

# TRANSIT OF MERCURY, 2019

A transit of Mercury over the disk of the Sun will occur on November 11. The entire transit will be visible in eastern North America, South America, Antarctica, extreme southern Greenland, extreme western Africa, and the Atlantic Ocean.

The times provided in the following tables are given provisionally in Universal Time, using  $\Delta T(A) = +69^s.0$ . 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	November 11 12 35 27.2	109.8	– 12 36.2	–17 30.5
Ingress, interior contact	11 12 37 08.5	109.8	– 13 01.7	–17 30.5
Least angular distance	11 15 19 48.3	24.3	– 53 56.8	–17 25.8
Egress, interior contact	11 18 02 33.3	298.8	– 94 53.1	–17 21.0
Egress, exterior contact	11 18 04 14.7	298.7	– 95 18.6	–17 21.0

Least angular distance:  $1' 15''.9$

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 2019 NOVEMBER 11

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>United States</b>	°	'	h	m	s	°	h	m	s	°	h	m	s	°
Hartford, CT	+41 46.2	- 72 40.6	12 36 03.4	109.9	12 37 44.6	109.9	15 20 12.8	1 13.2	18 02 39.8	298.5	18 04 21.0	298.5		
Boston, MA	+42 20.0	- 71 05.0	12 36 02.9	109.9	12 37 44.2	109.9	15 20 12.0	1 13.1	18 02 39.2	298.5	18 04 20.4	298.5		
New York, NY	+40 44.0	- 74 00.0	12 36 03.9	109.9	12 37 45.2	109.9	15 20 13.4	1 13.2	18 02 40.1	298.5	18 04 21.2	298.5		
Washington, DC	+38 53.7	- 77 02.2	12 36 04.9	109.9	12 37 46.2	109.9	15 20 14.7	1 13.4	18 02 40.9	298.5	18 04 22.1	298.5		
Raleigh, NC	+35 49.1	- 78 38.7	12 36 05.8	109.9	12 37 47.1	109.9	15 20 15.5	1 13.6	18 02 40.8	298.6	18 04 21.9	298.5		
Atlanta, GA	+33 45.3	- 84 23.4	12 36 07.1	109.9	12 37 48.4	109.9	15 20 18.1	1 13.9	18 02 43.2	298.6	18 04 24.4	298.5		
Miami, FL	+25 45.0	- 80 15.0	12 36 07.5	109.9	12 37 48.8	109.8	15 20 15.8	1 14.2	18 02 38.4	298.6	18 04 19.6	298.5		
Montgomery, AL	+32 21.7	- 86 16.8	12 36 07.5	109.9	12 37 48.8	109.8	15 20 18.9	1 14.0	18 02 43.9	298.6	18 04 25.0	298.5		
Detroit, MI	+42 19.9	- 83 02.8	12 36 04.9	109.9	12 37 46.3	109.9	15 20 17.2	1 13.4	18 02 44.9	298.5	18 04 26.1	298.5		
Indianapolis, IN	+39 47.5	- 86 08.9	12 36 05.9	109.9	12 37 47.3	109.9	15 20 18.6	1 13.6	18 02 45.8	298.6	18 04 26.9	298.5		
Chicago, IL	+41 50.0	- 87 38.0	. . . . .	. . .	. . . . .	. . .	15 20 19.0	1 13.6	18 02 47.0	298.6	18 04 28.2	298.5		
Milwaukee, WI	+43 03.0	- 87 57.0	. . . . .	. . .	. . . . .	. . .	15 20 19.0	1 13.5	18 02 47.4	298.6	18 04 28.6	298.5		
Minneapolis, MN	+44 58.8	- 93 15.1	. . . . .	. . .	. . . . .	. . .	15 20 20.6	1 13.6	18 02 50.3	298.6	18 04 31.5	298.5		
St. Louis, MO	+38 40.0	- 90 15.0	. . . . .	. . .	. . . . .	. . .	15 20 20.3	1 13.8	18 02 47.6	298.6	18 04 28.7	298.5		
Louisville, KY	+38 15.3	- 85 45.6	12 36 06.3	109.9	12 37 47.6	109.9	15 20 18.5	1 13.7	18 02 45.2	298.6	18 04 26.3	298.5		
Lincoln, NE	+40 48.6	- 96 40.5	. . . . .	. . .	. . . . .	. . .	15 20 22.3	1 13.8	18 02 51.2	298.6	18 04 32.4	298.5		
Oklahoma City, OK	+35 28.9	- 97 32.1	. . . . .	. . .	. . . . .	. . .	15 20 23.2	1 14.1	18 02 50.7	298.6	18 04 31.8	298.5		
Denver, CO	+39 44.4	-104 59.1	. . . . .	. . .	. . . . .	. . .	15 20 24.9	1 14.1	18 02 55.0	298.6	18 04 36.2	298.5		
Salt Lake City, UT	+40 45.0	-111 55.0	. . . . .	. . .	. . . . .	. . .	15 20 26.4	1 14.2	18 02 58.3	298.6	18 04 39.5	298.5		
Dallas, TX	+32 47.0	- 96 48.2	. . . . .	. . .	. . . . .	. . .	15 20 23.1	1 14.3	18 02 49.7	298.6	18 04 30.9	298.5		
Houston, TX	+29 45.0	- 95 25.0	. . . . .	. . .	. . . . .	. . .	15 20 22.7	1 14.4	18 02 48.3	298.6	18 04 29.4	298.5		
Albuquerque, NM	+35 06.6	-106 36.6	. . . . .	. . .	. . . . .	. . .	15 20 26.0	1 14.4	18 02 55.2	298.6	18 04 36.4	298.6		
Las Vegas, NV	+36 10.6	-115 08.2	. . . . .	. . .	. . . . .	. . .	15 20 27.8	1 14.6	18 02 59.4	298.6	18 04 40.6	298.6		
Los Angeles, CA	+34 03.0	-118 15.0	. . . . .	. . .	. . . . .	. . .	15 20 28.7	1 14.8	18 03 00.7	298.6	18 04 41.9	298.6		
San Diego, CA	+32 42.9	-117 09.7	. . . . .	. . .	. . . . .	. . .	15 20 28.6	1 14.9	18 03 00.0	298.6	18 04 41.2	298.6		
San Francisco, CA	+37 46.8	-122 25.2	. . . . .	. . .	. . . . .	. . .	15 20 28.7	1 14.7	18 03 02.7	298.6	18 04 43.9	298.6		
Portland, OR	+45 32.0	-122 40.0	. . . . .	. . .	. . . . .	. . .	15 20 26.9	1 14.2	18 03 02.7	298.6	18 04 43.9	298.6		
Seattle, WA	+47 36.6	-122 20.0	. . . . .	. . .	. . . . .	. . .	15 20 26.3	1 14.1	18 03 02.5	298.6	18 04 43.7	298.5		
<b>Canada</b>														
St. John's, Nfld.	+47 34.1	- 52 42.4	12 35 56.6	110.0	12 37 37.8	109.9	15 20 03.9	1 12.5	18 02 33.7	298.5	18 04 14.9	298.5		
Moncton, N.B.	+46 07.0	- 64 48.2	12 36 00.4	110.0	12 37 41.7	109.9	15 20 09.3	1 12.8	18 02 37.9	298.5	18 04 19.1	298.5		
Halifax, N.S.	+44 38.0	- 63 35.0	12 36 00.5	110.0	12 37 41.7	109.9	15 20 08.7	1 12.8	18 02 36.7	298.5	18 04 17.9	298.5		
Charlottetown, P.E.I.	+46 14.4	- 63 08.4	12 36 00.0	110.0	12 37 41.2	109.9	15 20 08.5	1 12.8	18 02 37.2	298.5	18 04 18.4	298.5		
Montreal, Que.	+45 30.5	- 73 33.2	12 36 02.5	110.0	12 37 43.8	109.9	15 20 13.1	1 13.0	18 02 41.5	298.5	18 04 22.6	298.5		
Toronto, Ont.	+43 43.0	- 79 20.4	12 36 04.0	109.9	12 37 45.3	109.9	15 20 15.6	1 13.3	18 02 43.5	298.5	18 04 24.7	298.5		
Thunder Bay, Ont.	+48 22.9	- 89 14.8	. . . . .	. . .	. . . . .	. . .	15 20 18.7	1 13.3	18 02 49.2	298.5	18 04 30.3	298.5		
Winnipeg, Man.	+49 54.0	- 97 08.0	. . . . .	. . .	. . . . .	. . .	15 20 20.8	1 13.4	18 02 52.7	298.6	18 04 33.9	298.5		
Edmonton, Alta.	+53 34.6	-113 31.0	. . . . .	. . .	. . . . .	. . .	15 20 23.2	1 13.6	18 02 59.1	298.6	18 04 40.3	298.5		
Iqaluit, Nunavut	+63 44.9	- 68 31.2	. . . . .	. . .	. . . . .	. . .	15 20 09.9	1 12.4	18 02 45.6	298.5	18 04 26.9	298.5		
Vancouver, B.C.	+49 15.0	-123 06.0	. . . . .	. . .	. . . . .	. . .	15 20 25.8	1 14.0	18 03 02.6	298.6	18 04 43.9	298.5		

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	Latitude	Longitude	UT	<i>P</i>	UT	<i>P</i>	UT	Separation	UT	<i>P</i>	UT	<i>P</i>
<b>Martinique</b> Fort-de-France	+14 36.0	− 61 05.0	12 36 01.9	109.9	12 37 43.2	109.8	15 20 02.9	1 14.2	18 02 23.1	298.6	18 04 04.3	298.6
<b>Bermuda</b> Hamilton	+32 18.0	− 64 48.0	12 36 03.0	109.9	12 37 44.3	109.9	15 20 08.2	1 13.4	18 02 32.3	298.6	18 04 13.4	298.5
<b>Puerto Rico</b> San Juan	+18 29.0	− 66 08.0	12 36 04.0	109.9	12 37 45.2	109.8	15 20 06.9	1 14.1	18 02 27.5	298.6	18 04 08.7	298.5
<b>Haiti</b> Port-au-Prince	+18 32.0	− 72 20.0	12 36 05.9	109.9	12 37 47.1	109.8	15 20 10.5	1 14.3	18 02 31.2	298.6	18 04 12.4	298.5
<b>Jamaica</b> Kingston	+17 58.0	− 76 48.0	12 36 07.0	109.8	12 37 48.3	109.8	15 20 13.0	1 14.5	18 02 33.7	298.6	18 04 14.9	298.6
<b>Bahamas</b> Nassau	+25 03.6	− 77 20.7	12 36 06.9	109.9	12 37 48.2	109.8	15 20 14.2	1 14.1	18 02 36.5	298.6	18 04 17.6	298.5
<b>Cuba</b> Havana	+23 08.0	− 82 23.0	12 36 08.0	109.9	12 37 49.3	109.8	15 20 16.6	1 14.4	18 02 38.9	298.6	18 04 20.0	298.5
<b>Mexico</b>												
Mexico City	+19 25.0	− 99 10.0	. . . .	. . .	. . . .	. . .	15 20 23.7	1 15.1	18 02 47.9	298.6	18 04 29.0	298.6
Monterrey	+25 40.0	−100 20.0	. . . .	. . .	. . . .	. . .	15 20 24.5	1 14.8	18 02 50.1	298.6	18 04 31.2	298.6
Guadalajara	+20 40.0	−103 21.0	. . . .	. . .	. . . .	. . .	15 20 25.3	1 15.2	18 02 50.6	298.6	18 04 31.8	298.6
Veracruz	+19 26.1	− 96 23.0	12 36 09.2	109.8	12 37 50.6	109.8	15 20 22.7	1 15.0	18 02 46.2	298.6	18 04 27.3	298.6
<b>Guatemala</b> Guatemala City	+14 38.0	− 90 22.0	12 36 08.9	109.8	12 37 50.2	109.8	15 20 19.4	1 15.1	18 02 41.1	298.6	18 04 22.2	298.6
<b>El Salvador</b> San Salvador	+13 40.0	− 89 10.0	12 36 08.7	109.8	12 37 50.1	109.8	15 20 18.7	1 15.1	18 02 40.0	298.6	18 04 21.2	298.6
<b>Honduras</b> Tegucigalpa	+14 05.0	− 87 14.0	12 36 08.6	109.8	12 37 49.9	109.8	15 20 17.8	1 15.1	18 02 38.9	298.6	18 04 20.1	298.6
<b>Belize</b> Belmopan	+17 13.0	− 88 48.0	12 36 08.8	109.8	12 37 50.2	109.8	15 20 19.1	1 14.9	18 02 40.9	298.6	18 04 22.0	298.6
<b>Nicaragua</b> Managua	+12 06.0	− 86 18.0	12 36 08.3	109.8	12 37 49.6	109.8	15 20 17.0	1 15.1	18 02 37.7	298.6	18 04 18.8	298.6
<b>Venezuela</b> Caracas	+10 30.0	− 66 55.0	12 36 03.6	109.8	12 37 44.9	109.8	15 20 05.6	1 14.6	18 02 25.0	298.6	18 04 06.1	298.6
<b>Costa Rica</b> San Jose	+ 9 59.0	− 84 04.0	12 36 07.8	109.8	12 37 49.1	109.8	15 20 15.5	1 15.2	18 02 35.6	298.6	18 04 16.7	298.6
<b>Panama</b> Panama City	+ 8 57.0	− 79 30.0	12 36 06.9	109.8	12 37 48.2	109.8	15 20 12.8	1 15.1	18 02 32.3	298.6	18 04 13.4	298.6
<b>Argentina</b>												
Buenos Aires	−34 40.0	− 58 30.0	12 35 45.3	109.7	12 37 26.6	109.7	15 19 46.6	1 17.2	18 02 08.4	298.8	18 03 49.6	298.7
Cordoba	−31 25.0	− 64 11.0	12 35 48.9	109.7	12 37 30.2	109.7	15 19 50.8	1 17.1	18 02 11.7	298.8	18 03 52.8	298.7
<b>Falkland Islands</b> Stanley	−51 41.5	− 57 51.5	12 35 35.9	109.7	12 37 17.2	109.6	15 19 40.9	1 18.1	18 02 07.4	298.9	18 03 48.7	298.8
<b>Brazil</b>												
Recife	− 8 03.0	− 34 54.0	12 35 44.0	109.8	12 37 25.1	109.8	15 19 39.2	1 14.8	18 02 02.0	298.7	18 03 43.3	298.6
Rio de Janeiro	−22 54.5	− 43 11.8	12 35 43.8	109.8	12 37 25.0	109.7	15 19 40.8	1 16.0	18 02 02.7	298.7	18 03 43.9	298.7
Belo Horizonte	−19 55.1	− 43 56.3	12 35 45.3	109.8	12 37 26.5	109.7	15 19 42.0	1 15.8	18 02 03.5	298.7	18 03 44.7	298.7
Sao Paolo	−23 33.0	− 46 38.0	12 35 45.3	109.8	12 37 26.5	109.7	15 19 42.8	1 16.1	18 02 04.1	298.7	18 03 45.3	298.7

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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>	°	'	°	'	h	m	s	°	h	m	s	°
Brasilia	-15 45.0	- 47 57.0	12 35 48.9	109.8	12 37 30.0	109.7	15 19 45.8	1 15.7	18 02 06.2	298.7	18 03 47.4	298.7
Porto Alegre	-30 02.0	- 51 13.8	12 35 44.7	109.7	12 37 25.9	109.7	15 19 43.8	1 16.7	18 02 05.5	298.8	18 03 46.7	298.7
<b>Chile</b>												
Santiago	-33 30.0	- 70 40.0	12 35 49.7	109.7	12 37 31.0	109.6	15 19 53.5	1 17.4	18 02 14.7	298.8	18 03 55.9	298.7
Concepcion	-36 50.0	- 73 03.0	12 35 48.4	109.7	12 37 29.7	109.6	15 19 53.3	1 17.7	18 02 15.3	298.8	18 03 56.5	298.8
<b>Colombia</b>												
Medellin	+ 6 14.2	- 75 34.5	12 36 05.6	109.8	12 37 46.9	109.8	15 20 09.9	1 15.1	18 02 28.9	298.6	18 04 10.0	298.6
Bogota	+ 4 38.0	- 74 05.0	12 36 04.9	109.8	12 37 46.2	109.8	15 20 08.6	1 15.2	18 02 27.4	298.6	18 04 08.5	298.6
<b>Guyana</b> Georgetown	+ 6 46.0	- 58 10.0	12 35 59.7	109.8	12 37 40.9	109.8	15 19 59.1	1 14.5	18 02 18.5	298.6	18 03 59.6	298.6
<b>Suriname</b> Paramaribo	+ 5 52.0	- 55 14.0	12 35 58.3	109.8	12 37 39.5	109.8	15 19 56.9	1 14.5	18 02 16.5	298.6	18 03 57.6	298.6
<b>French Guiana</b> Cayenne	+ 4 55.0	- 52 18.0	12 35 56.7	109.8	12 37 37.9	109.8	15 19 54.6	1 14.5	18 02 14.5	298.6	18 03 55.7	298.6
<b>Bolivia</b>												
Santa Cruz	-17 45.0	- 63 14.0	12 35 54.8	109.7	12 37 36.0	109.7	15 19 55.0	1 16.2	18 02 13.9	298.7	18 03 55.1	298.7
Cochabamba	-17 23.0	- 66 10.0	12 35 55.9	109.7	12 37 37.2	109.7	15 19 56.9	1 16.3	18 02 15.7	298.7	18 03 56.9	298.7
<b>Paraguay</b> Asuncion	-25 15.0	- 57 40.0	12 35 49.5	109.7	12 37 30.7	109.7	15 19 49.1	1 16.5	18 02 09.3	298.7	18 03 50.5	298.7
<b>Ecuador</b> Quito	- 0 15.0	- 78 35.0	12 36 05.0	109.8	12 37 46.3	109.7	15 20 09.9	1 15.6	18 02 28.6	298.7	18 04 09.8	298.6
<b>Peru</b> Lima	-12 06.0	- 77 03.0	12 36 01.0	109.7	12 37 42.4	109.7	15 20 05.2	1 16.3	18 02 23.8	298.7	18 04 05.0	298.7
<b>Uruguay</b> Montevideo	-34 53.0	- 56 10.0	12 35 44.4	109.7	12 37 25.6	109.7	15 19 45.2	1 17.1	18 02 07.3	298.8	18 03 48.5	298.7
<b>Easter Island</b> Hanga Roa	-27 09.0	-109 26.0	12 35 55.6	109.7	12 37 37.1	109.6	15 20 12.4	1 18.2	18 02 37.9	298.8	18 04 19.1	298.8
<b>Pitcairn Islands</b> Adamstown	-25 04.0	-130 06.0	. . . .	. . . .	. . . .	. . . .	15 20 16.9	1 18.7	18 02 48.8	298.8	18 04 30.0	298.8
<b>French Polynesia</b> Papeete, Tahiti	-17 32.0	-149 34.0	. . . .	. . . .	. . . .	. . . .	15 20 19.7	1 18.7	18 02 59.4	298.9	18 04 40.7	298.8
<b>Kenya</b> Nairobi	- 1 17.0	+ 36 49.0	12 34 59.6	110.0	12 36 40.8	109.9	15 19 09.0	1 14.3	.. .. .	.. .. .	.. .. .	.. .. .
<b>Mozambique</b> Maputo	-25 58.0	+ 32 35.0	12 34 58.7	109.9	12 36 39.9	109.8	15 19 06.6	1 15.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>Uganda</b> Kampala	+ 0 18.8	+ 32 34.9	12 35 02.2	110.0	12 36 43.4	109.9	15 19 10.0	1 14.2	.. .. .	.. .. .	.. .. .	.. .. .
<b>Zimbabwe</b> Harare	-17 51.8	+ 31 01.8	12 35 00.0	109.9	12 36 41.2	109.8	15 19 07.0	1 15.3	.. .. .	.. .. .	.. .. .	.. .. .
<b>Zambia</b> Lusaka	-15 25.0	+ 28 17.0	12 35 01.8	109.9	12 36 42.9	109.9	15 19 07.7	1 15.1	.. .. .	.. .. .	.. .. .	.. .. .
<b>South Africa, Rep. of</b>												
Johannesburg	-26 12.3	+ 28 02.7	12 35 01.0	109.9	12 36 42.2	109.8	15 19 07.3	1 15.9	.. .. .	.. .. .	.. .. .	.. .. .
Cape Town	-33 55.5	+ 18 25.4	12 35 05.8	109.8	12 36 46.9	109.8	15 19 10.0	1 16.3	.. .. .	.. .. .	.. .. .	.. .. .
<b>Namibia</b> Windhoek	-22 34.2	+ 17 05.0	12 35 07.3	109.9	12 36 48.5	109.8	15 19 10.0	1 15.5	.. .. .	.. .. .	.. .. .	.. .. .
<b>Angola</b> Luanda	- 8 50.3	+ 13 14.1	12 35 11.9	109.9	12 36 53.0	109.9	15 19 12.8	1 14.5	.. .. .	.. .. .	.. .. .	.. .. .

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	Latitude	Longitude	UT	<i>P</i>	UT	<i>P</i>	UT	Separation	UT	<i>P</i>	UT	<i>P</i>
<b>Congo, Democratic Republic of</b> Kinshasa	− 4 19.5	+ 15 19.3	12 35 11.5	109.9	12 36 52.6	109.9	15 19 13.0	1 14.2	.. .. .	.. .. .	.. .. .	.. .. .
<b>Libya</b>												
Benghazi	+32 07.0	+ 20 04.0	12 35 19.3	110.0	12 37 00.5	110.0	15 19 26.8	1 12.4	.. .. .	.. .. .	.. .. .	.. .. .
Tripoli	+32 54.1	+ 13 11.1	12 35 23.3	110.0	12 37 04.4	110.0	15 19 29.1	1 12.3	.. .. .	.. .. .	.. .. .	.. .. .
<b>Central African Republic</b> Bangui	+ 4 22.0	+ 18 35.0	12 35 11.4	110.0	12 36 52.5	109.9	15 19 14.5	1 13.7	.. .. .	.. .. .	.. .. .	.. .. .
<b>Chad</b> N'Djamena	+12 06.7	+ 15 02.1	12 35 15.8	110.0	12 36 56.9	109.9	15 19 18.4	1 13.2	.. .. .	.. .. .	.. .. .	.. .. .
<b>Tunisia</b> Tunis	+36 48.0	+ 10 11.0	12 35 26.2	110.1	12 37 07.3	110.0	15 19 32.2	1 12.2	.. .. .	.. .. .	.. .. .	.. .. .
<b>Cameroon</b> Yaounde	+ 3 52.0	+ 11 31.0	12 35 15.9	110.0	12 36 57.0	109.9	15 19 16.7	1 13.7	.. .. .	.. .. .	.. .. .	.. .. .
<b>Nigeria</b> Lagos	+ 6 27.2	+ 3 23.8	12 35 21.9	110.0	12 37 03.0	109.9	15 19 20.9	1 13.5	.. .. .	.. .. .	.. .. .	.. .. .
<b>Algeria</b> Algiers	+36 42.0	+ 3 13.0	12 35 29.9	110.0	12 37 11.0	110.0	15 19 34.5	1 12.2	.. .. .	.. .. .	.. .. .	.. .. .
<b>Niger</b> Niamey	+13 31.3	+ 2 06.3	12 35 24.6	110.0	12 37 05.7	109.9	15 19 24.1	1 13.1	.. .. .	.. .. .	.. .. .	.. .. .
<b>Ghana</b> Accra	+ 5 33.0	− 0 12.0	12 35 24.2	110.0	12 37 05.3	109.9	15 19 22.3	1 13.6	.. .. .	.. .. .	.. .. .	.. .. .
<b>Ivory Coast</b> Abidjan	+ 5 20.2	− 4 01.6	12 35 26.7	109.9	12 37 07.8	109.9	15 19 24.2	1 13.6	.. .. .	.. .. .	.. .. .	.. .. .
<b>Morocco</b> Rabat	+34 02.0	− 6 50.0	12 35 35.0	110.0	12 37 16.1	110.0	15 19 37.3	1 12.3	.. .. .	.. .. .	.. .. .	.. .. .
<b>Mali</b> Bamako	+12 39.0	− 8 00.0	12 35 31.2	110.0	12 37 12.3	109.9	15 19 28.8	1 13.2	.. .. .	.. .. .	.. .. .	.. .. .
<b>Liberia</b> Monrovia	+ 6 19.0	− 10 46.8	12 35 31.6	109.9	12 37 12.7	109.9	15 19 28.1	1 13.6	18 01 59.6	298.6	18 03 40.9	298.6
<b>Western Sahara</b> El Aaiun	+27 09.2	− 13 12.2	12 35 37.5	110.0	12 37 18.6	110.0	15 19 37.3	1 12.6	.. .. .	.. .. .	.. .. .	.. .. .
<b>Sierra Leone</b> Freetown	+ 8 29.1	− 13 14.1	12 35 33.8	109.9	12 37 14.9	109.9	15 19 30.2	1 13.5	18 02 00.9	298.6	18 03 42.2	298.6
<b>Guinea-Bissau</b> Bissau	+11 51.0	− 15 34.0	12 35 36.1	109.9	12 37 17.2	109.9	15 19 32.7	1 13.3	18 02 02.9	298.6	18 03 44.2	298.6
<b>Mauritania</b> Nouakchott	+18 06.0	− 15 57.0	12 35 37.6	110.0	12 37 18.7	109.9	15 19 35.2	1 13.0	18 02 06.0	298.6	18 03 47.3	298.5
<b>Senegal</b> Dakar	+14 41.6	− 17 26.8	12 35 37.9	110.0	12 37 19.0	109.9	15 19 34.8	1 13.2	18 02 04.6	298.6	18 03 45.9	298.5
<b>Albania</b> Tirana	+41 19.8	+ 19 49.2	12 35 22.9	110.1	12 37 04.1	110.0	15 19 32.4	1 12.1	.. .. .	.. .. .	.. .. .	.. .. .
<b>Bosnia-Herzegovina</b> Sarajevo	+43 50.9	+ 18 21.4	12 35 24.5	110.1	12 37 05.7	110.0	15 19 34.3	1 12.0	.. .. .	.. .. .	.. .. .	.. .. .
<b>Austria</b> Vienna	+48 12.5	+ 16 22.4	12 35 27.0	110.1	12 37 08.2	110.0	15 19 37.5	1 12.0	.. .. .	.. .. .	.. .. .	.. .. .
<b>Croatia</b> Zagreb	+45 49.0	+ 15 59.0	12 35 26.3	110.1	12 37 07.5	110.0	15 19 36.0	1 12.0	.. .. .	.. .. .	.. .. .	.. .. .
<b>Czech Republic</b> Prague	+50 05.0	+ 14 25.0	12 35 28.5	110.1	12 37 09.7	110.0	15 19 39.1	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>Germany</b>												
Munich	+48 08.0	+ 11 34.0	12 35 29.1	110.1	12 37 10.2	110.0	15 19 38.5	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
Stuttgart	+48 46.7	+ 9 10.8	12 35 30.3	110.1	12 37 11.5	110.0	15 19 39.6	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .

# TRANSIT OF MERCURY OF 2019 NOVEMBER 11

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>Germany</b>												
Dusseldorf	+51° 14.2′	+ 6° 47.0′	12 35 32.0	110.1	12 37 13.2	110.0	15 19 41.7	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>San Marino</b>	+43 56.0	+ 12 26.0	12 35 27.3	110.1	12 37 08.5	110.0	15 19 35.8	1 12.0	.. .. .	.. .. .	.. .. .	.. .. .
<b>Italy</b>												
Rome	+41 54.0	+ 12 30.0	12 35 26.6	110.1	12 37 07.8	110.0	15 19 34.5	1 12.1	.. .. .	.. .. .	.. .. .	.. .. .
Milan	+45 27.8	+ 9 11.4	12 35 29.3	110.1	12 37 10.5	110.0	15 19 37.6	1 12.0	.. .. .	.. .. .	.. .. .	.. .. .
<b>Switzerland</b>	+47 22.0	+ 8 33.0	12 35 30.2	110.1	12 37 11.3	110.0	15 19 38.9	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>Netherlands</b>	+52 22.4	+ 4 53.5	12 35 33.1	110.1	12 37 14.3	110.0	15 19 42.9	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>France</b>												
Ajaccio, Corsica	+41 55.6	+ 8 44.2	12 35 28.5	110.1	12 37 09.6	110.0	15 19 35.6	1 12.0	.. .. .	.. .. .	.. .. .	.. .. .
Marseille	+43 17.8	+ 5 22.2	12 35 30.5	110.1	12 37 11.7	110.0	15 19 37.4	1 12.0	.. .. .	.. .. .	.. .. .	.. .. .
Paris	+48 51.4	+ 2 21.0	12 35 33.4	110.1	12 37 14.5	110.0	15 19 41.6	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>Spain</b>												
Barcelona	+41 23.0	+ 2 11.0	12 35 31.6	110.1	12 37 12.8	110.0	15 19 37.4	1 12.0	.. .. .	.. .. .	.. .. .	.. .. .
Madrid	+40 24.0	- 3 41.0	12 35 34.5	110.0	12 37 15.6	110.0	15 19 39.1	1 12.1	.. .. .	.. .. .	.. .. .	.. .. .
<b>United Kingdom</b>												
London	+51 30.5	- 0 07.5	12 35 35.1	110.1	12 37 16.2	110.0	15 19 43.8	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
Birmingham	+52 29.0	- 1 53.6	12 35 36.0	110.1	12 37 17.2	110.0	15 19 44.9	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
Edinburgh	+55 57.0	- 3 09.6	12 35 37.1	110.1	12 37 18.3	110.0	15 19 47.1	1 11.8	.. .. .	.. .. .	.. .. .	.. .. .
Taunton	+51 01.1	- 3 06.0	12 35 36.2	110.1	12 37 17.4	110.0	15 19 44.5	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>Ireland</b>	+53 20.9	- 6 15.6	12 35 38.0	110.1	12 37 19.2	110.0	15 19 46.7	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>Faroe Islands</b>	+62 00.0	- 6 47.0	12 35 39.3	110.1	12 37 20.5	110.0	15 19 51.3	1 11.8	.. .. .	.. .. .	.. .. .	.. .. .
<b>Portugal</b>	+38 42.8	- 9 08.4	12 35 37.1	110.0	12 37 18.2	110.0	15 19 40.5	1 12.1	.. .. .	.. .. .	.. .. .	.. .. .
<b>Ascension Island</b>	- 7 55.7	- 14 24.7	12 35 30.7	109.9	12 37 11.8	109.8	15 19 26.3	1 14.5	18 01 55.7	298.7	18 03 37.0	298.6
<b>Canary Islands</b>	+28 09.0	- 15 25.0	12 35 39.0	110.0	12 37 20.1	110.0	15 19 38.9	1 12.5	18 02 11.3	298.6	18 03 52.6	298.5
<b>Madeira</b>	+32 39.1	- 16 54.6	12 35 40.5	110.0	12 37 21.7	110.0	15 19 41.5	1 12.4	18 02 14.3	298.5	18 03 55.6	298.5
<b>Iceland</b>	+64 08.0	- 21 56.0	12 35 44.0	110.1	12 37 25.3	110.0	15 19 56.3	1 11.9	.. .. .	.. .. .	.. .. .	.. .. .
<b>Cape Verde Islands</b>	+14 55.2	- 23 30.5	12 35 41.9	109.9	12 37 23.0	109.9	15 19 38.6	1 13.2	18 02 06.3	298.6	18 03 47.6	298.5
<b>Azores</b>	+37 44.0	- 25 40.0	12 35 45.8	110.0	12 37 26.9	110.0	15 19 48.0	1 12.3	18 02 19.4	298.5	18 04 00.7	298.5
<b>South Georgia</b>	-54 16.9	- 36 30.5	12 35 27.9	109.7	12 37 09.1	109.6	15 19 31.6	1 17.9	18 02 01.2	298.9	18 03 42.5	298.8
<b>Greenland</b>	+64 10.0	- 51 44.0	12 35 51.7	110.0	12 37 33.0	110.0	15 20 05.0	1 12.2	18 02 41.4	298.5	18 04 22.7	298.5