15 45.0	− 47 57.0	11 13 54.8	83.2	11 17 06.0	83.5	14 58 10.7	5 15.2	18 38 47.3	224.4	18 41 58.0	224.7
Porto Alegre	−30 02.0	− 51 13.8	11 13 50.8	83.1	11 17 02.1	83.4	14 58 22.5	5 14.2	18 39 12.7	224.5	18 42 23.4	224.8
<b>Chile</b>												
Santiago	−33 30.0	− 70 40.0	. . . . .	. . . . .	. . . . .	. . . . .	14 58 49.6	5 14.9	18 39 39.3	224.5	18 42 49.9	224.8
Concepcion	−36 50.0	− 73 03.0	. . . . .	. . . . .	. . . . .	. . . . .	14 58 52.0	5 14.7	18 39 46.2	224.5	18 42 56.8	224.8
<b>Colombia</b>												
Medellin	+ 6 14.2	− 75 34.5	11 14 07.2	83.4	11 17 19.3	83.7	14 58 38.7	5 19.1	18 38 53.0	224.3	18 42 03.6	224.5
Bogota	+ 4 38.0	− 74 05.0	11 14 07.7	83.4	11 17 19.8	83.7	14 58 38.1	5 18.9	18 38 53.0	224.3	18 42 03.6	224.5
<b>Guyana</b> Georgetown	+ 6 46.0	− 58 10.0	11 14 01.0	83.4	11 17 12.6	83.6	14 58 12.3	5 18.1	18 38 28.8	224.3	18 41 39.5	224.5
<b>Suriname</b> Paramaribo	+ 5 52.0	− 55 14.0	11 13 59.4	83.4	11 17 10.9	83.6	14 58 08.1	5 17.8	18 38 26.2	224.3	18 41 36.9	224.6
<b>French Guiana</b> Cayenne	+ 4 55.0	− 52 18.0	11 13 57.5	83.4	11 17 08.9	83.6	14 58 03.9	5 17.6	18 38 23.8	224.3	18 41 34.5	224.6
<b>Bolivia</b>												
Santa Cruz	−17 45.0	− 63 14.0	11 14 04.5	83.2	11 17 16.1	83.5	14 58 36.5	5 15.9	18 39 08.6	224.4	18 42 19.2	224.7
Cochabamba	−17 23.0	− 66 10.0	11 14 05.8	83.2	11 17 17.5	83.5	14 58 40.7	5 16.1	18 39 11.9	224.4	18 42 22.4	224.7
<b>Paraguay</b> Asuncion	−25 15.0	− 57 40.0	11 13 58.1	83.2	11 17 09.5	83.4	14 58 30.8	5 14.9	18 39 12.6	224.5	18 42 23.3	224.7
<b>Ecuador</b> Quito	− 0 15.0	− 78 35.0	11 14 09.2	83.4	11 17 21.4	83.7	14 58 48.0	5 18.6	18 39 05.7	224.3	18 42 16.4	224.6
<b>Peru</b> Lima	−12 06.0	− 77 03.0	. . . . .	. . . . .	. . . . .	. . . . .	14 58 53.3	5 17.3	18 39 19.4	224.4	18 42 29.9	224.6
<b>Uruguay</b> Montevideo	−34 53.0	− 56 10.0	11 13 50.3	83.1	11 17 01.6	83.3	14 58 30.8	5 14.0	18 39 25.1	224.5	18 42 35.8	224.8
<b>Easter Island</b> Hanga Roa	−27 09.0	−109 26.0	. . . . .	. . . . .	. . . . .	. . . . .	14 59 21.2	5 17.5	18 40 19.1	224.4	18 43 29.8	224.6
<b>Pitcairn Islands</b> Adamstown	−25 04.0	−130 06.0	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 38.8	224.3	18 43 49.8	224.5
<b>French Polynesia</b> Papeete, Tahiti	−17 32.0	−149 34.0	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 47.1	224.2	18 43 58.6	224.4
<b>Cook Islands</b> Avarua, Rarotonga	−21 12.0	−159 46.0	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 54.7	224.2	18 44 06.3	224.4
<b>American Samoa</b> Pago Pago, Tutuila	−14 16.8	−170 42.0	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 51.1	224.1	18 44 03.1	224.3
<b>Tokelau</b> Fakaofu	− 9 21.9	−171 12.9	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 46.1	224.0	18 43 58.1	224.3
<b>Tonga</b> Nuku’alofa, Tongatapu	−21 08.0	−175 12.0	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 57.0	224.1	18 44 09.0	224.4
<b>Tuvalu</b> Vaiaku, Funafuti	− 8 31.3	+179 11.9	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 44.7	224.0	18 43 57.0	224.3

# TRANSIT OF MERCURY OF 2016 MAY 9

Location	Position		Ingress Exterior Contact		Ingress Interior Contact		Least Angular Distance		Egress Interior Contact		Egress Exterior Contact	
	Latitude	Longitude	UT	<i>P</i>	UT	<i>P</i>	UT	Separation	UT	<i>P</i>	UT	<i>P</i>
<b>Fiji</b> Suva, Viti Levu	–18 08.0	+178 25.0	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 54.0	224.1	18 44 06.2	224.3
<b>Kiribati Island</b> South Tarawa	+ 1 19.5	+172 59.0	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 30.8	223.9	18 43 43.3	224.2
<b>Marshall Islands</b> Delap-Uliga-Djarrit	+ 7 05.0	+171 22.9	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	18 40 22.0	223.9	18 43 34.5	224.1
<b>Thailand</b> Bangkok	+13 44.0	+100 30.0	11 10 26.4	83.1	11 13 38.2	83.3	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>China, People's Republic of</b>												
Beijing	+39 55.0	+116 26.0	11 10 46.0	83.3	11 13 58.4	83.6	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Shijiazhuang	+38 02.6	+114 29.9	11 10 43.5	83.3	11 13 55.8	83.6	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Chongqing	+29 33.0	+106 30.4	11 10 34.4	83.2	11 13 46.5	83.5	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Lanzhou	+36 03.0	+103 48.0	11 10 40.0	83.3	11 13 52.0	83.5	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Mongolia</b> Ulan Bator	+47 55.2	+106 55.2	11 10 53.6	83.4	11 14 05.8	83.6	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Vietnam</b> Hanoi	+21 02.0	+105 51.0	11 10 29.0	83.2	11 13 41.0	83.4	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Malaysia</b> Kuala Lumpur	+ 3 08.0	+101 42.0	11 10 25.7	83.0	11 13 37.3	83.3	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Myanmar</b> Yangon (Rangoon)	+16 48.0	+ 96 09.0	11 10 28.1	83.1	11 13 39.8	83.4	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Andaman and Nicobar Islands</b> Port Blair	+11 40.2	+ 92 45.6	11 10 27.9	83.1	11 13 39.3	83.3	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Nepal</b> Kathmandu	+27 43.0	+ 85 22.0	11 10 38.0	83.2	11 13 49.5	83.4	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>India</b>												
Kolkata	+22 34.2	+ 88 22.2	11 10 33.4	83.1	11 13 44.9	83.4	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Delhi	+28 36.6	+ 77 13.8	11 10 43.9	83.2	11 13 55.2	83.4	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Mumbai	+18 58.5	+ 72 49.6	11 10 43.0	83.1	11 13 54.1	83.4	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Sri Lanka</b> Colombo	+ 6 56.1	+ 79 50.6	11 10 34.9	83.0	11 13 46.0	83.3	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Pakistan</b>												
Lahore	+31 33.0	+ 74 20.6	11 10 48.1	83.2	11 13 59.4	83.5	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Karachi	+24 51.6	+ 67 00.6	11 10 51.1	83.1	11 14 02.2	83.4	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Kazakhstan</b> Almaty	+43 16.7	+ 76 53.7	11 10 56.4	83.3	11 14 08.0	83.5	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Uzbekistan</b> Tashkent	+41 16.0	+ 69 13.0	11 11 00.1	83.3	11 14 11.5	83.5	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Afghanistan</b> Kabul	+34 31.5	+ 69 08.0	11 10 54.7	83.2	11 14 06.0	83.5	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Turkmenistan</b> Ashgabat	+37 56.0	+ 58 22.0	11 11 07.9	83.2	11 14 19.0	83.5	14 55 31.7	5 20.2	. . . . .	. . . . .	. . . . .	. . . . .
<b>United Arab Emirates</b> Abu Dhabi	+24 28.0	+ 54 22.0	11 11 06.1	83.1	11 14 16.9	83.4	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Iran</b> Tehran	+35 40.0	+ 51 26.0	11 11 14.7	83.2	11 14 25.6	83.5	14 55 31.8	5 19.7	. . . . .	. . . . .	. . . . .	. . . . .

Location	Position		Ingress Exterior Contact		Ingress Interior Contact		Least Angular Distance		Egress Interior Contact		Egress Exterior Contact	
	Latitude	Longitude	UT	P	UT	P	UT	Separation	UT	P	UT	P
<b>Azerbaijan</b> Baku	+40 22.8	+ 49 53.5	11 11 19.1	83.3	11 14 30.2	83.5	14 55 34.8	5 20.2	.. .. .	...	.. .. .	...
<b>Saudi Arabia</b> Riyadh	+24 39.0	+ 46 46.0	11 11 16.9	83.2	11 14 27.6	83.4	14 55 30.6	5 18.3	.. .. .	...	.. .. .	...
<b>Iraq</b> Baghdad	+33 19.5	+ 44 25.3	11 11 22.9	83.2	11 14 33.7	83.5	14 55 33.4	5 19.2	.. .. .	...	.. .. .	...
<b>Yemen</b> Sana'a	+15 20.9	+ 44 12.4	11 11 19.5	83.1	11 14 30.0	83.4	14 55 32.9	5 17.1	.. .. .	...	.. .. .	...
<b>Lebanon</b> Beirut	+33 53.2	+ 35 30.8	11 11 35.9	83.2	11 14 46.7	83.5	14 55 38.8	5 19.1	.. .. .	...	.. .. .	...
<b>Israel</b> Tel Aviv	+32 04.0	+ 34 47.0	11 11 36.6	83.2	11 14 47.4	83.5	14 55 38.8	5 18.8	.. .. .	...	.. .. .	...
<b>Egypt</b> Cairo	+30 03.5	+ 31 13.7	11 11 41.9	83.2	11 14 52.6	83.5	14 55 41.2	5 18.5	.. .. .	...	.. .. .	...
<b>Turkey</b> Istanbul	+41 01.0	+ 28 58.0	11 11 46.9	83.3	11 14 57.8	83.6	14 55 46.4	5 19.8	.. .. .	...	.. .. .	...
<b>Russia</b>												
Novosibirsk	+55 01.0	+ 83 00.0	11 11 07.4	83.4	11 14 19.3	83.6	.. .. .	.. .. .	.. .. .	...	.. .. .	...
Yekaterinburg	+56 50.0	+ 60 35.0	11 11 22.5	83.4	11 14 34.0	83.7	14 55 48.0	5 22.2	.. .. .	...	.. .. .	...
Nizhny Novgorod	+56 20.0	+ 44 00.0	11 11 35.8	83.4	11 14 47.3	83.7	14 55 50.2	5 21.8	.. .. .	...	.. .. .	...
Magadan	+59 34.0	+150 48.0	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	.. .. .	18 38 39.8	223.7	18 41 52.7	223.9
Tiksi	+71 38.0	+128 52.0	11 11 34.1	83.5	11 14 46.6	83.8	.. .. .	.. .. .	18 38 13.1	223.7	18 41 25.9	223.9
Moscow	+55 45.1	+ 37 37.1	11 11 41.6	83.4	11 14 53.0	83.7	14 55 52.0	5 21.6	.. .. .	...	.. .. .	...
Murmansk	+68 58.0	+ 33 05.0	11 11 52.6	83.5	11 15 04.4	83.7	14 56 09.0	5 22.9	18 37 34.2	223.8	18 40 46.8	224.0
St. Petersburg	+59 57.0	+ 30 19.0	11 11 50.7	83.4	11 15 02.1	83.7	14 55 59.7	5 22.0	.. .. .	...	.. .. .	...
<b>Somalia</b> Mogadishu	+ 2 02.0	+ 45 21.0	11 11 18.5	83.0	11 14 28.9	83.3	14 55 38.9	5 15.6	.. .. .	...	.. .. .	...
<b>Tanzania</b> Dar es Salaam	- 6 48.0	+ 39 17.0	11 11 31.1	83.0	11 14 41.3	83.2	14 55 50.1	5 14.5	.. .. .	...	.. .. .	...
<b>Ethiopia</b> Addis Ababa	+ 9 01.8	+ 38 44.4	11 11 28.7	83.1	11 14 39.1	83.3	14 55 38.8	5 16.2	.. .. .	...	.. .. .	...
<b>Kenya</b> Nairobi	- 1 17.0	+ 36 49.0	11 11 33.8	83.0	11 14 44.1	83.2	14 55 47.0	5 15.0	.. .. .	...	.. .. .	...
<b>Mozambique</b> Maputo	-25 58.0	+ 32 35.0	11 11 50.4	82.9	11 15 00.6	83.1	14 56 18.5	5 12.8	.. .. .	...	.. .. .	...
<b>Uganda</b> Kampala	+ 0 18.8	+ 32 34.9	11 11 41.1	83.0	11 14 51.3	83.3	14 55 49.3	5 15.1	.. .. .	...	.. .. .	...
<b>Sudan</b> Khartoum	+15 38.0	+ 32 32.0	11 11 39.2	83.1	11 14 49.6	83.4	14 55 41.1	5 16.8	.. .. .	...	.. .. .	...
<b>Mauritius</b> Port Louis	-20 10.0	+ 57 31.0	11 11 09.5	82.9	11 14 20.0	83.1	.. .. .	.. .. .	.. .. .	...	.. .. .	...
<b>Rodrigues Island</b> Port Mathurin	-19 41.0	+ 63 25.0	11 11 01.8	82.8	11 14 12.4	83.1	.. .. .	.. .. .	.. .. .	...	.. .. .	...
<b>Seychelles</b> Victoria, Mahe	- 4 37.0	+ 55 27.0	11 11 04.6	82.9	11 14 15.1	83.2	.. .. .	.. .. .	.. .. .	...	.. .. .	...
<b>Madagascar</b> Antananarivo	-18 56.0	+ 47 31.0	11 11 22.9	82.9	11 14 33.2	83.1	.. .. .	.. .. .	.. .. .	...	.. .. .	...
<b>Maldives</b> Male	+ 4 10.5	+ 73 30.5	11 10 40.6	83.0	11 13 51.5	83.2	.. .. .	.. .. .	.. .. .	...	.. .. .	...

# TRANSIT OF MERCURY OF 2016 MAY 9

Location	Position		Ingress Exterior Contact		Ingress Interior Contact		Least Angular Distance		Egress Interior Contact		Egress Exterior Contact	
	Latitude	Longitude	UT	<i>P</i>	UT	<i>P</i>	UT	Separation	UT	<i>P</i>	UT	<i>P</i>
<b>Kerguelen Islands</b> Port-aux-Francais	−49 21.0	+ 70 13.0	11 11 26.7	82.8	11 14 37.5	83.0	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Comoros Islands</b> Moroni	−11 45.0	+ 43 12.0	11 11 26.3	82.9	11 14 36.5	83.2	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
<b>Zimbabwe</b> Harare	−17 51.8	+ 31 01.8	11 11 49.5	82.9	11 14 59.7	83.2	14 56 09.1	5 13.4	. . . . .	. . . . .	. . . . .	. . . . .
<b>Zambia</b> Lusaka	−15 25.0	+ 28 17.0	11 11 53.5	82.9	11 15 03.7	83.2	14 56 08.8	5 13.5	. . . . .	. . . . .	. . . . .	. . . . .
<b>South Africa, Rep. of</b> Johannesburg	−26 12.3	+ 28 02.7	11 11 58.0	82.9	11 15 08.2	83.1	14 56 22.8	5 12.7	. . . . .	. . . . .	. . . . .	. . . . .
Cape Town	−33 55.5	+ 18 25.4	11 12 16.6	82.9	11 15 26.8	83.1	14 56 43.4	5 12.2	. . . . .	. . . . .	. . . . .	. . . . .
<b>Namibia</b> Windhoek	−22 34.2	+ 17 05.0	11 12 15.8	82.9	11 15 26.0	83.2	14 56 29.8	5 12.9	. . . . .	. . . . .	. . . . .	. . . . .
<b>Angola</b> Luanda	− 8 50.3	+ 13 14.1	11 12 19.7	83.0	11 15 29.9	83.3	14 56 19.8	5 14.0	. . . . .	. . . . .	. . . . .	. . . . .
<b>Congo, Democratic Republic of</b> Kinshasa	− 4 19.5	+ 15 19.3	11 12 14.7	83.0	11 15 24.9	83.3	14 56 12.8	5 14.4	. . . . .	. . . . .	. . . . .	. . . . .
<b>Libya</b> Benghazi	+32 07.0	+ 20 04.0	11 12 00.0	83.3	11 15 10.7	83.5	14 55 52.0	5 18.7	. . . . .	. . . . .	. . . . .	. . . . .
Tripoli	+32 54.1	+ 13 11.1	11 12 11.1	83.3	11 15 21.9	83.6	14 55 59.8	5 18.7	. . . . .	. . . . .	. . . . .	. . . . .
<b>Central African Republic</b> Bangui	+ 4 22.0	+ 18 35.0	11 12 06.6	83.1	11 15 16.8	83.3	14 56 01.8	5 15.4	. . . . .	. . . . .	. . . . .	. . . . .
<b>Chad</b> N'Djamena	+12 06.7	+ 15 02.1	11 12 11.8	83.1	11 15 22.1	83.4	14 56 02.0	5 16.2	. . . . .	. . . . .	. . . . .	. . . . .
<b>Tunisia</b> Tunis	+36 48.0	+ 10 11.0	11 12 15.1	83.3	11 15 25.9	83.6	14 56 03.6	5 19.2	. . . . .	. . . . .	. . . . .	. . . . .
<b>Cameroon</b> Yaounde	+ 3 52.0	+ 11 31.0	11 12 20.3	83.1	11 15 30.5	83.4	14 56 11.8	5 15.3	. . . . .	. . . . .	. . . . .	. . . . .
<b>Nigeria</b> Lagos	+ 6 27.2	+ 3 23.8	11 12 35.2	83.1	11 15 45.5	83.4	14 56 22.3	5 15.6	. . . . .	. . . . .	. . . . .	. . . . .
<b>Algeria</b> Algiers	+36 42.0	+ 3 13.0	11 12 25.9	83.3	11 15 36.7	83.6	14 56 12.2	5 19.3	18 37 21.1	224.0	. . . . .	. . . . .
<b>Niger</b> Niamey	+13 31.3	+ 2 06.3	11 12 35.6	83.2	11 15 46.1	83.5	14 56 20.2	5 16.5	. . . . .	. . . . .	. . . . .	. . . . .
<b>Ghana</b> Accra	+ 5 33.0	− 0 12.0	11 12 42.2	83.2	11 15 52.5	83.4	14 56 28.8	5 15.6	. . . . .	. . . . .	. . . . .	. . . . .
<b>Ivory Coast</b> Abidjan	+ 5 20.2	− 4 01.6	11 12 49.3	83.2	11 15 59.7	83.4	14 56 35.3	5 15.6	. . . . .	. . . . .	. . . . .	. . . . .
<b>Morocco</b> Rabat	+34 02.0	− 6 50.0	11 12 42.4	83.4	11 15 53.3	83.6	14 56 26.4	5 19.1	18 37 23.6	224.1	18 40 35.4	224.3
<b>Mali</b> Bamako	+12 39.0	− 8 00.0	11 12 54.2	83.2	11 16 04.7	83.5	14 56 37.4	5 16.5	18 37 38.5	224.2	18 40 50.1	224.5
<b>Liberia</b> Monrovia	+ 6 19.0	− 10 46.8	11 13 01.2	83.2	11 16 11.7	83.5	14 56 46.4	5 15.9	18 37 46.5	224.3	18 40 57.9	224.5
<b>Western Sahara</b> El Aaiun	+27 09.2	− 13 12.2	11 12 56.1	83.3	11 16 06.9	83.6	14 56 38.6	5 18.4	18 37 29.1	224.1	18 40 40.7	224.4
<b>Sierra Leone</b> Freetown	+ 8 29.1	− 13 14.1	11 13 04.8	83.2	11 16 15.3	83.5	14 56 49.3	5 16.2	18 37 45.1	224.3	18 40 56.5	224.5
<b>Guinea-Bissau</b> Bissau	+11 51.0	− 15 34.0	11 13 07.4	83.3	11 16 18.1	83.5	14 56 51.3	5 16.7	18 37 42.7	224.2	18 40 54.1	224.5

Location	Position		Ingress Exterior Contact		Ingress Interior Contact		Least Angular Distance		Egress Interior Contact		Egress Exterior Contact	
	Latitude	Longitude	UT	P	UT	P	UT	Separation	UT	P	UT	P
<b>Mauritania</b> Nouakchott	+18° 06.0′	− 15° 57.0′	11 13 05.3	83.3	11 16 16.0	83.6	14 56 48.0	5 17.4	18 37 36.9	224.2	18 40 48.4	224.5
<b>Senegal</b> Dakar	+14 41.6	− 17 26.8	11 13 09.3	83.3	11 16 20.0	83.5	14 56 52.8	5 17.0	18 37 40.8	224.2	18 40 52.2	224.5
<b>Albania</b> Tirana	+41 19.8	+ 19 49.2	11 12 00.0	83.3	11 15 10.9	83.6	14 55 54.3	5 19.8	.. .. .	.. .. .	.. .. .	.. .. .
<b>Ukraine</b> Kiev	+50 27.0	+ 30 31.4	11 11 47.1	83.4	11 14 58.3	83.6	14 55 51.1	5 21.0	.. .. .	.. .. .	.. .. .	.. .. .
<b>Hungary</b> Budapest	+47 28.3	+ 19 03.0	11 12 01.0	83.4	11 15 12.1	83.6	14 55 57.7	5 20.5	.. .. .	.. .. .	.. .. .	.. .. .
<b>Moldova</b> Chisinau	+47 00.6	+ 28 52.1	11 11 48.3	83.4	11 14 59.4	83.6	14 55 49.7	5 20.5	.. .. .	.. .. .	.. .. .	.. .. .
<b>Belarus</b> Minsk	+53 54.0	+ 27 34.0	11 11 51.5	83.4	11 15 02.8	83.7	14 55 55.6	5 21.3	.. .. .	.. .. .	.. .. .	.. .. .
<b>Romania</b> Bucharest	+44 25.9	+ 26 06.2	11 11 51.4	83.3	11 15 02.4	83.6	14 55 50.3	5 20.2	.. .. .	.. .. .	.. .. .	.. .. .
<b>Finland</b> Helsinki	+60 10.3	+ 24 56.2	11 11 55.8	83.4	11 15 07.3	83.7	14 56 02.7	5 22.0	.. .. .	.. .. .	.. .. .	.. .. .
<b>Latvia</b> Riga	+56 56.9	+ 24 06.4	11 11 55.9	83.4	11 15 07.3	83.7	14 56 00.4	5 21.6	.. .. .	.. .. .	.. .. .	.. .. .
<b>Greece</b> Athens	+37 58.0	+ 23 43.0	11 11 54.2	83.3	11 15 05.1	83.6	14 55 49.6	5 19.4	.. .. .	.. .. .	.. .. .	.. .. .
<b>Bulgaria</b> Sofia	+42 42.0	+ 23 20.0	11 11 55.0	83.3	11 15 06.0	83.6	14 55 51.7	5 20.0	.. .. .	.. .. .	.. .. .	.. .. .
<b>Poland</b> Warsaw	+52 13.8	+ 21 00.7	11 11 58.8	83.4	11 15 10.0	83.7	14 55 58.9	5 21.1	.. .. .	.. .. .	.. .. .	.. .. .
<b>Serbia and Montenegro</b> Belgrade	+44 49.2	+ 20 27.7	11 11 59.1	83.4	11 15 10.1	83.6	14 55 55.2	5 20.2	.. .. .	.. .. .	.. .. .	.. .. .
<b>Bosnia-Herzegovina</b> Sarajevo	+43 50.9	+ 18 21.4	11 12 02.0	83.4	11 15 13.0	83.6	14 55 56.7	5 20.1	.. .. .	.. .. .	.. .. .	.. .. .
<b>Svalbard</b> Longyearbyen	+78 13.0	+ 15 33.0	11 12 04.8	83.5	11 15 16.8	83.8	14 56 26.0	5 23.7	18 37 40.5	223.8	18 40 52.9	224.0
<b>Sweden</b> Stockholm	+59 21.0	+ 18 04.0	11 12 02.3	83.5	11 15 13.8	83.7	14 56 06.3	5 21.9	18 37 25.3	223.8	18 40 37.7	224.1
<b>Austria</b> Vienna	+48 12.5	+ 16 22.4	11 12 04.5	83.4	11 15 15.6	83.6	14 56 00.4	5 20.6	.. .. .	.. .. .	.. .. .	.. .. .
<b>Croatia</b> Zagreb	+45 49.0	+ 15 59.0	11 12 05.2	83.4	11 15 16.2	83.6	14 55 59.7	5 20.3	.. .. .	.. .. .	.. .. .	.. .. .
<b>Czech Republic</b> Prague	+50 05.0	+ 14 25.0	11 12 06.8	83.4	11 15 18.0	83.7	14 56 03.1	5 20.8	.. .. .	.. .. .	.. .. .	.. .. .
<b>Germany</b>												
Munich	+48 08.0	+ 11 34.0	11 12 10.7	83.4	11 15 21.8	83.7	14 56 04.9	5 20.6	.. .. .	.. .. .	.. .. .	.. .. .
Stuttgart	+48 46.7	+ 9 10.8	11 12 13.7	83.4	11 15 24.8	83.7	14 56 07.5	5 20.7	18 37 20.7	223.9	18 40 33.0	224.2
Dusseldorf	+51 14.2	+ 6 47.0	11 12 16.0	83.4	11 15 27.2	83.7	14 56 10.7	5 21.0	18 37 21.2	223.9	18 40 33.5	224.2
<b>San Marino</b> San Marino	+43 56.0	+ 12 26.0	11 12 10.3	83.4	11 15 21.3	83.6	14 56 02.5	5 20.1	.. .. .	.. .. .	.. .. .	.. .. .
<b>Italy</b>												
Rome	+41 54.0	+ 12 30.0	11 12 10.6	83.4	11 15 21.5	83.6	14 56 01.9	5 19.8	.. .. .	.. .. .	.. .. .	.. .. .
Milan	+45 27.8	+ 9 11.4	11 12 14.4	83.4	11 15 25.5	83.6	14 56 06.4	5 20.3	.. .. .	.. .. .	.. .. .	.. .. .



# TRANSIT OF MERCURY OF 2016 MAY 9

Location	Position		Ingress Exterior Contact		Ingress Interior Contact		Least Angular Distance		Egress Interior Contact		Egress Exterior Contact	
	Latitude	Longitude	UT	<i>P</i>	UT	<i>P</i>	UT	Separation	UT	<i>P</i>	UT	<i>P</i>
<b>Denmark</b> Copenhagen	+55 40.6	+ 12 34.1	11 12 08.3	83.4	11 15 19.6	83.7	14 56 07.7	5 21.5	18 37 23.0	223.9	18 40 35.3	224.1
<b>Norway</b> Oslo	+59 57.0	+ 10 45.4	11 12 09.5	83.5	11 15 21.0	83.7	14 56 11.8	5 21.9	18 37 24.9	223.8	18 40 37.3	224.1
<b>Switzerland</b> Zurich	+47 22.0	+ 8 33.0	11 12 14.8	83.4	11 15 25.9	83.7	14 56 07.6	5 20.5	18 37 20.5	223.9	18 40 32.7	224.2
<b>Netherlands</b> Amsterdam	+52 22.4	+ 4 53.5	11 12 17.8	83.4	11 15 29.1	83.7	14 56 13.0	5 21.1	18 37 21.6	223.9	18 40 33.8	224.2
<b>France</b>												
Ajaccio, Corsica	+41 55.6	+ 8 44.2	11 12 16.0	83.4	11 15 27.0	83.6	14 56 06.0	5 19.9	.. .. .	.. .. .	.. .. .	.. .. .
Marseille	+43 17.8	+ 5 22.2	11 12 20.4	83.4	11 15 31.4	83.6	14 56 10.1	5 20.0	18 37 20.2	224.0	18 40 32.4	224.2
Paris	+48 51.4	+ 2 21.0	11 12 22.3	83.4	11 15 33.5	83.7	14 56 14.5	5 20.7	18 37 20.9	223.9	18 40 33.0	224.2
<b>Spain</b>												
Barcelona	+41 23.0	+ 2 11.0	11 12 25.6	83.4	11 15 36.6	83.6	14 56 13.6	5 19.8	18 37 20.5	224.0	18 40 32.5	224.2
Madrid	+40 24.0	- 3 41.0	11 12 34.4	83.4	11 15 45.4	83.7	14 56 21.0	5 19.8	18 37 21.4	224.0	18 40 33.4	224.3
<b>United Kingdom</b>												
London	+51 30.5	- 0 07.5	11 12 24.1	83.4	11 15 35.4	83.7	14 56 17.7	5 21.0	18 37 21.7	223.9	18 40 33.8	224.2
Birmingham	+52 29.0	- 1 53.6	11 12 25.7	83.5	11 15 37.0	83.7	14 56 19.8	5 21.2	18 37 22.2	223.9	18 40 34.3	224.2
Edinburgh	+55 57.0	- 3 09.6	11 12 25.2	83.5	11 15 36.6	83.7	14 56 21.9	5 21.6	18 37 23.6	223.9	18 40 35.7	224.2
Taunton	+51 01.1	- 3 06.0	11 12 27.9	83.4	11 15 39.2	83.7	14 56 20.8	5 21.0	18 37 22.0	223.9	18 40 34.0	224.2
<b>Ireland</b> Dublin	+53 20.9	- 6 15.6	11 12 30.1	83.5	11 15 41.4	83.7	14 56 24.5	5 21.3	18 37 23.2	223.9	18 40 35.2	224.2
<b>Faroe Islands</b> Torshavn	+62 00.0	- 6 47.0	11 12 24.8	83.5	11 15 36.4	83.8	14 56 26.7	5 22.3	18 37 27.1	223.9	18 40 39.3	224.1
<b>Portugal</b> Lisbon	+38 42.8	- 9 08.4	11 12 43.0	83.4	11 15 54.1	83.7	14 56 28.7	5 19.7	18 37 23.0	224.0	18 40 34.9	224.3
<b>Ascension Island</b> Georgetown	- 7 55.7	- 14 24.7	11 13 10.4	83.1	11 16 20.8	83.4	14 57 04.0	5 14.5	18 38 07.3	224.4	18 41 18.6	224.6
<b>Can. Islands</b> Las Palmas de Gran Canaria	+28 09.0	- 15 25.0	11 12 58.8	83.4	11 16 09.8	83.6	14 56 41.8	5 18.6	18 37 29.5	224.1	18 40 41.1	224.4
<b>Madeira</b> Funchal	+32 39.1	- 16 54.6	11 12 58.0	83.4	11 16 09.1	83.6	14 56 42.1	5 19.1	18 37 28.0	224.1	18 40 39.6	224.3
<b>Iceland</b> Reykjavik	+64 08.0	- 21 56.0	11 12 34.7	83.5	11 15 46.5	83.8	14 56 39.5	5 22.7	18 37 31.9	223.9	18 40 43.9	224.1
<b>Cape Verde Islands</b> Praia, Santiago	+14 55.2	- 23 30.5	11 13 18.7	83.3	11 16 29.5	83.6	14 57 03.6	5 17.3	18 37 44.4	224.2	18 40 55.7	224.5
<b>Azores</b> Ponta Delgada	+37 44.0	- 25 40.0	11 13 05.4	83.4	11 16 16.7	83.7	14 56 53.1	5 20.0	18 37 30.9	224.1	18 40 42.4	224.3
<b>South Georgia</b> Grytviken	-54 16.9	- 36 30.5	11 13 17.6	82.9	11 16 28.6	83.2	14 58 09.2	5 12.3	18 39 39.5	224.6	.. .. .	.. .. .
<b>Greenland</b> Nuuk	+64 10.0	- 51 44.0	11 12 50.8	83.6	11 16 03.0	83.9	14 57 03.7	5 23.3	18 37 44.6	223.9	18 40 56.4	224.1

*Dot leaders indicate the phenomenon occurs below the horizon.*