GERALD RHEMANN imaging from near and far

With remote observatories in Namibia and the Alpen foothills, this Austrian imager can lock his lens on any comet or nebula he likes.

text and images by Gerald Rhemann

My first encounter

with astronomy wasn't until 1986. Intrigued by the frequent media reports about the return of Halley's Comet, I decided to have a look through a big telescope myself. I traveled to the western suburbs of Vienna — the capital city of Austria and my hometown — where the historic Kuffner Observatory and its 10.6-inch (270 millimeters) refracting telescope live.

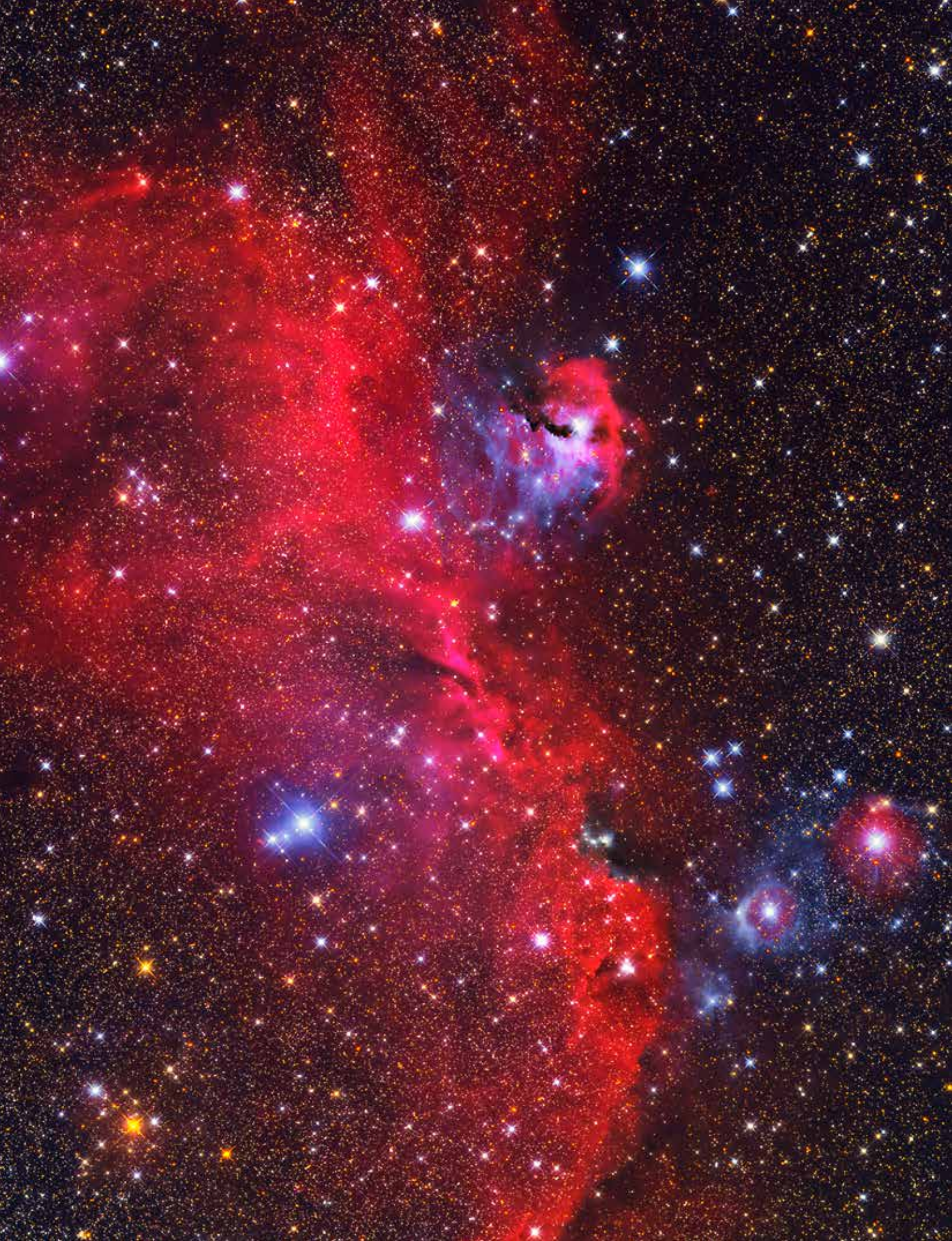
But what I saw through the eyepiece disappointed me. Even through this big refractor, Comet 1P/Halley appeared as nothing more than a foggy patch — no evidence of the impressive tails that shone through in photographs. Still, Halley aroused my interest enough that a couple of years later, in 1989, I purchased a telescope and mount. I wanted to make images that captured the same level of detail I had seen in photos of that comet, detail that the eye alone can't see. Plus, because I was the owner of a photography shop, I had ready access to all the other stuff I needed — cameras, lenses, a darkroom, and experience.

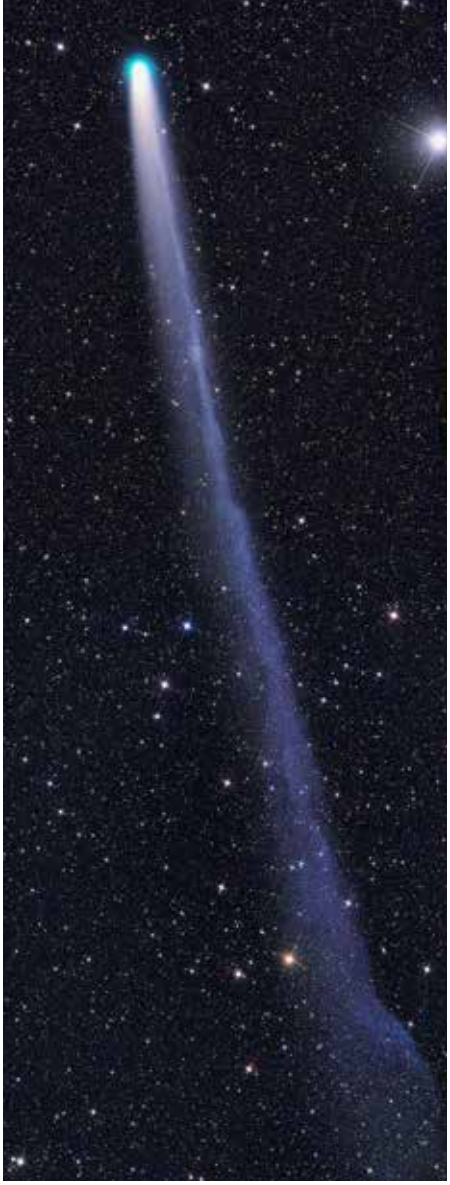
For several months, the author (pictured above) had the opportunity to remotely control an astrograph located in Nerpio, Spain. With it, he captured IC 2177, the Seagull Nebula in Monoceros (right). This image had 21.9 total hours of exposure — the longest of any object the author has ever captured. (ASA 8-inch f/2.9 hyperbolic astrograph, FLI PL 16803 CCD camera, HαLRGB image with 180, 555, 224, 140, and 217 minutes of exposure, respectively)

Comets in the foothills

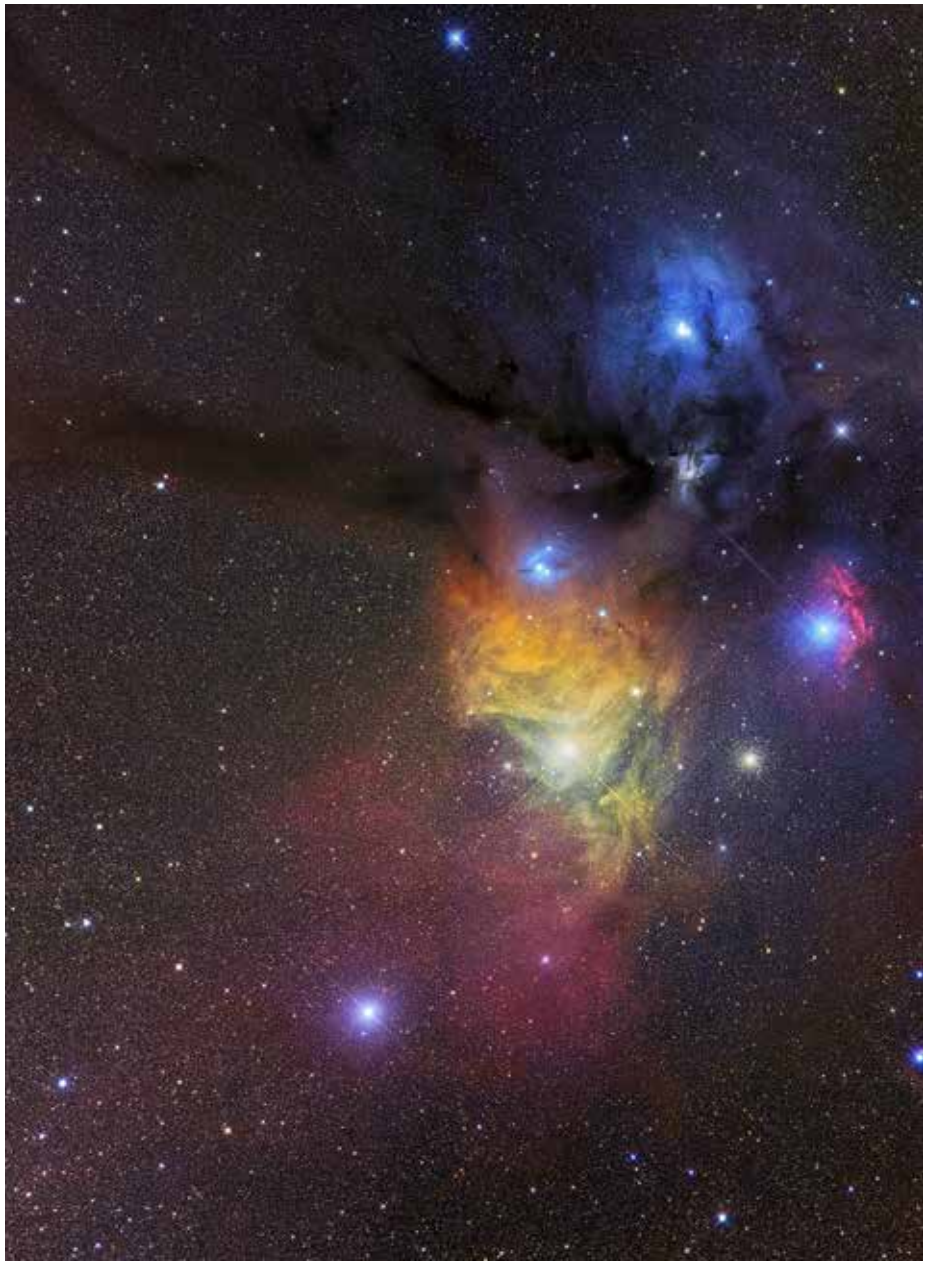
My backyard, however, was not an ideal observing spot. Vienna's light-polluted skies didn't lead to photographic success. Fortunately, I met Michael Jäger, the most experienced and successful comet imager in Austria. Because Jäger and I share an interest in taking portraits of the solar system's oldest inhabitants, a deep and lasting friendship developed between us. He showed me his favorite dark-sky sites: observation-friendly spots in the Austrian Voralpen. In these foothills of the Alps, less than an hour's drive from my home, light pollution is nearly nonexistent.

Gerald Rhemann *has been sky-shooting since 1989. His work has been featured in scientific papers and on NASA websites.*





The author captured Comet Lovejoy (C/2013 R1) on the morning of December 14 from Jauerling, a mountain in the Austrian Voralpen. The CCD's sensor was sensitive to blue light and therefore accentuated the ion tail structures, whose carbon monoxide causes the hue. The comet was active and powerful enough that its ion tail visibly changed from one day to the next. The image is a two-panel mosaic. (8-inch f/2.9 ASA hyperbolic astrograph, FLI PL 16070 CCD camera, LRGB image with 5-minute exposures through each filter for each panel)



The region around Antares (Alpha [α] Scorpii) is one of the most amazing and beautiful in the entire sky, containing a complex mix of emission and reflection nebulae, dust lanes obscuring background stars, and star clusters. The author took this six-panel mosaic from Namibia over the course of three nights. (8-inch f/2.9 ASA hyperbolic astrograph, FLI PL 16070 CCD camera, LRGB image with exposures of 35, 25, 25, and 40 minutes, respectively, for each panel)

For imaging bright comets or comets at low altitude under the transparent Voralpen skies, I have portable equipment: an Astrosysteme Austria (ASA) DDM60 mount and an ASA 8-inch f/2.9 hyperbolic astrograph. Although trekking out there is a challenge and requires discipline, especially on a cold winter night, it feels worth the effort when I can capture crisp shots of comet tails streaming through space.

But creating those pictures is no small task. Both the imaging and the processing of dynamic observations like these are time-consuming. Because a comet perceptibly moves in the field during the exposure — and sometimes its tail structure changes quite quickly as well — processing observations isn't straightforward. To get both pinpoint star shots and a sharp comet image, I first remove the stars. Then, going back to the original picture, I remove the comet from the star field, and — finally — I put them back together again. That might sound easy, but it is not.

My images are so precise that I report positional observations to the International Astronomical Union, which has designated my observatory in Eichgraben C14.

The era of chemical film

I first imaged deep-sky objects and comets through an 8-inch Celestron and later a 5.2-inch Takahashi Epsilon 130 astrograph. After I became more proficient, I decided to purchase a Schmidt camera, then the most suitable instrument for comet imaging.

The camera was a small one, only suitable for use with 35mm film, and it was tricky to work with: I had to cut the film and load the pieces into the film holder without scratching them or getting any dust or moisture on them — and I had to do this in an improvised darkroom in the

This portrait of reflection nebula IC 4592 also shows IC 4601 in the lower left. (8-inch f/2.9 ASA hyperbolic astrograph, FLI PL 16803 CCD camera, LRGB image with exposures of 55, 30, 20, and 50 minutes, respectively)

back of my car. But the hardship provided valuable practice, and I worked myself up to a larger Schmidt camera that was suitable for 6x6cm plates. With a focal length of 450mm and a focal ratio of f/2.0, this camera was fast and produced great images across the entire field of view.

In those days, commercial film just wasn't ready for astroimaging. We photographers had to alter it a bit. Using nitrogen gas, we hypersensitized the film to reduce reciprocity failure, which makes the film less responsive after a certain amount of exposure time. We also had to develop and print the film ourselves, which required access to a darkroom. In view of all these difficulties, only a few amateurs worldwide attempted serious astrophotography. With the Schmidt camera, however, and doing considerable preparatory work, I obtained several hundred images of comets and deep-sky objects.

Step into the digital age

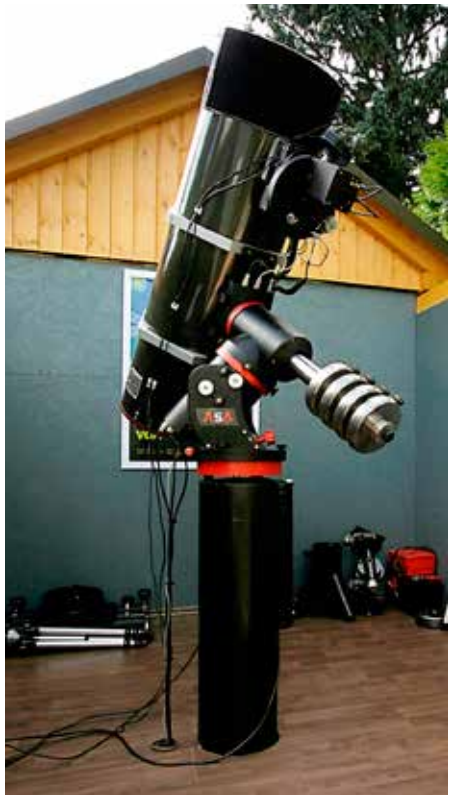
In 2003, I recognized that the time of film had passed, and I switched to CCD astrophotography. Meanwhile I had acquired a 14-inch Cassegrain telescope with a prime focus option at f/3.0. On this instrument, I installed my first CCD camera, a Starlight Xpress SXV-H9.

Imaging with this camera opened a whole new world and new feeling for me. Because I could immediately see what I was photographing, I could be sure the image was in focus and the mount was tracking properly. Moreover, the digital "darkroom" rendered unimaginable possibilities in processing plausible, as the throughput increased enormously. There are always trade-offs, though: lots of cables and lots of electricity — both of which made traveling to observing sites difficult.

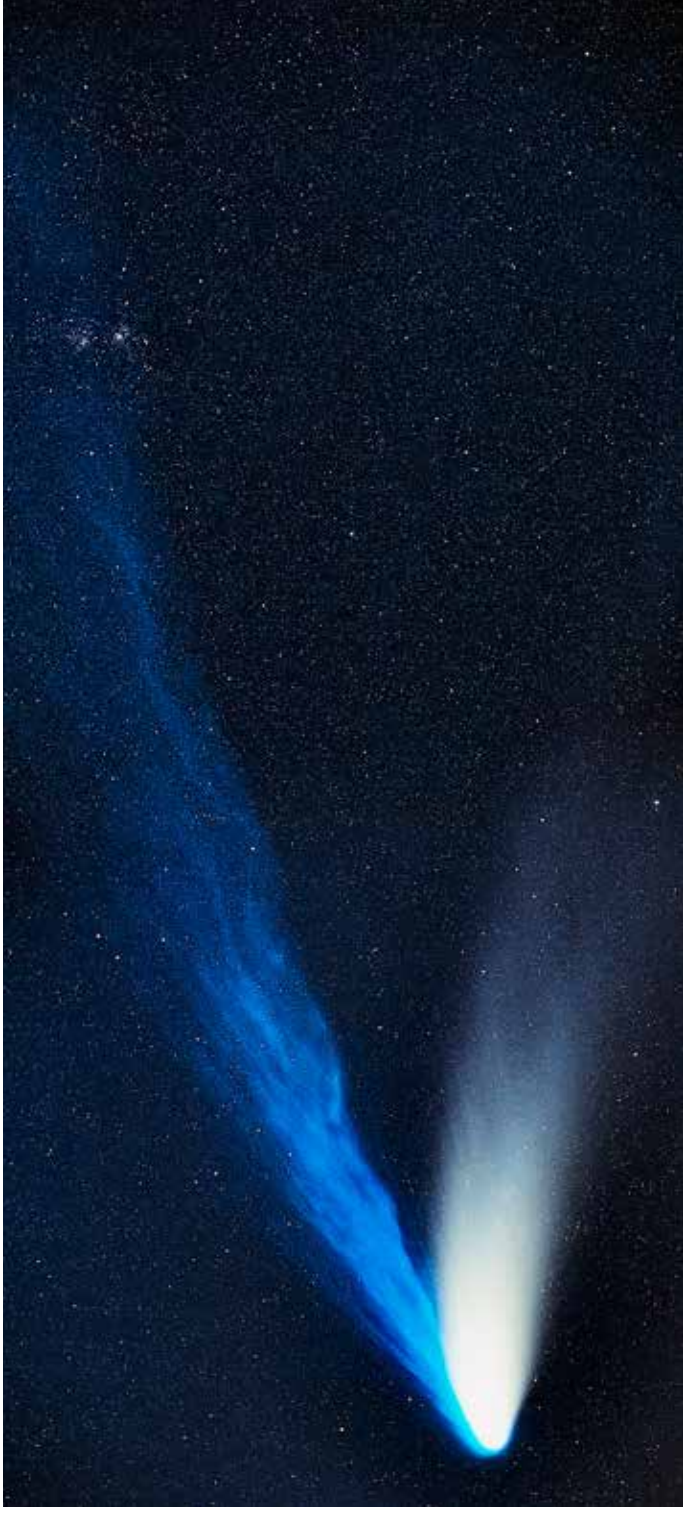
Not one to be deterred, I solved the problem by building an observatory in the backyard of my weekend house in Eichgraben, Lower Austria. It has a roll-off roof and is fully remote-controlled — I can obtain images wherever I am. The observatory has a 12-inch ASA 12N astrograph at f/3.6 on an ASA DDM85 direct drive mount and a Finger Lakes Instrumentation ML8300 CCD camera.

Under southern skies

Even though I now have many nearby observing options, the summer nights at



The author's remote-controlled observatory in Eichgraben, Lower Austria, contains a 12-inch ASA 12N astrograph at f/3.6 on an ASA DDM85 mount. He also observes from the Austrian Voralpen and Namibia, where he has a remote setup.



On an average night, the seeing in Eichgraben is only moderately good. But in spring, it sometimes is decent enough to use the ASA Barlow Corrector to get a longer focal length (2,070mm) with a 12-inch ASA 12N astrograph at f/6.8, as the author did to obtain this image of Bode's Galaxy (M81). (FLI ML8300 CCD camera, LRGB image with exposures of 240, 110, 70, and 140 minutes, respectively)

In this April 1997 image, Comet Hale-Bopp's (C/1995 O1) tail stretches up to the Double Cluster in Perseus (NGC 869/884). The observations were recorded on Kodak Pro Gold 6x6cm plates. (225/255/450mm Schmidt camera, exposure of 5 minutes)

Austrian latitudes are short and the weather is unstable. Southern objects are visible at low altitudes or not at all. To make up for what my region lacks, I travel to Namibia every two years. My next trip to southwestern Africa will be my seventh.

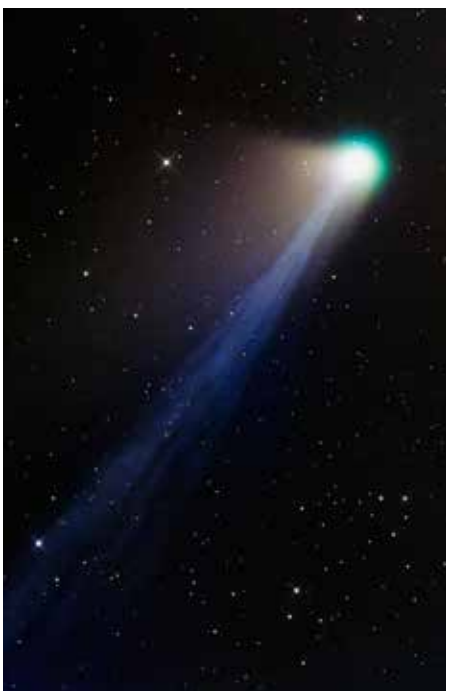
At the Southern Sky Guest Farm Tivoli, the owners specialize in hosting astronomers. You can rent a telescope, a mount, and an observatory, or you can take your equipment with you and install it for the length of your stay. The owners adapt everything to the needs of skywatchers. Excellent meals are available — even in the middle of the night — and you can have a relaxed stay with like-minded people.

The farm is on the edge of the Kalahari Desert, making the climate dry. From May to September, which is Namibian winter, the nights last 12 hours and stable high-pressure systems dominate the weather. Namibia, twice the size of California, has only 2.5 million residents, most of whom live in a few cities far from the farm. Because Namibia sits on the Tropic of Capricorn, the center of the Milky Way transits the zenith, giving visitors like me full access to our galaxy's core wonders.

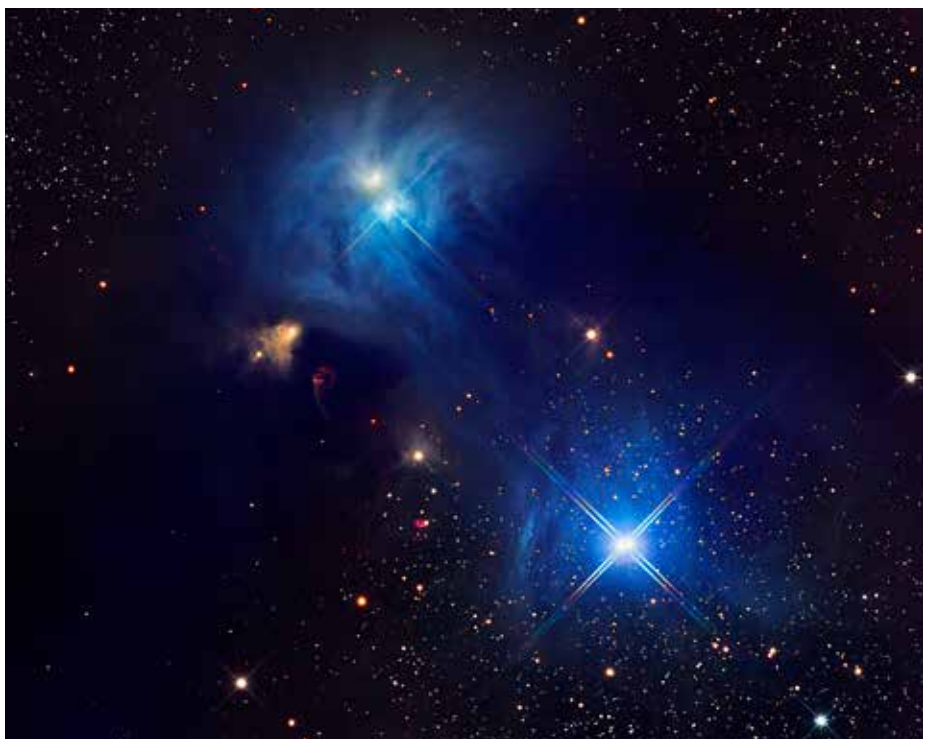
During my 2010 stay in Namibia, I installed the same type of equipment that I have in my observatory in Eichgraben in a friend's nearby Southern Hemisphere observatory. By 2012, that observatory was fully remote-controlled, and I have access to this 12-inch astrograph whenever I want.

In the future, I plan to use this telescope for comet searching. The probability of finding a new visitor to the inner solar system is much greater in the Southern Hemisphere than in the north, where several professional automatic comet-search programs are already in place. Maybe I will discover a new object as intriguing as the comet that first inspired me to put my eye to a telescope. In that quest, I will sometimes use the Southern Hemisphere telescope from my European home, but I won't always stay put. Distance astrophotography is no substitute for actually being on location and enjoying transparent skies with my own senses while creating images that enhance what we can see on our own.

Operating a telescope in Namibia via remote control, the author obtained this image of NGC 2170 in Monoceros. (12-inch f/3.6 ASA astrograph, FLI ML8300 CCD camera, LRGB image with exposures of 230, 140, 140, and 170 minutes, respectively)



Comet Lemmon (C/2012 F6) was mostly visible in the Southern Hemisphere. The author captured it April 21, 2013, by remotely controlling his telescope near Guest Farm Tivoli in Namibia. (12-inch f/3.6 ASA 12N astrograph, FLI ML8300, LRGB image with exposures of 6 minutes through each filter)



Although the transparency of Namibian skies is almost always perfect, the seeing is not. The night the author obtained this image of NGC 6726, however, the seeing happened to be great, so he used the longer focal length of the 12-inch ASA 12N astrograph at f/6.8. (FLI ML8300 CCD camera, LRGB image with exposures of 60, 50, 40, and 50 minutes, respectively)

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