The Skyris Planetary Cameras:
a Celestron and Imaging Source Marriage Made in Heaven

a review by Robert Reeves

I have been a long-time user of The Imaging Source cameras for lunar photography. For some time I wondered when The Imaging Source was going to release faster USB3 versions of their popular astronomy cameras. Earlier this year, I got my answer from Celestron. The venerable telescope maker has entered into a partnership with The Imaging Source to produce USB3 versions of the astronomy cameras that have become synonymous with planetary imaging. I was asked to be a beta tester for the new cameras, now called the Celestron Skyris series.

To use the Skyris cameras at their full USB3 frame rates, a USB3-capable computer is obviously needed. The cameras are however backward compatible to USB2 connections, though the frame rate will be slower due to reduced bandwidth. Most recent USB2 laptops have an expansion card slot that allows installing a USB3 adapter. Indeed, that is how I operate my Skyris on a three year-old i3 processor Dell laptop.

The first striking feature about the new Skyris camera is its size. Gone is the familiar Imaging Source blue cube. The Skyris uses Sony sensors, Imaging Source electronics, but a Celestron designed round, silver-colored, fined aluminum case. The Skyris produces 12-bit images and the faster USB3 frame rate makes the heat-dissipating fins a desirable item to control image noise. Fortunately, Celestron has minimized the fins to where they are more like enhanced ridges and the camera is very easy to handle. In fact, the camera is so small I lost it once, only to find it was actually in my pocket!

The different Skyris models are named after the sensor used in each camera and are available in both monochrome and color, denoted by the model suffix of "M" or "C". As the camera sensor size increases, we no longer have the Imaging Source numerical name progression like DMK-21, 31, 41, and 51. As the chart below shows, the now Celestron-branded small sensor camera is called the Skyris 618 because it uses the Sony 618 sensor. The Skyris 445 and 274 models follow the same scheme.

Note that there is no Skyris equivalent to the DMK-31. I see this as no loss as I feel the intermediate-sized DMK-31 was an "orphan". Planetary specialists used the DMK-21, while lunar specialists desired maximum sensor real estate with the DMK-41 and 51.

Each model of Skyris camera ships with a 1 1/4-inch telescope adapter, USB3 cable with

locking screws that secure to the camera, and a driver installation disk.

So lets cut to the chase and how do these new cameras perform? In a nutshell...great! I am pleased with the image quality and ease of operation of the Skyris cameras. They are an able replacement for our beloved Imaging Source astronomy cameras.

Initially, I was puzzled about the frame rate for the 1600 by 1200 pixel Skyris 274 that I was using. Being USB3, I had anticipated a higher frame rate than 20 FPS. Then I realized the Skyris produces 12-bit images, not 8-bit like the USB2 cameras. There is more data with each frame, thus the frame rate is not a simple multiple of previous cameras.

USB3 speed, 12-bit output

Skyris 618C Skyris 618M	Skyris 445C Skyris 445M	Skyris 274C Skyris 274M
640 x 480	1280 x 960	1600 x 1200
5.6 micron	3.75 micron	4.4 micron
120 fps	30 fps	20 fps
Best for planets	Dual lunar and planetary	Best for the Moon
4000 frames in 33 seconds!	Planets with "region of interst" crop	Covers large "real estate"
Small areas of the Moon		

I initially used the Skyris 274C, or the largest sensor color model. Being primarily a lunar imager myself, I was pleased with the overall image quality produced by the camera on my Celestron-8 telescope. However, at thinner lunar phases, coupled with the high magnification produced at F/25 when using a 2.5X Powermate, the color camera's lower sensitivity made imaging along the terminator difficult. The exposure time sometimes approached the inverse of the frame rate. Planetary imagers will not have that difficulty with the Skyris 618C as the small sensor camera possesses larger, more sensitive pixels.

Being a lunar photography specialist I found the Skyris 274M to be quite up to the task of high f/ratio imaging along the terminator. The 274M is noticeably more sensitive as it does not have the Bayer filter array used in the color camera.

After years of using the benchmark DMK-41 camera, the wider view offered by the 274's 1600 by 1200 pixel sensor initially made me feel as if I were shooting at a lower magnification. That illusion was soon replaced by the satisfaction that I could image broad lunar territory much faster with the 274's wider field of view. Indeed, a full moon mosaic at 2000 mm focal length is easily accomplished with 16 generously overlapped frames compared to the 49 frames required with the popular DMK-21.

The Skyris cameras work well with either the Imaging Sources' IC Capture 2.1 used with the previous DMK cameras or the newer version 2.2 provided with the Skyris. With the exception of the initial Celestron brand splash screen, I could tell no difference between the 2.1 and the 2.2 versions, thus users of the older USB2 DMK cameras will seamlessly transition to the Skyris.

IC Capture is easy to use and works well, but the program is basically designed for industrial imaging. Once the Skyris drivers are installed, camera control through the popular freeware FireCapture program is flawless. Image quality is the same, but in my opinion, FireCapture is more convenient and offers features like file and memory management tools and a reticle overlay designed with the astronomer in mind.

Regardless of which video capture software you use, the .AVI output from the Skyris is

compatible with both AutoStakkert and Registax image processing software. Personally, I find both processing programs essential. Initial image stacking with AutoStakkert, then application of wavelets in RegiStax, shows a slight, but noticeable improvement in the finished image quality over only processing with RegiStax. I say this here because the Skyris driver installation disc comes with RegiStax, allowing the user to go from video capture to finished image without additional downloads. But my advice is download the free AutoStakkert program to perform initial stacking, then import the resulting .TIF into RegiStax for detail enhancement with wavelets.

This article is a product review, and while there is much to like about the Skyris cameras, I am obliged to say what disappointed me. But before I say what that point is, I am delighted to say that Celestron is addressing the issue and will soon have a fix that can be applied to existing cameras.

My complaint is the Skyris control software maintains a fixed frame rate even when the recorded field of view is reduced through the "region of interest" (ROI) cropping feature. Lets examine this issue using the Skyris 445 as an example. Ideally, if the field of view recorded by the 1280 by 960 pixel Skyris 445 were cropped to 640 by 480 pixels through ROI cropping, the frame rate should increase from 30 FPS to nearly 120 FPS. Currently, this does not happen and the frame rate remains 30 FPS regardless of the ROI size.

In defense of Celestron, it has been conventional wisdom that increased frame rates with ROI cropping are not possible with CCD-based cameras because of the nature of how the CCD sensor is electronically read. But the good news is that soon Celestron will release software and firmware updates that will allow higher frame rates with ROI. This fix will allow the large sensor Skyris 445 and 274 cameras to capture both large areas of the moon at full resolution and efficiently capture the planets at a faster frame rate using the ROI crop feature. When this software fix is released, the new Celestron Skyris will go from being a great planetary camera to perfect planetary camera!

The bottom line is I highly recommend the Celestron Skyris cameras to anyone who is interested in imaging solar system objects with a quality, easy-to-use planetary camera.

The Photography of Robert Reeves

The area around the bright, young crater Aristarchus and the ancient ghost crater Prinz is marked by complex volcanism. The elevated roughness of the rectangular-shaped Aristarchus Plateau contrasts the smooth terrain of surrounding Oceanus Procellarum. The famous volcanic channel of Schroter's Valley arcs into the Aristarchus Plateau while numerous additional volcanic rilles fork northward from the Aristarchus Plateau and the Harbinger Mountains north of Prinz. Celestron-8, 2.5X Powermate, DMK-51