

ANNULAR SOLAR ECLIPSE

(21 June, 2020)



Flow of talk

- **What is Eclipse?**
- **Types of Eclipses**
- **Solar Eclipse**
- **Types of Solar Eclipses**
- **Why does the Solar Eclipse occur?**
- **Why solar eclipse doesn't happen every new moon day?**
- **Difference between Eclipse, Transit and Occultation**
- **Annular Solar Eclipse**
- **Phases during Eclipse**
- **How to observe Solar Eclipse**
- **Why Solar Eclipse is important?**
- **Annular Solar Eclipse- 21 June, 2020**
 - **Across the globe**
 - **From India**
 - **Visibility from India (major metro cities)**
 - **Region of annularity (hot spots)**
 - **Activities that can be carried out during eclipse**
- **Outreach activities**



What is Eclipse?

An eclipse is an astronomical event that occurs when an astronomical object is temporarily obscured, either by passing into the shadow of another body or by having another body pass between it and the viewer. This alignment of three celestial objects is known as a Eclipse.



Types of Eclipses

solar eclipse

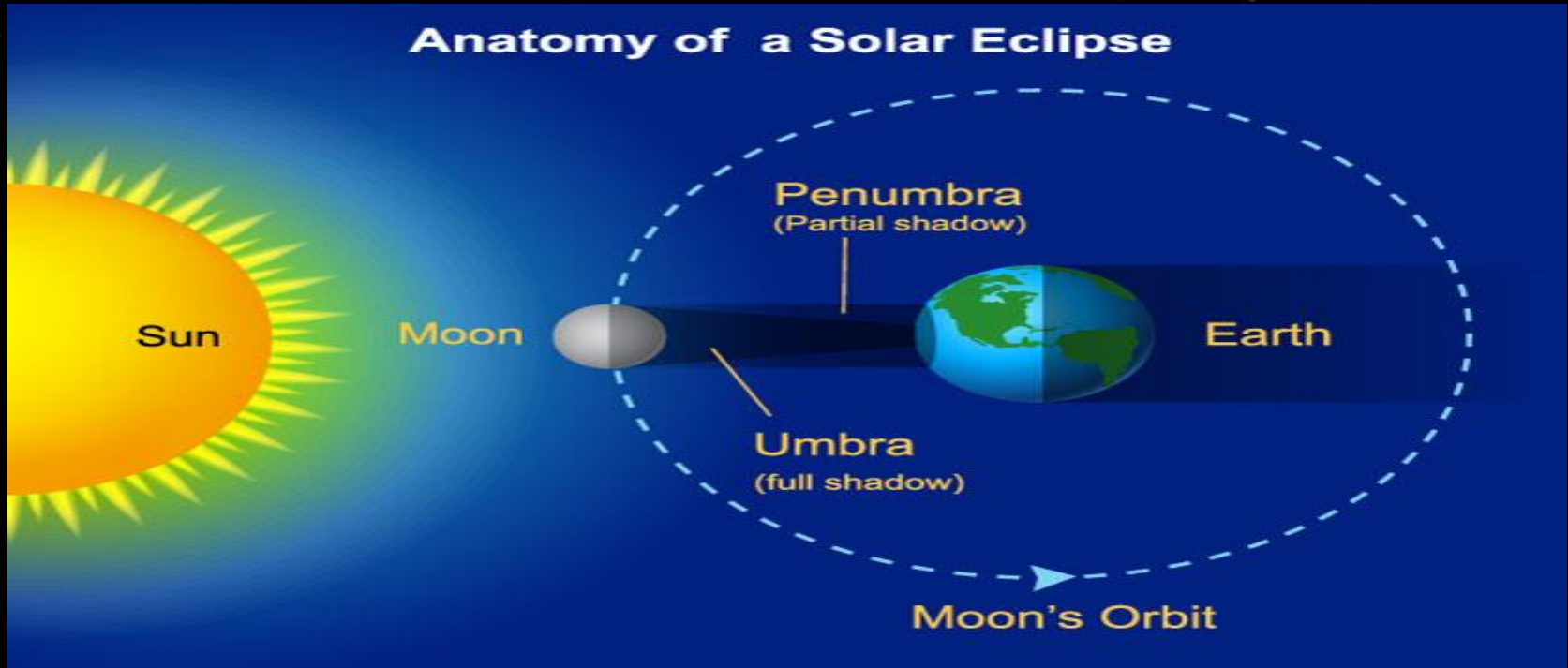


VS



lunar eclipse

Solar Eclipse



A solar eclipse occurs when the moon passes in front of the sun, blocking it out partially or completely. The eclipse results in parts of the earth being covered in the shadow of the moon.

Types of Solar Eclipse



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Partial Eclipse



Annular Eclipse

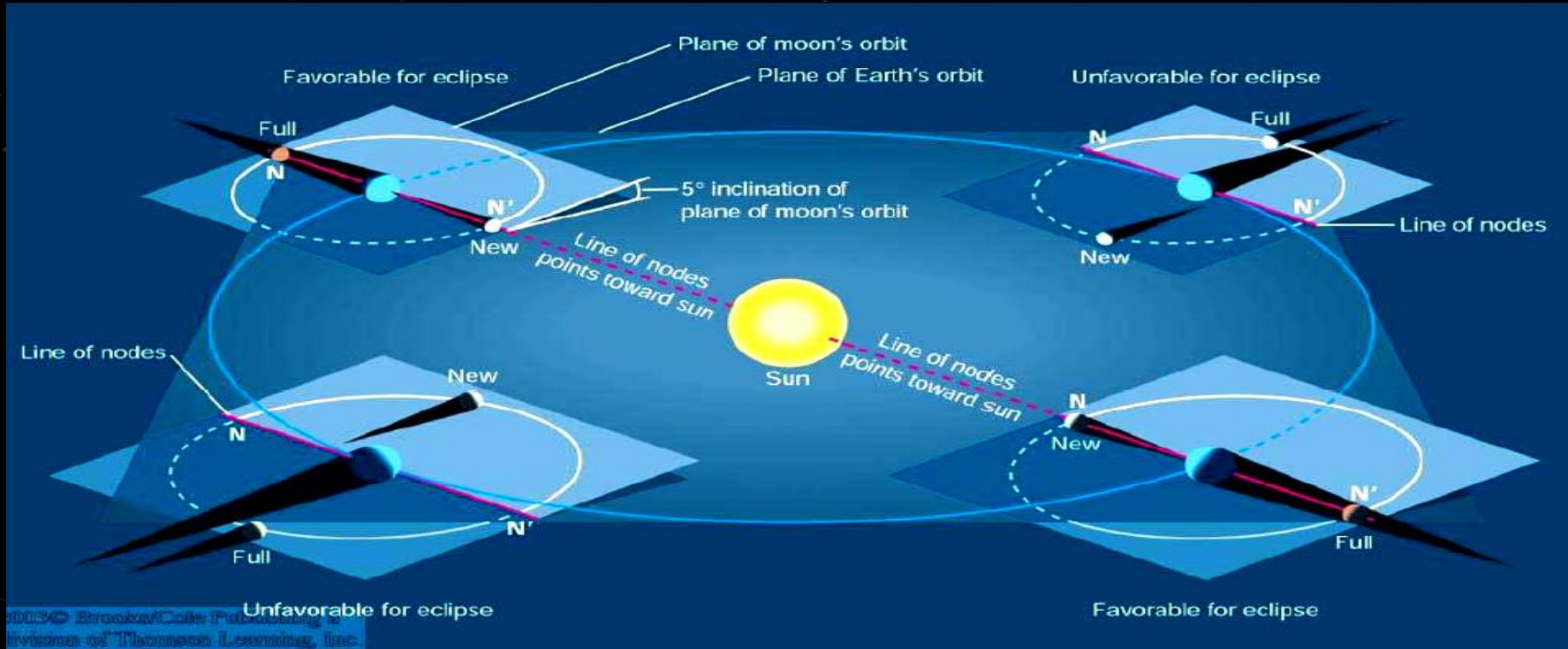


Total Eclipse



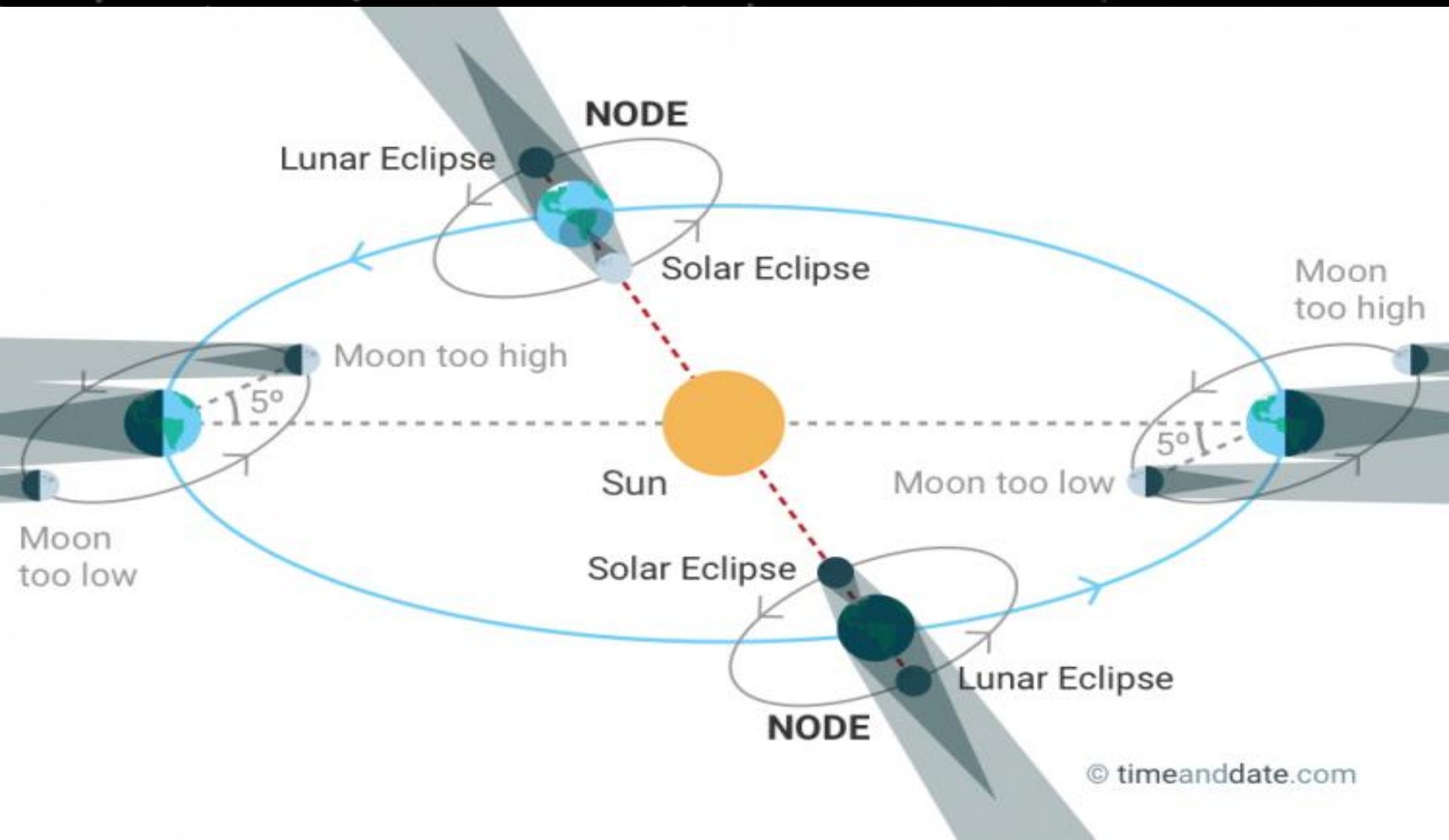
Hybrid Eclipse

Why does the solar eclipse occur?



- Because of the place of Earth, Moon and Sun.
- On its Orbit, when Moon comes in a straight line with Sun and Earth blocking the Sun's rays to come on the Earth surface.
- Because of the angular size of Moon & Sun from Earth.
- Solar Eclipse occurs on New Moon day.

Why solar eclipse doesn't happen every new moon day ?



Difference between Eclipse, Transit and Occultation



Eclipse

An eclipse is the result of the total or partial masking of a celestial body by another along an observer's line of sight.



Transit

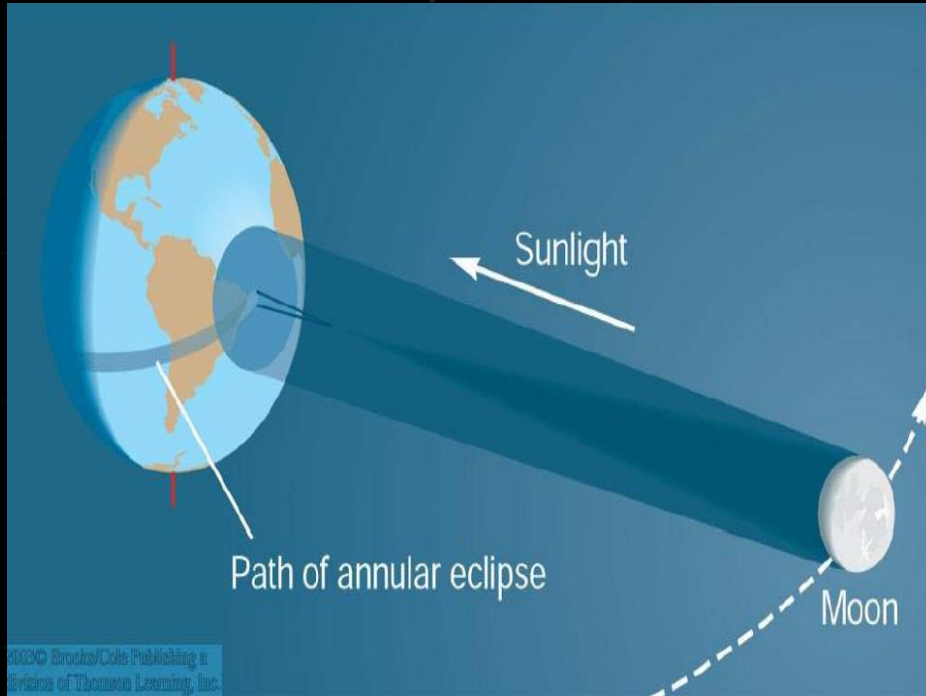
A transit is either the act of one celestial body passing in front of another or the time at which a celestial object is highest in the sky.



Occultation

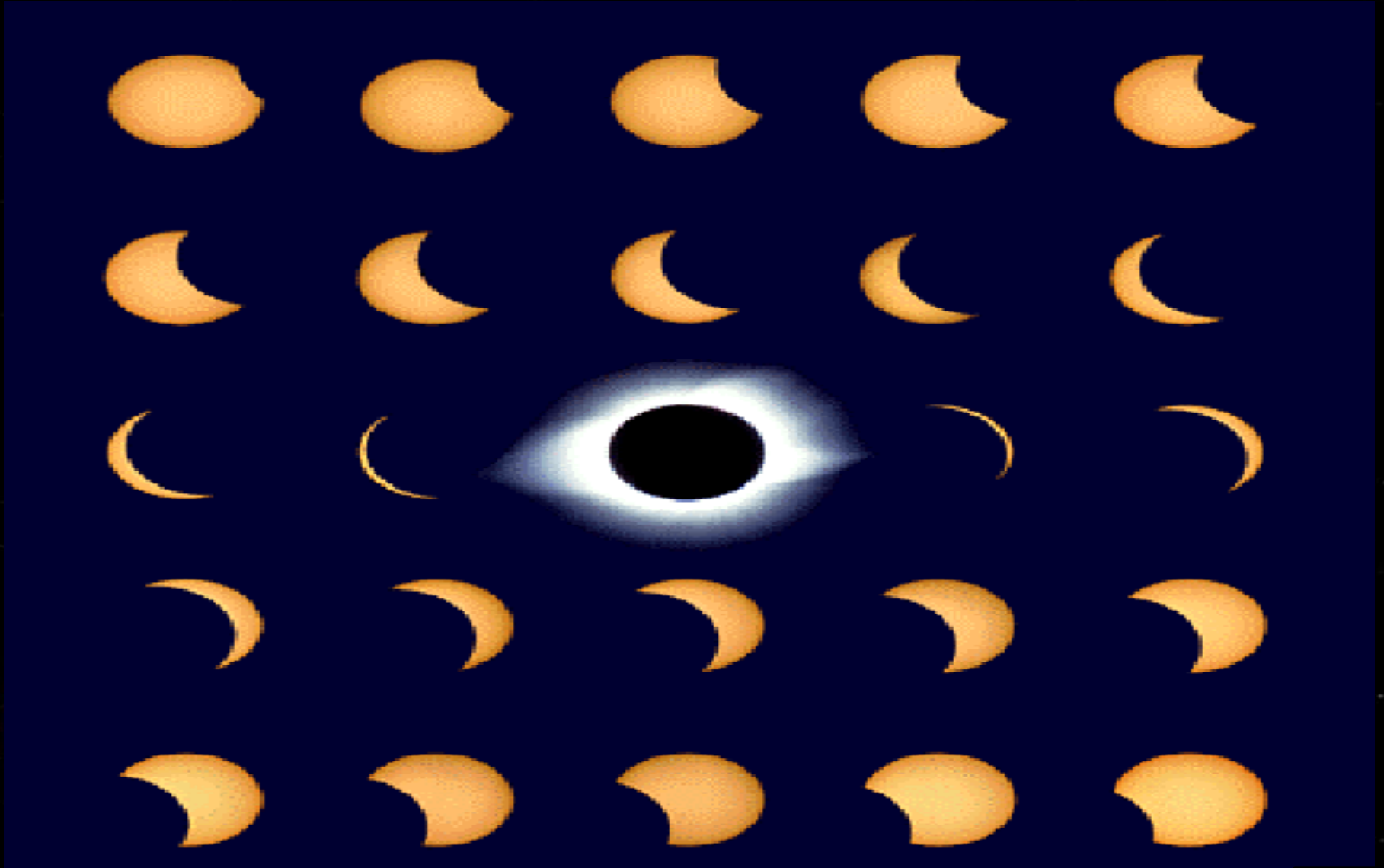
An occultation occurs when a celestial object is eclipsed by the Moon or another solar system body.

Annular Solar Eclipse



- When moon is at farthest approach mean smallest angular size then Sun.
- Moon does not exactly cover the Sun.
- Moon looks smaller than the Sun; therefore able to block the central region, leaving the outer ring (annulus of Sun's photosphere) un-covered.

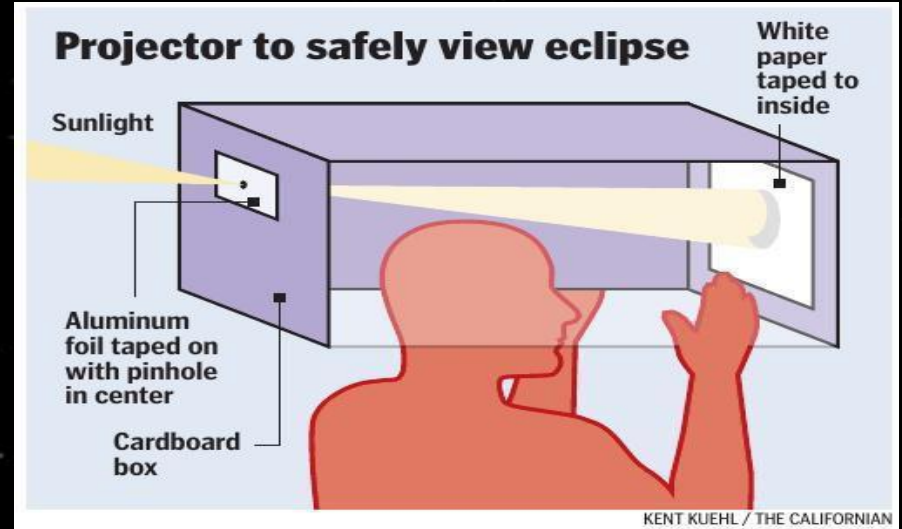
Phases during Eclipse



How to observe Solar Eclipse



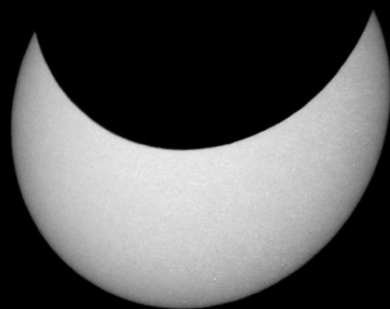
Solar Viewer



Pin hole Camera



Sun Projection



Solar Filter

Why Solar Eclipse is important?

- **Confirmative Activities:**
- Shape of the Moon and the Earth.
- Planets moving around the Sun.
- **Research Activities:**
- Presence of Helium in Sun's atmosphere:
 - →18 August 1868, TSE at Guntur, India
- Proof of Relativity Theory:
 - →29 May 1919, Principe Island.
- **General Activities:**
- Measuring the relative velocities of Sun and Moon.
- Measuring the diameter of Sun and Moon.
- Drawing the area of Sun covered during the Eclipse.
- Finding the time of maximum solar eclipse.
- **Next solar eclipse visible from India:**
- **20 March, 2034- Total solar eclipse**
- **17 February, 2064- Annular solar eclipse**



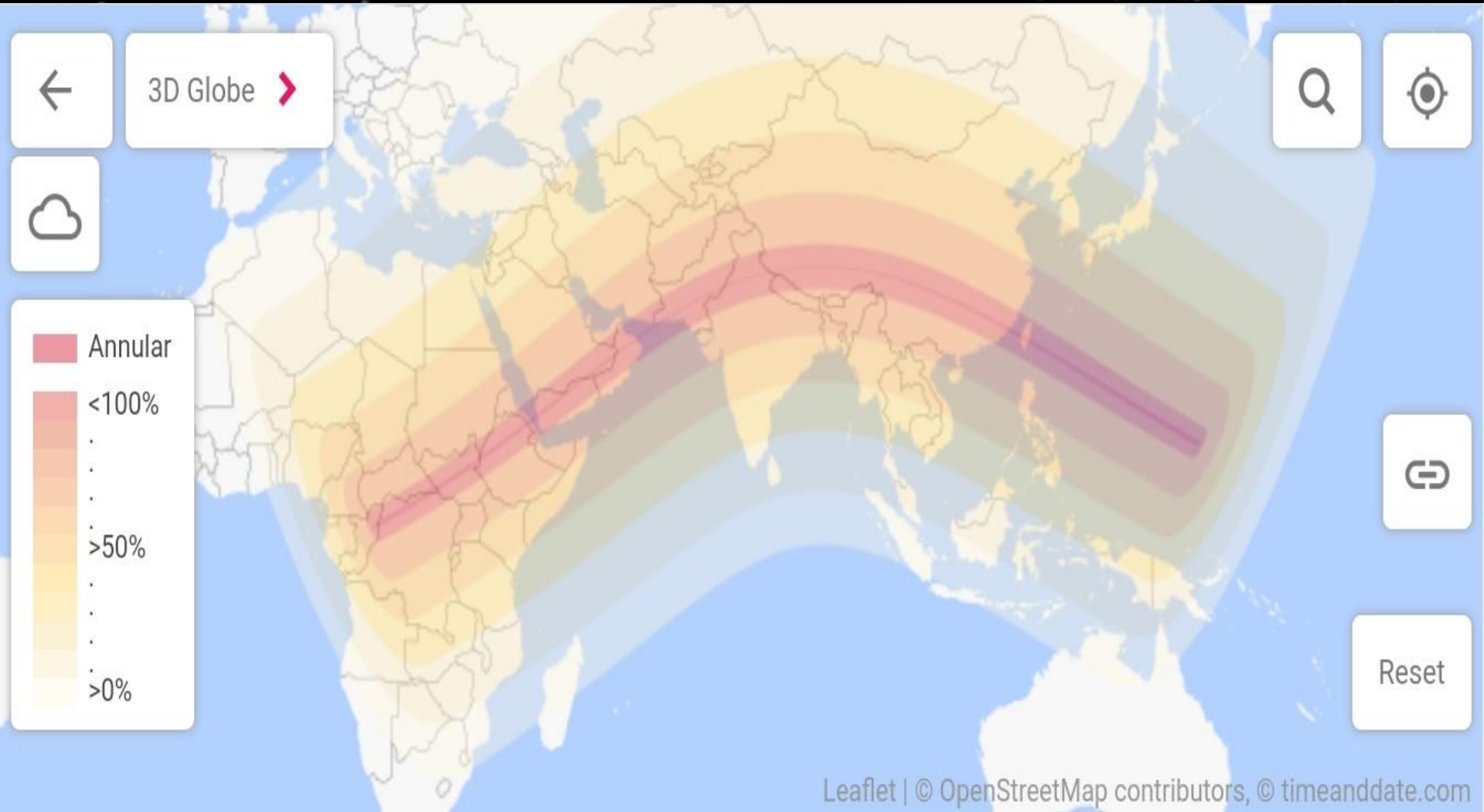
Annular Solar Eclipse

(21 June 2020)

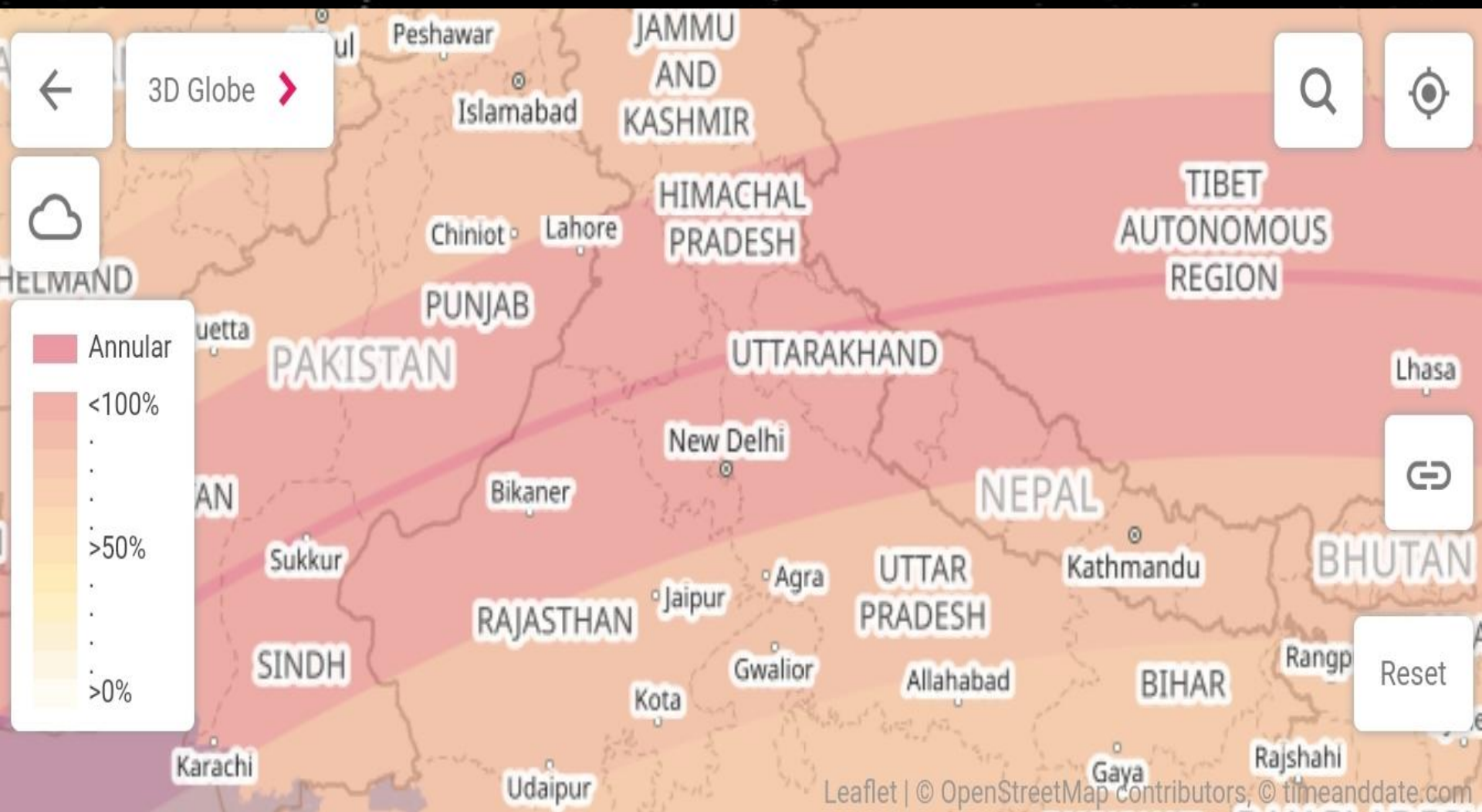
On June 21, 2020, an annular, or "ring of fire," solar eclipse will be visible from parts of Africa including the Central African Republic, Congo, and Ethiopia; south of Pakistan and northern India and China.



Across the Globe



From India



Visibility from India (Major Metro Cities)

New Delhi, India

Partial solar eclipse visible
(93.77% coverage of Sun)

Magnitude: 0.9525

Duration:3 hours, 28 minutes, 34 seconds

Partial begins:21 Jun, 10:20:02

Maximum:21 Jun, 12:01:40

Partial ends:21 Jun, 13:48:36

Kolkata, India

Partial solar eclipse visible
(65.52% coverage of Sun)

Magnitude: 0.7266

Duration:3 hours, 30 minutes, 57 seconds

Partial begins:21 Jun, 10:46:20

Maximum:21 Jun, 12:35:39

Partial ends:21 Jun, 14:17:17

Mumbai, India

Partial solar eclipse visible
(62.10% coverage of Sun)

Magnitude: 0.6986

Duration:3 hours, 27 minutes, 1 second

Partial begins:21 Jun, 10:00:49

Maximum:21 Jun, 11:37:41

Partial ends:21 Jun, 13:27:

Bangalore, India

Partial solar eclipse visible
(36.17% coverage of Sun)

Magnitude: 0.4737

Duration:3 hours, 18 minutes, 42 seconds

Partial begins:21 Jun, 10:12:59

Maximum:21 Jun, 11:47:36

Partial ends:21 Jun, 13:31:41

Chennai, India

Partial solar eclipse visible (34.23% coverage of Sun)

Magnitude: 0.4557

Duration:3 hours, 19 minutes, 24 seconds

Partial begins:21 Jun, 10:22:08

Maximum:21 Jun, 11:59:04

Partial ends:21 Jun, 13:41:32



Partial Solar Eclipse will be visible from the above major metro cities

Region of Annularity (Hot Spots)

Dehradun, Uttarakhand, India

Annular solar eclipse visible
(98.96% coverage of Sun)
Magnitude: 0.9948
Duration: 3 hours, 26 minutes, 28 seconds
Duration of annularity: 9 seconds
Partial begins: Jun 21 at 10:24:07
Full begins: Jun 21 at 12:05:18
Maximum: Jun 21 at 12:05:21
Full ends: Jun 21 at 12:05:27
Partial ends: Jun 21 at 13:50:35

Kurukshetra, Haryana, India

Annular solar eclipse visible
(98.95% coverage of Sun)
Magnitude: 0.9962
Duration: 3 hours, 26 minutes, 21 seconds
Duration of annularity: 27 seconds
Partial begins: 21 Jun, 10:21:06
Full begins: 21 Jun, 12:01:28
Maximum: 21 Jun, 12:01:40
Full ends: 21 Jun, 12:01:55
Partial ends: 21 Jun, 13:47:27

Sirsa, Haryana, India

Annular solar eclipse visible
(98.92% coverage of Sun)
Magnitude: 0.9956
Duration: 3 hours, 25 minutes, 40 seconds
Duration of annularity: 24 seconds
Partial begins: 21 Jun, 10:16:52
Full begins: 21 Jun, 11:56:02
Maximum: 21 Jun, 11:56:14
Full ends: 21 Jun, 11:56:26
Partial ends: 21 Jun, 13:42:32

Suratgarh, Rajasthan, India

Annular solar eclipse visible
(98.90% coverage of Sun)
Magnitude: 0.9966
Duration: 3 hours, 24 minutes, 55 seconds
Duration of annularity: 30 seconds
Partial begins: 21 Jun, 10:14:25
Full begins: 21 Jun, 11:52:39
Maximum: 21 Jun, 11:52:54
Full ends: 21 Jun, 11:53:09
Partial ends: 21 Jun, 13:39:20

Yamunanagar, Haryana, India

Annular solar eclipse visible
(98.95% coverage of Sun)
Magnitude: 0.9963
Duration: 3 hours, 26 minutes, 23 seconds
Duration of annularity: 27 seconds
Partial begins: 21 Jun, 10:22:16
Full begins: 21 Jun, 12:02:51
Maximum: 21 Jun, 12:03:03
Full ends: 21 Jun, 12:03:18
Partial ends: 21 Jun, 13:48:39



Activities that can be carried out during the eclipse

- Finding the time of maximum Annularity.
- Duration of eclipse.
- Finding percentage of Annular Solar Eclipse.
- Finding angular size of Sun and Moon.
- Calculating the Earth circumference
- Observing the Nature sea waves, plants, animals, birds during the Solar Eclipse .



Thanks

