Oculus All-Sky Camera

Ever wonder what's happening in the night sky when you're not looking? Here's a way to find out.

Starlight Xpress Oculus
All-Sky Camera
U.S. Price: $1,095
Available from dealers worldwide
www.sxccd.com

I<small>T'S</small> <small>HUMAN</small> <small>NATURE</small> that fuels my enthusiasm for testing new products. But that same human nature also makes some of these products intrinsically more interesting to me than others. And this is the case with the new Oculus All-Sky Camera from the venerable CCD-camera maker Starlight Xpress in the U.K.

Ever since reading about the Smithsonian Astrophysical Observatory's Prairie Network in the March 1970 issue of this magazine, I've been captivated by the idea of photographically patrolling the night sky. But this was too expensive for most amateurs to attempt in the days of film-based astrophotography, and I expect it was the reason no commercial patrol systems were then available.

That, however, has changed in the low-cost-per-shot digital age, and today there are several commercial systems for snapping pictures of the night sky. What makes the Oculus All-Sky Camera stand out is its excellent performance-to-price ratio. The camera's 1.45-megapixel Sony monochrome SuperHAD ICX205AL CCD offers high sensitivity (too high, in fact, to be used with the supplied lens for daytime imaging). It also has very low dark current and antiblooming to prevent unsightly image artifacts on bright objects. The Oculus produces 2.8-megabyte, 16-bit FITS images that capture all of the CCD's dynamic range. This image format is also compatible with all programs for processing and analyzing astronomical images.

The camera I borrowed from the manufacturer for our review came with a 1.55-mm f/2 fisheye lens that creates a 180° circular image. But Starlight Xpress's Terry Platt also loaned me a 2.5-mm f/1.2 lens that is now shipped standard with the camera (the 1.55-mm lens will remain an option). Although the 2.5-mm lens loses a little of the sky

around the horizon (where most of us have some obscuration), it has much better imaging performance, especially for stars. I clearly preferred this lens for my tests.

The Oculus camera is a small, weatherproof module designed to remain outdoors 24/7. After several nights using the temporary arrangement pictured opposite, I mounted the camera on a permanent pole attached to the outside wall of my backyard observatory. The camera still looked and performed like new after more than five months of continuous exposure to wind, rain, and the blistering heat served up by one of New England's hottest summers on record. My only word of caution is that any permanent mounting should allow relatively easy access to the camera, since dust, pollen, spider webs, residual spots from raindrops, and the occasional bird poop needs to be cleaned from the camera's acrylic dome now and then.

The Oculus uses a USB 2.0 connection to a computer for its power and data transmission. There's a separate 12-volt DC input to power the camera's dew heaters (an AC-powered adapter comes with the Oculus). Although running these heaters is optional, they are a must for dewy conditions. They also help remove raindrops quickly after a storm. I left them on continuously.

The camera's USB 2.0 cable is only 10 feet (3 meters) long, and it was too short for my permanent mounting arrangement. Because the maximum recommended length for a USB 2.0 cable is about 16 feet, adding a 6-foot extension cable to the Oculus still wasn't enough for my setup. Instead, for greater separation between the camera and computer, Starlight Xpress recommends connecting the camera to a *powered* USB hub, which itself can be at least 16 feet from the computer via another USB 2.0 cable. Although this arrangement worked fine for me, it also meant keeping the powered hub only 10 feet from the camera, which placed it outside (and needing weatherproofing).

My best solution was to use a so-called USB 2.0 active repeater cable. I purchased a 33-foot repeater cable for $21.95 from **sewell.com** (part number SW-29419). It worked like a champ, and allowed a distance of more than 40 feet between the camera and computer. Some USB 2.0

Despite a brilliant, 85%-illuminated gibbous Moon on the morning of May 28th, the Oculus camera with the 1.55-mm fisheye lens captured a short meteor trail flashing in the author's eastern (left) sky.

The author tested two lenses with the Oculus camera, which can use any C-mount video lens. He preferred the 2.5-mm f/1.2 lens (at left with a homemade light shield), which now comes standard with the camera.

Right: The Oculus camera comes with a spare acrylic dome, an AC power supply for the dew heaters (see text for details), software CD-ROM, and a hard-shell, foam-fitted carrying case.

WHAT WE LIKE:

Compact all-weather construction

Scientific-grade image data

Continuous night-sky monitoring

WHAT WE DON'T LIKE:

Occasional issues with software
(see text for details)

repeater cables work better than others, but I can certainly recommend the Sewell cable for the Oculus.

The software provided with the Oculus is both a strength and weakness of the system. One of its strengths is that it was easy to install and run on all six computers I tried. These included a very old Windows XP desktop that I dredged out of storage (it hadn't even been turned on since the last Bush administration) and a modern netbook computer running 64-bit Windows 7 professional.

Another of the software's strengths is its simplicity. With minimal referencing of the manual, I had images streaming from the camera only moments after installing the program. And I mastered most of its basic functions in about a half hour. It's easy to take and automatically save up to 1,000 sequentially numbered frames. The software also enables turning all of these frames into an AVI-format movie. Each morning I'd watch the movie from the previous night's images, and then pull any original frames of interest for detailed analysis and processing.

Although the software is robust and never crashed when I left it running unattended, the program was rather temperamental if I tried having it run the Oculus in the background while using the computer for other tasks. It also wanted to be left alone when automatically acquiring a sequence of images — I couldn't use the program to process one image while the camera was taking another.

This composite picture assembled from full-frame images made with the 2.5-mm lens shows some of the brighter meteors captured during last August's Perseid shower.

The only other handicap I encountered with the software was its 1,000-frame limit. Since the optimum exposure in my suburban sky was about 30 seconds, the 1,000 frames only lasted for about 8 hours of sky patrolling. This was fine for short summer nights, but as winter approached I was wishing for a greater frame limit.

But it's easy to run the Oculus with most programs designed for astronomical cameras, since it looks to the outside world like a standard Starlight Xpress SXV-H9 camera. For example, the Oculus was plug-and-play compatible with *MaxIm DL* (version 5.23).

I really like the Oculus All-Sky Camera. It's become a morning ritual after a clear night for me to head to the computer and watch the AVI movie. Airplanes, flaring satellites, occasional meteors, and passing clouds (it's true, some do spontaneously form over my observatory) are all part of the whirling starry vista. My wife calls it reality TV for geeks. I couldn't agree more. ✦

*Over the years, senior editor **Dennis di Cicco** has built several photographic systems for patrolling the night sky. Despite one being outrageously dangerous, he's lived to tell about it.*