

Photographing the Moon's parallax

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The total eclipse of the Moon on June 15, 2011 was a great opportunity to document the lunar parallax. We all know that the position of the Moon relative to the stars depends on the observer's location on the Earth's surface. When the Moon is observed at the same time at two different sites, the difference between the two positions of the Moon relative to the background stars is the parallax.

In order to show the lunar parallax, images with both the Moon and the background stars are needed. During most of the time, this is extremely difficult to achieve, because the Moon is so bright. During a total lunar eclipse, however, the Moon is faint enough to allow taking pictures where both the Moon and the surrounding stars are visible. It is essential that the images obtained at the different observing sites are taken at the same time. When pictures from two locations are combined by matching the star patterns, the resulting image shows the background star field and two images of the Moon at different positions relative to the stars.

As far as equipment is concerned: a camera on a tripod is sufficient to obtain pictures that are suitable for showing the parallax. No large or fancy telescopes are needed. Anyone who is interested can easily get involved and take images.

The last total lunar eclipse took place on June 15, 2011, and was visible from Africa and Europe. We decided that this was an excellent opportunity set up an international collaboration to try to record the lunar parallax between South Africa and Germany. Members of the Pretoria Centre of the Astronomical Society of Southern Africa and of the Sternwarte Riesa in Germany were contacted for a project to photograph the totally eclipsed Moon and the background stars.

On June 15, totality started at 21.22 SAST and ended at 23.03 SAST. The eclipse was nicely visible from South Africa, but the situation was not so easy for the observers in Germany. For Pretoria, the Moon was high in the sky during the whole event, but for Riesa, the Moon only rose at the beginning of totality, and the eclipsed Moon was always close to the horizon. Therefore, it was decided to photograph the Moon during the last part of totality, when the Moon was highest for the observers in Riesa. The times for photographing the Moon were set at 22.30 SAST, 22.40 SAST, 22.50 SAST and 23.00 SAST.

During the eclipse, the skies were clear in Pretoria, and the totally eclipsed Moon could be seen very nicely in front of the central regions of the Milky Way. Unfortunately, the weather was cloudy in Riesa, but a few gaps in the clouds allowed some observations at the end of totality. Both in Riesa and in Pretoria, teams of enthusiastic observers took pictures of the Moon, and we were able to obtain images at both sites for 23.00 SAST. Table 1 lists the observers who contributed pictures for this project.

Table 1. Observers contributing images of the Moon

Observing site	Observer
Riesa, Germany	Christian Bartzsch
	Lisa Glagowski
	Michael Nitzsche
	Stefan Schwager
Pretoria, South Africa	Barbara Cunow
	Percy Jacobs
	Pat Kühn
	Neville Young

Figures 1-5 show the lunar parallax between Riesa and Pretoria at 23.00 SAST. Each picture is a combination of an image taken in Pretoria and one obtained in Riesa. It shows the eclipsed Moon with the starry background. North is up and east is to the left in all images. The northern Moon is the one seen from South Africa, the southern Moon is the one observed from Germany. The parallax of the Moon is clearly visible - the two Moons are 1.7 Moon diameters apart.



Figure 1. Parallax of the Moon between Pretoria and Riesa at 23.00 SAST. The image is a combination of two images, one taken by S. Schwager and the other one by B. Cunow.



Figure 2. Parallax of the Moon between Pretoria and Riesa at 23.00 SAST. The image is a combination of two images, one taken by M. Nitzsche and the other one by P. Kühn.



Figure 3. Parallax of the Moon between Pretoria and Riesa at 23.00 SAST. The image is a combination of two images, one taken by C. Bartzsch and the other one by P. Jacobs.



Figure 4. Parallax of the Moon between Pretoria and Riesa at 23.00 SAST. The image is a combination of two images, one taken by C. Bartzsch and the other one by N. Young.



Figure 5. Parallax of the Moon between Pretoria and Riesa at 23.00 SAST. The image is a combination of two images, one taken by L. Glagowski and the other one by B. Cunow.

Our results demonstrate how large the lunar parallax is between South Africa and Germany and how easy it is to record it during a total lunar eclipse. A project like this is an excellent

opportunity for an international collaboration between amateur astronomers and to show the general public how the skies at different observing sites differ apart from the effects due to different latitudes.

This project was not our first attempt to record the parallax of the Moon. During the total lunar eclipse at October 27/28, 2004, we were able to photograph the parallax between South Africa and Canada. Our pictures show a parallax of 3.3 Moon diameters between Pretoria/Johannesburg and Edmonton/Calgary, which is one of the largest parallaxes (perhaps even the largest parallax) ever recorded from the Earth's surface. Figure 6 shows the large parallax we could record between Pretoria and Calgary. The results were published in Cunow B., Monthly Notes of the Astronomical Society of Southern Africa, 2005, vol. 64, nos. 1&2, p. 9.

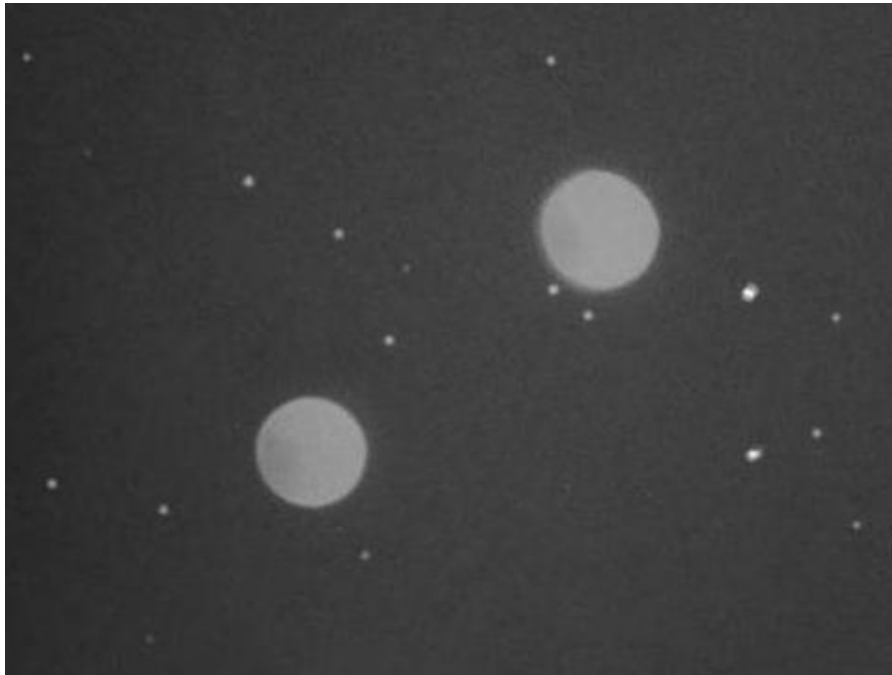


Figure 6. Parallax of the Moon on October 28, 2004 between Pretoria and Calgary. The image is a combination of two images obtained at 4.25 SAST, the one in Calgary taken by L. McNish, the one in Pretoria by B. Cunow. North is up and East is to the left.

I would like to thank everyone who participated in this project. Furthermore I would like to thank the members of the Sternwarte Riesa for making me an honorary member of the Sternwarte Riesa in 2009. More information about the participants and the project can be found at the websites of the Pretoria Centre of the Astronomical Society of Southern Africa at www.pretoria-astronomy.co.za and of the Sternenfrende Riesa at www.sternenfrende-riesa.de and the Sternwarte Riesa at www.sternwarte-riesa.de. Finally it should be noted that in June South Africa and Germany use the same local time: South African Standard Time SAST and Mitteleuropäische Sommerzeit MESZ are identical.