

Astrophotography Under Namibia's Dark Sky

Austrian amateur astronomers Gerald Rhemann and Wolfgang Promper recently travelled to the southern hemisphere on an astrophotography expedition to test some new ASA short focal ratio Newtonian telescopes.

The one prerequisite for successful colour photographs on chemical film was an absolutely dark sky. In order to achieve the best possible result on the exposed film, one's own dark room was needed, as commercial development laboratories could not be relied upon to produce perfect results. Even there the possibilities to ameliorate the image quality were available to just a few specialists only and as a result of this requirement profile few amateurs were able to produce consistently excellent photographs.

Recent fast development in astrophotography

During the last five years the



Astrofarm Tivoli is a green oasis in the midst of undulating yellow grass.

methods of working as an astrophotographer as well as the requirements of his equipment have completely changed, due to the breakneck speed of developments in the field of CCD-photography and DSLR-photography.

In the early days of CCD imaging, the sensors (known as chips) were quite small, and certainly a lot smaller than the standard 35mm film used by most amateurs. Today, the technology has progressed so far that CCD chips are available in sizes of 24 x 36mm as standard with sizes of 38 x 38mm available.

Moreover, changes with comparison to film were not only in size; resolution, quantum efficiency and range of contrast of a good CCD-camera have also shifted the limits in relation to film. Today it is not the film that sets the limits for high resolution astrophotography, but the optical system employed.

A new approach

The AstroSysteme, Austria team took note of this change and began development, together with German optical designer Philipp Keller, of high-quality astrographs that could guarantee a faultless image over a large image circle. After years of testing, these optical systems are now in serial production.

The systems are Newtonian based with very fast focal ratios ranging from $f/2.2$ to $f/3.8$, and by using high quality optical components combined with modern design techniques, the mirrors and correctors are designed to produce an unvignetted, flat field across an imaging circle up to 60mm in diameter.

Packaged into carbon fibre tubes, the telescopes are relatively lightweight and are more suitable for transport, especially by air, to darker, transparent skies.

Tests in Namibia



Michael Jager helps check in the considerable amount of luggage for the flight from Austria to Namibia.



Wolfgang Promper getting set up at sunset with a twelve inch $f/3.8$ astrograph.

Two models were selected from the first production run of the ASA astrographs, an eight inch $f/3.8$ and a twelve inch $f/3.8$ version. Both of these models had optics supplied by the renowned Russian optical company, LOMO.

Since our residence near Vienna, the capital of Austria, suffers gravely from light pollution, we were determined to test these optical systems under a truly dark sky and finally decided on a trip to Namibia. Namibia, the former South-West Africa, is situated on the southwestern coast of Africa. The country measures 824 292 km² and is rather sparsely populated with



The author, Gerald Rhemann with eight inch $f/3.8$ astrograph.

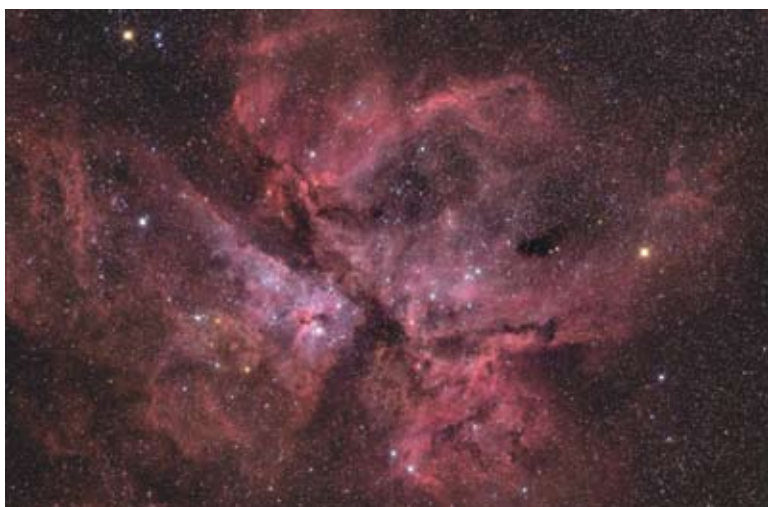
The crescent Moon and Venus in the pre dawn sky signal an end to another night of imaging.



No visit south of the equator would be complete without an image of the eta Carina Nebula.

*8" f/3.8
HaRGB of
45/20/20/30
minute
exposures.*

Gerald Rhemann



*The Pencil Nebula,
NGC2736.*

*8" f/3.8
HaLRGB of
24/40/20/20/30
minute
exposures.*

Gerald Rhemann



about 1.7 million inhabitants. The Astrofarm Tivoli (southern sky guest farm), located 180 km south-east of the capital Windhoek, is a green oasis in the midst of undulating yellow grass in the red sand of the Kalahari desert on the Tropic of Capricorn and is situated at 1362 m above sea level.

Guests are collected from the airport in Windhoek by Astrofarm Tivoli staff with appropriately large vehicles so that the guests and their astronomical equipment have sufficient space.

The journey from Windhoek is over a bumpy track to the farm, where one is greeted by an environment very much enhancing the holiday mood. The farm is run by the Schreiber family, which have owned the farm since 1963, and instrumental in the initial setup of the farm was the breeding karakul sheep, known as the black diamonds of Namibia.

A possibility for dark sky observations was been created in 1986, at first on a small scale, in the form of two concrete pillars, cast into the ground to support telescope equipment. Little by little the demand increased and hence stargazers now are met with a well-expanded infrastructure.

The Astrofarm Tivoli provides excellent food (with supplies for night time consumption) and has wonderful rooms, all with showers and W.C. Daytime activities can include game observation, sight seeing aeroplane flights as well as a full safari.

The top attraction for astronomers, though, is the dark, deep-blue sky that we enjoyed on all the fourteen nights of our visit. In addition, there is the southern starry sky in all its splendour. When the Milky Way centre stands at the zenith, it gives such a bright light that this can be seen even in the countryside.

In May, the Sun sets at 6 p.m. local time and a half hour later one is able

The ghostly glow of VdB105 in Scorpius.

*12" f/3.8
HaRGB of
100/20/20/30
minute
exposures.*

Wolfgang Promper



to start astrophotography. Darkenss lasts until 5 a.m., barely an hour before the sun rises again.

Early evenings we could manage images of objects in the southern winter Milky Way as well as the many interesting objects around the Southern Cross and in the constellation of Carina, whilst the later part of the evening, into

morning, the constellation of Scorpius culminates at the zenith and objects of the summer sky are available.

We intended to photograph many of these objects, and as an extra bonus the bright double comet 73P Schwassmann-Wachmann presented a unique spectacle.

The intricate nature and delicate colours of the Vela supernova remnant.

*8" f/3.8
HaO3LRGB of
20/20/50/20/
20/30
minute
exposures.*

Gerald Rhemann



All of our equipment had survived air transport without any mishap, so, having finished the preparatory tasks, we started with our work. For photography we used two Finger Lakes Instruments CCD cameras. We have both been using FLI's 6303E which proved to be a great match for the Astrographs. The cameras have very low readout noise, which was a big advantage under the very dark Namibian sky. Subexposures were taken in the three to five minutes range for LRGB and ten minutes for H-Alpha without being affected by the readout noise. The sensitivity of the camera in combination with the Astrograph was so good, that we decided to do pure RGB imaging the next time we go to such a dark sky. We had the cameras on the telescopes for all the two weeks and although the equipment had to withstand temperature changes in the range of thirty degrees between day and night, they worked flawlessly from the first day until we left.

Unfortunately, during our stay there was a period of rather bad seeing, probably caused by the fact that the layers of earth are strongly heated by the high daily temperatures of 25 to 30 degrees and are cooled down at night to -8 degrees. Only during the Namibian winter, starting by July, this situation improves and then there is not only the habitual excellent transparency, but also a very quiet air.

Results and perspectives for the future

The limit for the well performing astrographs finally proved to be the seeing. Particularly good results were achieved with NGC7293, the Helix Nebula imaged with the twelve inch astrograph and the Vela Supernova Remnant imaged with the eight inch. The results were even more spectacular considering the relatively short exposure times.

As an example of the resolution

that was obtained with the 12" astrograph in good seeing, please study the enlargement of the centre of M8, the Lagoon Nebula.

Future visits to Namibia are already being planned and we hope to use a new corrector system allowing for three different focal ratios with the same optical system, achieved by simply remounting the corrector in a different configuration.

For more details, see the Astro Systeme website at <http://www.astrosysteme.at> and the Tivoli Astrofarm website at <http://www.tivoli-astrofarm.de>

More of Wolfgang Promper's pictures can be seen at <http://www.astro-pics.com> and more of Gerald Rhemann's images can be seen at <http://www.astrostudio.at>



Two fragments (B and C) of comet 73/P Schwassmann-Wachmann imaged from Namibia. 8" f/3.8

Two frame mosaic consisting of RGB of 2/2/3 minutes (binned 2x2)

Gerald Rhemann



Left: NGC7293, the Helix Nebula showing seldom imaged detail. 12" f/3.8

HaRGB of 120/20/20/30 minute exposures.

Wolfgang Promper

This close up of the Lagoon nebula, M8, shows the resolution achieved during good seeing. 12" f/3.8

LRGB of 60/20/20/30 20/30 minute exposures.

Wolfgang Promper

