

Australian Astronomy

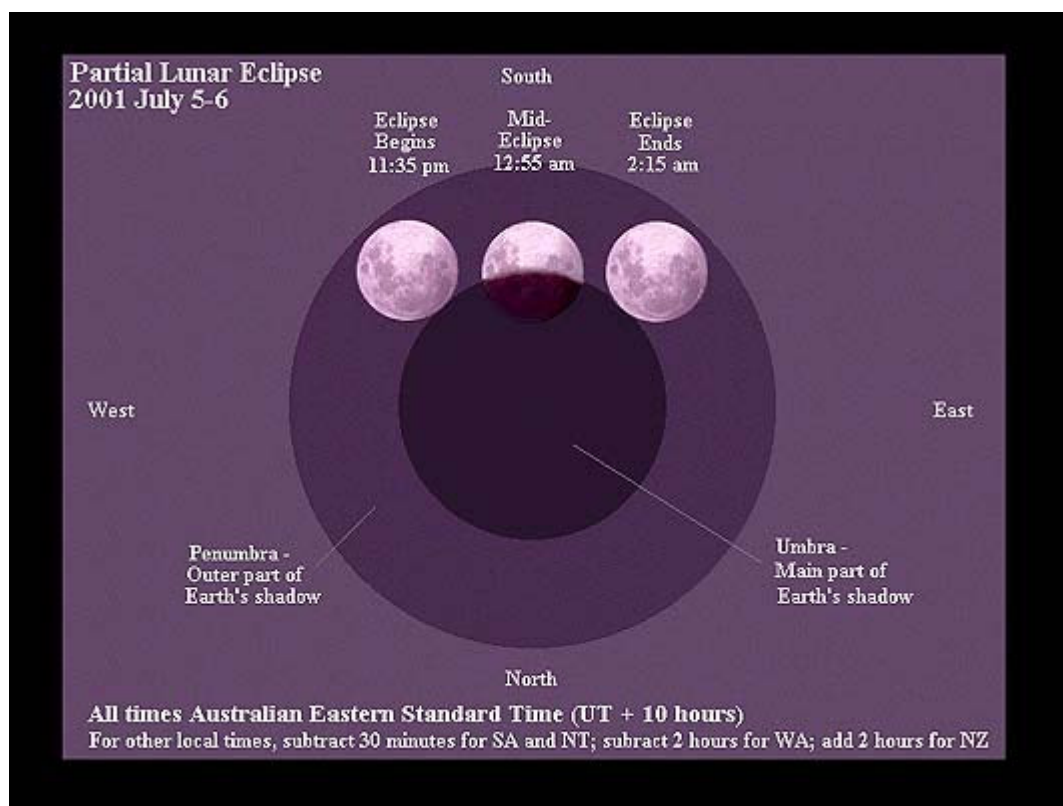
ASA Factsheet No. 9

Partial Lunar Eclipse, July 5-6, 2001

A partial eclipse of the Moon was visible from all of Australia on the night of 2001 July 5-6, beginning late in the evening of Thursday, July 5. The eclipse began at 11:35 pm Eastern Australian Standard time, reached a peak at 12:55 am, and ended at 2:15 am. Because of the differences between time zones, the eclipse took place from 11:05 pm to 1:45 am in South Australia and The Northern Territory, and from 9:35 pm to 12:15 am in Western Australia.

A lunar eclipse occurs when the Moon, in its orbit around the Earth, passes into the Earth's shadow in space. This does not happen every month, because the Moon's orbit is tilted by just over 5 degrees with respect to the Earth's orbit around the Sun. Most of the time, therefore, the Moon passes 'above' or 'below' the shadow, resulting in no eclipse. During some lunar eclipses, the entire disc of the Moon passes into the Earth's shadow, resulting in a total lunar eclipse. However, during the July 5-6 event, only 50% of the Moon's diameter was immersed in the shadow, resulting in a partial eclipse.

Times and dates mentioned in this guide refer only to passages through the Earth's dark, circular shadow called the umbra. Surrounding the umbra, there is a lighter region of shadow called the penumbra, through which the Moon also passes (sometimes, the Moon passes through only this region, missing the umbra altogether). However, except when the Moon's edge is very close to the umbra, it is very difficult to detect any penumbral effects, as this region includes some direct sunlight.



This diagram shows the passage of the Moon through the Earth's shadow during the partial eclipse of July 5-6. The eclipse reached a maximum at 12:55 am EST on July 6. The passage through the penumbra was barely noticeable. The diagram shows north to the bottom, corresponding to orientation of the Moon as it was observed from southern Australia. From latitudes north of 23 degrees south, the diagram should be viewed upside down. Note that east and west are in their correct positions - we are looking up to the sky!

As the event progressed, the diagram should have been gradually rotated anticlockwise (clockwise, from the far north of Australia) to match the appearance of the Moon.

Watching the Eclipse

Eclipses of the Moon, which are seen at night, are quite safe to watch. Indeed, binoculars can be used to give a better view than is seen with the unaided eye. Solar eclipses, seen during the day, are different: it is dangerous to look directly at the disc of the Sun at any time, including during eclipses in which part of the Sun's disc is hidden by the Moon.

On the night of July 5-6, as the centre of the Moon passed to the south of the Earth's shadow, it is the northern part of the Moon that appeared dark - the lower half, as seen from our part of the world. Although, during total lunar eclipses, the shaded portion of the Moon typically appears red (because more red light than blue passes through the Earth's atmosphere onto the Moon), this effect was not obvious during July's eclipse, and the eclipsed portion of the Moon simply appeared fairly dark.

The passage of the Moon through the Earth's shadow is shown in the diagram. In relation to the Earth's shadow, the Moon moved from west to east. However, during the eclipse, the Moon appeared to move across the sky from east to west, simply because of the Earth's rotation.

During the eclipse, the Moon was quite high in the northern sky from most of Australia. However, from a latitude of 23 degrees south (Rockhampton, for example), it passed exactly overhead during the event. People watching from still farther north (from Darwin, for example) needed to face south to see the Moon when at its highest.

While watching a lunar eclipse, it is interesting to reflect on the fact that, over two thousand years ago, the Greek astronomer Aristotle (384-322 BC) used them to support the argument that the Earth is round: the circular nature of the shadow of the Earth on the Moon is quite obvious! Also, lunar eclipses, like solar eclipses, have been associated with historical events. One of the more famous partial lunar eclipses was that of 1453 May 22, which so terrified the soldiers defending Constantinople that their loss of morale is said to have contributed to the city's defeat by the Turkish army!

Photographing the Eclipse

It is possible to photograph the eclipse, but it is important to have a camera whose exposures can be set manually. Unfortunately, a camera giving automatic exposures will usually produce a very overexposed image of the Moon! It is also important to realise that the disc of the Moon appears very small as seen from Earth. If you use a 'normal' lens - which, on a modern camera, has a focal length of typically 35 to 50 millimetres - a disappointingly small image will appear on your film. You should, therefore, use a lens of much longer focal length than this - 200 millimetres or longer is recommended. As a guide to exposures, if you are using 100 ISO (100 ASA) film the typical exposure for the full Moon or partially eclipsed Moon is 1/125 second at f/8. If you are using a different speed film, you can adjust your exposure accordingly. For example, if you have 200 ISO film, you can halve the above exposure. It is a good idea to use a tripod, and to 'bracket' your exposures - try a range, centred on the recommended value. Also, if the Moon is seen through misty cloud, make sure that your exposure range extends up to several stops more than this figure (one 'stop' extra is equivalent to doubling the exposure). It is interesting to take a sequence of pictures of the eclipse - later on, you will have a fine record of the Moon passing through the shadow!



This partial eclipse of the Moon occurred on 1990 August 6, and was visible from all of Australia. The sequence of photographs shows the progression of the Moon's disc through the northern part of the Earth's shadow. During this event, 68% of the Moon's diameter was immersed in the shadow at mid-eclipse. The photographs were taken by Karenne Barnes of the Astronomical Society of Tasmania Incorporated.

Recent and Forthcoming Lunar Eclipses

Two recent lunar eclipses visible from Australia were the partial eclipse of 1999 July 28, and the spectacular total eclipse of 2000 July 16-17.

The next lunar eclipse (after the 2001 event) visible from Australia will be seen early in the morning of 2004 May 5. It will be total, with at least part of totality visible from all of Australia. However, from the eastern parts of the country, the Moon will set during totality, and morning twilight will interfere; the best view will be obtained in the west. Partial lunar eclipses will be visible from all of Australia on the evening of 2005 October 17 and on the morning of 2006 September 8. The partial phase only of a total lunar eclipse will be seen from the western parts of the country on the morning of 2007 March 4, and a total eclipse will be seen from the entire country on the evening of 2007 August 28 (although the view from the far west will be affected by twilight).

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