JIGYASA Programme 2020-21 (CSIR-NISCAIR)

RING OF FIRE

Annular Solar Eclipse on July 21st ,2020

Report of the webinar presented by

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Executive Summary

India will be experiencing annular solar eclipse on 21st June 2020. Annularity will be visible in

the states of Rajasthan, Punjab, Haryana, Himachal Pradesh, Uttarakhand with maximum

obscuration1 of around 99% and other parts of country will experience partial solar eclipse.

The annular solar eclipse will begin at 09:56 AM IST at Dwarka, Gujarat and will end at 14:29

PM IST at Dibrugarh, Assam. The path of annularity is as shown in the Figure.

Figure : Path of annular solar eclipse on 21st June 2020

During solar eclipse the Sun is partially/fully covered by the Moon, as a result there will be

reduction in solar irradiance and hence corresponding reduction in power generation

Solar eclipse 21st June 2020 at a glance:

Parameters	Values
Type of eclipse/date	Annular /21st June 2020
Solar eclipse start time (For India)	09:56 AM (Dwarka)
Maximum eclipse time	11:50 AM
Solar eclipse end time (For India)	14:29 PM (Dibrugarh, Assam)
Visibility of annularity	Northern part of India
Maximum % of Obscuration	98.66% (Chamoli, Uttarakhand)
All India estimated solar generation reduction at the time of maximum solar eclipse w.r.t. normal day (assuming clear sky conditions)	11943 MW at 11:50 AM
Northern Region estimated solar generation reduction at the time of maximum solar eclipse w.r.t. normal day (assuming clear sky conditions)	4514 MW at 11:47 AM
Western Region estimated solar generation reduction at the time of maximum solar eclipse w.r.t. normal day (assuming clear sky conditions)	2720 MW at 11:50 AM
Southern Region estimated solar generation reduction at the time of maximum solar eclipse w.r.t. normal day (assuming clear sky conditions)	4721 MW at 11:50 AM
All India average solar generation ramp down rate	102 MW/Minute
All India average solar generation ramp up rate	104 MW/Minute

* Solar eclipse impact assessment is done by assuming clear sky conditions which is the worst possible scenario. June being a monsoon season in India, solar generation is likely to be impacted by cloud cover on solar eclipse day.

Annular eclipse- 21.06.2020

On 21st June 2020, our country will be experiencing annular eclipse, annularity will be visible

in Northern states like Rajasthan, New Delhi, Punjab, Western Uttar Pradesh and Uttarakhand.

Rest of the country will be experiencing partial eclipse of Sun. The annular eclipse will begin at

09:56 AM IST at Dwarka, Gujarat and will end at 14:29 PM IST at Dibrugarh, Assam. This large

annular eclipse will cover over 99% of the sun, lasts for 38 seconds at the point of maximum

eclipse, creating a narrow path of 21 km wide.

The solar eclipse start time, end time and the maximum obscuration for various locations are

obtained from Positional Astronomy Centre, Indian Metrological Department3. From this data

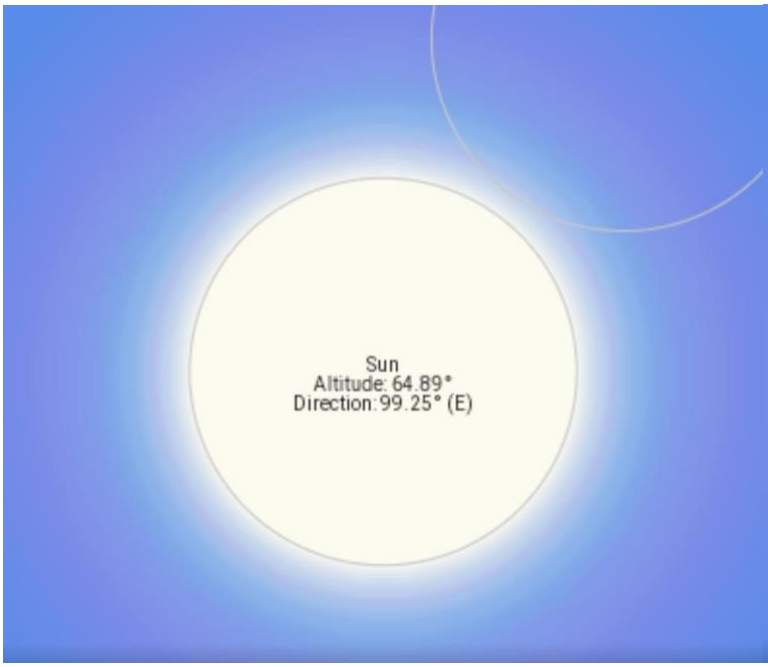
source, 85 locations data for partial eclipse and six locations data for annular eclipse has been

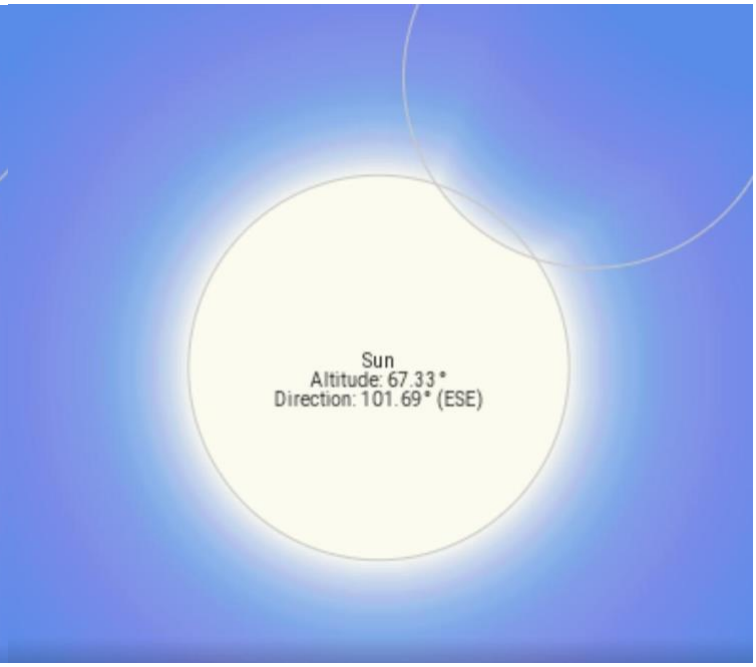
S. No.	City	Obscuration (%)	Eclipse Start Time	Maximum Eclipse Time	Eclipse End Time
1	New Delhi	93.8	10:20	12:01	13:48
2	Ahmedabad	77.2	10:03	11:42	13:32
3	Mumbai	62.1	10:00	11:37	13:27
4	Kolkata	65.5	10:46	12:35	14:17
5	Hyderabad	50.3	10:14	11:55	13:44
6	Bengaluru	36.5	10:13	11:47	13:31
7	Chennai	34.2	10:22	11:59	13:41
8	Trivandrum	23.2	10:14	11:40	13:15

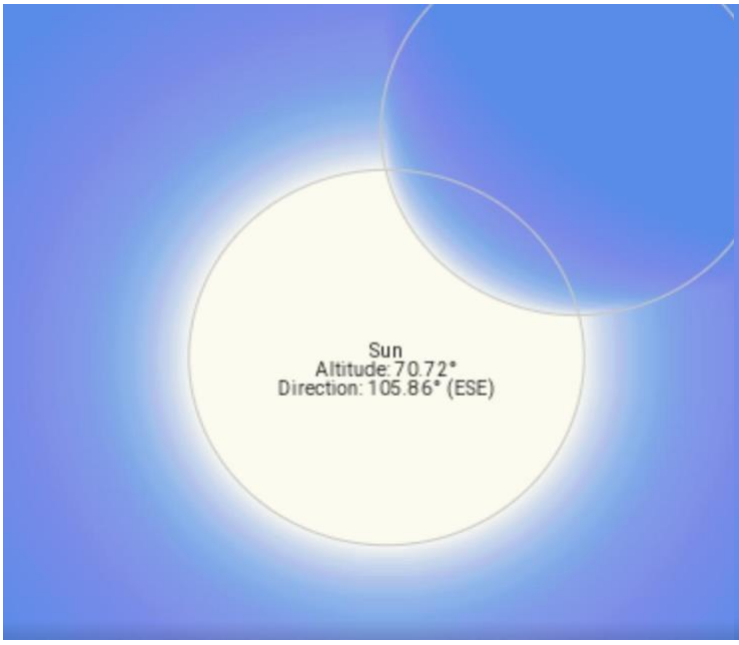
Table 1 : Details of obscuration(%) in major cities of India

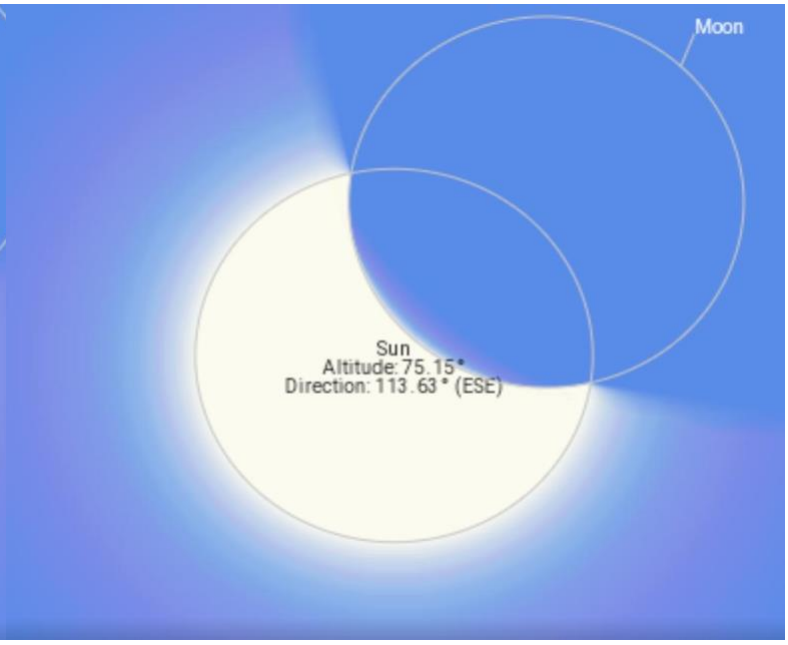
captured throughout the country.

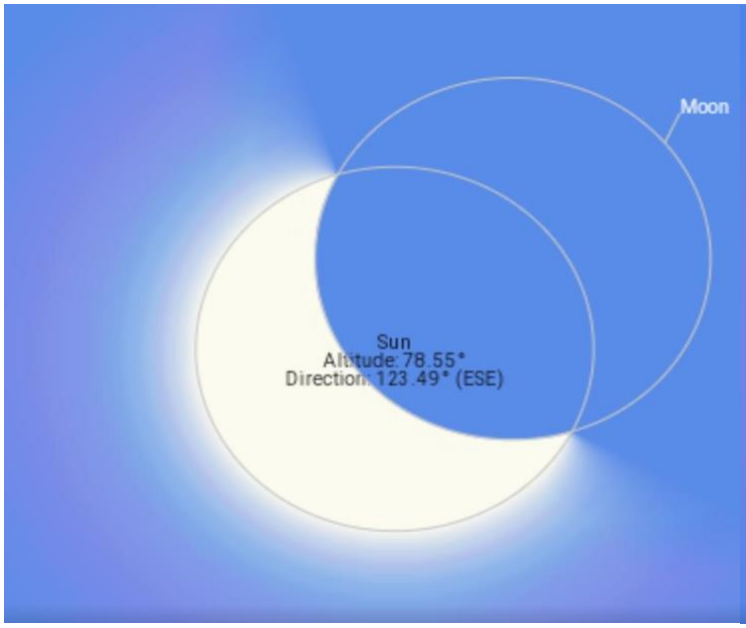
A Series of events during solar eclipse is presented below compiling few pictures.

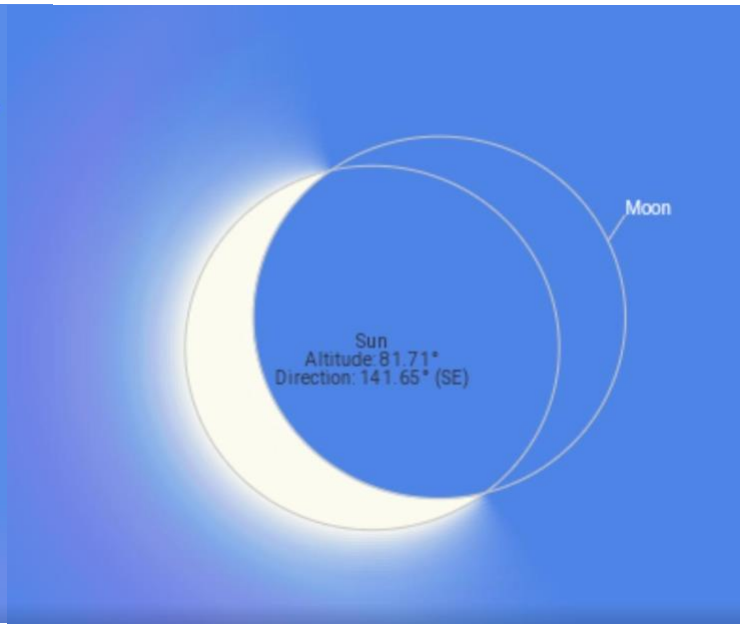


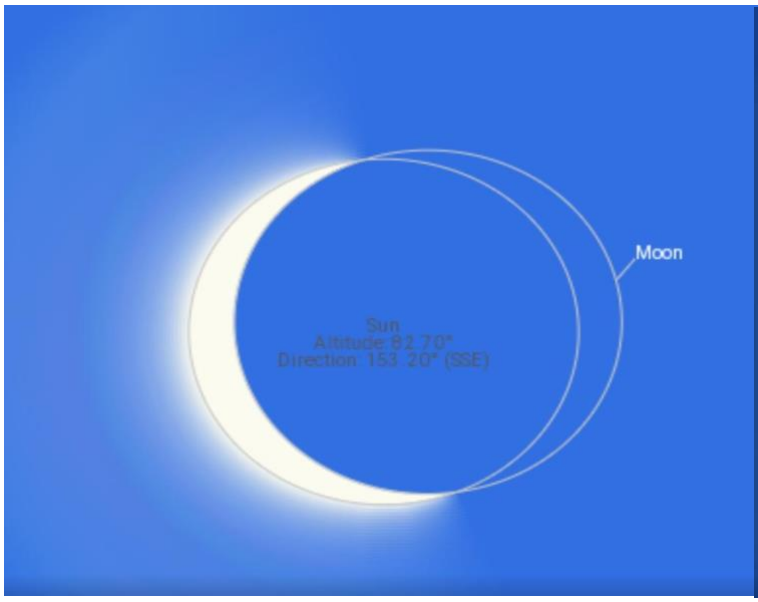


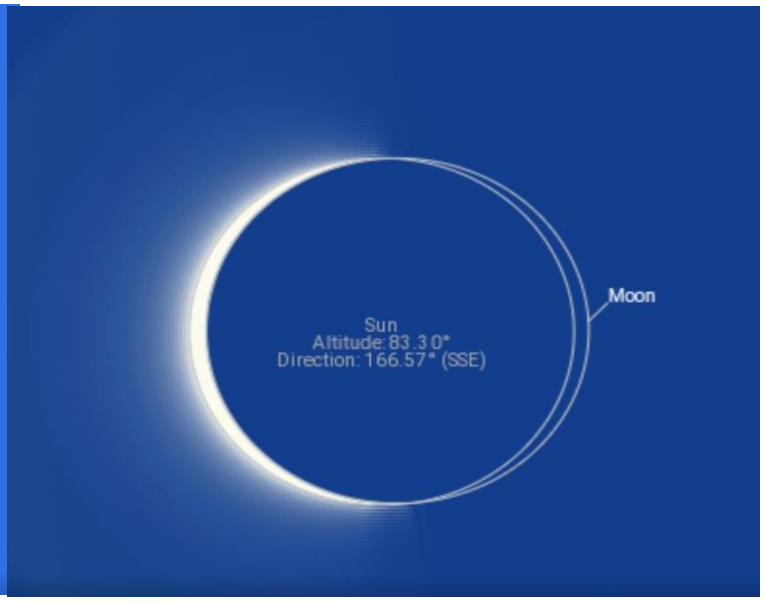


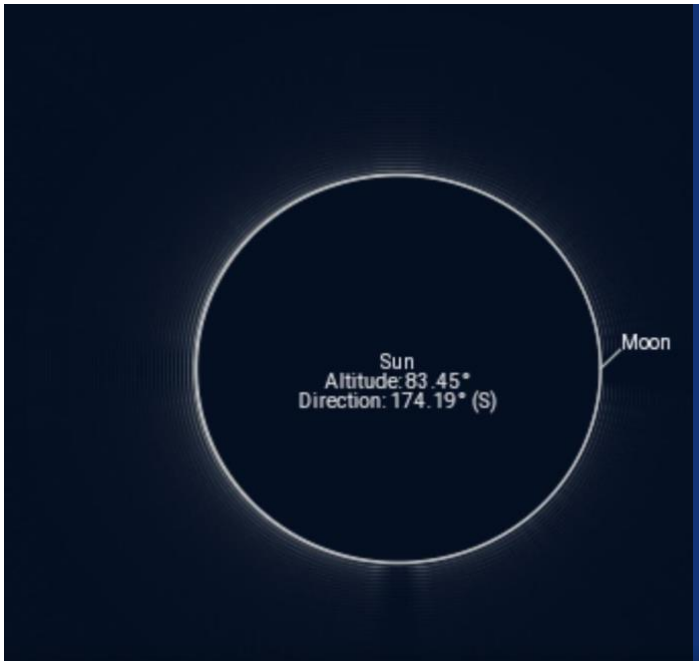


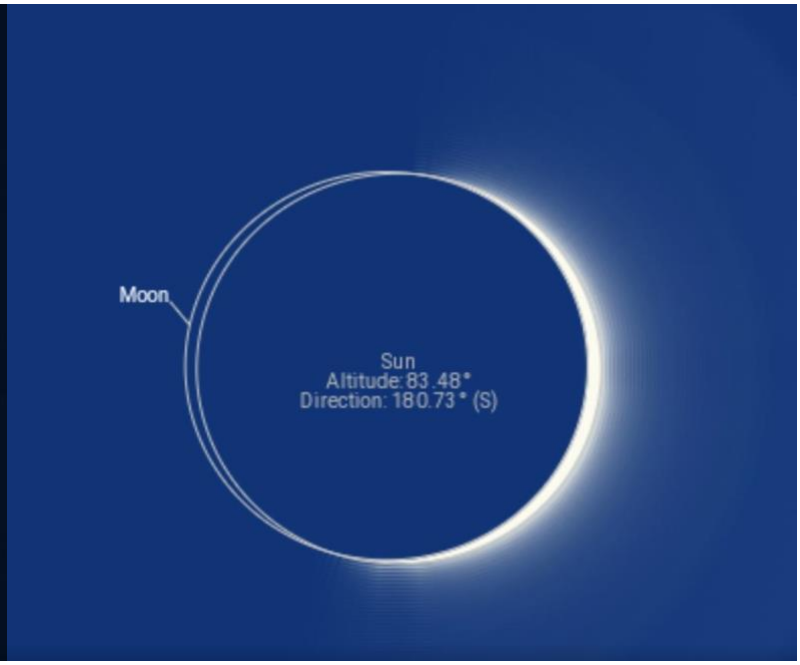

Moon
Sun
Altitude: 78.55°
Direction: 123.49° (ESE)

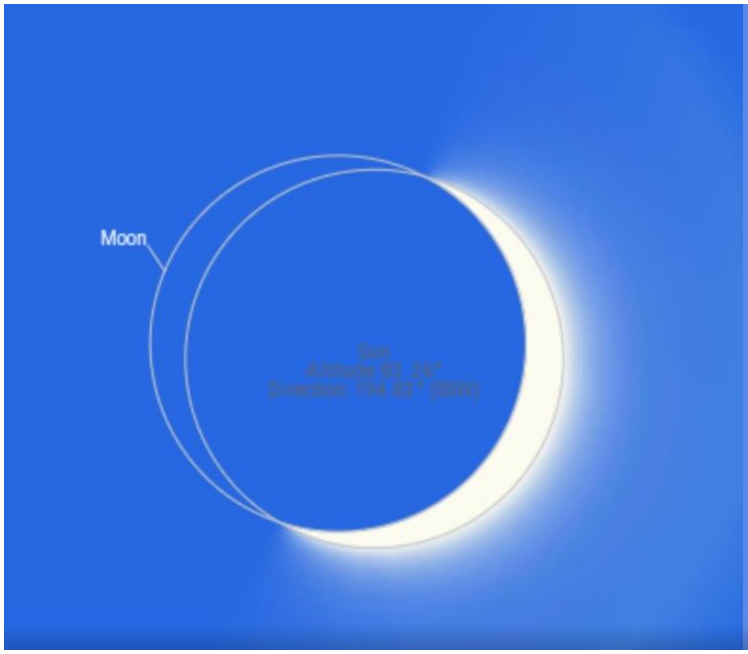

Moon
Sun
Altitude: 81.71°
Direction: 141.65° (SE)

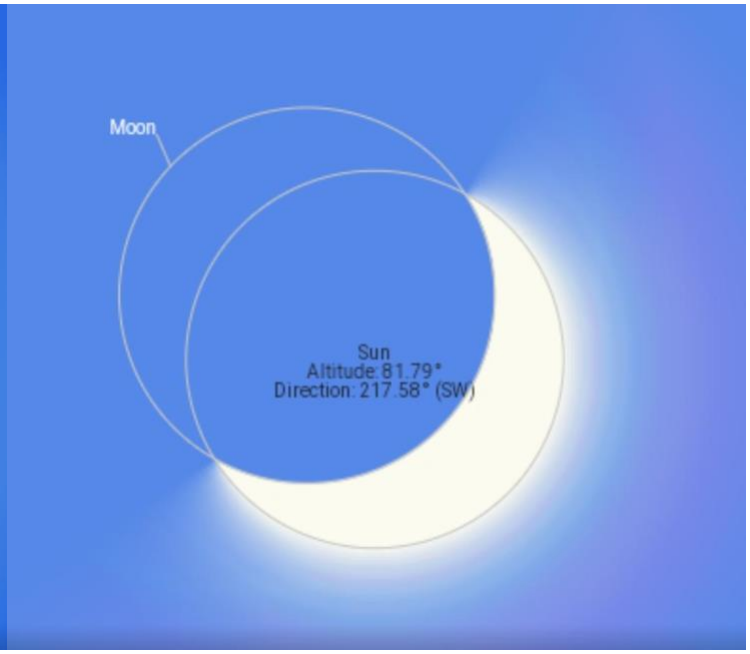

Moon
Sun
Altitude: 82.70°
Direction: 153.20° (SSE)

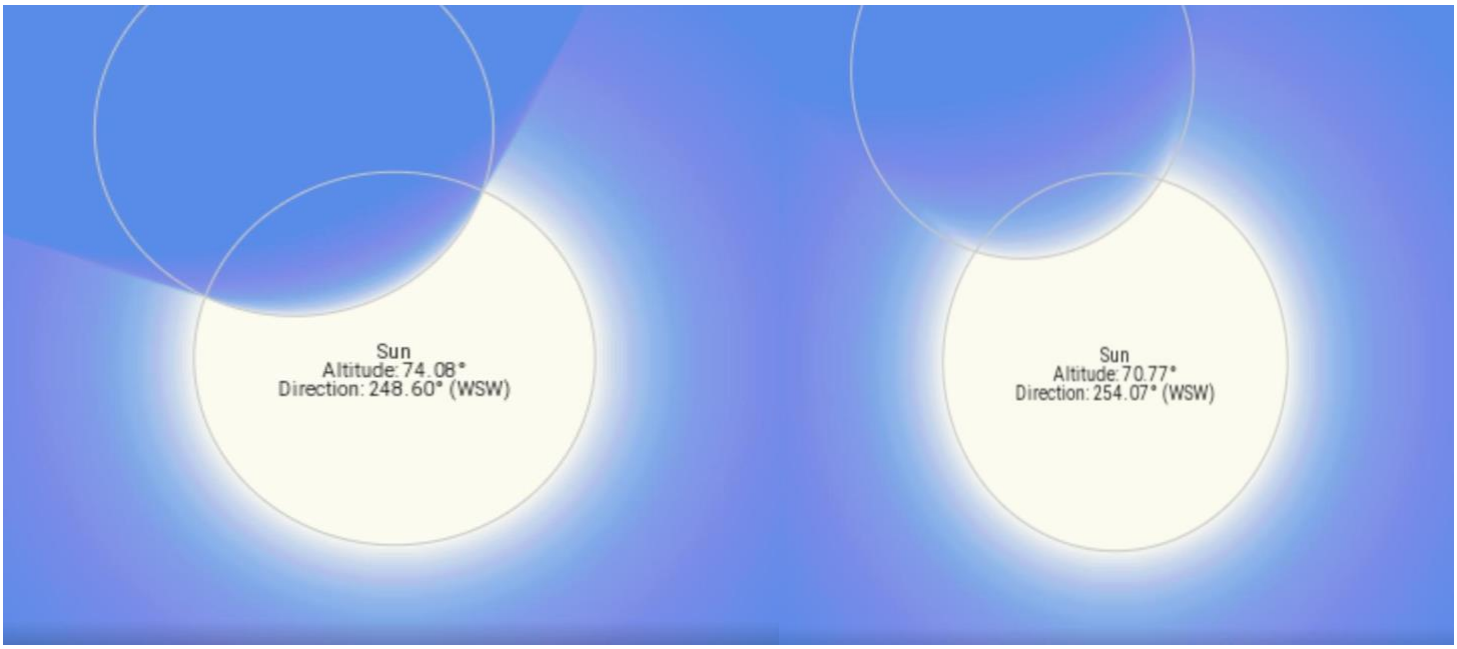

Moon
Sun
Altitude: 83.30°
Direction: 166.57° (SSE)

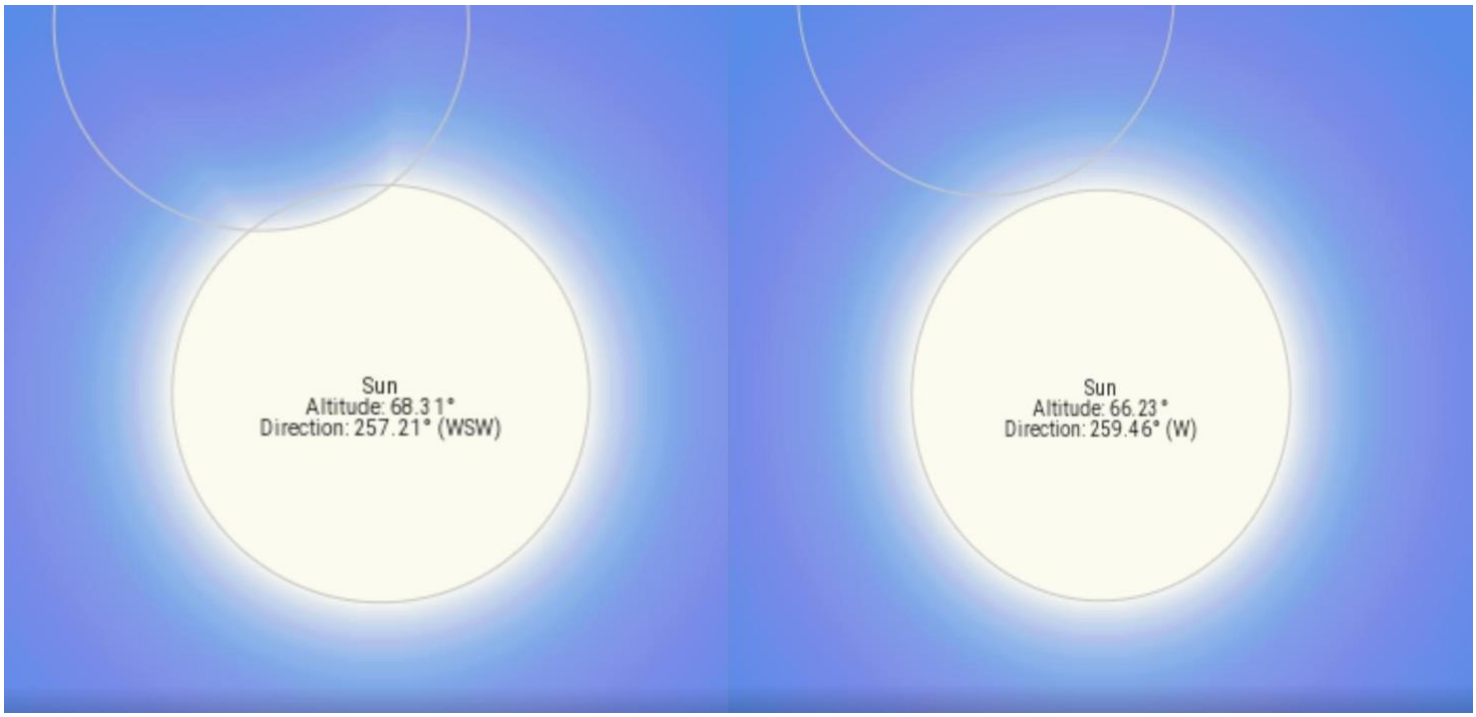

Sun
Altitude: 83.45°
Direction: 174.19° (S)
Moon


Moon
Sun
Altitude: 83.48°
Direction: 180.73° (S)


Moon


Moon
Sun
Altitude: 81.79°
Direction: 217.58° (SW)


Sun
Altitude: 74.08°
Direction: 248.60° (WSW)
Sun
Altitude: 70.77°
Direction: 254.07° (WSW)


Sun
Altitude: 68.31°
Direction: 257.21° (WSW)
Sun
Altitude: 66.23°
Direction: 259.46° (W)